



Caribou Indicator and Related Indicators

These indicators figure into the exercise of evaluating of the Caribou Indicator. They are presented here in their current draft form and may be modified further pending this assessment and review of Draft 2 of the Standard.

Indicator 6.4.3 – The Caribou Indicator

6.4.1 Management of caribou habitat is implemented following approach A, B, or C below.

- A. Where a SARA-compliant range plan¹ exists, the Organization participates to its full capacity in the implementation of the range plan.

Where only a portion of the Management Unit is covered by a SARA-compliant range plan, the plan is being implemented for that portion of the Management Unit, and Approach B or C is being implemented for the remainder of the Management Unit that is within a caribou range not covered by a SARA-compliant range plan.

Where a SARA-compliant range plan does not exist, management of caribou habitat is being implemented following Approach B or C below.

- B. Management of caribou habitat is implemented following the requirements of Table 6.4.3. The following requirements are also addressed.
1. In implementing the requirements of Table 6.4.3, updated measurements of cumulative disturbance are used where available provided that the methodology used in calculating cumulative disturbance is:
 - 1.1. Comparable to that employed by *Environment Canada* (2011) and that definitions of human-induced and natural disturbances are comparable (e.g. using provincial data); or
 - 1.2. Based on empirical evidence supported by expert * opinion if different from the methodology and definitions used by *Environment Canada* (2011).
 2. *Best efforts** are made to keep projected levels of cumulative disturbance on *caribou ranges** below 35% when large natural disturbance occurs and significantly elevate the levels of cumulative disturbance.
- C. In the absence of a SARA-compliant range plan, management of caribou habitat using methods other than Approach B is implemented only when supported by independent expert* input validating that the alternate approaches are based on empirical evidence fostering stewardship of caribou habitat comparable to, or better than, that provided in Approach B. A risk-based approach comparable to that in Table 6.4.3 is used whenever possible.

This Indicator refers to boreal caribou only. Refer to the discussion in Annex J for information regarding mountain caribou.

¹ A SARA (Species at Risk Act)-compliant range plan is a caribou habitat management plan that has been confirmed by Environment and Climate Change Canada (ECCC) as meeting the requirements of section 7.4 of the Federal Recovery Strategy for the Woodland Caribou, Boreal population, in Canada.



Table 6.4.3. Requirements of Indicator 6.4.3. Shaded cells in the table indicate requirements corresponding to a Risk Classification. All shaded cells that refer to a Risk Classification must be addressed. Shaded cells are numbered for reference in discussions and for use in examples described in Annex J.

	Risk Element	Risk Classification							
		Any		Stable or Increasing				Decreasing or Unknown**	
		Low (≤20%)		Moderate (>20-35%)		High (>35%)		Mod. (>20-35%) or High (>35%)	
	Forest Management Unit* Disturbance Category (percent cumulative disturbance in that portion of the FMU that overlaps caribou range)→		≤35%	>35%	≤35%	>35%	≤35%	>35%	Any
Management Requirements	Carefully planned implementation of forest <i>management activities</i> * that follow a precautionary approach is permitted.	1		3					
	Carefully planned implementation of forest <i>management activities</i> * that follow a precautionary approach is permitted providing there is strong evidence of the sufficiency of other aspects of overall <i>habitat</i> * quality.		2		4		9	16	
	Carefully planned implementation of forest <i>management activities</i> * that follow a precautionary approach is permitted. However, forest management that results in net expansion of cumulative disturbances shall not occur unless it is based on reasons that foster the <i>long-term</i> * recovery of caribou habitat.						10	11	17
	Planning efforts are in progress such that habitat disturbance within the <i>caribou range</i> * will not exceed 35% within the <i>long term</i> * planning horizon and habitat recovery will be implemented.			5	6				
	Habitat recovery and <i>restoration</i> * is in progress and demonstrated in current strategic or operational plans with the objective of lowering the extent of cumulative disturbance in the <i>caribou range</i> *						12	13	18
	<i>The Organization</i> * works within its <i>sphere of influence</i> * to achieve the requirements associated with this <i>caribou range</i> * risk category and forest <i>Management Unit</i> * disturbance category.			7	8	14	15	19	

** As described in the explanatory notes below for Indicator 6.4.3, this column also applies in circumstances in which the population is stable or increasing due to extraordinary human intervention.



Explanatory Notes for Approach B

35% Benchmark for Disturbed Area

Approach B uses a disturbance level of 35% as the high risk threshold in Table 6.4.3. The threshold is not intended to serve as a target level of disturbance, but as a level beyond which significant measures are necessary to address the state of habitat on caribou ranges. However 35% is not a 'tipping point' beyond which caribou population will switch from sustainable to unsustainable. Rather this management threshold, prescribed by Canada's *Federal Recovery Strategy* for the boreal population of woodland caribou, is a point along a continuum of risk for boreal caribou that carries with it some uncertainty. Specifically, the Federal Recovery Strategy notes that "*This recovery strategy identifies 65% undisturbed habitat in a range as the disturbance management threshold, which provides a measurable probability (60%) for a local population to be self-sustaining. This threshold is considered a minimum threshold because at 65% undisturbed habitat there remains a significant risk (40%) that local populations will not be self-sustaining*".

Spatial Aspects

Some *Management Units** may include areas both within and outside *caribou ranges**. For this Approach, the management requirements identified in Table 6.4.3 are to be assessed based only on the area of the forest *Management Unit** within *caribou ranges**.

If a forest *Management Unit** extends into more than one *caribou range**, this Approach's requirements based on the level of disturbance within the forest *Management Unit** are to be addressed separately for the distinct portions of the forest *Management Unit** in each *caribou range**.

Figures 1 to 3 in Appendix J provide examples of the Approach's requirements in different situations.

The Importance of Population Information

The framework in Table 6.4.3 is based on cumulative disturbance and caribou population status in *caribou ranges**. The conventional means of evaluating caribou population status is through the use of data on demographic trends, such as population growth rate, calf recruitment, and female survival. Table 6.4.3 recognizes this by specifically identifying management requirements in *caribou ranges** in which the risk category is moderate or high and the range population status is either decreasing or unknown, and described in the last column in the table.

There may be circumstances in which a caribou population is stable or increasing due to, or with the assistance of, extraordinary human intervention, such as predator control or fencing of large areas. Based on the weight of evidence, if a population is believed to be stable or increasing only because of such measures, the requirements associated with the population status of "decreasing or unknown" should be used as a basis for evaluation of compliance with the requirements of Table 6.4.3.

Terminology

'Habitat restoration,' as used in Table 6.4.3, is the process of returning *habitat** to a condition suitable for use by caribou and/or comparable to its condition prior to disturbance in the context of overall *caribou range** condition. The ultimate intent of habitat restoration, is the recovery and persistence of caribou populations.

The term 'net expansion of forest management within the range (based on cumulative disturbance)' refers to an increase in cumulative disturbed area. In this context, it is possible to harvest an area of previously unharvested forest after a comparably-sized area of disturbed forest has returned to an undisturbed state (that is, after it has been restored). Also, harvesting within an existing cumulative disturbance footprint does not result in an expansion in disturbance. In these circumstances, the total area of disturbance would not increase and there would be no net expansion of forest management.

'*Best efforts**' are identified in requirement 2 of this Approach. A *best effort** is not the same as an obligatory requirement, but it requires *The Organization** to make persistent and sincere attempts to address a requirement. See the glossary for a complete definition of *best efforts**.

Strong Evidence of Sufficiency

In natural circumstances disturbance across a *caribou range** is not evenly distributed. The requirements



of this Approach recognize this, and allow levels of disturbance within those portions of the forest *Management Unit** that overlap *caribou ranges** to exceed 35%. However, the requirements for permitting that level of disturbance are stringent. Levels of disturbance beyond 35% may only occur where there is strong evidence of the sufficiency of other aspects of *habitat** quality within the portion of the *caribou range** that occurs within the forest *Management Unit**. For this indicator, strong evidence of the sufficiency of other aspects of habitat quality is addressed by ensuring that the requirements of all of the following indicators are met: 6.8.1 (*Forest types** and age classes), 6.8.2 (Forest patches), 6.8.3 (*Connectivity**), 6.8.4 (Access management) and requirements related to intact forest landscapes in Principle 9.

Cumulative Disturbance

Cumulative disturbance is the proportion of a range with combined anthropogenic and natural disturbances less than a benchmark age. A commonly-used benchmark age has been 40 years (e.g. Environment Canada 2011), however there is uncertainty about the broad applicability of this benchmark. Different boreal forest regions are characterised by varying disturbance ecologies and there is also variability in the relationship between the level of cumulative disturbance and caribou productivity. A benchmark of 40 years can be used in the absence of an empirical basis for another benchmark as explained below in the discussion of Requirement 1.

Requirement 1 – Measures of cumulative disturbance

This requirement identifies that approaches other than those used by *Environment Canada* may be used in quantifying cumulative disturbance. This refers to the increasingly standard practice by provinces and territories to use provincial/territorial datasets to quantify disturbance, rather than the national disturbance layer in *Environment Canada* (2011). If used, the alternate approach should be based on empirical evidence supported by *expert** opinion. Note that it is not required for the *expert** to be independent. Definitions of *expert** and *independent expert** are provided in the glossary.

Requirement 2 – Best efforts to keep projected levels of cumulative disturbance below 35%

In the boreal forests, large natural disturbances, such as fire or windthrow may significantly affect levels of cumulative disturbance on forest *Management Units** and *caribou ranges** and add to overall risk to caribou persistence in a given *caribou range**. Large disturbances outside the forest *Management Unit** may affect the level of cumulative disturbance in the *caribou range** in which the forest *Management Unit** exists. Organizations should consult with experts to identify whether and how to adjust to management activities following natural disturbances.

Explanatory Notes for Approach C

In recognition that the scientific basis for managing caribou habitat continues to evolve, this Approach provides a means to implement management other than that identified by Approach B. For example, scientific investigations may provide data specific to *caribou ranges** or ecological regions that are more appropriate to use than the calibrated relationship between caribou productivity and level of cumulative disturbance provided in the *Federal Recovery Strategy*. Provided that those new data and related interpretations have a credible empirical basis, a relationship other than that incorporated into the disturbance levels that are used in Table 6.4.3 could be employed. A risk management approach remains preferred even if new data or interpretations are used.



Indicator 6.1.3 – Range of Natural Variation (*This indicator is provided here as it is referred to in Indicators 6.8.1 and 6.8.2. Testing of the Caribou Indicator does not require assessment of this indicator*)

Appropriate to the scale, intensity and risk of forest management operations, an assessment of the stand-level composition of the forest is made using the one of the following three approaches (A,B,or C) that is most appropriate:

- A. In *Management units** with a long history of forest management or settlement, and where the forest is significantly different from the *pre-industrial forest** in terms of landscape patterns, species and age class distributions, the present nature of the forest is characterized, addressing:
 - 1 The distribution of *forest types** (quantitative information);
 - 2 The age class distribution of *forest types** (quantitative information); and
 - 3 Stand-level elements of the *pre-industrial forest** missing or under-represented from the present landscape (quantitative and descriptive information as appropriate).

- B. In *Management units** where human use of the forest has not significantly altered landscape patterns from *pre-industrial** conditions and sufficient information is available, an analysis of the *Range of Natural Variation** has been prepared and includes:
 - 1 An assessment of the natural range of the amount of each *forest type**;
 - 2 An assessment of the natural range of *forest types** by *age class**; and
 - 3 An assessment of the natural range of disturbance sizes and sizes of post-disturbance remnant patches.

For items 1 and 2 in this list, the analysis characterizes the *Range of Natural Variation** by identifying the upper and lower extremes of the range and measures of variance or dispersion between the extremes (for example, *the interquartile ranges**)

- C. In *Management units** where human use of the forest has not significantly altered landscape patterns from pre-industrial conditions, but sufficient information is not available or analyses have not been prepared to assess the *Range of Natural Variation** as required in part B of this indicator, the present nature of forest cover is characterized, addressing:
 - 1 The distribution of *forest types** (quantitative information)
 - 2 The age class distribution of *forest types** (quantitative information)
 - 3 The distribution of patch sizes.

In addition, a process is in place and is being implemented to gather information and conduct analyses so as to be able to characterize the *Range of Natural Variation** as described in component B of this indicator.



Data analyses required in this indicator are used in subsequent indicators that address different aspects of forest condition (e.g. 6.8.1 forest community composition and 6.8.2 large forest patches). This indicator recognizes that different circumstances exist regarding forest landscapes and data availability that affect the type of analyses that are possible and appropriate to use in subsequent indicators. Three circumstances (A,B, and C) are recognized:

- A – This case applies to conditions such as exist in the Maritimes, southern Quebec, and southern Ontario where there is a long history of settlement and forest management and the present forest cover is significantly different from the pre-industrial forest.
- B - This case applies to conditions such as exist in northern Ontario and other places where forest is still the main land cover and sufficient data exist and analyses of the *Range of Natural Variation** have been prepared.
- C – This case applies to conditions in which it would be desirable to manage according to the *Range of Natural Variation**, but where sufficient data are not available or analyses have not been completed. These circumstances may exist in many *Management Units**.

Recognizing the case B is more desirable than case C, the indicator requires demonstration of progress in moving from the circumstances described in case C to those in case B.

The spatial scale at which an analysis of the Range of Natural Variation is conducted can significantly affect the results. Data from a smaller area, will generally produce a narrower range. The scale at which analyses should be undertaken for this indicator should be based on an ecologically appropriate area and scale, regardless of the size of the management unit.



Indicator 6.8.1 – Forest Types and Age Classes

A distribution of forest types and age classes of forest types is maintained or restored according to A B or C below.

- A. Where an assessment of the Range of Natural Variation has been completed for Indicator 6.1.3, the distribution of forest types and ages classes of forest types is based on the Natural Range of Variation.

Reasonable bounds (such as the interquartile range) are used as a guide for identifying forest types and age class distributions consistent with the Range of Natural Variation.

- B. Where an Assessment of the Natural Range of Variation has not been completed the distribution of forest types and age classes of forest types is based on a documented review of the natural distributions for the forest region (or similar ecologically-based unit).

Once an analysis of the Range of Natural Variation has been completed, as described in Part C of Indicator 6.1.3, the requirements of Part A of this indicator will apply.

- C. The distribution of forest types and age classes of forest types deviates from the Natural Range of Variation (Part A of this indicator) or the documented review (Part B of this indicator) only in circumstances in which the Management Unit has a long history of management and settlement.

In all cases (i.e. A, B, and C):

The distribution of forest types and age classes of forest types to be maintained or restored may take anticipated impacts of climate change into account only when based on a peer-reviewed strategy of adaptation to climate change.

Age-class distributions used in this indicator represent the full range of ages such that old forest classes are incorporated into the age-class distribution to be maintained or restored.



Indicator 6.8.2 – Forest Patches

A distribution of forest patch sizes, including large areas of forest in contiguous blocks, is maintained or restored according to A, B, or C below.

- A. Where an assessment of the Range of Natural Variation has been completed for Indicator 6.1.3, the distribution of patch sizes is informed by the Assessment of Natural Variation.
- B. Where an Assessment of Range of Natural Variation has not been completed, the distribution of patch sizes is based on a documented review of natural patch sizes for the forest region (or similar ecologically-based spatial unit).
Once an analysis of the Range of Natural Variation has been completed, as described in Part C of Indicator 6.1.3, the requirements of Part A of this indicator will apply.
- C. The distribution of patch sizes that is maintained or restored deviates from the Natural Range of Variation (Part A of this indicator) or the documented review (Part B of this indicator) only in circumstances in which the Management Unit has a long history of management and settlement.

Where *Intact Forest Landscapes** occur, their management can contribute to meeting the requirements of this Indicator. For *Management Units** in which *Intact Forest Landscapes** do not exist, and for portions of *Management Units** outside of *Intact Forest Landscapes**, the requirements of this indicator should be addressed through management of the remaining large areas of contiguous forest.



Indicator 6.8.3 – Connectivity

In a manner consistent with the ecology of the ecoregion and *forest types** being managed, management activities show consideration for maintenance and *restoration** of *connectivity** at the *landscape** and *stand** scales to meet the *habitat** and movement needs of fish and wildlife species. Connectivity planning considers the natural mosaic of *forest types** and disturbance patterns, and managing *roads**, linear disturbances, culverts, and other wetland and watercrossings and other barriers that affect *connectivity**.

The following requirement applies to forest within *caribou ranges**:

Through the use of empirical information and/or *Traditional Knowledge**, the *Organization** demonstrates an understanding of the movement needs of caribou on their *Management Unit**, and demonstrates that planned management will maintain or restore *connectivity** to a level sufficient to meet caribou movement needs. In the absence of a demonstrated understanding of movement needs, a *precautionary approach** is used in addressing *landscape* connectivity** concerns related to caribou habitat management. **(Add)**



Indicator 6.8.4 Access Management

Appropriate to the *scale intensity and risk** of operations, a comprehensive access *Management Plan** is being implemented for *roads** used for forest management that:

1. Avoids *road** building in candidate *protected areas** and *special management areas** as required by Indicator 6.5.10;
2. Includes deactivation and/or abandonment and maintenance strategies for all grades of *road** under the management of *The Organization**;
3. Considers intactness in areas with sensitive biological values and where remoteness is a key tourism value;
4. Manages access development, use, and *road** reclamation in light of the needs of *species at risk** and access-sensitive species;
5. Identifies and attempts to maintain a fair and equitable balance between the ecological value of intactness and social and economic values associated with maintenance of access; and
6. Is consistent with approved government/land management plans.

Where access and/or other linear disturbances are being constructed or used by other tenure holders or other land users, *The Organization** works within its *sphere of influence** to address the components of this Indicator and encourage others to address the components of the indicator. **(Add)**