Management of Trails in the St-Jean-Lauzon Forest in Consideration of Conservation Needs

ACRE (Action Chelsea for the Respect of the Environment) has an agreement with the owners of lots 3 031 054 et 3 031 056 and is currently working on their acquisition. This will be ACRE's fifth property in the Larrimac Forest Complex.

The new forest, named St-Jean-Lauzon, is a northern mixed forest dominated by sugar maple, with some stands of pure hemlock. It is located within an ecological corridor identified by Gatineau Park. This corridor functions primarily as a structural corridor, supporting a wide range of forest species. The forest has an extensive nework of informal trails (see Figure 1), which has been recently expanded by nearby residents. These multi-use trails were never formally planned and are currently lightly used for walking, skiing, snowshoeing, and mountain biking.

Figure 1. Trail network in the St-Jean-Lauzon Forest showing a very high density informal trail network. This informal network is used very lighty and was developed without any plan.

Figure 1 also shows the locations of the cameras used to document trail use, along with wildlife presence, as part of a study conducted in the forest over 87 trap nights (three cameras operating for 29 camera days each) in August–September 2024. Based on the results of this study, the trails are not actively used. On average, only 0.7 people use the trails per day, and 0.2 people are walking their dogs. The number of cyclists is very low (0.06 per camera day).

The highest level of use (1.1 people per camera day) was recorded by Camera 1, located on the collector trail near the Jolicoeur–McMartin Forest entrance. In contrast, Camera 3, which was positioned at a trail intersection and could capture users from all directions, recorded very low activity (0.2 people per camera day).

Overall, trail use in this forest is considerably lower than in the nearby Jolicoeur–McMartin Forest and Larrimac Forest, where an average of 6 people per day was recorded during the most recent study (July–August 2024).

Trail network ecological impact

While trails promote physical activity and nature appreciation—two values that are central to ACRE's mission—they can also have significant ecological impacts. Trails may fragment habitats, disturb wildlife, influence predation dynamics, and alter animal movement patterns. Understanding these effects is essential for developing sustainable recreation strategies that balance human access with biodiversity conservation.

Habitat Fragmentation and Avoidance Behaviour - Trails fragment wildlife habitat by creating linear disturbances across forested areas. This fragmentation effect influences the spatial distribution and habitat use of wildlife. For instance, Miller et al. (1998) found that the presence of recreational trails in forested parks around Washington, D.C. reduced bird species richness and abundance within 50–100 meters of trails.

Impacts on Movement and Connectivity - Trails can act as partial barriers to movement, especially when they are heavily used or wide. For species with low tolerance to disturbance, such as some amphibians and ground-nesting birds, the trail corridor becomes an avoided zone, reducing the effective size of available habitat.

Trail Density Thresholds and Wildlife Sensitivity - Trail density refers to the amount of trail network present within a given area, often expressed as a ratio of trail length to the area they cover. While the presence of a single trail can have localized effects, the overall density of trails in a landscape has more significant ecological consequences. Trail density, typically measured in kilometers of trail per square kilometer of habitat (km/km²), influences the degree of fragmentation and the proportion of habitat exposed to human activity. Studies conducted in eastern North America and in comparable forest regions suggest that a trail density greater than 1.0 km/km² begins to significantly reduce habitat quality for species sensitive to disturbance (Robinson et al., 2010).

Forest interior metrics - Forest interior measurements refer to the assessment of habitat conditions within a forest that are away from the edges and their associated influences. It's typically calculated by using a buffer along linear disturbances, such as roads and trails. This buffer area represents the "edge" habitat, which differs significantly from the interior due to factors like increased disturbance, sunlight, wind, and predation

Summary of Management Implications - Given these varied impacts, land managers must adopt trail designs and recreation policies that minimize ecological disturbance. Best practices include concentrating use on a smaller number of well-maintained trails; implementing seasonal closures in sensitive habitats; designing buffer zones along trails (e.g., ≥ 100 m from wetlands or nesting areas); limiting trail density to less than 0.5–1.0 km/km² in high-value habitats; and educating trail users to remain on designated paths.

Analysis of the St-Jean-Lauzon Forest trail network

We conducted a Trail Density and Forest Interior Metric GIS analysis of the St-Jean-Lauzon Forest (see table below).

Table 1. Results of GIS Analysis of Trails in St-Jean-Lauzon Forest.

Trail density

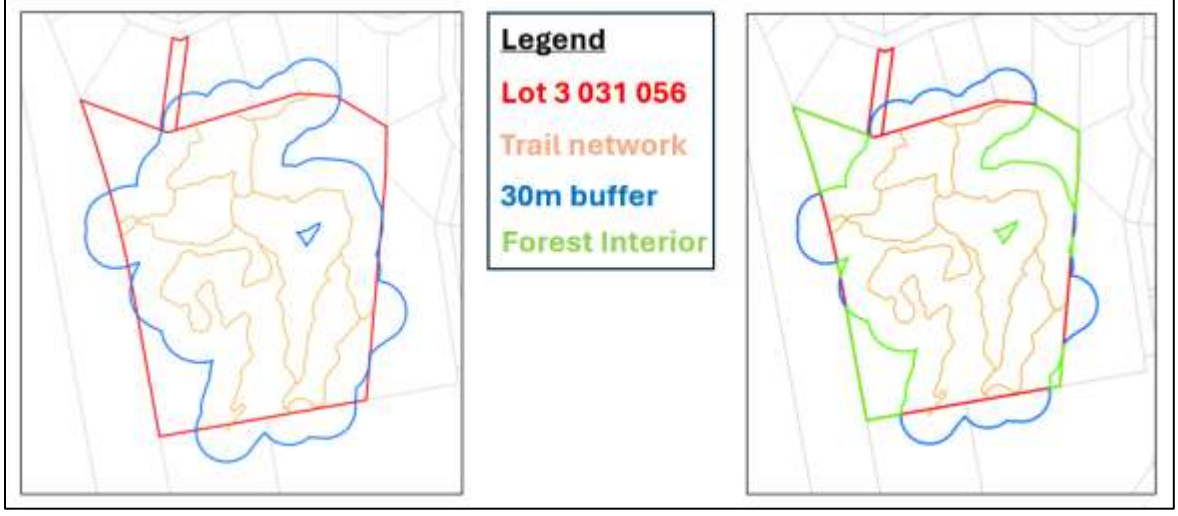
LOT #	Area (km2)	Length of Trail Network (km)	Trail density (km/km2)
3 031 056	0.074373	1.98843	26.7

>2.5 km/km² – Associated with strong avoidance behaviour, especially near trail clusters or in fragmented landscapes (Larson et al., 2016).

Forest interior metrics

LOT #	Area (m2)	Length of Trail Network (m) (m2)	Area not affected by a 30% buffer on trail network (m2)	%
3 031 056	74373.2	1988.43	13101.2	18%

Only 18% of lot 3 031 056 can be considered forest interior based on a 30-metre trail buffer applied to the existing trail network



The results illustrate the very high density of trails (26.7 km/km^2) in the St-Jean-Lauzon Forest in comparison to published standards. For comparison, trail densities in North American protected areas range from <0.5 km/km² in remote wilderness areas to >4 km/km² in highly developed peri-urban parks (Marion et al., 2016; Reed & Merenlender, 2008).

Forest interior condition was calculated by buffering trails using a 30-metre buffer in a GIS and calculating the remaining forest outside the buffered areas. The 30-m buffer represents impact for moderately disturbance susceptible species. This value is taken from literature. Table 1 shows that only 18% of the overall St-Jean-Lauzon Forest can be considered forest interior based on 30 metre buffer.

Conclusions

The existing informal network of trails is not good for conservation because of the very high density. We need to redesign the trail system, so it works for conservation and the users of the property. Many existing trails will need to be closed to reduce habitat fragmentation and enable more effective forest management for conservation purposes. We should retain trails that provide important recreational needs; notably, those providing access to the North-South trail near the highway, that connect to the Jolicoeur-McMartin Forest, and to Muskoka Road.

It is important to understand that the closure of the informal, non-essential trails is a requirement from Environment and Climate Change Canada, who provided funding to ACRE for the acquisition of this forest. ACRE is committed to providing recreational access to our properties, and to having trails that connect neighbourhoods, subject to conserving nature.

References

Reed, S. E., & Merenlender, A. M. (2008). Quiet, Nonconsumptive Recreation Reduces Protected Area Effectiveness. *Conservation Letters*, 1, 146–154

Marion, J. L., Leung, Y. F., Eagleston, H., & Burroughs, K. (2016). A review and synthesis of recreation ecology research supporting carrying capacity and visitor use management decision making. *Journal of Forestry*, 114(3), 339–351.

Miller, S. G., Knight, R. L., & Miller, C. K. (1998). Influence of recreational trails on breeding bird communities. *Ecological Applications*, 8(1), 162–169.

Robinson, B. G., et al. (2010). Effects of recreational trails on forest birds: Evidence from a systematic review. *Biological Conservation*, 143(4), 1144–1154.