



NWT State of Environment Report **2022**

Rapport **2022** sur l'état de l'environnement aux TNO

Le présent document contient la traduction
française du sommaire.

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Executive Summary

The Northwest Territories State of the Environment Report 2022 (NWT SOE Report 2022)

The NWT SOE Report 2022 provides information on topics relevant to the environment organized to better understand what has occurred over time and what changes we might expect in the future. It also provides information on how the NWT compares to other parts of Canada and the world.

The goal of this report is to help understand our changing world and make better decisions that affect NWT residents and the environment, now and in the future. The specific objectives of the NWT SOE Report 2022 are to provide:

- An assessment of environmental status and trends in the NWT.
- Data and information for territorial, national, and international state of the environment initiatives.
- An early-warning system of possible impacts resulting from environmental change.

This report is the fourth in a series of reports beginning in 2009, and the first report legislated under the *Environmental Rights Act*. This report fully integrates information to better highlight the cumulative effects of many driving forces and pressures on key aspects of our environment and how the environment and people shape each other.

Data and information included in the NWT SOE Report 2022 comes from a wide range of agencies and published sources. The web-based report provides links to the original sources of information and contact information so readers can find more information on each topic.

How is the information organized?

The NWT SOE Report 2022 contains 20 Focal Points, or relevant topics, organized into the following four sections: Driving Forces, Pressures, State and Stewardship.

Driving Forces

Driving forces are the environmental, socio-economic, and cultural forces that affect the environment on a global scale. These global forces affect the environment in complex ways and may be difficult for NWT residents to influence.

Pressures

Pressures are direct stresses on the environment caused by global driving forces and local human actions. Tracking environmental pressures provides valuable information and context that can be used to show why the state of the environment is changing in the NWT. Looking at pressure focal points help us better understand the direct impacts of human actions on the environment now and into the future.

State

State indicators reflect current environmental conditions caused by driving forces, pressures, and stewardship actions. State indicators track changes in major ecosystem components and services and describe impacts of these changes on people and cultures.

Stewardship

Stewardship refers to the responsibility we have for living in and protecting the natural environment by conserving resources and living sustainably. Practicing stewardship can help ecosystems become more resilient and can in turn help to improve conditions for the environment and for people.

Indicators

Each Focal Point in the NWT SOE Report 2022 is examined using one or more Indicators. Indicators are chosen to communicate key information on our environment in a way that is relevant to the people of the NWT. Indicators can be used to compare current conditions with desired performance; show trends over time; allow comparisons between different regions; help judge the sustainability of current practices; and define and publicize new standards and measures for assessing progress toward a sustainable future.

Key insights from the NWT SOE Report 2022:

Chapter 1 provides more detail on the following key findings:

Driving Forces

1. A Changing Planet

Planetary changes are global changes that may affect countries and regions around the world in diverse ways.

- The global population is increasing.
- Concentrations of global greenhouse gases continue to increase.
- The Earth has warmed by approximately 0.2°C per decade since the Industrial Revolution.
- More extreme weather events are occurring around the world as the climate warms and changes.
- Average temperatures in Arctic regions throughout the world are increasing three times as fast as in other areas of the world.
- The heat content of oceans around the globe is increasing and oceans are getting more acidic.
- El Niño and other global atmospheric oscillations are challenging to predict.

2. Climate Change

Climate change is one of the most pressing global issues of this generation and will be for generations to come.

- Much warmer winters are being observed across the NWT.
- Lightning strikes have increased in the tundra, but not yet in forested areas of the NWT.
- The NWT climate will continue to warm up, but this warming will be less severe if we act now.

3. Economy

The economy and the environment are linked in complex ways. A healthy and sustainable environment is key to a healthy and sustainable economy. Similarly, changes in the economy can become a driving force for changes in the environment. Changes in the overall NWT economy and in specific sectors can be understood by tracking key economic indicators that affect the NWT environment.

- The NWT Real GDP increased between 1999 and 2007 by 45.4%, then declined from 2008 to today.
- As global prices for natural resources fluctuate, prospects for exploration and development of some of the NWT's resources also change.
- In the future, an increase is expected in the demand for electric vehicles and the metals (rare earth elements) required for their batteries and other components.
- The traditional fur economy in the NWT typically responds to changes in global fur prices.

Pressures

4. Energy Use

Energy use depends on distinct factors specific to each region.

- Energy use per person in the NWT is nearly double the Canadian average.
- Solar energy, while increasing in use, currently contributes only marginally to the NWT's overall community electricity production.
- Industry accounts for most of the energy used in the NWT.

5. Human Activity

Human activity is strongly driven by the economic forces within a country or region. Exploring changes in human activity help to explain changes to the environment.

- Shipping traffic in the Northwest Passage was steadily increasing before the COVID-19 pandemic.

- Rates of road travel and the number of registered vehicles are increasing faster than the NWT population.
- Air traffic in the NWT increased until 2008 but has since declined.
- Trends in permitted development activities largely follow global economic trends.

6. Landscape Changes

Landscape changes caused by human activities can impact the natural environment locally and beyond their immediate footprint. Landscape changes that are not directly caused by human activities are found in other focal points, such as vegetation and permafrost.

- Landscape changes that are a direct result of human activities have occurred on about 0.1% of the NWT land base.

7. Solid Waste

Solid waste puts significant pressure on the environment in several ways, including the space it takes to store and treat, requirements for transportation, the presence of compounds that can leak into the environment from landfills, the production of greenhouse gases, the long time required for some wastes to break down fully, and the tendency for landfills to attract wildlife when not managed properly.

The NWT currently has three regulated programs that reduce or divert materials from the waste stream: the Beverage Container Program, the Electronics Recycling Program, and the Single-use Retail Bags Program.

- The Single Use Retail Bag Program resulted in a 72% reduction in use of single-use retail bags across the NWT from 2010-2021.
- The 10-year average recovery rate for beverage containers from 2011-2021 is 84%.
- Approximately 74.2 tonnes of electronics were collected for recycling in the NWT during the 2020-2021 fiscal year.
- From 2017 to 2021, approximately 244 thousand litres of liquid and 64 thousand kilograms of solid hazardous waste were shipped south and safely disposed.

8. Contaminants

Contaminants are often by-products of development activities locally and globally and can be from natural sources.

- The number of spills has gone down in the territory in relation to declining industrial activity.
- Contaminant levels in caribou and moose are low. They are healthy and remain a healthy choice for the people that consume them.
- Elevated mercury in fish is found in some lakes in the NWT.

State

9. Coasts and Oceans

The coastal regions of the NWT and the Beaufort Sea are experiencing significant changes and ice-free summers in the Arctic Ocean will soon be common.

- Between 1968 and 2020, summer sea ice in all northern Canadian waters declined at an average rate of 7.5% per decade.
- Acidification in the Arctic Ocean is occurring faster than in more temperate oceans.
- Sea level rise and increasing storms are changing the Mackenzie Delta and other ecosystems, and eroding other coastal areas by up to 10 metres per year.

10. People and Cultures

The people and cultures of the NWT are integral to the environment.

- Population growth in the NWT has been modest.
- Fluency in Indigenous languages in the NWT continues to decline.

11. Water

To fully understand the integrity of the environment, it is essential to know if the water is healthy. If aquatic ecosystem health is compromised, it can be reflected in the entire ecosystem and in human health. The vast majority of the NWT's freshwater is within the Mackenzie River Basin, where water flows through river systems in several provinces and territories that

eventually drain into the Mackenzie River and then into the Beaufort Sea. This is Canada's largest river basin and the second largest river basin in North America.

- Alkalinity and organic carbon are increasing in many NWT rivers, which are signs of increasing rock weathering and permafrost degradation. Chloride levels and turbidity are also changing.
- Mercury levels in the water of major rivers in the NWT are safe for aquatic life.
- River flow is increasing in NWT watersheds, especially in winter.
- Water levels in the NWT's large lakes vary a lot, but with no significant trend.
- Warmer waters lead to increased productivity and potential algal blooms.

12. Air

Clean air is essential to our well-being. The decisions we make every day, at home and at work, affect the quality of the air we breathe. We all share responsibility for clean air to contribute to healthy communities, resilient ecosystems and a sustainable economy for the future.

- NWT air quality is typically good, with some notable exceptions in 2014 due to wildfire smoke.

13. Permafrost

Permafrost is ground that has been continuously frozen for two years or longer. In most of the NWT, permafrost is thousands of years old. Permafrost can be limited to a thin layer only a few metres thick beneath the earth's surface, or it can be a layer hundreds of metres thick. In the tundra, it can underlie the entire landscape or occur in smaller isolated pockets in the southern NWT. The state of permafrost in the NWT is monitored using ground temperature sensors, measuring active layer thickness (the layer of ground above permafrost that thaws in the summer and refreezes in winter). and mapping the presence of thermokarst as an indicator of sensitive terrain.

- Permafrost is warming up, and in some areas accelerated thawing is causing thermokarst landscapes to develop.

- The active layer has been increasing in the NWT.
- Thermokarst landscapes, peatland degradation, thaw lakes, and landslides are increasing in number and extent in the NWT.
- Current and future permafrost thaw is threatening NWT waterbodies.

14. Vegetation

Vegetation provides habitat for wildlife and ecosystem services such as food, fuel, and many other essential resources.

- The area burned and the number of fires varies annually, with no clear trend.
- Some invasive plant species introduced into the NWT are now spreading in natural ecosystems, often along roads and along rivers in southern NWT.
- Outbreaks of pest and alien insects are affecting NWT forests, are occurring further north, and may be increasing in frequency and intensity.
- Shrubs are invading the tundra, especially just north of the treeline.

15. Wildlife

The NWT is one of the few remaining regions in the world that supports large tracts of undisturbed land and intact, healthy species communities. NWT peoples, cultures, and the environment depend on the wildlife species that live here.

- All five types of caribou in the NWT have been facing conservation challenges. Some caribou populations have been doing better and showing signs of recovery, but others continue to decline.
- Insect-eating migratory birds, shorebirds, and grassland birds are in steep decline.
- The ranges of 10 out of 72 terrestrial or coastal mammals in the NWT are changing, mostly expanding northward.
- The overall percentage of alien species in the NWT has not changed in the past 20 years, but monitoring programs to detect the arrival of alien insect species are particularly limited.
- Northern wildlife health is changing.

16. Species at Risk

The loss of biodiversity is an issue of global concern, with potentially significant consequences for the environment.

- One in 100 species in the NWT are at risk of becoming extirpated or extinct in the next 100 years.
- Nine (18%) of NWT species at risk continue to have declining population numbers.
- Two of the most important threats to species at risk in the NWT are climate change and habitat change.

Stewardship

17. Planning and Adapting

Planning and adapting are key responses to a changing environment.

- Transboundary water agreements are in place with three of five jurisdictions.
- 99% of the action items in the 2019/2020 NWT Water Stewardship Strategy Progress Review have had been implemented or partially implemented.
- Recovery action planning is complete for 10 of the 12 species at risk listed in the NWT.
- 92% of funded action items in the NWT Climate Change 2019-2023 Action Plan are on track to be completed by 2023.

18. Sustainable Use of Renewable Resources

The responsible use of renewable resources, such as wildlife, fish, and plants, has always been especially important to the people of the NWT. The sustainable use of resources is important for ensuring they remain for future generations, people stay connected to the land, and knowledge and practices are passed on to future generations. On-the-land activities can also help provide valuable information about the status of the environment across the NWT.

- The volume of the commercial timber harvest in the NWT remains very small, but demand for wood pellets may result in increased harvests in the future.

- Trapping in the NWT has declined since the collapse of global fur prices after prices peaked in the 1980s. Today about 500 NWT trappers are selling furs to international markets.
- About 40% of NWT residents participate in either hunting or fishing each year. This percentage has not changed significantly since 1999.
- About 13% of NWT residents relied on country food for most of their daily meat and fish consumption in 2018, compared to 21% in 1998.
- Eco-tourism was growing before the pandemic.

19. Environmental Benefits and Knowledge

Environmental literacy is the capacity of humans to understand connections between themselves and their environment. Awareness, understanding, and concern about these connections enhance informed decision making to address complex environmental issues.

- Formal environmental and cultural camps and informal learning opportunities are offered in all NWT regions.

20. Protected Areas and Land Use Planning

The conservation network in the NWT includes protected and conservation areas, which provide varying levels of protection depending on the objectives of the individual site. For example, some conservation areas are guided by land use plans that detail where certain activities can take place. Protected areas, on the other hand, typically restrict most, if not all, forms of industrial development.

- 17.3% of the NWT's land (including freshwater) is in protected and conservation areas and marine protected areas cover 2.1% of the NWT's marine waters.
- 38 of the 45 ecoregions of the NWT have protected or conservation areas.
- 18% of the 6,949 known archaeological sites in the NWT are in protected areas.

Current Driving Forces of Environmental Change:

This section describes how global environmental changes and social, demographic, and economic forces are resulting in additional pressures and impacts to the environment at regional and local levels. Many forces influence the environment. This section focuses on those that are most significant to the NWT, to bring more specific and meaningful context to present and future environmental challenges in the NWT.

The driving forces are summarized in Focal Points 1 to 3 of Chapter 1 and the online SOE Indicators.

Climate Change

- Climate change is one of the most significant forces affecting our environment, creating challenges for this generation and for generations to come.

Global Environmental Changes

- Direct effects of increasing global carbon dioxide concentrations
- Global atmospheric oscillations can amplify the effects of climate change

Global Economic Changes

- Global demand for NWT natural resources is shaping local environmental pressures.
- Increased global demands for shorter shipping routes will have an impact on our ocean ecosystem.
- Global population increase will put extra pressures on our environment.

Early Warning of Ocean Signs and Cumulative Impacts:

Early Warning Signs

Early warning signs are small but noticeable changes in the environment that can warn us that much larger impacts may occur in the future if nothing changes.

Predicted future impacts are summarized in the report under the following headings with links to relevant online SOE Indicators for more information:

Predicted Tipping Point Impacts

- Sudden and irreversible ocean ecosystem shifts
- Increased methane release due to permafrost thaw
- Predicted Short-term Impacts
- Continued large scale coastal erosion
- Continued increases in landslides and slumping
- Continued waterflow increases
- Continued long-range deposition of contaminants and increased methylation of mercury
- Increased frequency and severity of extreme weather events

Predicted Long-term Impacts

- Increased effects of pests and invasive species
- Potential for landscape changes
- Increased demand for critical minerals
- Reduced air quality in summers
- Increased possibility of spills and other contamination

Cumulative Impacts

The combined impacts of driving forces and pressures pose a significant risk to ecosystems and communities in the NWT. Cumulative impacts are the combined effects that human activities and natural processes have on our environment.

Cumulative impacts on ecosystems

Although the environment of the NWT is changing, generally the environment is healthy, and ecosystems are intact.

Cumulative impacts on human health

Human health is directly affected by economic driving forces and the pressures these forces exert on the environment. Global population growth and increasing demand for natural resources affect human health negatively.

Cumulative impacts on community livelihoods

Community livelihood is defined as the economic, social, and cultural means to ensuring community health and resiliency for current and future generations. Community livelihoods are an integral part of our environment and are affected by climate change and global demands and economic outlook.

Positive Trends and Future Actions:

Stewardship is our collective responsibility for taking care of the environment through the wise use of resources, and through protection and conservation efforts. These actions and efforts by people, organizations and government help to counteract negative impacts on the environment:

- Sustainable industrial development
- Protecting land, water, and biodiversity
- Ensuring clean and abundant water
- Ensuring clean air
- Managing waste and pollution
- Planning, managing, and using information
- Making wise decisions
- Educating and inspiring action

Sommaire

Rapport 2022 sur l'état de l'environnement aux Territoires du Nord-Ouest

Le Rapport 2022 sur l'état de l'environnement aux TNO présente des renseignements sur des sujets liés à l'environnement, structurés de façon à mieux comprendre les changements survenus au fil du temps et ceux auxquels nous pouvons nous attendre. Il présente également des renseignements sur la façon dont les TNO se comparent aux autres régions du Canada et du monde.

Le but de ce rapport est d'aider à comprendre notre monde changeant et à prendre de meilleures décisions qui affectent les résidents des TNO et l'environnement, maintenant et dans le futur. Les objectifs particuliers du rapport sont de fournir :

- une évaluation de la situation et des tendances environnementales aux TNO;
- des données et des renseignements pour les initiatives territoriales, nationales et internationales sur l'état de l'environnement;
- un système d'alerte précoce des impacts possibles résultant des changements environnementaux.

Quatrième rapport d'une série qui a débuté en 2009, ce rapport intègre pleinement l'information afin de mieux mettre en évidence les effets cumulatifs des multiples forces motrices et pressions sur des aspects clés de notre environnement et la manière dont l'environnement et les personnes se façonnent mutuellement.

Les données et les renseignements compris dans le Rapport 2022 proviennent d'un large éventail d'organismes et de sources publiées. Le rapport en ligne fournit des liens vers les sources d'information originales et des coordonnées afin que le lecteur puisse trouver plus de renseignements sur chaque sujet.

Comment l'information est-elle organisée?

Le Rapport 2022 aborde 20 sujets d'intérêt organisés en quatre sections : forces motrices, pressions, état et intendance.

Forces motrices

Les forces motrices sont les forces environnementales, socio-économiques et culturelles qui affectent l'environnement à l'échelle mondiale. Ces forces mondiales affectent l'environnement de manière complexe et il peut être difficile pour les résidents des TNO d'avoir une influence sur celles-ci.

Pressions

Les pressions sont des contraintes directes sur l'environnement causées par les forces mondiales et les actions humaines locales. Le suivi des pressions environnementales fournit des renseignements et un contexte précieux qui peuvent être utilisés pour montrer pourquoi l'état de l'environnement change aux TNO. L'examen des sujets d'intérêt liés à ces pressions nous aide à mieux comprendre les répercussions directes des actions humaines sur l'environnement, aujourd'hui et à l'avenir.

État

Les indicateurs d'état reflètent les conditions environnementales actuelles causées par les forces motrices, les pressions et les actes d'intendance. Ces indicateurs permettent de suivre l'évolution des principaux éléments et services des écosystèmes et de décrire les répercussions de ces changements sur les populations et les cultures.

Intendance

L'intendance fait référence à la responsabilité que nous avons de vivre dans l'environnement naturel et de le protéger en conservant les ressources et en vivant de manière durable. Elle peut accroître la résilience des écosystèmes, ce qui peut contribuer à améliorer les conditions pour l'environnement et les personnes.

Indicateur

Chaque sujet d'intérêt du Rapport 2022 est examiné selon un ou plusieurs indicateurs. Ces derniers sont choisis pour communiquer des renseignements clés sur notre environnement d'une manière pertinente pour les Ténos. Les indicateurs peuvent servir à comparer les conditions actuelles avec les performances souhaitées; à montrer les tendances dans le temps; à établir des comparaisons entre différentes régions; à juger de la durabilité des pratiques actuelles; et à définir et publier de nouvelles normes et mesures pour évaluer les progrès vers un avenir durable.

Principaux enseignements du Rapport 2022

Le chapitre 1 fournit plus de détails sur les principales constatations suivantes.

Forces motrices

1. Une planète en mutation

Les changements planétaires sont des changements mondiaux qui peuvent affecter les pays et les régions du monde à différents égards.

- La population mondiale augmente.
- Les concentrations de gaz à effet de serre dans le monde continuent d'augmenter.
- Depuis la révolution industrielle, la Terre se réchauffe d'environ 0,2 °C par décennie.
- Des phénomènes météorologiques extrêmes sont de plus en plus fréquents dans le monde à mesure que le climat se réchauffe et change.
- Les températures moyennes dans l'ensemble des régions arctiques augmentent trois fois plus vite que dans les autres régions du monde.
- Le contenu thermique des océans du monde entier augmente et les océans s'acidifient.
- El Niño et les autres variations atmosphériques mondiales sont difficiles à prévoir.

2. Changement climatique

La question du changement climatique est l'un des enjeux mondiaux les plus urgents de cette génération et le restera pour les générations à venir.

- On observe des hivers beaucoup plus chauds qu'auparavant aux TNO.
- Les épisodes de foudre ont augmenté dans la toundra, mais pas encore dans les zones forestières des TNO.
- Le climat des TNO va continuer à se réchauffer, mais ce réchauffement sera moins grave si nous agissons maintenant.

3. Économie

L'économie et l'environnement sont liés de manière complexe. Un environnement sain et durable est la clé d'une économie saine et durable. De même, les changements dans l'économie peuvent devenir une force motrice pour les changements dans l'environnement. Les changements dans l'économie globale des TNO et dans des secteurs spécifiques peuvent être compris en suivant les indicateurs économiques clés qui affectent l'environnement des TNO.

- Le produit intérieur brut réel des TNO a augmenté de 45,4 % entre 1999 et 2007, puis a diminué entre 2008 et aujourd'hui.
- Les prix mondiaux des ressources naturelles fluctuant, les perspectives d'exploration et de développement de certaines des ressources des TNO varient également.
- On s'attend à une augmentation de la demande de véhicules électriques et des métaux (éléments de terres rares) nécessaires à leurs batteries et autres éléments.
- L'économie traditionnelle de la fourrure aux TNO réagit généralement aux changements des prix mondiaux de la fourrure.

Pressions

4. Consommation d'énergie

La consommation d'énergie dépend de facteurs distincts propres à chaque région.

- La consommation d'énergie par personne aux TNO est presque le double de la moyenne canadienne.
- L'énergie solaire, bien qu'elle soit de plus en plus utilisée, ne contribue actuellement que marginalement à la production d'électricité communautaire globale des TNO.
- L'industrie représente la plus grande partie de l'énergie utilisée aux TNO.

5. Activité humaine

L'activité humaine est fortement influencée par les forces économiques d'un pays ou d'une région. L'étude de l'évolution de l'activité humaine permet d'expliquer les changements dans l'environnement.

- Le trafic maritime dans le passage du Nord-Ouest était en constante augmentation avant la pandémie de COVID-19.
- Les taux de déplacement routier et le nombre de véhicules immatriculés augmentent plus rapidement que la population des TNO.
- Le trafic aérien aux TNO a augmenté jusqu'en 2008, mais il diminue depuis.
- Les tendances des activités de développement autorisées suivent largement les tendances économiques mondiales.

6. Changements de paysage

Les changements de paysage causés par les activités humaines peuvent avoir des répercussions sur l'environnement naturel à l'échelle locale et au-delà de leur empreinte immédiate. Ceux qui ne sont pas directement causés par les activités humaines se retrouvent dans d'autres sujets d'intérêt, comme la végétation et le pergélisol.

- Les changements de paysage qui sont le résultat direct des activités humaines se sont produits sur environ 0,1 % du territoire des TNO.

7. Déchets solides

Les déchets solides exercent une pression importante sur l'environnement à plusieurs égards, notamment en raison de l'espace qu'il faut pour les stocker et les traiter, des exigences en matière de transport, de la présence de composés qui peuvent s'échapper des décharges dans l'environnement, de la production de gaz à effet de serre, du temps nécessaire pour que certains déchets se décomposent complètement et de la tendance des décharges à attirer la faune lorsqu'elles ne sont pas gérées correctement.

Les TNO disposent actuellement de trois programmes réglementés qui réduisent la quantité de matériaux du flux de déchets ou les détournent : le Programme de gestion des contenants de boissons, le Programme de recyclage des appareils électroniques et le Programme de gestion des sacs à provisions jetables.

- Le Programme de gestion des sacs à provisions jetables a permis de réduire de 72 % l'utilisation des sacs à usage unique aux TNO entre 2010 et 2021.
- Le taux de récupération moyen des contenants de boissons sur 10 ans, entre 2011 et 2021, est de 84 %.
- Environ 74,2 tonnes d'appareils électroniques ont été collectées pour être recyclées aux TNO au cours de l'exercice financier 2020-2021.
- De 2017 à 2021, environ 244 000 litres de déchets dangereux liquides et 64 000 kilogrammes de déchets dangereux solides ont été expédiés vers le sud et éliminés en toute sécurité.

8. Contaminants

Les contaminants sont souvent des sous-produits des activités de développement à l'échelle locale et mondiale et peuvent provenir de sources naturelles.

- Le nombre de déversements a diminué sur le territoire en relation avec le déclin de l'activité industrielle.
- Les taux de contaminants du caribou et de l'orignal sont faibles. Ils sont sains et restent un choix sain pour les personnes qui les consomment.
- On trouve des taux élevés de mercure dans les poissons de certains lacs des TNO.

État

9. Côtes et océans

Les régions côtières des TNO et de la mer de Beaufort connaissent des changements importants et les étés sans glace dans l'océan Arctique seront bientôt monnaie courante.

- Entre 1968 et 2020, la glace de mer d'été dans toutes les eaux du nord du Canada a diminué à un taux moyen de 7,5 % par décennie.
- L'acidification se produit plus rapidement dans l'océan Arctique que dans les océans plus tempérés.
- L'élévation du niveau de la mer et l'augmentation des tempêtes modifient le delta du Mackenzie et d'autres écosystèmes, et érodent d'autres zones côtières jusqu'à 10 mètres par an.

10. Résidents et cultures

Les résidents et les cultures des TNO font partie intégrante de l'environnement.

- La croissance de la population des TNO a été modeste.
- La maîtrise des langues autochtones aux TNO continue de diminuer.

11. Eau

Pour bien comprendre l'intégrité de l'environnement, il est essentiel de savoir si l'eau est saine. Si la santé des écosystèmes aquatiques est compromise, cela peut se répercuter sur l'ensemble de l'écosystème et sur la santé humaine. La grande majorité de l'eau douce des TNO se trouve dans le bassin du fleuve Mackenzie, où l'eau s'écoule dans des réseaux fluviaux de plusieurs provinces et territoires qui se déversent finalement dans le fleuve Mackenzie, puis dans la mer de Beaufort. Il s'agit du plus grand bassin fluvial du Canada et du deuxième en importance en Amérique du Nord.

- L'alcalinité et le carbone organique augmentent dans bon nombre de fleuves et de rivières aux TNO, ce qui témoigne de l'augmentation de l'altération des roches et de la dégradation du pergélisol. Les taux de chlorure et de turbidité varient également.

- Les taux de mercure dans l'eau des principaux fleuves et rivières des TNO sont sans danger pour la vie aquatique.
- Le débit augmente dans les bassins versants des TNO, surtout en hiver.
- Les niveaux d'eau des grands lacs des TNO varient beaucoup, mais sans tendance significative.
- Les eaux qui se réchauffent entraînent une augmentation de la productivité et une prolifération potentielle des algues.

12. Air

L'air pur est essentiel à notre bien-être. Les décisions que nous prenons tous les jours, à la maison et au travail, ont une influence sur la qualité de l'air que nous respirons. Nous avons tous un rôle à jouer si nous souhaitons que nos collectivités saines, nos écosystèmes robustes et notre économie durable continuent à jouir d'un air de qualité.

- La qualité de l'air des TNO est généralement bonne, avec quelques exceptions notables en 2014 attribuables à la fumée des feux de forêt.

13. Pergélisol

Le pergélisol est un sol qui est continuellement gelé depuis au moins deux ans. Dans la majeure partie des TNO, le pergélisol a des milliers d'années. Il peut se limiter à une fine couche de quelques mètres sous la surface de la terre, ou être une couche de plusieurs centaines de mètres. Dans la toundra, le pergélisol peut être présent sous l'ensemble du paysage, tandis que dans le sud des TNO, il peut se trouver dans de petites poches isolées. L'état du pergélisol aux TNO est surveillé à l'aide de capteurs de température du sol, en mesurant l'épaisseur de la couche active (la couche de sol au-dessus du pergélisol qui dégèle en été et regèle en hiver) et en cartographiant la présence de thermokarst comme indicateur de terrain sensible.

- Le pergélisol se réchauffe et, dans certaines régions, le dégel accéléré entraîne le développement de paysages thermokarstiques.
- La couche active a augmenté aux TNO.
- Les paysages thermokarstiques, la dégradation des tourbières, les lacs de dégel et les glissements de terrain sont de plus en plus nombreux et étendus aux TNO.

- Le dégel actuel et futur du pergélisol menace les masses d'eau des TNO.

14. Végétation

La végétation fournit un habitat pour la faune et des services écosystémiques comme la nourriture, le carburant et de nombreuses autres ressources essentielles.

- La superficie brûlée et le nombre d'incendies varient chaque année, sans qu'une tendance claire se dégage.
- Certaines espèces végétales envahissantes introduites aux TNO se propagent maintenant dans les écosystèmes naturels, souvent le long des routes et des fleuves et rivières dans le sud des TNO.
- Les épidémies d'insectes nuisibles et exotiques affectent les forêts des TNO, et se produisent de plus en plus loin au nord; leur fréquence et leur intensité pourraient augmenter.
- Les arbustes envahissent la toundra, surtout juste au nord de la limite des arbres.

15. Faune

Les TNO sont l'une des rares régions du monde à abriter de vastes étendues de terres non perturbées et des communautés d'espèces intactes et saines. Les peuples, les cultures et l'environnement des TNO dépendent des espèces sauvages qui y vivent.

- Les cinq types de caribous des TNO ont été confrontés à des problèmes de conservation. Certaines populations de caribous se portent mieux et montrent des signes de rétablissement, mais d'autres continuent de décliner.
- Les oiseaux migrateurs insectivores, les oiseaux de rivage et les oiseaux des prairies sont en déclin rapide.
- Les aires de répartition de 10 des 72 mammifères terrestres ou côtiers des TNO changent; elles s'étendent surtout vers le nord.
- Le pourcentage global d'espèces exotiques aux TNO n'a pas changé au cours des vingt dernières années, mais les programmes de surveillance visant à détecter l'arrivée d'espèces d'insectes exotiques sont particulièrement ténus.

- La santé de la faune sauvage du Nord est en train de changer.

16. Espèces en péril

L'appauvrissement de la biodiversité est un problème d'envergure mondiale, avec des conséquences potentiellement importantes pour l'environnement.

- Une espèce sur 100 aux TNO risque de disparaître ou de s'éteindre au cours des 100 prochaines années.
- Neuf (18 %) des espèces en péril aux TNO continuent de voir leur population décliner.
- Deux des plus importantes menaces pour les espèces en péril aux TNO sont le changement climatique et la modification des habitats.

Intendance

17. Planification et adaptation

La planification et l'adaptation sont des réponses essentielles à un environnement en évolution.

- Des ententes de protection des eaux transfrontalières sont en place avec trois des cinq provinces et territoires voisins.
- Parmi les mesures prévues dans le rapport d'étape 2019-2020 de la Stratégie sur la gestion des eaux des TNO, 99 % ont été mises en œuvre ou partiellement mises en œuvre.
- La planification des mesures de rétablissement est terminée pour 10 des 12 espèces en péril répertoriées aux TNO.
- En ce qui concerne les mesures financées dans le plan d'action 2019-2023 sur le changement climatique des TNO, 92 % sont en voie d'être achevées d'ici 2023.

18. Utilisation durable des ressources renouvelables

L'utilisation responsable des ressources renouvelables, comme la faune, les poissons et les plantes, a toujours été particulièrement importante pour les résidents des TNO. L'utilisation durable des ressources est importante pour garantir qu'elles seront toujours là pour les générations futures, que les gens resteront liés à la terre et que les connaissances et les pratiques seront transmises aux générations futures. Les activités sur les terres ancestrales peuvent également contribuer à fournir des renseignements précieux sur l'état de l'environnement aux TNO.

- Le volume de la récolte commerciale de bois aux TNO reste très faible, mais la demande de granulés de bois pourrait entraîner une augmentation des récoltes à l'avenir.
- Le piégeage aux TNO a diminué depuis l'effondrement des prix mondiaux de la fourrure après le pic des années 1980. Aujourd'hui, environ 500 trappeurs des TNO vendent des fourrures sur les marchés internationaux.
- Environ 40 % des résidents des TNO pratiquent la chasse ou la pêche chaque année. Ce pourcentage est demeuré sensiblement le même depuis 1999.
- Environ 13 % des résidents des TNO comptaient sur la nourriture traditionnelle pour la majeure partie de leur consommation quotidienne de viande et de poisson en 2018, contre 21 % en 1998.
- L'écotourisme se développait avant la pandémie.

19. Avantages et connaissances en matière d'environnement

La conscience de l'environnement est la capacité des humains à comprendre les liens qui les unissent à leur environnement. La prise de conscience, la compréhension et le souci de ces liens permettent de prendre des décisions éclairées pour résoudre des problèmes environnementaux complexes.

- Des camps environnementaux et culturels formels et des possibilités d'apprentissage informel sont proposés dans toutes les régions des TNO.

20. Aires protégées et aménagement du territoire

Le réseau de conservation des TNO comprend des aires protégées et des aires de conservation, qui offrent divers niveaux de protection selon les objectifs de chaque site. Par exemple, certaines zones de conservation sont guidées par des plans d'aménagement du territoire qui précisent où certaines activités peuvent avoir lieu. Les aires protégées, quant à elles, limitent généralement la plupart des formes de développement industriel, voire toutes les formes.

- Les aires protégées et de conservation représentent 17,3 % du territoire des TNO (en tenant compte de l'eau douce) et les zones de protection marine couvrent 2,1 % des eaux marines des TNO.
- Au total, 38 des 45 écorégions des TNO comportent des aires protégées ou de conservation.
- Sur les 6 949 sites archéologiques connus des TNO, 18 % se trouvent dans des aires protégées.

Forces motrices actuelles du changement environnemental

Cette section décrit comment les changements environnementaux mondiaux et les forces sociales, démographiques et économiques entraînent des pressions et des impacts supplémentaires sur l'environnement à l'échelle régionale et locale. De nombreuses forces influencent l'environnement. Cette section se concentre sur celles qui sont les plus importantes pour les TNO, afin d'apporter un contexte plus spécifique et plus significatif aux défis environnementaux actuels et futurs des TNO.

Les forces motrices sont résumées dans les sujets d'intérêt 1 à 3 du chapitre 1 et dans les indicateurs de l'état de l'environnement en ligne.

Changement climatique

- Le changement climatique constitue l'une des forces les plus importantes qui affectent notre environnement, créant des défis pour la présente génération et celles qui suivront.

Changements environnementaux mondiaux

- Ce sont les effets directs de l'augmentation des concentrations mondiales de dioxyde de carbone.
- Les oscillations atmosphériques mondiales peuvent amplifier les effets du changement climatique.

Changements économiques mondiaux

- La demande mondiale des ressources naturelles des TNO façonne les pressions environnementales locales.
- L'augmentation de la demande mondiale de courts trajets maritimes affectera notre écosystème océanique.
- L'augmentation de la population mondiale exercera des pressions supplémentaires sur notre environnement.

Signes précurseurs et impacts cumulatifs

Signes précurseurs

Les signes précurseurs sont de légers changements, quoique perceptibles, dans l'environnement, qui peuvent nous avertir que des impacts beaucoup plus importants pourraient se produire à l'avenir si rien ne change.

Les répercussions prévues sont résumées dans le rapport sous les rubriques suivantes, avec des liens vers les indicateurs pertinents de l'état de l'environnement en ligne pour de plus amples renseignements.

Répercussions prévues du point de basculement

- Changements soudains et irréversibles dans les écosystèmes océaniques
- Augmentation de la libération de méthane en raison du dégel du pergélisol

Répercussions prévues à court terme

- Poursuite de l'érosion côtière à grande échelle
- Augmentation continue des glissements de terrain et des éboulements
- Augmentation continue du débit d'eau
- Dépôt continu de contaminants sur de longues distances et méthylation accrue du mercure
- Augmentation de la fréquence et de l'intensité des phénomènes météorologiques extrêmes

Répercussions prévues à long terme

- Effets accrus des parasites et des espèces envahissantes
- Changements potentiels du paysage
- Augmentation de la demande de minéraux critiques
- Diminution de la qualité de l'air en été
- Possibilité accrue de déversements et d'autres contaminations

Effets cumulatifs

Les effets cumulatifs des forces motrices et des pressions représentent un risque important pour les écosystèmes et les collectivités aux TNO. Les effets cumulatifs sont les effets combinés des activités humaines et des phénomènes naturels sur notre environnement.

Répercussions cumulatives sur les écosystèmes

Bien que l'environnement des TNO change, il est généralement sain et les écosystèmes sont intacts.

Répercussions cumulatives sur la santé humaine

La santé humaine est directement affectée par les forces motrices économiques et les pressions qu'elles exercent sur l'environnement. La croissance démographique mondiale et la demande croissante de ressources naturelles nuisent à la santé humaine.

Répercussions cumulatives sur les moyens de subsistance de la collectivité

Par définition, les moyens de subsistance de la collectivité sont les moyens économiques, sociaux et culturels permettant de garantir la santé et la résilience de la collectivité pour les générations actuelles et futures. Les moyens de subsistance de la collectivité font partie intégrante de notre environnement et sont affectés par le changement climatique, la demande mondiale et les perspectives économiques.

Tendances positives et actions futures

L'intendance est notre responsabilité collective de prendre soin de l'environnement par une utilisation judicieuse des ressources et par des efforts de protection et de conservation. Ces actions et efforts des personnes, des organisations et du gouvernement contribuent à contrecarrer les répercussions négatives sur l'environnement.

- Développement industriel durable
- Protection de la terre, de l'eau et de la biodiversité
- Garantie d'une eau propre et abondante
- Garantie d'un air pur
- Gestion des déchets et de la pollution
- Planification, gestion et utilisation de l'information
- Prise de décisions judicieuses
- Sensibilisation et inspiration de l'action

Introduction

NWT State of the Environment Report 2022 (NWT SOE Report 2022)

Everything in the environment is interconnected. To understand this better, we need to look at a wide range of environmental indicators and how they relate to each other. Understanding our world is key to making informed decisions now and in the future.

The NWT SOE Report 2022 provides:

- Information about the changing environment to identify trends and helps us assess the status of the environment in the NWT.
- An early warning system of possible impacts resulting from environmental change so that we can adapt our management actions.
- Data and information for territorial, national, and international state of the environment initiatives.

The *Environmental Rights Act (ERA)* SNWT 2019, c 19 requires the Government of the Northwest Territories (GNWT) to complete an NWT SOE Report 2022 within three years of the Act coming into force (September 2019), and every four years thereafter. This report fulfills the legislated requirement for an SOE Report within three years of the Act coming into force.

The NWT SOE 2022 Report includes:

Chapter 1: Key Findings

This chapter provides a summary of status and trends for 20 Focal Points, or key topics, of the NWT environment, describing key findings of impairment and improvement in the environment. The intent of this chapter is to fulfil *ERA 2019 s20 (4)(a)(c)(d)*.

Chapter 2: Current Driving Forces of Environmental Change

This chapter identifies relationships between observed changes in the environment and the factors that influence them. The intent of this chapter is to fulfil *ERA 2019 s20 (4)(e)*.



Chapter 3: Early Warning Trends and Cumulative Impacts

This chapter identifies emerging environmental issues and identifies long-term and cumulative impacts. The intent of this chapter is to fulfil *ERA 2019 s20 (4)(f)*.

Chapter 4: Positive Trends and Future Actions

This chapter reports on positive stewardship activities underway and makes recommendations for future actions and activities that could help safeguard the environment from harm. The intent of this chapter is to fulfil *ERA 2019 s20 (4)(g)*.

All information that led to the findings included in the NWT SOE Report 2022, in addition to sources and references, are provided in the 68 online SOE Indicators.



Sources of Knowledge

The GNWT is committed to making decisions based on the best available information, including information drawn from Indigenous knowledge, community knowledge and western science.

Indigenous knowledge and skills have been developed and transmitted over centuries and reflect local contexts and relationships with the environment. The importance of Indigenous knowledge is recognized by the GNWT through the *Traditional Knowledge Policy 53.03*, developed in 1997. More recent planning documents include the *GNWT Traditional Knowledge Policy Implementation Framework* and the *Environment and Natural Resources (ENR) Traditional Knowledge Implementation Plan*. The *Traditional Knowledge Policy* states: “The Government of the Northwest Territories recognizes that the aboriginal peoples of the NWT have acquired a vast store of traditional knowledge through their experience of centuries of living in close harmony with the land.”

In accordance with *ERA 2019 s20 (4)(b)*, the NWT SOE Report 2022 relies on all available sources of information to develop indicators and report on changes in the NWT environment.

The NWT SOE Report 2022 structure was modified to better embrace a key concept shared in many Indigenous stories from the NWT. This concept is complex but is conveyed by key phrases such as “homeland,” “humans are the land,” and “remember the promise¹.” The structure of the report in the past included humans solely as creating pressures on the

environment and finding some solutions. The structure of the current and future reports will recognize that humans and cultures are integral parts of ecosystems and the environment: the effects of driving forces and pressures on the environment include those on human communities, cultures, and health.

With each report we will strive to make significant gains in respectfully including the rich Indigenous knowledge shared with us by Indigenous peoples in the NWT.



Taking Samples from Caribou. (GNWT)

1 Sahtú Elders, Harnum, B. Simmons, D. and Polfus, J.L. 2014. Kədə Nt'q Benats'adí – Remember the promise. Sahtú Renewable Resources Board, Tulí'ta. NT. 27 pp.

How is the Report Structured?

Using the DPSIR Framework

The NWT SOE Report 2022 was structured using a framework tested around the world to help link environmental changes to causal forces. This framework is called DPSIR because it examines environmental changes through the lenses of **D**iving Forces, **P**ressures, **S**tates, **I**mpacts and **R**esponses. Consult the online SOE Indicators for more details about this framework.

Using Focal Points

Focal points are areas of interest about the environment and are organized within the DPSIR framework. By using focal points, the NWT SOE Report 2022 provides a focus on key connections within the environment. The focal points are numbered and referenced in this report to match the organization of the online SOE Indicators where all baseline information, sources and references are found and organized by indicators.

Using Indicators

Indicators were selected to characterize whether the environment is changing. The indicators can reveal trends in the environment over time, tell us more about the state of the environment, and in some cases, we can use them to provide projections about future environmental conditions. These indicators provide the sources and references used as baseline information for the NWT SOE Report 2022 and can be found on ENR's website.

Need More Info?

Looking for more information about a topic? Each indicator is numbered in the NWT SOE Report 2022 – Indicator Report. ➔ Look for these symbols pointing to the appropriate indicators.

Chapter 1: Key Findings

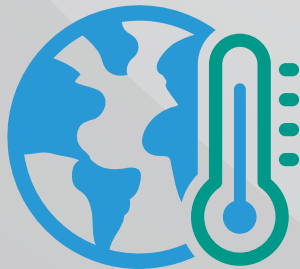
This chapter summarizes key findings from 68 indicators described in the online SOE Indicators.

Driving Forces

Driving forces are the environmental, socio-economic, and cultural forces that affect the environment on a global scale. These global forces affect the environment in complex ways and may be difficult for NWT residents to influence.

Focal points included are:

- *A Changing Planet*
- *Climate Change*
- *Global Economy*



1. A Changing Planet

Planetary changes are global changes that may affect countries and regions around the world in diverse ways.

The global population is increasing.

In 2019, the global human population reached 7.7 billion people. The United Nations predicts the global human population will increase to 9.7 billion in 2050 and peak at around 10.9 billion by 2100. [▶ Indicator 1.1](#)

Concentrations of global greenhouse gases continue to increase.

Greenhouse gas emissions have been steadily increasing around the world and are predicted to continue to increase over at least the next decades.

[▶ Indicator 1.3](#)

The Earth has warmed by approximately 0.2°C per decade since the Industrial Revolution.

This warming trend is expected to continue for at least another few decades and possibly longer if concerted global action is not taken to drastically reduce emissions in the short-term. [▶ Indicator 1.2](#)

More extreme weather events are occurring around the world as the climate warms and changes.

In 2019, an estimated 23.9 million people were displaced globally by weather-related disasters such as floods, hurricanes, wildfires, droughts, and extreme temperatures. By 2050, up to 200 million people around the world could be affected by environmental changes. [▶ Indicator 1.1](#)

Average temperatures in Arctic regions throughout the world are increasing three times as fast as in other areas of the world.

In northern regions around the world, average temperatures increased at a rate three times higher than global averages due to Arctic amplification.

[Indicator 1.2](#)

The heat content of oceans around the globe is increasing and oceans are getting more acidic.

Most of the extra energy trapped in the earth's atmosphere through human-caused greenhouse gas emissions is stored in the oceans as heat. Heat content increased by 0.55-0.79 watts per square metre for the full ocean depth from 1993 to 2019. This rate of heat gain is significant. Ocean heat content is projected to continue rising until at least 2040, at which point future changes could vary widely, depending on the level of emissions. Globally, oceans are increasingly more acidic (lower pH). This is caused by rising levels of carbon dioxide (CO₂) in the atmosphere, approximately 20-30% of which is absorbed into the ocean. Average global ocean pH has been declining by 0.017-0.027 pH units per decade.

[Indicator 1.2](#)

El Niño and other global atmospheric oscillations are challenging to predict.

Shifts in global atmospheric oscillations occur every few years to decades. Tracking these oscillations helps explain climate variability including annual or semi-annual changes in weather and environmental conditions around the world. [Indicator 1.4](#)

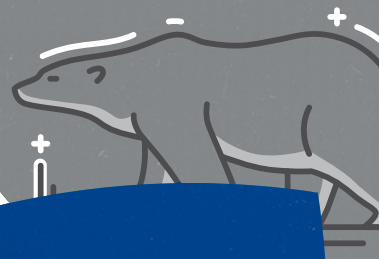
Learn more about Focal Point 1 in the online SOE Indicators.

Greenhouse Gas

Greenhouse gases trap heat within the earth's atmosphere. Human activities have increased the amount of greenhouse gases in the atmosphere to levels that have resulted in a steady rise in the average annual temperature of the planet. Increased emissions of carbon dioxide are the primary cause of this excess warming, but global atmospheric concentrations of methane have also increased substantially.

Arctic Amplification

A phenomenon caused by feedback loops where increased temperatures result in reduced sea ice cover, which reduces the earth's albedo (reflection of solar radiation from the earth's surface) and increases absorption of energy from the sun further increasing temperatures.



Global Atmospheric Oscillations

Naturally occurring cycles of changes in ocean and atmospheric conditions can occur in one part of the world and result in weather changes in another part of the world. These global atmospheric oscillations work together with a changing climate to influence annual weather patterns. The best known global atmospheric oscillation is the El Niño-La Niña. The change from one phase of the oscillation to the other is driven by pressure changes in the atmosphere and water temperature changes in the southern Pacific Ocean but the effects are felt across large regions including North America. Since the 1970s, the strength of El Niño events has increased and warmer winters in the NWT have been associated with El Niño events.



Lightning. (NWT/Ben Napper)

2. Climate Change

Climate change is one of the most pressing global issues of this generation and will be for generations to come.

Much warmer winters are being observed across the NWT.

Changes and abnormalities in NWT seasonal weather patterns emerge from tracked differences between observed temperature and precipitation and historical normal weather conditions. Temperatures are increasing across the NWT in all seasons, but primarily in winter. The annual air temperature in the NWT is increasing two to four times faster than the global average increase in temperature. This trend is expected to continue. Precipitation in each region will continue to be variable but, in general, annual precipitation is expected to increase everywhere in northern Canada.

[Indicator 2.1](#)

Lightning strikes have increased in the tundra, but not yet in forested areas of the NWT.

Longer fire seasons and seasons with large or numerous wildfires are predicted to happen more often in the future. In the NWT, 88% of wildfires are started by lightning strikes. Although no trends have been noted in lightning frequency in forested areas of the NWT to date, lightning events are expected to increase

by as much as 112% by the year 2100. An increase in lightning events has been detected in the treeless Canadian Arctic. [Indicator 2.2](#)

The NWT climate will continue to warm up, but this warming will be less severe if we act now.

Under a low greenhouse gas emissions scenario, temperatures in northern Canada will stabilize after about 2050 at roughly 2.1°C above temperatures recorded between 1986 and 2005. Under a high emissions scenario, warming in northern Canada will continue until the end of the century and beyond, reaching a mean temperature rise of about 7.8°C above the reference period. The significantly greater warming under the high emissions scenario illustrates the long-term climate benefits associated with aggressive and early mitigation efforts. [Indicator 2.3](#)

Learn more about Focal Point 2 in the online SOE Indicators.



An Economic Activity-Port and Raildorado in Hay River. (GNWT/M Oldham)

3. Economy

The links between the economy and the environment are manifold: the environment provides resources to the economy and acts as a sink for emissions and waste. Natural resources are vital inputs for production in many sectors, while production and consumption also lead to pollution and other

pressures on the environment. Lessons from around the world demonstrate that a healthy and sustainable environment is key to a healthy, sustainable economy.

Changes in the economy can become a driving force for changes in the environment. These economic indicators provide information about overall changes in the NWT economy, and specific changes in the oil and gas and mineral sectors — sectors that have direct impacts on the NWT environment.

The NWT Real GDP increased between 1999 and 2007 by 45.4%, then declined from 2008 to today.

The Gross Domestic Product (GDP) is a measure of the value of all goods and services produced in an economy over the course of the year. The economy in the NWT is mainly based on the extraction of non-renewable resources and commodities such as diamonds, oil, and gas. Diamond extraction is the largest economic sector. The value of these commodities is influenced by the global economy, and current and future global economies are uncertain. This uncertainty is reflected in financial decisions made by resource development companies as they react to global economic fluctuations when developing their resources and bringing them to market. GDP trends in the NWT follow global economic trends, including declines since 2008. Significant global changes that have occurred since 2019, such as the COVID-19 pandemic, have triggered economic changes in the NWT: the GDP for sectors such as mining, oil and gas, and construction have decreased but the demand for industries such as retail trade, finance, and insurance have increased.

➤ [Indicator 3.1](#)

As global prices for natural resources fluctuate, prospects for exploration and development of some of the NWT's resources also change.

Historically, the mining and oil and gas industries have had a significant impact on the NWT's economy and environment. However, oil and gas production has been declining in the NWT since 2002 — a trend that

is expected to continue with the global shift away from fossil fuel use. However, interest in oil and gas in the NWT could increase if there is a market shift to ethical, secure, and cleaner fuel supplies. Mineral exploration in the NWT continues to fluctuate year to year and is currently considered low, valued at \$63 million.

➤ [Indicators 3.2 and 3.3](#)

In the future, an increase is expected in the demand for electric vehicles and the metals (rare earth elements and other critical minerals) required for their batteries and other components.

As the NWT holds important deposits of the rare earth elements and other critical minerals needed to produce these batteries, this could be advantageous for the NWT economy. ➤ [Indicator 3.3](#)

The traditional fur economy in the NWT typically responds to changes in global fur prices.

From 2013 to 2021, there was a rise in domestic fur sales and a decrease in fur exports in response to changes in the international fur market and an overall decline in fur use. However, in the NWT, there has been an increase in traditional crafters using fur. This is likely due to the increasing value and recognition of Indigenous fashion and art in the marketplace. It is uncertain how weather, the global economy, and competition for market shares with other fur producing countries will affect the future of the trapping industry in the NWT. ➤ [Indicator 3.3](#)

Learn more about Focal Point 3 in the online SOE Indicators.

Pressures

Pressures are direct stresses on the environment caused by global driving forces and local human actions. Tracking environmental pressures provides valuable information and context that can be used to show why the state of the environment is changing in the NWT. Looking at pressure focal points helps us better understand the direct impacts of human actions on the environment now and into the future.

Focal points included are:

- *Energy Use*
 - *Human Activity*
 - *Landscape Changes*
 - *Solid Waste*
 - *Contaminants*
-

4. Energy Use

Energy use depends on distinct factors specific to each region.

Energy use per person in the NWT is nearly double the Canadian average.

With long distance travel and cold winters, we use a lot of energy to heat and light homes and businesses, transport people and goods, and power industry. Energy use in the NWT puts pressure on the environment and can increase air pollution, change the landscape, and contribute to climate change. [▶ Indicator 4.1](#)

Solar energy, while increasing in use, currently contributes only marginally to the NWT's overall community electricity production.

The NWT's community electricity supply primarily comes from three sources: hydro, diesel, and natural gas. Unlike most of Canada, the NWT is not connected to the North American electrical grid. This means that each community must have its own source of electricity and backup. In 2020, most (72%) of the electricity generated for NWT communities comes from hydro-electric facilities. Electricity production also comes from diesel generators (22%), natural gas (5%) or a combination of these. Solar electricity generation only accounts for about 0.6% of the NWT's total power supply. [▶ Indicator 4.2](#)

Industry accounts for most of the energy used in the NWT.

The NWT's energy supply is highly dependent on imported fossil fuels such as diesel, gasoline, and heating oil. Industry is the largest user of energy in the NWT. [▶ Indicator 4.1](#)

Learn more about Focal Point 4 in the online SOE Indicators.



Downtown Yellowknife. (GNWT)



CCGS Amundsen During the Canadian Arctic Shelf Exchange Study in 2003-04. (CASES Website Gallery)

5. Human Activity

Human activity can help to explain changes in the environment. The level of human activity is strongly tied to economic forces. At this time, the NWT is experiencing a downturn in economic growth, and currently direct human activity in the NWT is not as strongly linked to environmental change that is occurring.

Shipping traffic in the Northwest Passage was steadily increasing before the COVID-19 pandemic.

Over the past decade, the number of trips through the Northwest Passage steadily increased, averaging around 23 trips a year during the last five years. Prior to the COVID-19 pandemic, annual commercial and tourism use of the Northwest Passage was steadily increasing. Shipping and other transportation in Arctic waters is predicted to increase as sea ice cover declines due to climate change. This increase in use comes with risks. Even during relatively ice-free conditions in late summer, the Northwest Passage, and the Beaufort Sea more generally, is difficult to navigate given unmarked shallow areas, shifting sand and gravel bars, fog, and dangerous weather. There is risk to the environment, including from oil spills, other pollutants, noise, and introduction of non-native invasive species. Shipping through the Northwest Passage also breaks ice and fragments important sea ice habitat.

Shipping and transportation are expected to increase in the Northwest Passage in the coming years, especially for industrial, commercial, and tourism purposes, as the open water season extends and the area of year-round sea ice shrinks. Potential environmental impacts should be considered when planning shipping routes. Increasing shipping in the region will require an increase in level of preparedness to respond to potential environmental incidents. [▶ Indicator 5.1](#)

Rates of road travel and the number of registered vehicles are increasing faster than the NWT population.

Traffic is heaviest in and near larger communities such as Yellowknife, Hay River, Fort Smith, and Inuvik. A reduction in road use due to the COVID-19 pandemic is not expected to alter this pattern, as NWT residents are likely to increase their use of local roads for travel once again. Increases in road traffic, and associated noise and human activity, can be linked to reduced availability of effective habitat for some wildlife species and an increase in wildlife collisions and mortality.

[▶ Indicator 5.2](#)

Air traffic in the NWT increased until 2008 but has since declined.

Local air traffic is highest in the NWT at the Yellowknife airport. Traffic increased until 2008, and has remained stable ever since. Local air traffic is declining at the two largest airports in the Taiga Plains – Inuvik and Norman Wells, which serve as transportation hubs for exploration, mining, oil and gas development, tourism, hunting, fishing, and other sectors.

Air traffic volumes are linked to economic trends, exploration activities, and tourism in the NWT, with traffic increasing or dropping in line with these activities. Data for 2020 is not available yet, but sharp reductions in air traffic are temporarily expected due to the COVID-19 pandemic and the resulting temporary reduction in visitors from outside the NWT.

[▶ Indicator 5.3](#)

Trends in permitted development activities largely follow global economic trends.

Mineral, oil, and gas development activities typically follow a boom-and-bust pattern mostly linked to the global price of these commodities. For example, land under prospecting and mineral claims in the NWT reached a peak in the 1990s during the diamond staking rush. At this time, approximately 22 million hectares (an area roughly the size of the United Kingdom, 220,000 km²) of land was held under mineral claims. After the staking rush, mineral claims declined to a low in 2001-2004. Exploration activities related to the mineral industry increased in 2005-2007 to levels higher than during the staking rush of the late 1990s, but again declined after 2008 and have remained low since then. When global markets make extraction of resources economically feasible, exploration and extraction activities will increase. However, reduced commodity prices and difficulties in financing projects in some remote areas of the NWT regularly result in a rapid decrease in human activities related to mineral and oil-gas development. These cycles roughly mirror the global economy. [▶ Indicator 5.4](#)

Learn more about Focal Point 5 in the online SOE Indicators.



Landscape Changes. (GNWT)

6. Landscape Changes

Landscape changes caused by human activities can impact the natural environment locally and beyond their immediate footprint. Landscape changes that are not directly caused by human activities are found in other focal points, such as vegetation and permafrost.

Landscape changes that are a direct result of human activities are estimated to have occurred on about 0.1% of the NWT land base.

Two-thirds of these landscape changes were the result of linear developments – including roads, seismic lines, pipeline right-of-ways, and telephone or other transmission lines. Although limited in footprint, linear disturbances can fragment habitat, which can affect species movement patterns across the landscape and predator-prey interactions. Most linear development in the NWT has taken place in forested regions, with forests having twice the area of landscape change compared to non-forested parts of the NWT. New infrastructure, transportation corridors, and forestry activities are planned or being considered, which would result in additional landscape change. [▶ Indicator 6.1](#)

Learn more about Focal Point 6 in the online SOE Indicators.



Single Use Bags. (GNWT)

7. Solid Waste

Solid waste puts significant pressure on the environment in several ways, including the space it takes to store and treat waste, requirements for transportation, the presence of compounds that can leak into the environment from landfills, the production of greenhouse gases, the long time required for some wastes to break down fully, and the tendency for landfills to attract wildlife when not managed properly.

The NWT currently has three regulated programs that reduce or divert materials from the waste stream: the Beverage Container Program, the Electronics Recycling Program, and the Single-use Retail Bags Program.

The Single Use Retail Bag Program resulted in a 72% reduction in use of single-use retail bags across the NWT from 2010-2021.

Since the start of the Single Use Retail Bag Program in 2010, the use of single-use retail bags in the NWT has been reduced by more than 69 million bags. The ten-year average estimated annual reduction in use of single-use retail bags is 6.7 million bags, or 150 bags per NWT resident. Between March 28 and June 30, 2020, the Single Use Retail Bag fee was temporarily waived as a precaution to prevent the spread of COVID-19.

➤ [Indicator 7.1](#)

The 10-year average recovery rate for beverage containers from 2011-2021 is 84%.

Recycling beverage containers prevents plastic, aluminum, glass, and multi-material containers from entering the environment and/or NWT landfills. Since the inception of the Beverage Container Program in 2005, more than 378 million containers have been returned for recycling.

During the 2020-2021 fiscal year, significantly more recyclable containers were distributed in the NWT while recycling depots experienced closures and reduced services in response to the COVID-19 pandemic. These compounding trends resulted in a lower recovery rate than previous years at 62%. In the long term, rates are expected to return to pre-pandemic levels. ➤ [Indicator 7.2](#)

Approximately 74.2 tonnes of electronics were collected for recycling in the NWT during the 2020-2021 fiscal year.

Electronics contain harmful materials that can leach into the natural environment. Since the start of the Electronics Recycling Program in 2016 a total of 424 tons of electronics have been diverted from landfills.

In 2021, the GNWT committed to creating a territory-wide program to recycle an expanded suite of electronic and electrical products. In October 2021, ENR launched the Expanded Electronic and Electrical Product Recycling pilot project (E-Pilot). Collection events and community depots in Fort Providence, Fort Smith, Hay River, Inuvik, Norman Wells and Yellowknife now accept an additional 500+ electronics and electrical products. The E-Pilot is expected to run for two years. Data collected during the E-Pilot will help design a sustainable program to best manage this expanded suite of products. ➤ [Indicator 7.3](#)

From 2017 to 2021, approximately 244 thousand litres of liquid and 64 thousand kilograms of solid hazardous waste were shipped south and safely disposed.

ENR and MACA worked with the communities of Paulatuk, Fort Providence, Tulita, Fort Good Hope, Fort Simpson, and Norman Wells to identify and remove these hazardous materials. Historical hazardous waste is a concern at most NWT solid waste facilities and work is continuing to compile inventories, dispose of waste and conduct future hazardous waste management planning through the GNWT's Clean Up Clean Start program. ➔ [Indicator 7.4](#)

Learn more about Focal Point 7 in the online SOE Indicators.



Containing a Fuel Spill Near Yellowknife NWT. (GNWT)

8. Contaminants

Contaminants are often by-products of development activities locally and globally.

The number of spills has gone down in the territory in relation to declining industrial activity.

Hazardous materials include contaminants such as fuel (petroleum hydrocarbons) and metals. Distinct types of activities are linked to several types of spills, and each type of spill is associated with various levels of risk to the environment. Changes to the number of spills of hazardous materials each year are tied to changes in the NWT's resource-based economy. The number of hazardous materials spills tends to decline during downturns in the economy. Efforts continue across the NWT to reduce the number of potential spills with improved prevention and education programs. Developing clean-up technologies in extremely cold and remote environments remains a challenge. ➔ [Indicator 8.1](#)

Contaminant levels in caribou and moose are low. They are healthy and remain a healthy choice for the people that consume them.

Monitoring efforts are ongoing to track levels and changes in contaminants found in wildlife. These efforts are an important part of the national program to monitor contaminants in Arctic wildlife and the environment. Cadmium and mercury are heavy metals that can be transported over long distances in the atmosphere, travelling from industrial sources in the south to northern regions. Both metals can accumulate in the liver and kidneys, and, to a lesser extent, in muscle tissue. Elevated levels of heavy metal accumulation can cause health problems for wildlife and people who consume affected animals. Contaminant levels are low and are expected to remain low in terrestrial mammals, although based on increasing global trends of contaminants, ongoing long-term. ➔ [Indicator 8.2](#)



Lutsel K'e. Thaidene Nene. (GNWT)

Elevated mercury in fish is found in some lakes in the NWT.

Since the 1970s, mercury concentrations have been measured in fish from more than 100 lakes, rivers, and deltas in the NWT. Monitoring levels of mercury in fish of the NWT helps to reveal the risks associated with consuming local fish species.

Historically, mercury was used in industrial processes around the world. Due to long range atmospheric transport, mercury has been deposited in the Arctic. Mercury can remain in the environment for extended periods of time and can cause high mercury concentrations in fish through biomagnification and bioaccumulation.

Increasing temperatures will also result in increased mercury concentrations in fish as warmer conditions cause more inorganic mercury in the environment to be converted to methyl mercury. When inorganic mercury converts to methyl mercury, it can accumulate in the environment with the highest concentrations often in the tissues of top predators.

Mercury is also present in high concentrations in some waters of the NWT due to weathering of upstream rocks and sediments that are naturally high in mercury.

Average mercury concentrations in plankton-feeding fish species are very low (generally ≤ 0.2 ppm) but average concentrations are higher in predatory fish in some NWT lakes (approaching and sometimes over the guideline level for commercial sale and consumption at 0.5 ppm) [Indicator 8.3](#)

Learn more about Focal Point 8 in the online SOE Indicators.

State

State indicators reflect current environmental conditions caused by driving forces, pressures, and stewardship actions. State indicators track changes in major ecosystem components and services and describe impacts of these changes on people and cultures.

Focal points included are:

- *Coasts and Oceans*
- *Peoples and Cultures*
- *Water*
- *Air*
- *Permafrost*
- *Vegetation*
- *Wildlife*
- *Species at Risk*

9. Coasts and Oceans

The coastal regions of the NWT and the Beaufort Sea are experiencing significant changes and are likely at a tipping point. Ice-free summers in the Arctic Ocean will soon be common.

Between 1968 and 2020, summer sea ice in all northern Canadian waters declined at an average rate of 7.5% per decade.

The 2020 minimum ice extent (measured each September) in the Arctic Ocean was the second lowest on record, and the 2021 maximum ice extent was the ninth lowest on record. Sea ice is an important habitat component for Arctic wildlife and for people. This reduction in sea ice is affecting local weather and the global climate. The temperature of the sea surface is intricately linked to sea ice and affects the Arctic marine ecosystem.

In the Beaufort Sea, the extent of summer ice is decreasing by 8.3% per decade and has experienced the greatest total ice loss of all Arctic regions since 1968. Surface temperature in the middle of the Beaufort Sea is increasing at a rate of 1.1°C per century and 5.9°C per century in coastal areas.

Given these trends, it is predicted that ice-free summers in the Arctic Ocean will be a more common occurrence in the coming decades. [Indicator 9.1](#)

TIPPING POINTS

Points where minor changes or events become significant and cause substantial changes that may be irreversible.



Mackenzie Delta Shoreline Aftermath of an Unprecedented Storm Surge in 1999. (CIRNAC)

Acidification in the Arctic Ocean is occurring faster than in more temperate oceans.

Ocean acidification has been increasing more rapidly in Arctic marine areas, particularly the Beaufort Sea, than anywhere else globally because icy water can absorb more CO₂ than warm water. Low acidity levels are a crucial characteristic of marine ecosystems. Increasing acidity negatively impacts marine organisms such as shellfish. For example, up to 70% of the shells of pteropods, a type of sea snail, in the Beaufort Sea now have corroded shells due to increasing ocean acidity. As global greenhouse gases continue to increase, oceans around the world will become more acidic. When the acidity of oceans becomes too high, many organisms with shells will be unable to survive.

In the Beaufort Sea, the critical threshold for survival of some forms of marine life may be reached within this decade. ➔ [Indicator 9.2](#)

Sea level rise and increasing storms are changing the Mackenzie Delta and eroding coastal areas by up to 10 metres per year.

All Beaufort Sea coastal communities are experiencing sea-level rise, with Tuktoyaktuk, Baillie Island, and Cape Bathurst expected to experience over 1m of sea-level rise by 2100. Sea level rise is particularly important along NWT coastlines where sand and mud are held together by ice-rich permafrost. As the rising sea and storms impact coasts, they quickly erode. Implications of sea level rise for coastal communities include relocation of infrastructure and the loss of heritage resources as coastlines recede.

➔ [Indicator 9.3](#)

Learn more about Focal Point 9 in the online SOE Indicators.



Łutsel'K'e Dene First Nation in a Spring Camp. (GNWT/Pat Kane)

10. People and Cultures

The people and cultures of the NWT are integral to the environment.

Population growth in the NWT has been modest.

In 2016, the NWT population was estimated at 44,556. In 2021, the estimate increased to 45,520 residents. Most of the population growth has occurred in Yellowknife. About three-quarters of NWT residents live in medium (greater than 1,000 but less than 10,000 residents) or large communities (over 10,000 residents). The birth rate for the NWT remains much higher than the Canadian average, and, like much of Canada, the NWT population is aging. Most newcomers to the NWT come from other Canadian jurisdictions. In-migration to the NWT has been generally on par with out-migration. According to the NWT Bureau of Statistics, the NWT has experienced close to no change in population over the last five years. ➔ [Indicator 10.1](#)



Cabin Woods Lake Peel River Valley. (GNWT)



The Hay River Near Enterprise. (GNWT)

Fluency in Indigenous languages in the NWT continues to decline.

The land and environment are richly described in the NWT's nine Indigenous languages. Each language is suited for stories, expressions, and knowledge about specific regions in the NWT. Preserving Indigenous languages is one way to help preserve Indigenous knowledge, as these languages are integral to the context-specific transmission of knowledge, protocols, and skills.

In 2019 a survey found that 33% of Indigenous people in the NWT aged 15 years and older could speak an Indigenous language. This represents a decrease from the previous survey in 2014 and continues the declining trend that has been observed since 1989. The Chipewyan, North Slavey, and South Slavey languages are experiencing the greatest declines in use.

[Indicator 10.2](#)

Learn more about Focal Point 10 in the online SOE Indicators.

11. Water

To fully understand the integrity of the environment, it is essential to know if the water is healthy. If aquatic ecosystem health is compromised, it can be reflected in the entire ecosystem and in human health. The vast majority of the NWT's freshwater is within the Mackenzie River Basin, where water flows through river systems of several provinces and territories that eventually drain into the Mackenzie River and then into the Beaufort Sea. This is Canada's largest river basin and the second largest river basin in North America.

Alkalinity and organic carbon are increasing in many NWT rivers, which are signs of increasing rock weathering and permafrost degradation. Chloride levels and turbidity are also changing.

Long-term water quality monitoring sites are operated at nine key sites in the NWT. Analyses include levels of suspended solids (alkalinity, chloride, turbidity), nutrients (organic carbon, nitrogen), metals (iron), and many other parameters. Alkalinity is increasing in seven of the nine river sites monitored in the Mackenzie River Basin, which flows into the Arctic Ocean. Rock weathering is usually the cause of increased alkalinity.

Alkalinity is measured as levels of calcium carbonate and is an indicator of rock weathering. Rock weathering is the breaking down or dissolving of surface rocks and minerals.

Chloride levels are decreasing in southern NWT rivers and the Peel River but are increasing in both the Lockhart River and Great Bear Lake and watershed. There are increasing levels of turbidity (suspended sediments in the water) in the Slave River and Liard River, but decreasing levels in the Lockhart River, as well as in parts of the Mackenzie, Great Bear, and Hay Rivers. Organic carbon is increasing across all monitored rivers, especially in areas of extensive permafrost in the NWT, suggesting a link to the widespread permafrost degradation that is being observed. When organic carbon increases, the abundance of microorganisms also increases, reducing oxygen levels. Other parameters show mixed trends, including an increase in total iron in the Peel River, and a decrease in dissolved nitrogen in the Hay and Slave rivers. [▶ Indicator 11.2](#)

Mercury levels in the waters of major rivers in the NWT are safe for aquatic life.

MERCURY METHYLATION

Mercury methylation is the process that forms methylmercury. Mercury methylation typically occurs in sediments. Metals, including methylmercury, tend to bind to particles (referred to as suspended sediments) in surface waters. As flow rates increase there is typically an increase in suspended sediments due to contributions from the watershed, and there are more particles for metals and mercury to attach. Methylmercury is the most toxic form of mercury because it bioaccumulates in organisms over time with increased exposure (becomes more concentrated over time inside living creatures) and biomagnifies (increases exponentially) up the food chain. Mercury is natural but becomes available in the environment from weathered rocks, from decomposition of living material in the local environment and from industrial activities. Coal burning and waste incineration are the main sources globally of long-transport of mercury via the atmosphere. In the NWT the most common source of mercury is from eroded rock high in mercury with atmospheric deposition of mercury being secondary.

Average levels of mercury in major rivers of the NWT are below the recommended total mercury guidelines for freshwater aquatic life issued by the Canadian Council of Ministers of the Environment. Water

monitoring in major NWT rivers indicate that mercury levels are safe for aquatic life, including fish. In the summer of 2020, the levels of suspended sediments in the Slave River were very high due to high water flows following record elevated levels of precipitation in the Slave River watershed. Not surprisingly, elevated levels of total mercury were measured in the water samples collected from the Slave River that summer. Dissolved concentrations of mercury in the Slave River were at or close to normal for the same period. Mercury will continue to be monitored in major rivers across the NWT, and long-term trends will be analyzed.

[▶ Indicator 11.3](#)

River flow is increasing in NWT watersheds, especially in winter.

Water flow is increasing in watersheds across the NWT. The reasons for this are complex, but surface and ground water storage changes due to thawing permafrost are suspected of being a key over-arching cause. The rate of increase in flow level varies regionally as flow is influenced by many factors such as timing, amount, and form of precipitation (snowfall and rainfall), length of open-water season, and human influences such as dams, consumption, and industrial use. [▶ Indicator 11.4](#)

Water levels in the NWT's large lakes vary a lot, but with no significant trend.

Water levels in Great Slave Lake were recently high, but over the period of record (1941-2019) increasing or decreasing trends have not been found, excluding during the initial filling period and other non-typical reservoir operation periods of the Williston Reservoir, including one filling and one spilling event. Water levels in large lakes such as Great Bear and Great Slave Lakes respond to all inflows, outflows, precipitation, and evaporation over a large area (basin). Accurate predictions of water levels in the large lakes in future depend on our understanding of changes in basin storage. These changes will depend on the extent and integrity of permafrost. [▶ Indicator 11.5](#)

Warmer waters lead to increased productivity and potential algal blooms.

Located near Yellowknife, Jackfish Lake has had a series of studies and investigations into the cause of dramatic changes in water quality over the last decade. Nutrient and chlorophyll levels are increasing and, since 2013, the lake has been experiencing recurring algal blooms. Investigations suggest that these blooms are caused by cyanobacteria, an organism capable of photosynthesis (using sunlight to make food). Studies are suggesting that the blooms which occur annually are occurring in response to increasing nutrient enrichment and warmer water, in part due to a power plant on the lake's shore. Researchers are studying the lake to assess if it can shed some light on how water quality may change in some lakes across the NWT if climate warming continues and a local source of nutrients exist.

➤ [Indicator 11.1](#)

Learn more about Focal Point 11 in the online SOE Indicators.



Air Quality Monitoring Station. (GNWT)

12. Air

Clean air is essential to our well-being. The decisions we make every day, at home and at work, affect the quality of the air we breathe. We all share responsibility for clean air to contribute to healthy communities, resilient ecosystems and a sustainable economy for the future.

NWT air quality is typically good, with some notable exceptions in 2014 due to wildfire smoke.

Air quality is measured using an international indicator for criteria air contaminants, where the amounts of trace particles (exceedingly small airborne solids) and gases in the air around us are analyzed. National and territorial standards establish limits for the maximum amount of criteria air contaminants that can be in ambient air for air quality to be considered good. The concentration of criteria air contaminants in the air is measured and compared to these standards to determine air quality in the NWT which is considered typically good.

The summer of 2014 was an exception, with a remarkably active wildfire season, with exceedingly high ambient particulate measurements in the South Slave region (Fort Smith) and the North Slave region (Yellowknife) that exceeded NWT Guidelines for Ambient Air Quality Standards. ➤ [Indicator 12.1](#)

Learn more about Focal Point 12 in the online SOE Indicators.



Permafrost Thaw Slumps Near Aklavik. (GNWT)

13. Permafrost

Permafrost is ground that has been continuously frozen for two years or longer. In most of the NWT, permafrost is thousands of years old. Permafrost can be limited to just a few metres beneath the earth's surface, or it can extend several hundreds of metres in thickness. In the tundra, it can underlie the entire landscape or occur in smaller isolated pockets in the southern NWT. The state of permafrost in the NWT is monitored using ground temperature sensors, measuring active layer thickness (the layer of ground above permafrost that thaws in the summer and refreezes in winter), and mapping the presence of thermokarst as an indicator of sensitive terrain.

Permafrost is warming up, and in some areas accelerated thawing is causing thermokarst landscapes to develop.

Monitoring ground temperatures of permafrost, and studying the influence of snow, vegetation, and soil disturbances, gives us early warning signs on when permafrost will reach thawing temperatures (just above 0°C). In the Mackenzie Delta region, ground temperatures have increased by up to 2°C since the

early 1970s. Mean annual ground temperatures are usually below -6°C in tundra environments where permafrost may be several hundred metres thick. Rates of temperature increase have been slower (about 0.2°C per decade) in the southern Mackenzie Valley, where the mean annual ground temperatures in permafrost in the region are now close to 0°C.

Even for permafrost well below thawing temperatures, ecosystem disturbances (e.g., human activities, wildfires) and extreme summer temperature or precipitation events can affect its stability. One interesting observation emerges from thermal modeling: most permafrost warming at abandoned oil and gas infrastructure sites in the western Arctic is caused by the rapid growth of tall shrubs and accumulation of snow, rather than rising air temperatures alone. [▶ Indicator 13.1](#)

The active layer has been increasing in the NWT.

ACTIVE LAYER

The layer of soil over permafrost that thaws and refreezes each year is called the active layer. Active layer thickness is influenced by climate, vegetation, and soil conditions. Monitoring thaw depths over several years can help identify and track changes caused by vegetation change, environmental disturbance, or climate.

Warmer air temperatures can result in increased overall thickness of the active layer, slower re-freezing of the active layer, or in extreme cases, cause landslides or slumping to occur in sloping terrain. The thickness of the active layer is projected to increase this century, however, the rates of this increase will be influenced by climate, vegetation, and soil conditions. [▶ Indicator 13.2](#)

Thermokarst landscapes, peatland degradation, thaw lakes, and landslides are increasing in number and extent in the NWT.

THERMOKARST

Thermokarst is terrain that results from the thaw of ice-rich permafrost, surface-subsidence, collapse, and erosion. In flat areas, these landscapes have a pitted or undulating topography, with thaw lakes forming in shallow ground depressions. Thermokarst is often associated with peatlands which are widespread throughout the central and southern Mackenzie Valley.

In the western Arctic region, where the terrain is particularly ice-rich, thawing is resulting in extensive pond formation, expansion of lakes and development of large landslides called thaw slumps. These landslides can produce mudflows that are discharged into freshwater lakes, rivers, or the ocean. Landslides can also stabilize and cover tundra vegetation. Thermokarst impacts terrestrial and aquatic habitats, as well as buildings and other infrastructure. ➔ [Indicator 13.3](#)

Current and future permafrost thaw is threatening NWT waterbodies.

Using a standard called the “Canadian Water Resources Vulnerability Index to Permafrost Thaw,” the NWT ranked among the highest of Canadian provinces and territories in terms of how vulnerable waterbodies are to permafrost thaw. Waterbodies in the NWT are vulnerable to changes due to the ice-rich nature of some areas of permafrost in the NWT. These changes can include shifts in water quality due to permafrost degradation and thaw-driven mass wasting, and changes in water quantity due to modification of snow accumulation, melt, flow paths and runoff.

➔ [Indicator 13.4](#)

Learn more about Focal Point 13 in the online SOE Indicators.



Fire NWT. (GNWT)

14. Vegetation

Vegetation provides habitat for wildlife and ecosystem services such as food, fuel, and many other essential resources.

The area burned and the number of fires varies annually, with no clear trend.

Although there are dramatic fluctuations in annual area burned and annual number of wildfires, no significant trends were detected. Every year, about 249 wildfires occur in the NWT, burning on average 500,000 hectares of land.

Each year’s wildfire season is getting longer. Extreme weather events and changes in precipitation, soil moisture, and air temperature are predicted to result in more weather extremes, including extremely hot years followed by cold rainy years. Under the right conditions, the forests of western North America have experienced massive, high-intensity wildfires, especially when hot, dry, and windy conditions combine with dry forest fuel. These factors can also contribute to an increase in other vegetation stressors such as insects and disease, which can contribute to more extreme wildfire seasons.

➔ [Indicator 14.2](#)

Some invasive plant species introduced into the NWT are now spreading in natural ecosystems, often along roads and rivers in southern NWT.

Alien plant species that have been introduced into North America from another region of the world, are being introduced into the NWT. In 2020, 140 alien plant species were recorded in the NWT, an increase from 134 in 2015, 116 in 2010, and 94 in 2005. Not all alien plant species have negative impacts on natural ecosystems; in fact, many have been introduced for food production and are not capable of surviving winters without actions taken by people. Alien species that grow and reproduce quickly and spread aggressively in natural habitats are called invasive species. These species can harm native species and ecosystems. Currently, the only plant species found in the NWT known to be invasive are two species of sweet clovers (*Melilotus* sp.). These are common along NWT roads and are now invading river shores and mudflat islands. We expect more alien plant species to be introduced and established in the NWT in the future. It is expected that these species will likely spread into natural habitats. [Indicator 14.3](#)

Outbreaks of pest and alien insects are affecting NWT forests, are occurring further north, and may be increasing in frequency and intensity.

Occasional outbreaks in the populations of insects feeding on tree species are an expected and normal part of life in the boreal forest. However, the location, frequency, and intensity of these outbreaks is changing. The most important forest pest species in the NWT is the spruce budworm, which has been monitored in the NWT since the 1950s. In the late 1990s and early 2000s, there was an unprecedented outbreak of the spruce budworm north along the Mackenzie River Valley. However, by 2002 the population started to decline and in 2005, the population returned to moderate levels and has since stabilized. Other pest species such as tent caterpillars and bark beetles can cause significant damage to NWT forests. Two alien insects — larch sawfly and amber-marked birch leaf miner — are considered invasive and are now commonly found in

forests in the southern NWT. Mountain pine beetle was detected near the southern border in the summer of 2012, but a controlled burn and wildfire appears to have removed the infestation. This species is expected to move north again within the next decade. Its future survival and impacts on NWT forests are uncertain, and annual monitoring continues. [Indicator 14.4](#)

PEST SPECIES

Species naturally occurring in an area that can be harmful, noxious, or troublesome, whether directly or indirectly, and that causes ecological or economic damage. Pest species affecting trees are called forest pest species.

ALIEN SPECIES

Species not naturally occurring in an area that are introduced because of human actions.

INVASIVE SPECIES

Alien species that invade natural areas and may create ecological or economic damage.

Shrubs are invading the tundra, especially just north of the treeline.

The Normalized Difference Vegetation Index (NDVI) is used to study vegetation changes covering large regions of the earth, such as the tundra ecosystem. NDVI is sensitive to green leaf area, and in the tundra is identifying increases in shrub cover.

The tundra in northwestern NWT has shown a 21% increase in NDVI since 1985. Aerial photos taken of the Tuktoyaktuk Peninsula in 1980 and 2013 and ground-based measurements in the region confirmed that the NDVI changes were the result of shrubs expanding and overtopping lichen. The tundra in mainland NWT just north of the treeline also shows an overall increase in NDVI. However, a decreasing NDVI has been found around Nunavut's Arctic Archipelagos and elsewhere which indicates that the NWT's northernmost islands may not be greening for now.

Modeling of these trends suggests that shrub cover (mostly willows and birches) in tundra regions will increase by up to 52% by the 2050s compared to the mid-20th century. The ecological consequences of these changes are uncertain. Increases in woody vegetation may promote fire activity. More shrubs may increase forage for different species but may reduce the availability of lichen forage for caribou. [Indicator 14.5](#)

NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

A group of measurements from satellites, airplanes or unmanned aerial vehicles used to assess green vegetation. Higher NDVI means more vegetation growth, and in tundra ecosystems, more shrubs.

Learn more about Focal Point 14 in the online SOE Indicators.



Caribou Near Paulatuk. (GNWT)

15. Wildlife

Wildlife and biodiversity are very important to people, cultures, and the environment. The NWT is one of the few remaining regions in the world that supports large tracts of undisturbed land and intact, healthy species communities. NWT peoples, cultures, and the environment depend on the wildlife species that live here.

All five types of caribou in the NWT have been facing conservation challenges. Some caribou populations have been doing better and showing signs of recovery, but others continue to decline.

To understand the population dynamics of the five types of caribou in the NWT, it is important to consider all sources of knowledge, including Indigenous, local, and western-scientific knowledge.

Peary caribou: Peary caribou are small light coloured caribou that live on the Arctic Islands. Peary caribou populations in the NWT declined steeply between the 1960s and 1990s. There are some signs of recovery but previous die-offs after severe weather events suggest recovery is not guaranteed. Surveys on the western Queen Elizabeth Islands (2012) show more caribou than in the previous decade. There has also been some recovery on Banks Island (2014, 2019 surveys), however numbers remain low.

Dolphin and Union caribou: The Dolphin and Union caribou population is unique. Most of the herd moves on sea ice between their summer range on Victoria Island and their winter range on the mainland. The latest surveys (2018, 2020) showed a rapid decline in numbers since 2015.

Barren-ground caribou: Barren-ground caribou surveys (2021) indicate the Tuktoyaktuk Peninsula population is beginning to show improvement, the Cape Bathurst population remains small but showed a slight increase, and the Bluenose-West population remains small but stable. The Bluenose-East population shows positive signs after an ongoing decline, but the latest Bathurst population survey indicated ongoing major conservation concerns. The Porcupine caribou is a large population of caribou that ranges from Alaska to the Yukon and northwestern NWT. Numbers have been increasing since the 2000s and it is the only population of migratory caribou found on mainland NWT that has not undergone a decline in the last decade.

Northern mountain caribou: Northern Mountain caribou are found in the Mackenzie Mountains. Populations are generally thought to be stable based on scientific information, however Indigenous knowledge holders have reported population declines or displacements in some areas. Management planning is underway for northern mountain caribou in the Mackenzie Mountains to identify future needs and work on population size and trends.

Boreal caribou: About 6,000-7,000 boreal caribou are estimated to be present in the NWT. They are dispersed at a very low density in the forests east of the Mackenzie Mountains. Population trends are estimated regularly in a number of study areas across their range in the NWT. Study areas where long-term trends have been assessed have documented previous decreasing population trends in areas where habitat disturbance is high. Recent data (2017-2019) show stable to increasing trends. ENR is currently working to collect further monitoring data for the northernmost regions of the NWT. [Indicator 15.1](#)

Insect-eating migratory birds, shorebirds, and grassland birds are in steep decline.

The NWT is home to 300 species of birds but only about 6% of these bird species remain in the NWT year-round. The rest are migratory species, spending more than eight months of each year outside the NWT during migration and on their wintering grounds. In Canada, including the NWT, aerial insectivores, grassland birds, and shorebirds have declined to less than half the numbers seen in the 1970s. Not all migratory birds in Canada have declining populations, but the overall trends indicate widespread decline from changes in ecosystems, such as declines in insect populations, a mismatch in the timing of nesting and climate, and large-scale habitat changes. [Indicator 15.2](#)

The ranges of 10 out of 72 terrestrial or coastal mammals in the NWT are changing, mostly expanding northward.

The NWT is home to 72 terrestrial or coastal mammals. Of these, 10 species of mammals have shifted their ranges, some to a greater or lesser extent, over the past 15 years. These species include wood bison, muskoxen, elk, mule deer, white-tailed deer, coyote, cougar, grizzly bear, polar bear, and the northern raccoon. Most movements are from south to north, but some species, such as mainland tundra muskox, are expanding their ranges in southern forested areas, representing a re-occupation of their historical range. [Indicator 15.3](#)

The overall percentage of alien species in the NWT has not changed in the past 20 years, but monitoring programs to detect the arrival of alien insect species are limited.

The number of wild species in the NWT is tracked and reported every five years. The percentage of alien species for each taxonomic group of species (e.g., mammal, birds, etc.) is used to track the rate of species introductions. In the NWT, the percentage of alien species in most species groups is very small: from 0% (amphibians), 1% (birds, fish, butterflies), 2% (beetles). These percentages have not changed in the past 20 years. Only 1% of mammals (one species) occurring in the NWT is an alien species. However, the percentage of vascular plant species that are alien to the NWT is now at 12% and has increased by 1% every five years. The number of alien insect species is expected to increase, but tracking these species remains difficult as few monitoring programs are in place in the NWT that can detect new insect species. The NWT has an effective program to detect forest pests, but lacks systematic monitoring programs for soil fauna, micro-insects and garden and agricultural pests.

[Indicator 15.4](#)

Northern wildlife health is changing.

Wildlife health can be impacted by a range of factors, and ongoing monitoring is in place to look at the types, levels, distribution, and changes in diseases, parasites, contaminants and other health stressors. While many wildlife diseases occur in NWT wildlife, we report on a number of key indicator pathogens that have the potential to impact wildlife populations or human health, including anthrax and bovine tuberculosis (in wood bison), brucellosis and winter ticks (in ungulates), bartonella (in rodents), erysipelas (in mammals and fish), toxoplasmosis (in mammals), rabies (in foxes), trichinosis (in bears, walrus, and wolverines), and warbles (in caribou). In the NWT, some diseases have played a role in significant mortality events and population declines, such as anthrax in bison, and others need to be monitored because of their potential to impact domestic animal and human health, such as rabies and brucellosis. With changing environmental and climactic conditions, we may see new and emerging diseases in the future, such as chronic wasting disease (in ungulates), white-nose syndrome (in bats), and meningeal worm (in deer). Increasing types and levels of disease and changes in wildlife health can be an early warning sign of ecosystem change or cumulative impacts on NWT wildlife species.

[▶ Indicator 15.5](#)

Infectious diseases are also a concern for aquatic wildlife including freshwater fish, amphibians (frogs and toads), waterfowl, and marine wildlife, such as seals. Amphibians are extremely sensitive to changes in their environment, so the health of amphibian populations serves as a good indicator of aquatic ecosystem change. Two amphibian diseases implicated in global amphibian declines have been detected in the NWT, chytrid fungus and ranaviruses. They can cause die-offs and other negative effects, but the outcomes of infections at the population level are unknown. In the NWT, declines in amphibian populations over the past 20-30 years have been reported by Indigenous knowledge holders. Fish species in the NWT can have tapeworms, which can negatively impact harvest value and cause infections in humans and animals that consume raw or undercooked fish. Phocine distemper has been detected in seals in the Arctic. Avian cholera can cause outbreaks in waterfowl and there was a die-off event on Banks Island in the 1990s. [▶ Indicator 15.6](#)

Learn more about Focal Point 15 in the online SOE Indicators.



Yellow-banded Bumble Bee. (GNWT)

16. Species at Risk

The loss of biodiversity is an issue of global concern, with potentially significant consequences for the environment.

Extinct: a species that no longer exists anywhere in the world.

Extirpated: a species that no longer exists in the wild in a particular region (for example, Canada or NWT), but exists elsewhere.

One in 100 species in the NWT are at risk of becoming extirpated or extinct in the next 100 years.

About 1% of species tracked in the NWT are at risk. This percentage is called the “Species at Risk Index”. This index is higher and increasing for our amphibian (17%) and mammal (10%) species. ➔ [Indicator 16.1](#)

Nine (18%) of NWT species at risk continue to have declining population numbers.

In the NWT, 50 species have been classified as being at risk of extirpation or extinction. The reasons for these classifications are complex, but most of these species have been facing substantial accumulated threats. Recovery efforts are under way and population trends are now increasing for three (6%) species at risk, are stable for 11 (22%) species, but continue to decline for nine (18%) species. There are mixed trends (differences occur among populations or regions) for another five (10%) species at risk. Population trends are unknown for 22 (44%) of the identified species at risk in the NWT. Most of the species that have limited trend information are birds and insects. Increasing monitoring efforts and inventories will be essential to assess the status of these species in the NWT in the future. ➔ [Indicator 16.2](#)

Two of the most important threats to species at risk in the NWT are climate change and habitat change.

All threats to species at risk in the NWT were scored and analyzed using a modified version of the standardized threat classification system developed by the International Union for the Conservation of Nature (IUCN). In total, 46 species at risk in the NWT were assessed for threats: two amphibians, 14 mammals, 19 birds, four fish, four insects, and three plants. The analysis showed that no single threat to biodiversity acts independently but that the cumulative impacts and interactions of threats resulting from climate change and habitat degradation were the most important in explaining why species are at risk of extirpation from the NWT. ➔ [Indicator 16.3](#)

Learn more about Focal Point 16 in the online SOE Indicators.

Stewardship

Stewardship refers to the responsibility we have for living in and protecting the natural environment by conserving resources and living sustainably. Practicing stewardship can help ecosystems become more resilient and can in turn help to improve conditions for the environment and for people.

Focal points included are:

- *Planning and Adapting*
 - *Developing Renewable Resources*
 - *Promoting Environmental Benefits and Knowledge*
 - *Protecting Special Areas and Land Use Planning*
-

17. Planning and Adapting

Planning and adapting are key responses to a changing environment.

Transboundary water agreements are in place with three of five jurisdictions.

Transboundary water management agreements are an important way to protect the waters flowing into the NWT within the Mackenzie River Basin from upstream Alberta, Saskatchewan, British Columbia, and the Yukon. In addition, the NWT plays a key role to ensure upstream water is protected in water basins we share with Nunavut.

Transboundary agreements create a framework for cooperation and joint decision making and include a series of risk informed management actions for shared waters such as monitoring, learning plans, and setting transboundary water objectives. The GNWT has signed agreements with Alberta, British Columbia, and Yukon governments. Negotiations are ongoing with Saskatchewan for a transboundary agreement that will apply to all waters shared by Saskatchewan and NWT in the Mackenzie River Basin, including the Tazin River Watershed. The GNWT and Yukon Government are currently finalizing an update to their existing agreement.

➤ [Indicator 17.1](#)



Waterfall, Canol Trail. (GNWT)

99% of the action items in the 2019/2020 NWT Water Stewardship Strategy Progress Review had been implemented or partially implemented.

A Water Stewardship Strategy and associated action plans have been collaboratively developed to establish a partnership-based approach to enhancing and promoting water stewardship in the NWT at all levels. The last Progress Report for the 2016-2020 Action Plan showed that most Action Items were completed or in progress with 6% fully completed, 51% well under way but still requiring work, 42% initiated and in progress, and 1% not yet started. ENR and its partners worked collaboratively to develop the most recent 2021-2025 Water Stewardship Strategy Action Plan that was released in November 2021. [▶ Indicator 17.2](#)

Recovery action planning is complete for 10 of 12 species at risk listed in the NWT.

In the NWT, 12 species had been listed under the *Species at Risk (NWT) Act*, as of July 2021. Recovery strategies or management plans, as well as agreements to implement these plans, are in place for 10 of the 12 listed species. Progress reports on the actions undertaken to implement management plans or recovery strategies and progress towards meeting objectives are required every five years, or sooner. The first progress report was released in November 2021. The *Species at Risk (NWT) Act* is a relatively recent piece of legislation, coming into force in February 2010. Since that time, the NWT Conference of Management Authorities has worked collaboratively to identify targeted management actions to guide species recovery, many of which are now being implemented by a range of management authorities. Success in conserving and recovering species at risk depends on the commitment and cooperation of many different partners to implement the approaches set out in management plans and recovery strategies.

[▶ Indicator 17.3](#)

92% of funded action items in the NWT Climate Change 2019-2023 Action Plan are on track to being completed by 2023.

The 2030 NWT Climate Change Strategic Framework (CCSF) and accompanying action plan set out the GNWT's long-term plan for addressing climate change in the NWT. The GNWT produces an annual report that assesses the territory's progress on important initiatives, such as transitioning to a lower-carbon economy, improving our understanding of climate change impacts, building resilience, and adapting to a changing climate. The second progress report on the action plan was published in October 2021. The GNWT will continue to provide annual progress reports until 2023. Then, an evaluation and formal review of the CCSF and Action Plan will inform potential revisions to the CCSF and the development of the next five-year Action Plan. [▶ Indicator 17.4](#)

Learn more about Focal Point 17 in the online SOE Indicators.



Drying Fish. (NWT Archives)

18. Sustainable Use of Renewable Resources

Renewable resources, such as forests, can replenish over time. The responsible use of renewable resources such as wildlife, fish and plants has always been especially important to the people of the NWT. The sustainable use of resources is important for ensuring they remain for future generations and people stay connected to the land, passing on knowledge and practices to future generations. On-the-land activities can also help provide valuable information about the status of the environment across the NWT.

The volume of the commercial timber harvest in the NWT remains very small, but demand for wood pellets may result in increased harvest in the future.

Commercial timber harvesting has occurred throughout the forested areas of the NWT but has usually been limited to small volumes in localized areas of the southern NWT. Harvest operations on settled land claim areas and other private lands are part of the commercial timber harvest volume, as is wood harvested for commercial use through commercial cutting permits and licences and wood harvested under personal free timber cutting permits. As of 2020–2021, only one company had an active timber cutting licence. This licence authorized them to harvest up to 7,500 cubic metres from the Cameron Hills timber supply area for fuel wood

and rough-sawn lumber. Currently, planning continues to construct a wood pellet manufacturing facility that would increase timber harvesting in the southern NWT.

➤ [Indicator 18.1](#)

Trapping in the NWT has declined since the collapse of global fur prices after highs of the 1980s. Today about 500 NWT trappers are selling furs to international markets.

The number of people trapping in the NWT has decreased since the early 1980s, although numbers appear to have stopped declining in more recent years. This trend was affected by the COVID-19 pandemic which resulted in reduced participation in trapping. Participation in trapping is influenced by a variety of factors including fur prices, unemployment levels, alternate employment opportunities, and the cost of trapping equipment, fuel and supplies. In the past 10 years, about 500 active trappers have sold their furs through the Genuine Mackenzie Valley Furs program. The number of individuals who harvest fur for personal use is unknown. In many communities, traditional trapping areas continue to be used, handed down, and shared through families. ➤ [Indicator 18.2](#)

About 40% of NWT residents participate in either hunting or fishing each year. This percentage has not changed significantly since 1999.

Information about hunting and fishing activities is obtained from permits, individual surveys, household surveys and community studies. Data and trends from these sources vary, but generally suggest that hunting and fishing activities are stable to declining in recent years. Surveys show that 36% of NWT residents over 15 years old went hunting or fishing in 2019, compared with 45% in 2014, 39% in 2009, 37% in 2004, and 42% in 1999. The number of hunting licences sold declined by about 3% per year from 1990 to 2004 but has stabilized at about 1200 hunters a year since 2007. The number of fishing licences issued to NWT residents has remained relatively stable since 2000, at about 5000-6000 per year and fishing licences issued to Canadians who are not NWT residents and foreign visitors remained stable

over the last decade; however, the pandemic caused a significant drop in non-resident fishing licence purchases, from 6282 in 2019 to 514 in 2020. ➤ [Indicator 18.3](#)

About 13% of NWT residents relied on country food for most of their daily meat and fish consumption in 2018, compared to 21% in 1998.

Consumption of country food tends to be lower in larger communities. However, many NWT residents still rely heavily on country food. The number of households where 75% or more of the meat or fish eaten in the household was obtained through hunting or fishing is declining in some NWT regions (South Slave, Tłı̄chq and Yellowknife) but is stable in the Beaufort-Delta and Dehcho regions. A greater number of households hunt, fish, gather berries and trap in regions outside of Yellowknife, where only 5% of the population relies on country food for most of their daily meals. ➤ [Indicator 18.4](#)

Eco-tourism was growing before the pandemic.

The NWT's appeal as a tourist destination will continue to rely on our vast, natural environment.

Overall trends in leisure visitor volumes showed generally steady growth from 2011-12 to 2018-19, but that trend was interrupted in 2019-20 with a decline in both the number of leisure visitors and the amount of money spent by visitors due to the pandemic. Approximately 70% of the NWT's visitors are Canadians.

The number of overnight visitors to territorial and national parks was stable or increased over the past decade. An increasing trend occurred until 2018, mostly driven by robust growth in the Beaufort Delta region associated with the opening of the Inuvik-to-Tuktoyaktuk Highway in November 2017. The greatest increase in number of visitors to territorial and national parks occurred in the North Slave and South Slave regions. This increase is mostly driven by NWT residents accessing parks in these regions. The number of visitors to territorial and national parks dropped significantly in 2020 due the pandemic. ➤ [Indicator 18.5 and 18.6](#)

Learn more about Focal Point 18 in the online SOE Indicators.



Visiting Thaidene Nënë Protected Areas. (Alietum Ltd – NWT)

19. Environmental Benefits and Knowledge

Environmental literacy is the capacity of humans to understand connections between themselves and their environment. Awareness, understanding, and concern about these connections enhance informed decision making to address complex environmental issues.

Formal environmental and cultural camps and informal learning opportunities are offered in all NWT regions.

There are formal and informal ways to share environmental knowledge. Indigenous governments, Indigenous organizations, regional education districts, wildlife management boards, and other organizations and agencies work together to provide educational opportunities that cater to the diverse environmental interests of the NWT.

Formal classroom and field-based environmental education opportunities are designed for NWT students from primary grades through post-secondary levels in communities across the NWT. These formal programs typically offer a mix of Indigenous and scientific knowledge. Some examples include the Take a Kid Trapping program, Hunter Education for high school students, and the Tundra Science and Culture Camp.

Informal education opportunities are offered by trained facilitators at workshops in educational venues and natural settings. ENR also offers a number of on the land programs to support learning and mentorship, including the Take a Family on the Land Program. [Indicator 19.2](#)

Learn more about Focal Point 19 in the online SOE Indicators.



Bison and Road Traffic. (GNWT/J Nagy)

20. Protected Areas and Land Use Planning

The conservation network in the NWT includes protected and conservation areas, which provide varying levels of protection depending on the objectives of the individual site. For example, some conservation areas are guided by land use plans that detail where certain activities can take place. Protected areas, on the other hand, typically restrict most, if not all, forms of industrial development. In the NWT, conservation areas are equivalent to other effective area-based conservation measures (OECMs) as defined in national and international biodiversity targets.

17.3% of the NWT's land base (including freshwater) is in protected and conservation areas and marine protected areas cover 2.1% of the NWT's marine base.

The NWT conservation network includes several protected and conservation areas, including lands managed and co-managed by federal, territorial, and Indigenous governments. These areas differ in the way they are managed and protected.

As of 2021, 170,455km² of NWT land (including fresh water) is in protected areas (12.7% of the NWT land base) and 5,322km² of NWT's Ocean is in protected areas (2.1% of the NWT marine base). Protected areas are ecologically intact and have the highest level of protection, including from all industrial development and support biodiversity conservation. Terrestrial protected areas include Territorial Protected Areas, National Parks, and National Park Reserves, one National Historic Site, the Thelon Wildlife Sanctuary, Migratory Bird Sanctuaries, and protected areas established under Land Claim agreements.

In addition, another 61,780 km² of the NWT land base (4.6%), including freshwater, are in established conservation areas, which include Territorial Natural Environmental Parks, the Gwich'in Territorial Recreational Park, Pingo Canadian Landmark, Thaidene Nëné Wildlife Conservation Area, and conservation zoning in approved land use plans. Conservation areas provide less restrictive protection than protected areas, while still contributing to the conservation network by protecting various natural and cultural values. Two marine protected areas have been established in the coastal waters of the NWT (Tarium Niryutait and Anguniaqvia Niqiqyuam). Protection is also provided to other coastal waters as part of the Migratory Bird Sanctuaries. [Indicator 20.1 and 20.3](#)



Canoe on Water at Sunset. (GNWT)

38 of the 45 ecoregions of the NWT have protected and conservation areas.

Ecological representation is part of the NWT's conservation planning approach. It seeks to protect biodiversity in the most effective way possible by protecting a representative portion of diverse landscapes so that the majority of wild species are protected. Landscapes are classified into ecoregions using physical and biological features such as soils, elevation, climate, and vegetation. The underlying assumption with this approach is that biodiversity is distributed largely following these features, so protecting a representative portion of the features will result in protecting most of our species across our landscapes. [▶ Indicator 20.2](#)

18% of the 6,949 known archaeological sites in the NWT are in protected areas.

There are very strong ties between land and Indigenous cultures. Protecting culturally significant areas also protects areas of great ecological importance and biodiversity. The number of documented or assessed archaeological sites across the NWT continues to increase; new sites are added to the GNWT inventory of archaeological sites every year. [▶ Indicator 20.4](#)

Learn more about Focal Point 20 in the online SOE Indicators.

Chapter 2: Current Driving Forces of Environmental Change

This section describes how global environmental changes and social, demographic, and economic forces are influencing the NWT environment, resulting in additional pressures and impacts at regional and local levels. Many forces influence the environment. This section focuses on those driving forces that are most significant to the NWT environment to bring more specific and meaningful context to present and future environmental challenges in the NWT.

The driving forces are summarized in Focal Points 1 to 3 of Chapter 1 and the online SOE Indicators.

Climate Change

Climate change is one of the most significant forces affecting our environment, creating challenges for this generation and for generations to come.

Human activities have caused the earth to warm by about 1.0°C since the early twentieth century. The temperature increase in Arctic regions is projected to be two to four times higher than the global average due to Arctic amplification. Between 1948 and 2016, mean annual air temperatures increased by 1.7°C for Canada as a whole, and by 2.3°C in northern Canada. Climate change is affecting the North to a far greater degree than the rest of the world, leaving the Arctic as one of the most impacted areas in the world.

Climate change is affecting many key aspects of our environment.

Direct and indirect effects of rising air temperatures on the NWT environment include:

DIRECT EFFECTS	INDIRECT EFFECTS
Increased ocean surface temperatures	Loss of sea ice, marine species and habitat changes, ocean level rises, coastal deterioration, increased Arctic shipping, increased pollution risk
Permafrost degradation and thaw	Development of thermokarst landscapes, infrastructure deterioration, vegetation changes, water quality deterioration, release of trapped carbon (methane)
Earlier and longer growing seasons	Longer wildfire seasons, reduced air quality, species distribution changes, vegetation changes, mismatch in breeding timing in wildlife, wildlife population changes
Extreme weather events	Reduced habitat availability (rain on snow events), more lightning events, variable precipitation (droughts and floods), wildlife heat stress, human health impacts, infrastructure deterioration, reduced access to land
Changes in disease vectors	Changes in disease dynamics, novel diseases, and parasites, increase in insect harassment, reduction in wildlife health, human health impacts, wildlife population declines, reductions in country food availability and health



Birch Lake Complex fires, near Fort Providence NWT. (GNWT)



Sampling NWT. (GNWT/Anna Coles)

Global Environmental Changes

Direct effects of increasing global carbon dioxide concentrations.

Increases in global greenhouse gas concentrations are directly responsible for the noticeable changes in the NWT's oceans. In addition to warming ocean surface waters, carbon dioxide directly contributes to increasing ocean acidification, especially in the Beaufort Sea. This acidification is predicted to disrupt our marine environments within the next decade.

Global atmospheric oscillations can amplify the effects of climate change.

Global atmospheric oscillations such as El Niño-La Niña can amplify the effects of a changing climate and in some years can rapidly affect environmental conditions in the NWT. The patterns of these global atmospheric oscillations are changing due to climate

change. For example, record early spring thaws have occurred due to strong El Niño phase events, and extremely large forest fire years in the NWT have been associated with the negative phase of the summertime Arctic Oscillation. In addition, a newly identified atmospheric circulation connected to the Scandinavian oscillation pattern appears to cause more heat waves and increased rates of wildfire events in the Arctic. As a result of these changes in global atmospheric oscillations, our vegetation, wildlife, landscapes as well as people may experience amplified effects of climate change. This prediction is based on the changing strength of global atmospheric oscillation events, which have increased due to climate change, bringing more atmospheric heat to the NWT, creating rapid environmental changes in a brief period of time.

Global Economic Changes

Global demand for NWT natural resources shapes local environmental pressures.

The NWT economy is mainly focused on the development of non-renewable resources. The natural resources produced in the NWT for the global market are mainly minerals, oil, and gas, and to a lesser extent, fur. The global market for natural resources was a key driver affecting land use patterns in the NWT in the past and will likely continue to affect land use in the future when there is increased demand for NWT resources.

The potential of NWT's energy sector is driven by both global and local demand. Changes to global energy demands affect the NWT's participation in oil and gas exploration and production, leading to annual variability in activities that result in landscape changes, such as the development of seismic lines, wells, and pipelines. Additionally, energy production and resource extraction can place pressure on surrounding environments by introducing contaminants from chemicals or hazardous materials used to produce and deliver these commodities to market. Since the early 2000s, oil and natural gas production in the NWT has been declining. Oil and gas production is predicted to continue to have a declining impact on the economy over the next 10 years, which may be a result of the global shift away from fossil fuel use. However, interest in oil and gas in the NWT could increase if there is a market shift to ethical, secure, and cleaner fuel supplies.

From 2002 onward, NWT commodities sold in global markets shifted from gold and silver to diamonds. The NWT also has deposits of rare earth elements and other critical minerals that are essential for shifting the world's economy to cleaner energy and continued growth in the digital age. The NWT's production is currently small but demand for these critical minerals is expected to increase.

CRITICAL MINERALS

Minerals that are considered the building blocks for a clean and digitized economy. They include rare earth elements, tungsten, and other minerals found in the NWT.

From 2013 to today, we have seen a rise in domestic fur sales and a decrease in export sales because of changes in the international fur market and the overall decline in global fur demand.

Increased global demands for shorter shipping routes will have an impact on our ocean ecosystem.

As icebreaker ships increasingly navigate through Arctic routes, their passage can negatively alter sea ice conditions. Sea ice is an important habitat component for Arctic wildlife and is also affected by rising global temperatures and climate change. Changes in sea ice conditions lead to complex effects in Arctic marine ecosystems and sea surface temperatures. Declining sea ice results in habitat loss for polar bears and seals, as well as a decline in algal growth, which is an important food source for many marine species.

Global population increase will put extra pressures on our environment.

A growing global population will generally demand more goods and services, which in turn will place increasing pressure on the environment. Increasing industrial activities around the globe will result in increases in some global pollutant levels that can accumulate in the Arctic due to long range atmospheric transport. These contaminants can affect water quality, air quality, wildlife health, and biodiversity.

Chapter 3: Early Warning Signs & Cumulative Impacts



Permafrost Melt. (GNWT/D Downing)

Early Warning Signs

Early warning signs are small but noticeable changes in the environment that can warn us that much larger impacts may occur in the future if nothing changes.

Each focal point was examined to see whether there are current signs that are likely to lead to:

- Sudden and irreversible impacts on the NWT's environment (tipping points).
- Greater impacts in the next few decades (short-term warnings).
- Greater impacts before the end of this century (long-term warnings).

Predicted future impacts are summarized below, with links to the indicators that provide more information about warning signs that underlie the prediction. Uncertainties in the ability to predict if and when some impacts will occur are also noted.

Predicted Tipping Point Impacts

- Sudden and irreversible ocean ecosystem shifts (e.g., declines in species of mammals and birds, loss of shellfish) due to summer sea ice loss, ocean water temperature increase and ocean acidification. This is expected to occur in the next decade or so. [▶ Indicators 1.2, 9.1, 9.2](#)
- Increased methane release due to permafrost thaw. This is irreversible and already occurring, leading to increased global temperatures. [▶ Indicators 1.1, 8.3](#)

Predicted Short-term Impacts

- Continued large scale coastal erosion due to rising sea levels and permafrost thaw. [▶ Indicators 1.2, 9.3, 13.3](#)
- Continued increases in landslides and slumping, especially in ice-rich terrain in the northern NWT, reduced land access, changes to freshwater systems, changes in landscape (thermokarst), changes in wildlife habitat, changes in vegetation (increasing shrubs), and possible major damage to local infrastructure and to ecosystem services, such as natural clean water provision, flood regulation, and recreational and cultural services. [▶ Indicators 13.3, 14.5, 15.1, 19.2](#)
- Continued waterflow increases, in part due to warmer winters, changes in precipitation patterns, increases in solutes, sediments and contaminant loads resulting in changes to freshwater ecosystems. [▶ Indicators 2.1, 11.2, 11.3, 11.4](#)

- Continued long-range deposition of contaminants and increased methylation of mercury resulting in bioaccumulation and biomagnification in large lake fish. ➤ [Indicators 1.1, 8.3](#)
- Increased frequency and severity of extreme weather events in both hot-dry years and cold-rainy years. Uncertainties exist due to difficulties in predicting future precipitation patterns. ➤ [Indicators 1.2, 1.4](#)
- Increased frequency and severity of weather events due to changes in global atmospheric oscillations. ➤ [Indicators 1.2, 1.4, 2.3.](#)

Predicted Long-term Impacts

- Increased effects of pests and invasive species in forest and river ecosystems due to warmer winters. ➤ [Indicators 2.1, 14.3, 14.4](#)
- Potential for landscape changes if demand for NWT resources increases. Resulting habitat and land use changes will require mitigation. ➤ [Indicators 3.2, 3.3, 5.4, 6.1](#)
- Reduced air quality in summers due to longer wildfire seasons and local and global industrial developments. ➤ [Indicators 1.1, 1.3, 12.1, 14.2](#)
- Increased possibility of spills and other contamination (e.g., air pollution, introduction of marine alien species) due to increases in shipping in the Northwest Passage. ➤ [Indicators 1.2, 5.1](#)

Cumulative Impacts

The combined impacts of driving forces and pressures pose a significant risk to ecosystems and communities in the NWT. Cumulative impacts are the combined effects that human activities and natural processes have on our environment.

CUMULATIVE IMPACTS ON ECOSYSTEMS

Although the environment of the NWT is changing, generally the environment is healthy, and ecosystems are intact.

Climate change, resulting in increasing temperatures and changes in precipitation, combined with regional landscape changes (e.g., habitat loss and fragmentation) act in a cumulative manner on terrestrial and freshwater ecosystems, most particularly on fish, wildlife, forest health, vegetation (shrub growth), water quality and quantity, and permafrost thaw in the NWT. These impacts will likely lead to long-term ecosystem shifts. Other changes, such as reduced air quality, from wildfire can adversely affect both wildlife and human health. Global demand for natural resources from the NWT may increase in the future, and this would place additional pressure on ecosystems in the NWT.

Marine ecosystems are also under pressure due to climate change and an increasing global demand for natural resources. Increased shipping in the Northwest Passage, ocean acidification, and decreased sea ice are increasing pressures placed on the Beaufort Sea ecosystems.

CUMULATIVE IMPACTS ON HUMAN HEALTH

Human health is directly affected by economic driving forces and the pressures these forces exert on the environment. Global population growth and increasing demand for natural resources can result in global increases in environmental contamination that have negative effects on human health. A larger human

population also means more greenhouse gas emissions, which affects air and water quality.

Human health is also affected indirectly by climate change. For example, declining air quality from longer and more intense wildfire seasons affects human health and well-being. Climate change is responsible for changes to wildlife health, storm surges, and permafrost thaw, all of which have impacts on human health. Climate change may also impact people's lifestyle decisions and affect community cohesion and resiliency. For example, as floods threaten infrastructure, people living near waterbodies may decide to live in different areas that are less vulnerable to floods but with different access to traditional resources. Similarly, as wildfires increase, people in NWT communities may be temporarily displaced if a fire threatens their home and community; this affects both the physical and mental health of people.

CUMULATIVE IMPACTS ON COMMUNITY LIVELIHOODS

In conventional economic terms, local economic growth is seen as a natural outcome of general population growth, as are increases in energy production and natural resource exports to meet global demands. The economy of the NWT relies heavily on mineral extraction, such as diamond mining. Therefore, when demand for these resources changes worldwide, the NWT economy feels the effects. The NWT has a robust co-management regulatory system to ensure that the effects of development are understood and minimized as much as possible.

Unlike conventional economic analysis that looks primarily at economic growth as a measure of economic health, we have chosen to look at changes in community livelihoods. We define community livelihood as the economic, social, and cultural means to ensuring community health and resiliency for current and future generations. Community livelihoods are an integral part of our environment.

Changes in the global economic outlook affect our environment in general, and the NWT's community livelihoods, in terms of economic investment, business opportunities and job creation.

Climate change also affects community livelihoods in many ways. Emerging changes in wildlife habitat, wildlife populations, and wildlife health affect community livelihoods by modifying access to resources (country food) that are integral to Indigenous culture and health. Permafrost degradation impacts the quality of existing infrastructure, and the cost and complexity of future infrastructure developments. Key driving forces, including global natural and health events and climate change acting in tandem with global and Arctic atmospheric oscillations, have cumulative impacts resulting in large and sometimes long-term disruptions of community livelihoods. For example, severe weather events like floods or droughts lead to pressure on cultural resources, infrastructure, travel, and housing.

Local stewardship responses can help address the impacts of the changing planet and the pressures on the NWT's ecosystems, human health, and community livelihoods. It's important to stay informed, promote environmental awareness, and enhance planning, mitigation, adaptation, and protection efforts so that we can do our part to protect the environment.

Chapter 4: Positive Trends and Future Actions

Stewardship is our collective responsibility for taking care of the environment through the wise use of resources, and through protection and conservation efforts.

Responding to our changing environment requires the use of sound information to understand impacts, plan effectively and act quickly when necessary. Across the NWT, people, organizations, and governments act as stewards of the land and resources, helping to counteract negative impacts on the environment. These efforts can be seen across and within initiatives and systems, in the private and public sectors, throughout multiple levels of governments, agencies and organizations, and on individual and broad scales.

- **Sustainable industrial development:** Robust regulatory systems are in place in the NWT to ensure development of natural resources is done responsibly and sustainably. The *2020 NWT Environmental Audit* checked to make sure the environment is protected through the NWT's integrated system for land and water management. The Audit concluded that overall, the system for managing land and water use in the NWT is working and, while some improvements can be made, no significant problems were identified.
- **Protecting land, water, and biodiversity:** Protecting critical areas of the NWT's most biologically diverse and culturally rich areas collectively contribute to ecological stability by ensuring landscapes are connected and important habitat for wildlife, which support species migration and adaptation are conserved.
- **Ensuring clean and abundant water:** While the water ecosystems in the NWT are generally healthy, the NWT's abundant freshwater resources require water partners to continue the broad and collaborative management approaches within and upstream of the NWT. Successful implementation of the *NWT Water Stewardship Strategy* and transboundary water management agreements with neighbouring jurisdictions help ensure the waters of the NWT remain clean, abundant, and productive for all time.
- **Ensuring clean air:** Clean air is essential to our well-being and the decisions we make every day affect the quality of the air we breathe. While air quality in the NWT is generally very good, we all share responsibility for clean air and many factors can affect air quality in the NWT, including local and long-distance emissions from wildfires and human-caused pollution, such as smoke or exhaust

from heating buildings, driving vehicles and our choice of vehicle type, and industrial development. Monitoring air quality in the NWT is done from state-of-the-art air quality monitoring stations, as part of a Canada-wide network and systems are in place to monitor precipitation to better understand regional patterns and trends.

Implementing the *2030 Energy Strategy* to reduce greenhouse gas (GHG) emissions by using more sustainable and alternative energy sources continues to drive us towards cleaner air in the future. Wind and solar projects are being implemented in several NWT communities and the Taltson Hydroelectricity Expansion project is being planned to help reduce our reliance on diesel fuel. In 2020-21, the NWT reduced its GHG emissions by 9.6 kilotonnes CO₂e since 2019.

- **Managing waste and pollution:** Keeping pollutants and hazardous substances out of the environment requires systems for managing household and industrial waste and spills. Although waste management infrastructure and systems differ between NWT communities, public events, education materials, public reporting systems, technical supports and effective waste diversion and management programs are available and adapting to help the public manage and minimize the impacts of waste and spills. The GNWT is currently working to implement three new waste diversion programs for used oil, tires, and electronics.
- **Planning, managing, and using information:** Not only is it important to research and monitor priority aspects of the environment to understand what is changing and the impacts of those changes, we also need dependable ways to store, share, assess and use that information. Knowledge priorities are articulated in the GNWT's Knowledge Agenda, as well as other strategies and action plans making it easier for research partners to align their interests with the needs of communities. Existing

information systems to store water, wildlife, forest, cumulative impact, and geologic data continue to be used and new ones are being built to make environment and climate data more accessible to those who need it, and in ways that serve users' needs.

- **Making wise decisions:** In 2021, the GNWT became the second jurisdiction in Canada to ensure government decisions explicitly consider climate change. In 2022, the GNWT will also be the second jurisdiction in Canada to finalize a Statement of Environmental Values that will apply to all GNWT departments and most agencies, to ensure environmental principles are at the forefront of decision-making and bolstering accountability for those decisions.
- **Educating and inspiring action:** Creating diverse and impactful educational materials and opportunities that teach us about the connections between ourselves and the environment continue to be needed. Education and awareness must strive to reach diverse audiences, through both scientific and Indigenous worldviews, using mediums that connect with young people and Elders alike, and that resonate with various education levels. Finding ways to bring our ideas and perspectives together will help everyone see their role in environmental stewardship.



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Next Steps

The NWT SOE Report is published every four years. Each report provides updated information about each of the indicators. As we gain more knowledge, we improve existing management practices to ensure the territory's environment remains resilient now and for future generations.

Sources and Acknowledgement

This NWT SOE Report 2022 is based on the information provided in the online SOE Indicators. Refer to the SOE Indicators for all sources and references, available at <https://www.enr.gov.nt.ca/en/nwt-state-environment-report>.

The Department of Environment and Natural Resources (ENR), GNWT coordinated the production of the NWT SOE Report 2022 with the help of an external contractor, Hemmera, of Yellowknife, NWT. A draft report was reviewed by relevant departments in the GNWT, and ENR produced the final version tabled in the Legislative Assembly for public review.

ENR would like to thank all contributors for their help with this report. ENR retains all responsibilities for any omissions or errors the report may contain.

Appendix A – Overview of State of Environment Framework

Overview of the DPSIR Framework

The Driving Force, Pressure, State, Impact, Response (DPSIR) framework is a tool that is widely used to analyze the important and inter-connected relationships between global and regional factors affecting our environment and society. The figure below shows how we can explore environmental issues and trends in the NWT through the series of cause-and-effect loops in the DPSIR framework. By exploring the connections between the DPSIR components, relationships become clearer, and we increase our understanding of how global changes (Driving Forces), human activities (Pressures) and environmental changes (State and Impacts) interplay with the health and socio-economic aspects of our life (Responses and Stewardship).



The DPSIR components are:

- **Driving forces (D)** are the global causes of change in our environment. These forces are the environmental, socio-economic, and cultural drivers of global human activities that either increase or relieve pressures on the environment. In the context of the NWT, these can be global or continental forces affecting directly or indirectly, the local pressures on our environment.
- **Pressures (P)** are the local or regional stressors on the environment caused by the driving forces and their associated human responses. These stressors place direct pressure on the environment.
- **States (S)** reflect the current condition of the environment. These conditions will change due to driving forces, pressures, and our responses to past conditions. Typically, states describe the characteristics or qualities of parts of an ecosystem, such as water, air, or biodiversity.
- **Impacts (I)** reflect the effects that changes in the state of an environmental component have on human society, economy, or health. Impacts can also affect the quality of the environment, measured for example by the level of environmental services provided, or influence the way the environment functions, measured for example by the level of ecosystem integrity. In the current report, the State and Impact components are grouped together.

- **Responses (R)** reflect the actions taken by humans to respond to, adapt to, control, or reverse negative impacts on our environment. These responses can directly or indirectly address the driving forces, pressures, states, or impacts in the system. In the current report, this component is called “Stewardship”.

The DPSIR framework helps us better understand and investigate relationships between the five components that cause change in the environment. Using this tool makes it easier to see the complexity of environmental issues within the NWT and plan appropriate responses.

Indicators

Indicators provide background information about key components of the environment. Each indicator was drafted following a template to ensure content included information about the nature of the indicator, the author(s) of the indicator, the NWT context, current status and trends, information about future trends and impacts, information about status and trends in other jurisdictions as appropriate, all cited references, and any additional technical notes. The indicators are grouped into focal points, themselves organized into a modified version of the DPSIR framework: Driving Forces, Pressures, State and Stewardship.

The indicators used to produce the NWT SOE Report 2022 are provide at <https://www.enr.gov.nt.ca/en/nwt-state-environmentreport>. Indicators will be updated online in the future. Each indicator is date-stamped.

Ecological Regions

For some indicators, data and information are organized according to the major ecological regions of the NWT. These regions are also called Ecozones. The NWT has diverse ecosystems found in six ecozones (see map below). More information about these regions is available online in <https://www.enr.gov.nt.ca/en/services/ecosystem-classification>.



Licence for Use of information

All baseline information provided in each indicator can be cited with attribution to ENR, GNWT. All figures, charts or tables can be used and adapted with attribution to ENR, GNWT, except figures with third-party copyright as clearly noted in the figure caption.

Availability of Baseline Data

ENR baseline data displayed in figures, charts or tables in each indicator are available by contacting enviro@gov.nt.ca, or visiting ENR's website.

