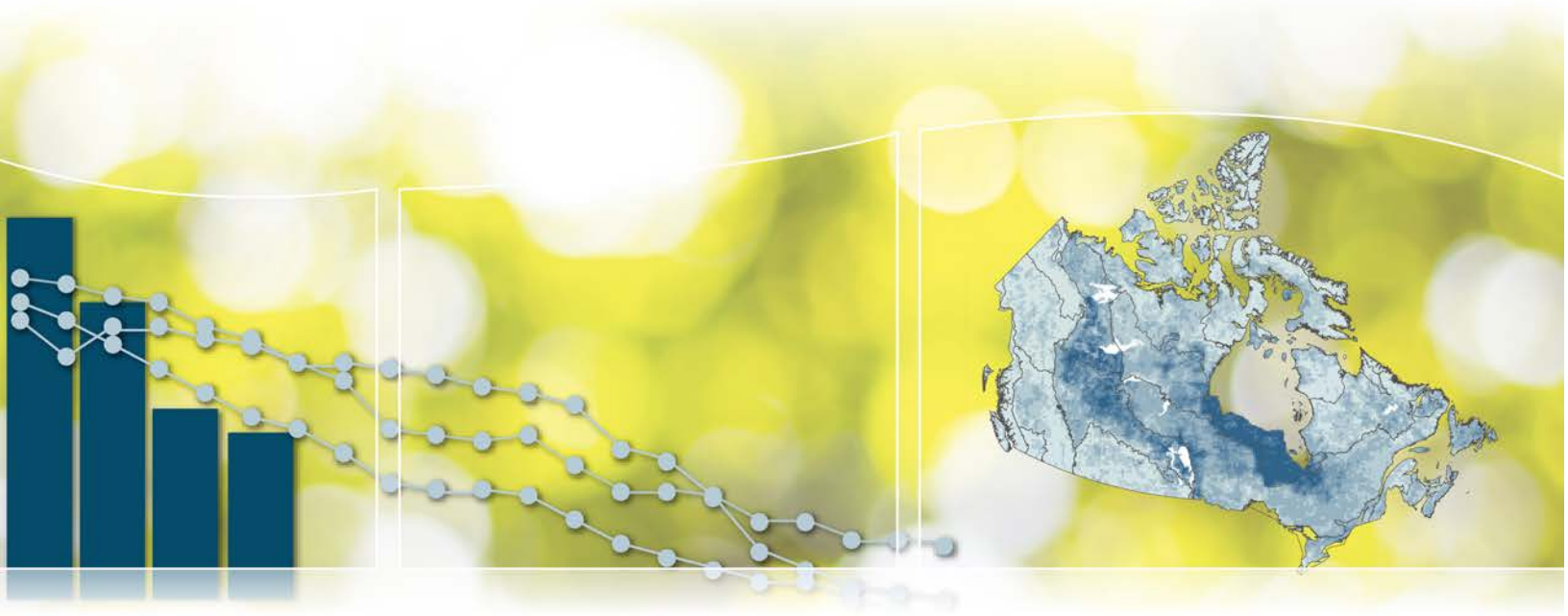
Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canadian Environmental Sustainability Indicators

Ecological integrity of national parks



Canada

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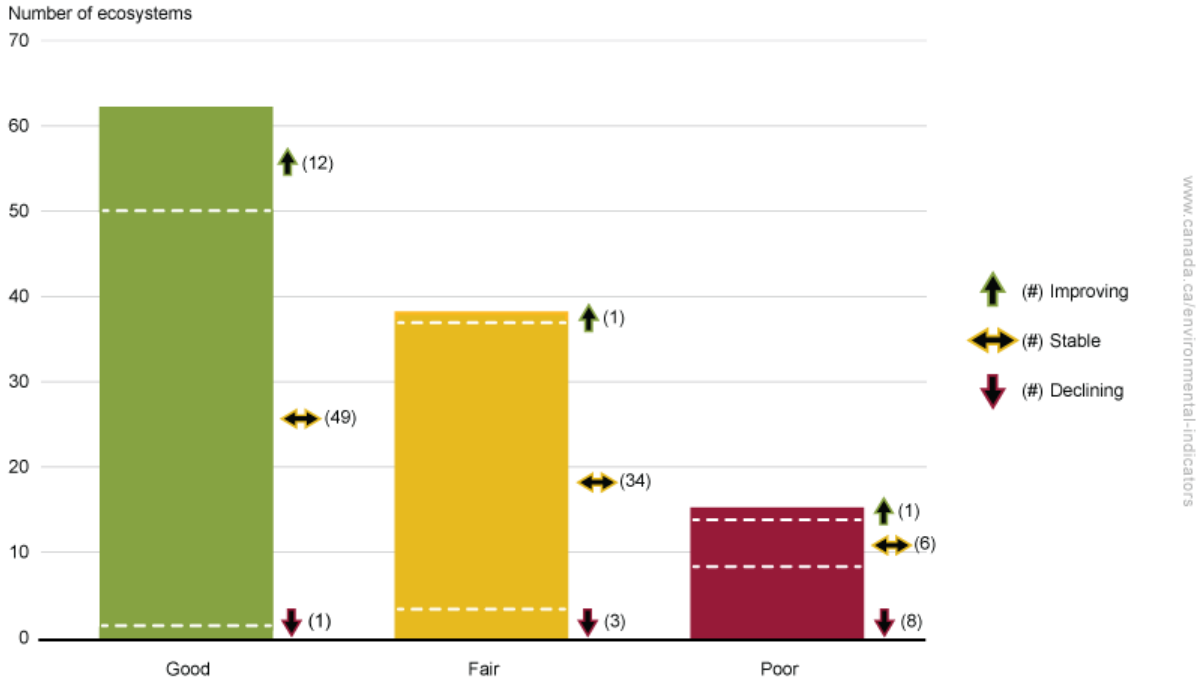
Ecological integrity of national parks indicator

Ecosystems have integrity when their native species, landscapes and functions are intact.[1] The ecological integrity of national parks is assessed by monitoring representative components of major park ecosystems, such as forest, freshwater and wetlands. It is a key measure of the condition of our national parks.

Key results

- Of the 115 ecosystems in 41 national parks[2] that were assessed, 54% are reported to be in good condition, and another 33% are in fair condition. The remaining 13% are in poor condition.
- Most park ecosystems are stable (89 of 115, 77%), 14 have improving trends, and 12 have declining trends.

Figure 1. Ecological integrity status and trends of ecosystems in 41 national parks, Canada, 2016



Data for Figure 1

Note: Park ecosystems may include forest, freshwater, wetlands, grasslands, shrublands, tundra, coastal/marine and glaciers, depending on what is present in each park.
Source: Parks Canada (2016) State of Canada's Natural and Cultural Heritage Places 2016.

[1] Parks Canada (2013) Science and Conservation – Ecological Integrity. Retrieved on November 9, 2016.

[2] Akami-Uapishk^{U}-KakKasuak-Mealy Mountains, Sable Island and Nááts'ihch'oh National Park Reserves and Auyuittuq and Qausuittuq National Parks did not report ecological integrity indicators in 2016. Rouge National Urban Park has also not yet reported.

Key measures are selected to represent each ecosystem's overall condition. Each of these measures is compared to threshold values and assigned a score. The scores within each ecosystem are then averaged together to generate an ecosystem rating.

Most of the ecosystems that improved were freshwater systems (8 systems). Most of the declining ecosystems were forests (5 systems).

Ecological integrity trends by ecosystem type, Canada, 2016

Ecosystem	Improving (number of ecosystems)	Stable (number of ecosystems)	Declining (number of ecosystems)	Total (number of ecosystems)
Forest	0	26	5	31
Shrublands	1	1	0	2
Grasslands	0	4	1	5
Tundra	1	16	0	17
Freshwater	8	24	2	34
Glaciers	0	0	1	1
Wetlands	1	8	2	11
Coastal/marine	3	10	1	14

Parks Canada identifies the major stressors of national parks[3] as being the following:

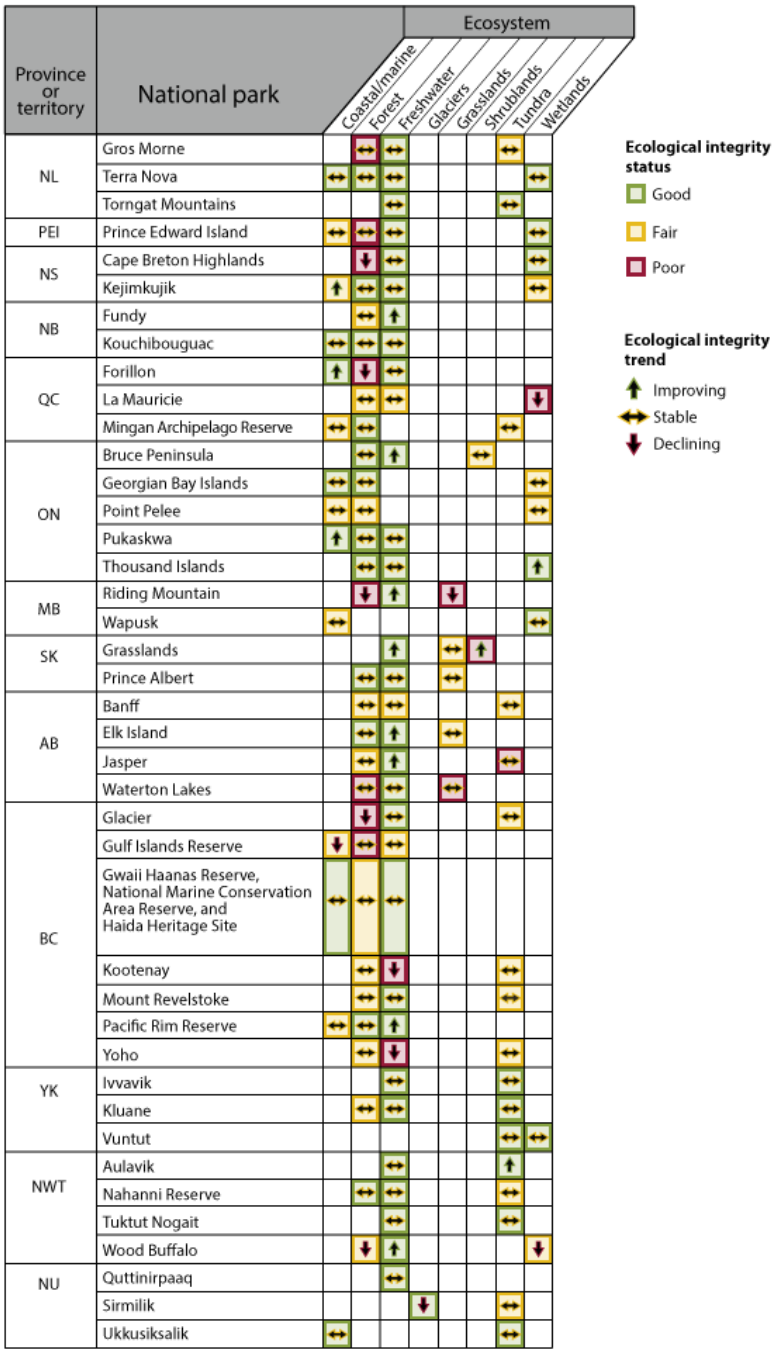
- Habitat loss
- Habitat fragmentation (for example, building of roads and trails)
- Losses of large carnivores, such as wolves
- Air pollution and acid rain
- Pesticides
- Invasive alien species
- Over-use

Parks are interlinked with their surrounding ecosystems and, despite their protected status, they are affected by many of the same pressures we place on the environment in general. Climate change and the long-range movement of pollution affect ecosystems inside and outside parks. The ecosystems respond differently to stressors, and they also respond differently to management actions. Some management actions may take many years to show results, particularly for slow-growing vegetation.

[3] Parks Canada (2015) Science and conservation – Stressors. Retrieved on November 9, 2016.

Data for individual parks

Figure 2. Ecological integrity status and trends of ecosystems in 41 national parks by province and territory, Canada, 2016



Data for Figure 2

Source: Parks Canada (2016) State of Canada's Natural and Cultural Heritage Places 2016.

About the indicator

What does the indicator measure

The indicator summarizes the status and trends of ecosystems within national parks.

The condition of ecosystems within national parks is evaluated regularly using a series of monitoring measures that are designed to track biodiversity and natural processes within those ecosystems. These measures are rolled up to produce ecological integrity indicators[4] for up to 4 major ecosystems in each park.

Each ecological integrity indicator consists of a rating (good, fair, poor) and a trend (improving, stable, declining), based on monitoring results and knowledge of ecological systems. These are summed to provide an overall picture.

Why is this indicator important

The Canadian Environmental Sustainability Indicators (CESI) reports on the ecological integrity of national parks as an indicator of the condition of Canada's protected areas. National parks represent a third of the protected area in Canada.

Parks Canada manages ecosystems to improve or maintain ecological integrity. Management plans systematically address opportunities for improving the integrity of park ecosystems. Funding for ecological restoration is prioritized for ecosystems that are in poor or declining condition. Environmental assessments and law enforcement are also key tools for maintaining the natural beauty of these treasured places.

This indicator supports the measurement of progress towards the long-term goal of the Federal Sustainable Development Strategy 2016–2019: Lands and forests support biodiversity and provide a variety of ecosystem services for generations to come. As of March 2016, the condition of 90% of park ecological integrity indicators was maintained or improved from 2011.

What are the related indicators

Canada's protected areas describe the amount and location of area protected within Canada and show how well our protected area network represents our broad ecological regions.

Global trends in protected areas compare the area protected in a set of peer countries.

Sustainably managed lands and forests

This indicator supports the measurement of progress towards the following 2016–2019 Federal Sustainable Development Strategy long-term goal: Lands and forests support biodiversity and provide a variety of ecosystem services for generations to come.

[4] Parks Canada refers to ecological integrity indicators in its reporting. This refers to the status and trends of key ecosystems in each park. The CESI Ecological integrity of national parks indicator, however, refers to an aggregate indicator across all parks and park ecosystems.

Data sources and methods

What are the data sources

The indicator summarizes ecosystem scores drawn from the State of Canada's Natural and Cultural Places 2016. The report contains the most recent available information from each park ecosystem, blending data that is from 0 to 10 years old. Selected measures in each major park ecosystem are combined and the ecosystem is scored as good, fair or poor. Parks Canada monitoring for ecological integrity formally began in 2008 and is ongoing.

More information

Ecological integrity is reported for major ecosystems in 41 of Canada's national parks. Data are not yet available for Akami-Uapishk^{U}-KakKasuak-Mealy Mountains National Park Reserve, Sable Island National Park Reserve, Nááts'ihch'oh National Park Reserve, Auyuittuq National Park, Qausuittuq National Park, or Rouge National Urban Park.

Between 1 and 4 major ecosystems in each park have ecological indicators. They are based on monitoring designed for the individual circumstances of each park. Examples of major ecosystems include forests, wetlands, and glaciers. Major ecosystems form most of the area of a park and are important to its biological functioning. For each major ecosystem, a scientifically sound set of environmental measures is developed, based on appropriateness, representativeness, monitoring needs and cost-effectiveness. Some examples of ecological integrity measures include wildlife surveys, estimates of plant productivity, water quality measurements, and invasive species surveys. Data for these underlying measures are gathered from a variety of sources, including on-the-ground field sampling, satellite imagery, academic and government partners, and traditional knowledge. Measured levels are compared to thresholds, such as whether a wildlife population is near desirable levels or whether water meets a water quality standard. Interim thresholds based on significant changes in desired traits are used when more biologically based assessments are not available. The frequency of monitoring varies from annually to once a decade, depending on the specific measurement.

Data are collated and stored in a database, the Information Centre for Ecosystems, to support management and reporting.

How is this indicator calculated

Ecological integrity monitoring is adapted to the ecology of each individual park. Information is gathered for each of the major ecosystems, and a determination is made as to whether the ecosystem is in good, fair or poor condition and whether it is improving, declining or stable. Complete methods information is available in Parks Canada's 2011 Consolidated Guidelines for Ecological Integrity Monitoring in Canada's National Parks, available from the Protected Areas Establishment and Conservation Branch, Parks Canada.

More information

Ecosystem status is determined from the monitoring results as follows: each measure is assigned a score based on its condition compared to its threshold (good = 2, fair = 1, poor = 0). If one-third or more of the measures are scored poor, the ecosystem-level indicator is also scored poor. Otherwise, the average score of the measures (weighted equally) determines the ecosystem score.

The assessment of the overall trend for each major ecosystem is based on a change in its status from 5 years previously. If the condition of the ecosystem indicator has not changed, it is considered stable unless a strong majority of the measures selected for that ecosystem have the same trend.

The national-level indicator is an overall assessment of ecological integrity across national parks. It is generated by summing the ecosystem-level indicator scores in each combination of status and trend across parks.

What has recently changed

Information on the status and trends of park ecosystems has strengthened since the last time this indicator was updated, and results can be reported on a greater number of park ecosystems. Changes in reporting approach have changed the presentation of the data, but the underlying information is similar. The frequency of Parks Canada national reporting has been reduced from every 2 years to every 5 years.

What are the caveats and limitations

The measurements used to determine the status and trend of major ecosystems are chosen to represent the most important elements of the ecosystem and thus provide an indication, rather than a complete assessment, of ecological integrity. Monitoring takes place against a background of natural variability, and because some locations are remote and some measurements are time-consuming or expensive to conduct, the frequency of monitoring may be low. This leads to unavoidable uncertainty in assigning status and trends to ecosystems.

Ecosystems are not of equal area or of equal importance in parks; comparisons between systems or between parks must be made with caution.

Some parks have not yet reported, while others are basing their reports on incomplete suites of measures that reflect current data availability. Ecological integrity measures are selected using objective techniques to provide credible overall assessments. Where information is incomplete, preliminary data and statistical principles are used to support the selection of measures and the definition of thresholds.

The equal weighting of measures may not always reflect their relative ecological importance.

The data do not include provincial or other parks or other types of protected areas.

Resources

References

Parks Canada (2016) State of Canada's Natural and Cultural Heritage Places 2016. Retrieved on November 9, 2016.

Parks Canada (2013) Science and conservation – Ecological Integrity. Retrieved on November 9, 2016.

Parks Canada (2011) Consolidated Guidelines for Ecological Integrity Monitoring in Canada’s National Parks. Protected Areas Establishment and Conservation Branch, Parks Canada.

Parks Canada (2011) The State of Canada's Natural and Historic Places 2011. Retrieved on November 9, 2016.

Related information

Parks Canada

Annex

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. Ecological integrity status and trends of ecosystems in 41 national parks, Canada, 2016

Ecological integrity status	Improving (number of ecosystems)	Stable (number of ecosystems)	Declining (number of ecosystems)	Total (number of ecosystems)
Good	12	49	1	62
Fair	1	34	3	38
Poor	1	6	8	15
Total	**14**	**89**	**12**	**115**

Note: Park ecosystems may include forest, freshwater, wetlands, grasslands, shrublands, tundra, coastal/marine and glaciers, depending on what is present in each park.
Source: Parks Canada (2016) State of Canada's Natural and Cultural Heritage Places 2016.

Table A.2. Data for Figure 2. Ecological integrity status and trends of ecosystems in 41 national parks by province and territory, Canada, 2016

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
NL	Gros Morne	Forest	Poor	Stable
NL	Gros Morne	Freshwater	Good	Stable
NL	Gros Morne	Tundra	Fair	Stable
NL	Terra Nova	Coastal/marine	Good	Stable
NL	Terra Nova	Forest	Good	Stable
NL	Terra Nova	Freshwater	Good	Stable
NL	Terra Nova	Wetlands	Good	Stable
NL	Torngat Mountains	Freshwater	Good	Stable
NL	Torngat Mountains	Tundra	Good	Stable
PEI	Prince Edward Island	Coastal/marine	Fair	Stable
PEI	Prince Edward Island	Forest	Poor	Stable
PEI	Prince Edward Island	Freshwater	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
PEI	Prince Edward Island	Wetlands	Good	Stable
NS	Cape Breton Highlands	Forest	Poor	Declining
NS	Cape Breton Highlands	Freshwater	Good	Stable
NS	Cape Breton Highlands	Wetlands	Good	Stable
NS	Kejimkujik	Coastal/marine	Fair	Improving
NS	Kejimkujik	Forest	Good	Stable
NS	Kejimkujik	Freshwater	Good	Stable
NS	Kejimkujik	Wetlands	Fair	Stable
NB	Fundy	Forest	Fair	Stable
NB	Fundy	Freshwater	Good	Improving
NB	Kouchibouguac	Coastal/marine	Good	Stable
NB	Kouchibouguac	Forest	Good	Stable
NB	Kouchibouguac	Freshwater	Good	Stable
QC	Forillon	Coastal/marine	Good	Improving
QC	Forillon	Forest	Poor	Declining
QC	Forillon	Freshwater	Good	Stable
QC	La Mauricie	Forest	Fair	Stable
QC	La Mauricie	Freshwater	Fair	Stable
QC	La Mauricie	Wetlands	Poor	Declining
QC	Mingan Archipelago Reserve	Coastal/marine	Fair	Stable
QC	Mingan Archipelago Reserve	Forest	Good	Stable
QC	Mingan Archipelago Reserve	Tundra	Fair	Stable
ON	Bruce Peninsula	Forest	Good	Stable
ON	Bruce Peninsula	Freshwater	Good	Improving
ON	Bruce Peninsula	Shrublands	Fair	Stable
ON	Georgian Bay Islands	Coastal/marine	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
ON	Georgian Bay Islands	Forest	Good	Stable
ON	Georgian Bay Islands	Wetlands	Fair	Stable
ON	Point Pelee	Coastal/marine	Fair	Stable
ON	Point Pelee	Forest	Fair	Stable
ON	Point Pelee	Wetlands	Fair	Stable
ON	Pukaskwa	Coastal/marine	Good	Improving
ON	Pukaskwa	Forest	Good	Stable
ON	Pukaskwa	Freshwater	Good	Stable
ON	Thousand Islands	Forest	Good	Stable
ON	Thousand Islands	Freshwater	Good	Stable
ON	Thousand Islands	Wetlands	Good	Improving
MB	Riding Mountain	Forest	Poor	Declining
MB	Riding Mountain	Freshwater	Good	Improving
MB	Riding Mountain	Grasslands	Poor	Declining
MB	Wapusk	Coastal/marine	Fair	Stable
MB	Wapusk	Wetlands	Good	Stable
SK	Grasslands	Freshwater	Good	Improving
SK	Grasslands	Grasslands	Fair	Stable
SK	Grasslands	Shrublands	Poor	Improving
SK	Prince Albert	Forest	Good	Stable
SK	Prince Albert	Freshwater	Good	Stable
SK	Prince Albert	Grasslands	Fair	Stable
AB	Banff	Forest	Fair	Stable
AB	Banff	Freshwater	Fair	Stable
AB	Banff	Tundra	Fair	Stable
AB	Elk Island	Forest	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
AB	Elk Island	Freshwater	Good	Improving
AB	Elk Island	Grasslands	Fair	Stable
AB	Jasper	Forest	Fair	Stable
AB	Jasper	Freshwater	Good	Improving
AB	Jasper	Tundra	Poor	Stable
AB	Waterton Lakes	Forest	Poor	Stable
AB	Waterton Lakes	Freshwater	Good	Stable
AB	Waterton Lakes	Grasslands	Poor	Stable
BC	Glacier	Forest	Poor	Declining
BC	Glacier	Freshwater	Good	Stable
BC	Glacier	Tundra	Fair	Stable
BC	Gulf Islands Reserve	Coastal/marine	Fair	Declining
BC	Gulf Islands Reserve	Forest	Poor	Stable
BC	Gulf Islands Reserve	Freshwater	Fair	Stable
BC	Gwaii Haanas Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	Coastal/marine	Good	Stable
BC	Gwaii Haanas Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	Forest	Fair	Stable
BC	Gwaii Haanas Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	Freshwater	Good	Stable
BC	Kootenay	Forest	Fair	Stable
BC	Kootenay	Freshwater	Poor	Declining
BC	Kootenay	Tundra	Fair	Stable
BC	Mount Revelstoke	Forest	Fair	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
BC	Mount Revelstoke	Freshwater	Good	Stable
BC	Mount Revelstoke	Tundra	Fair	Stable
BC	Pacific Rim Reserve	Coastal/marine	Fair	Stable
BC	Pacific Rim Reserve	Forest	Good	Stable
BC	Pacific Rim Reserve	Freshwater	Good	Improving
BC	Yoho	Forest	Fair	Stable
BC	Yoho	Freshwater	Poor	Declining
BC	Yoho	Tundra	Fair	Stable
YK	Ivvavik	Freshwater	Good	Stable
YK	Ivvavik	Tundra	Good	Stable
YK	Kluane	Forest	Fair	Stable
YK	Kluane	Freshwater	Good	Stable
YK	Kluane	Tundra	Good	Stable
YK	Vuntut	Tundra	Good	Stable
YK	Vuntut	Wetlands	Good	Stable
NWT	Aulavik	Freshwater	Good	Stable
NWT	Aulavik	Tundra	Good	Improving
NWT	Nahanni Reserve	Forest	Good	Stable
NWT	Nahanni Reserve	Freshwater	Good	Stable
NWT	Nahanni Reserve	Tundra	Fair	Stable
NWT	Tuktut Nogait	Freshwater	Good	Stable
NWT	Tuktut Nogait	Tundra	Good	Stable
NWT	Wood Buffalo	Forest	Fair	Declining
NWT	Wood Buffalo	Freshwater	Good	Improving
NWT	Wood Buffalo	Wetlands	Fair	Declining
NU	Quttinirpaaq	Freshwater	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
NU	Sirmilik	Glaciers	Good	Declining
NU	Sirmilik	Tundra	Fair	Stable
NU	Ukkusiksalik	Coastal/marine	Good	Stable
NU	Ukkusiksalik	Tundra	Good	Stable

Source: Parks Canada (2016) State of Canada's Natural and Cultural Heritage Places 2016.

www.ec.gc.ca

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