STATE OF ONTARIO'S PROTECTED AREAS

Forest Ecosystems

2021

Ontario

State of Ontario's Protected Areas Indicator Report

Forest Ecosystems

This indicator summarizes the state of forest ecosystems in Ontario's provincial parks and conservation reserves by comparing current forest conditions to simulations of predicted natural forest condition.

Status

Status: Mixed

Trend: Baseline

Why it's important

About 66 percent of Ontario is forest, with over 10 percent of those forests within parks and protected areas. Healthy forest ecosystems within protected areas (e.g., provincial parks and conservation reserves) provide important habitats for the province's biodiversity, and not all forest ecosystems are the same. The composition, structure and patterns of forested ecosystems change through natural succession (i.e., ageing processes) and are renewed by other natural processes including wildland fire, windthrow, and outbreaks of native insects and diseases.

Human activities within or adjacent to protected areas can directly and indirectly alter natural processes and influence protected area forests. For example, wildland fire suppression within or adjacent to a park can create a forest mosaic that differs from what we would expect under natural conditions. Likewise, excessive human-caused fires within a protected area can create an unnatural forest mosaic.

Wildland fire, windthrow, and insect and disease outbreaks that occur naturally within protected areas maintain a diversity of forest types and age classes. These natural processes create a mosaic of habitats across the landscape that support a variety of wildlife, plants, and other species. Maintaining these natural processes also contributes to the maintenance of ecological integrity, as mandated under the *Provincial Parks and Conservation Reserves Act, 2006*. The maintenance of ecological integrity within protected areas has the additional value of providing researchers with reference locations to support the monitoring of ecological change on the broader landscape.

How we monitor

The most detailed information on forest ecosystems across a significant portion of Ontario is the enhanced Forest Resources Inventory (https://www.ontario.ca/page/forest-resources-inventory). This inventory covers the area of the Managed Forest in Ontario, including most protected areas within that range (Figure 1). Forest Resources Inventory provides information about tree species composition, range, age, and distribution, as well as forest, ecological, and land use conditions.

The enhanced Forest Resources Inventory was used to determine the current forest condition of protected areas, which was compared with estimates of natural forest conditions (e.g. pre-colonization). The current condition inventory used in this analysis was updated in July 2020 and included recent burn areas in larger protected areas in the managed forest (Quetico, Woodland Caribou and Wabakimi provincial parks).

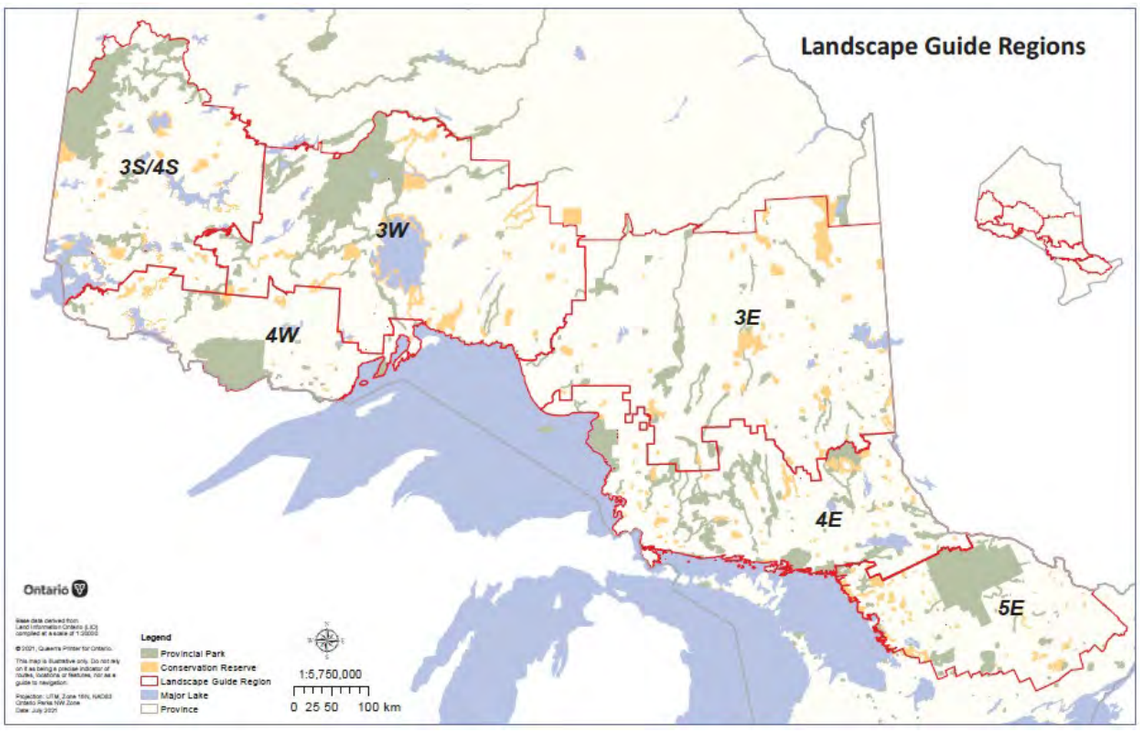

Figure 1. Map of the Managed Forest divided into the six Landscape Guide Regions showing locations of provincial parks and conservation reserves.

Natural forest conditions were estimated using computer models that simulate forest dynamics (e.g., fires, succession, post fire transitions). These science-based simulated ranges of natural variation (SRNV) are compared to recent forest conditions to provide an assessment of the ecological integrity of protected areas (e.g., are current forest conditions within the estimated range of natural conditions?) (Figure 2).

We used two indicators of forest condition to assess the ecological integrity of forests for all protected areas within the Landscape Guide Regions (Figures 1 and 2):

1) Young forest (e.g. all forest less than 36 years in age)
2) Mature and old forest (e.g. all forest in mature and older seral stages)

Young forest and mature/old forests were chosen as indicators as they represent both ends of the age distribution of forests, and thus provide insight into whether the forest age structure is natural or skewed towards a younger or mature/old forest.

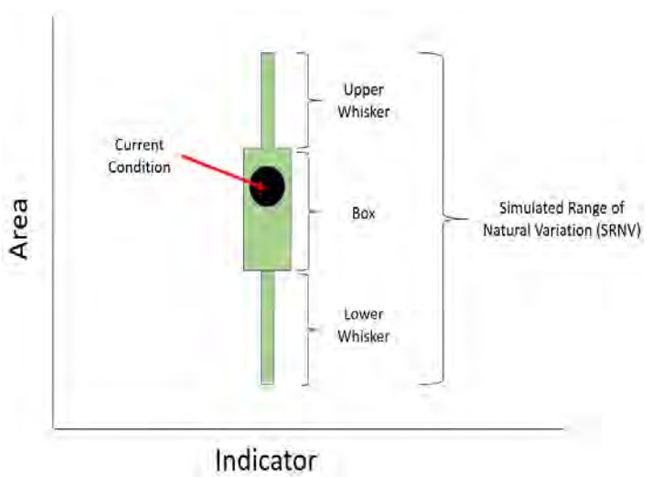

Figure 2. This example shows an estimate of the natural condition for a hypothetical indicator. The science-based simulations (e.g. estimates of natural) are expressed as a range between the upper and lower whiskers. The box in the center represents the condition that occurs most often (e.g. 50 percent of the time). A black dot is overlaid representing the current condition. If the black dot is above or below the estimates of the natural condition, ecological integrity may be compromised.

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What's happening

Protected area forests generally have less area of young forest and more area of mature/old forest than expected from the SRNV (Figure 3).

Current conditions for the young forest indicator were below the expected central distribution of SRNV in all six Landscape Guide Regions. Compared to the SRNV, the amount of young forest in protected areas was:

- far below the SRNV in 2 (33%) regions
- within the lower whisker of the SRNV in 3 (50%) regions
- within the box of the SRNV in 1 (17%) region

Inversely, the amount of mature/old forest in protected areas was above the expected central distribution of the SRNV in four of the six Landscape Guide Regions. Compared to the SRNV, the amount of old/mature forest in protected areas was:

- above the SRNV in 2 (33%) regions
- within the upper whisker of the SRNV in 1 (17%) region
- within the box of the SRNV in 1 (17%) region
- within the lower whisker of the SRNV in 2 (33%) regions

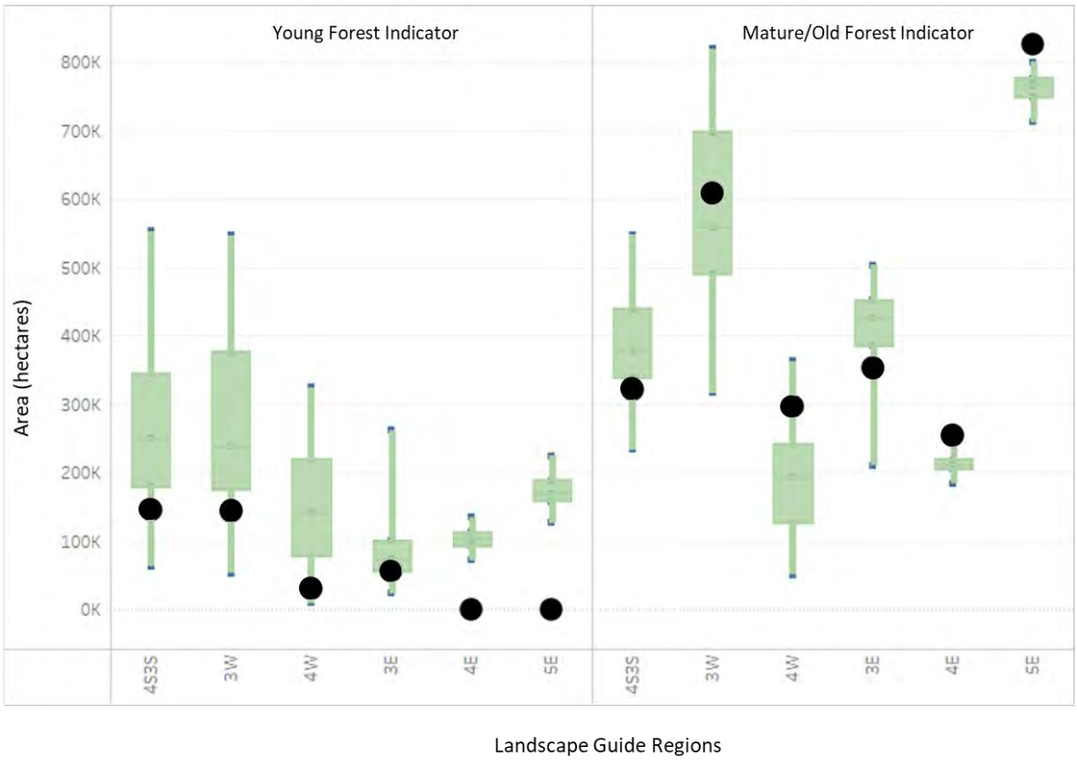

Figure 1. Simulated Range of Natural Variation (green box and whisker plot) of Young Forest Indicator (left panel) and Mature/Old Forest Indicator (right panel) compared to Current Condition (black circle) within protected areas (provincial parks and conservation reserves) for each Landscape Guide Region. Landscape Guide Regions are geographically ordered from northwest on left to southeast on right for illustration purposes.

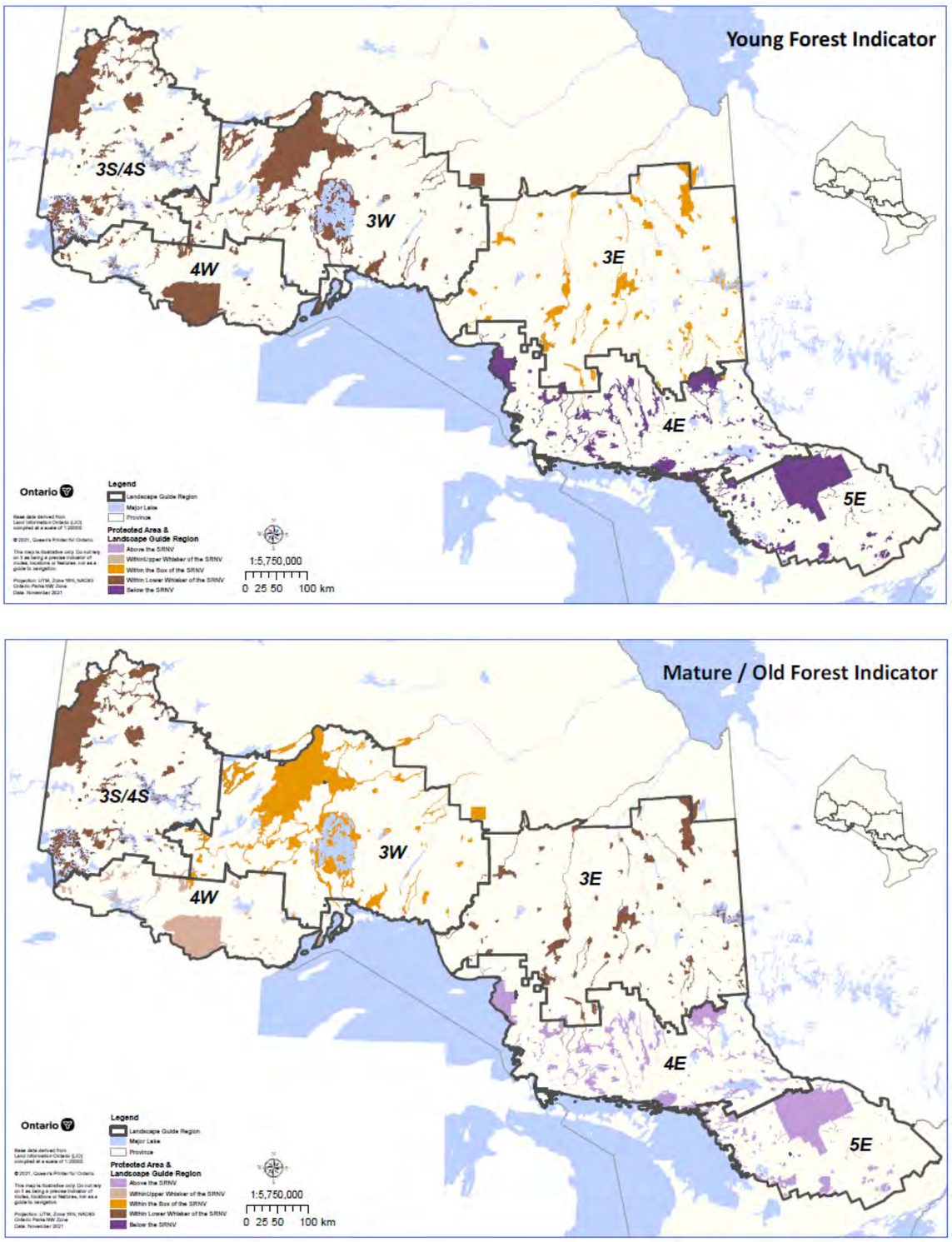

Figure 2. Map of the spatial pattern of Landscape Guide Regions agreement or departure of the current forest conditions in protected areas compared with the Simulated Range of Natural Variation (SRNV) box and whisker plot results for the Young Forest Indicator and Mature/Old Forest Indicator. Landscape Guide Regions are coloured as follows: yellow if current condition is within the box of the SRNV, brown if current condition is within upper (light shade) or lower (dark shade) whisker of the SRNV, and purple if current condition is above (light shade) or below (dark shade) of the SRNV.

The results have a south to north pattern (Figure 4). The greatest departures from the SRNV expectations for both the young and mature/old forest indicators are in the southern most Landscape Guide Regions of 5E and 4E. The northern Landscape Guide Regions have more mixed results, particularly for the mature/old forest indicator.

Undoubtedly there are many factors producing the results described above, but one major influence that is well documented is the historical suppression of wildland fire. Although the ecological benefits of wildland fire in the different forest regions of the Managed Forest (Boreal, Great Lakes-St. Lawrence) are well understood and reflected in policy today, suppression of wildland fires was typical until the late 1900s and early

2000s. Since 2004, wildland fire management in the province and in protected areas included a more balanced approach, with the recognition that wildland fire plays a critical role in disturbance-dependent ecosystems (MNR 2004a, MNR 2004b).

The current Wildland Fire Management Strategy (2014) continues to highlight the ecological benefits of wildland fire. The strategy includes direction to consider ecological benefits, along with other factors, in deciding on the appropriate response to a wildland fire. In addition, fire policies for provincial parks and conservation reserves were recently updated to modernize and streamline fire management planning for these protected areas. These updates are expected to enhance opportunities in protected areas for natural fire disturbance and prescribed burning to occur, while continuing to protect people and property (MECP & NDMNRF 2021). These policy changes are, however, relatively recent and it will take time to detect their impact considering the long timelines for forests to respond to changes in natural wildland fire regimes.

Other protected area policies also support the maintenance of natural disturbances that maintain forest diversity. For example, outbreaks of native insects and diseases are normally allowed to progress naturally.

Climate change may influence future trends by altering natural disturbances, such as more frequent and severe wildland fires, drought, windthrow events, snow and ice damage, and insect outbreaks.

Indicator last updated

November 2021

Data sources

- Land Information Ontario at https://www.ontario.ca/page/land-information-ontario
- [MECP and NDMNRF] Ministry of the Environment, Conservation and Parks and Ministry of Northern Development, Mines, Natural Resources and Forestry. 2021. Fire management policy for provincial parks and conservation reserves. Directive No. AFFES 2:12, Ontario Parks PAM 7.02, New revised August 3, 2021.
- [MNRF] Ministry of Natural Resources and Forestry. 2014. Wildland Fire Management Strategy. P00464, Toronto: Queen's Printer for Ontario.
- [MNR] Ministry of Natural Resources. 2004a. Forest fire management strategy for Ontario. Ontario Ministry of Natural Resources.
- [MNR] Ministry of Natural Resources. 2004b. Fire management policy for provincial parks and conservation reserves. Compiled by Aviation and Forest Fire Management Services Branch, Natural Heritage, Lands and Protected Spaces Branch. Directive No. FM 2:12, PM 11.03.03, PL 3.03.09, Issued June 25, 2004.

Related links

- Ontario Forest Resource Inventory at https://www.ontario.ca/page/forest-resources-inventory
- Ontario's Landscape Tool (OLT) at https://www.sdc.gov.on.ca/sites/mnrf-olt/en/SitePages/Home.aspx