ARCKP
Alberta Regional Caribou Knowledge Partnership

Understanding and reducing potential effects of temporary forestry roads on caribou

Temporary forestry road effects #1

Temporary or non-permanent forestry roads, within and between harvest areas, are a routine part of forest management operations. While these roads are eventually returned to a forested state, they can disrupt caribou movement patterns, increase predator access and reduce habitat quality while they remain open.

Different types of non-permanent forest roads affect caribou habitat and behaviour in a range of ways.[1] Understanding these differences is critical for forest planners and road designers to help reduce potential effects and support ecologically responsible and operationally efficient road practices. **Key potential effects of non-permanent forest roads on caribou include increased mortality due to greater predator access, reduced distribution, changes in movement patterns and behavior, increased presence of alternate prey such as deer and moose, and broader habitat alteration.**

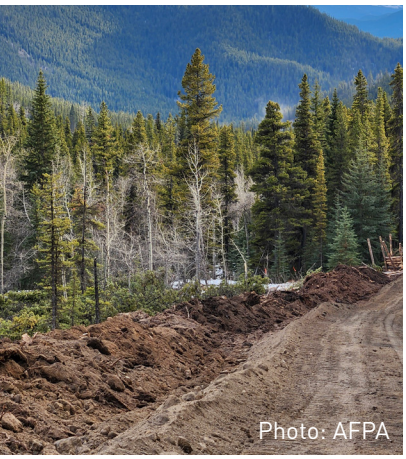


Photo: AFPA

Highlights

- Temporary roads typically have greater and longer-lasting effects on caribou as road length and active time used increases (e.g., from in-block roads to inter-planning unit roads).
- Practices that limit predator access, preserve hydrological function and enable quicker reforestation will help reduce adverse effects on caribou, regardless of road type.
- Avoiding road use between February 15th and July 15th helps reduce disturbance during caribou calving season.
- Roads built in sensitive peatland areas can alter hydrology. These sites require low-impact construction and specific reclamation approaches.

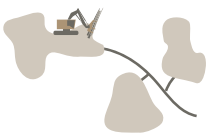
Non-permanent road types and their use

"Non-permanent forestry roads" are temporary access roads that branch off of main resource roads (Class 3 or higher) to support harvest and reforestation activities. These roads are generally open for three years or less and must be deactivated and/or reclaimed within that timeframe.[2]

Because non-permanent roads are not intended for long-term or high-volume use, they are generally built to a lower construction standard. Their seasonal or temporary nature means they are not designed to withstand repeated heavy traffic. In many cases, construction occurs across varied terrain and soil types. This includes areas such as peatlands, where road foundations may only be suitable during frozen conditions, further restricting their period of use.

Three types of non-permanent roads are commonly used across forested landscapes:

In-block roads: Short roads within a single harvest area, used to facilitate the movement of harvesting equipment and logs.



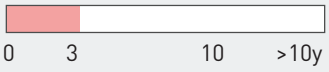
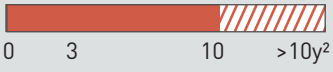
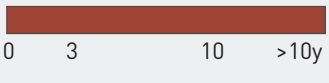
Inter-block roads: Roads that connect multiple harvest areas within a planning unit, typically traversing through forested areas between harvest sites.

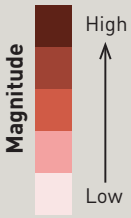
Inter-planning unit roads: Roads that connect larger planning units or clusters of harvest areas, often covering longer distances.

[1] The findings reported in this note are based on literature review and interviews with forest industry staff.
[2] Reclamation activities may include removing infrastructure, re-contouring and decompacting the roadbed, redistributing topsoil and organic material, spreading slash, seeding, planting, and blocking vehicle access — depending on site specifics.

Effects duration, magnitude and timing considerations by road type

Linear features, including roads, are ranked as a medium to moderate threat to caribou (COSEWIC, 2014b). The effects of temporary forestry roads on woodland caribou vary depending on the road type.

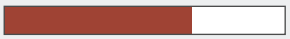
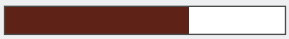
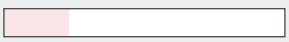
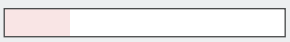
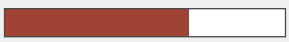
Road Type	Effects	Rationale
 **In-Block**		Effects are limited because caribou generally avoid harvest areas and in-block roads are quickly deactivated/reclaimed.
 **Inter-Block**		Intermediate levels of expected traffic, but traffic disturbance only expected during active harvest period (when caribou are expected to avoid the area).
 **Inter-Planning Unit**		More traffic, cross more habitat types (including refuge habitat). Disturbance from these roads lasts as long as harvest/reforestation in the area.



High: Effects will affect a large portion of the resource (e.g., habitat, cover, etc.), beyond its capacity to recover; or, disturbance will permanently affect a significant portion of the resource relative to its availability or relative to regulatory standards.

Moderate: Effects will affect a moderate portion of the resource, beyond its capacity to recover; or, disturbance will permanently affect a moderate portion of the resource relative to its availability.

Low: Effects will be noticeable, but recovery is possible within short-term; or, disturbance will permanently affect only a small portion of the resource relative to its availability.

Driver of road harms to caribou	 In-Block[3]	 Inter-Block[3]	 Inter-Planning Unit[3]
Alteration of **predation/ encounter** rates			
Direct human-caused mortality resulting from increased **recreational/hunting access**			
Direct human-caused mortality resulting from **vehicle collision**	 (High confidence[4])	 (High confidence)	 (Low confidence)
Influence of road disturbances on **caribou movement and distribution**			
Barriers (complete or partial) **preventing movement** between local populations			
Alteration of **individual energy reserves** resulting from responses to habitat disturbance			

[2] Dashed lines indicate mid-term (3–10 years) to long-term (10+ years) effects.
[3] All roads are dry or frozen, and do not include all-weather or permanent roads.
[4] Moderate confidence in effects unless otherwise indicated.

Habitat degradation — specifically, altered drainage where roads cross peatlands — is most likely with inter-planning unit roads. These effects may be highest where peatland crossings are long and disrupt cross-drainages, potentially causing habitat changes that extend for hundreds of meters and persist unless natural drainage is quickly restored.

Timing considerations

Caribou are particularly vulnerable during the spring through fall, with peak sensitivity occurring in the calving (May and June) and post-calving periods. During these seasons, access to roads and linear features by predators can significantly increase calf mortality. **The Government of Alberta recommends ceasing industrial activity between February 15th and July 15th to prevent disturbance. Where forest operations are unavoidable during these periods, low-impact construction and active measures to reduce visibility and predator movement should be prioritized.**

Practical Implications

Forest road practices to improve caribou outcomes

A key aspect of providing quicker habitat recovery for caribou is using the best available practices and planning for reforestation from the very start. This section outlines road construction techniques that benefit caribou by reducing the effects of roads and supporting faster reforestation following harvest activities. For road network strategies, see Note #4 in this series.

When roads in caribou habitat are unavoidable, the following practices can help **reduce long-term effects by limiting predator access, preserving hydrological function and enabling quicker reforestation**. These practices are applicable regardless of road type but may have the greatest effect if regularly applied to inter-planning unit roads (i.e., those with the strongest adverse effects on caribou).

Implications Summary

- Block roads following operations to limit predator access
- Maintain hydrology and wetland integrity in peatland areas
- Plan for faster reclamation from the start

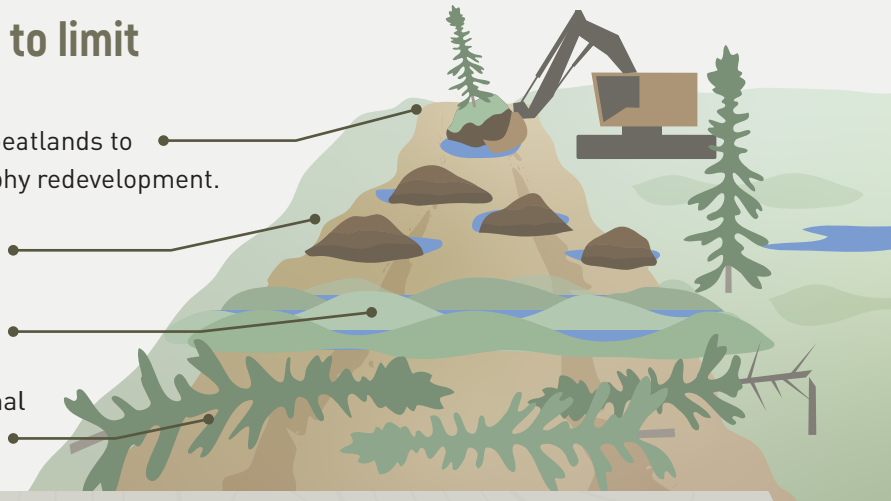
Block roads following operations to limit predator access

Consider transplanting hummocks from adjacent peatlands to reintroduce vegetation and promote microtopography redevelopment.

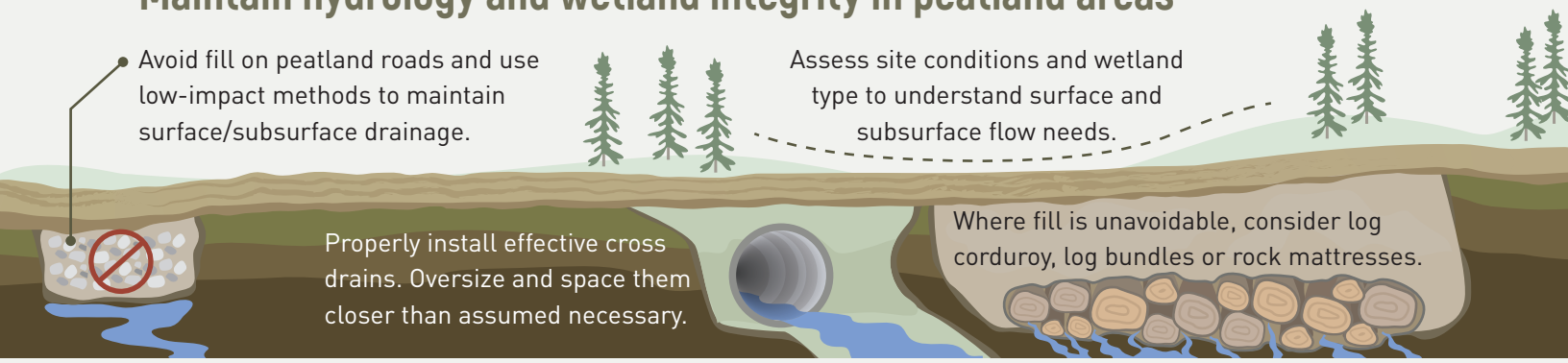
Use mounding on mineral soil to reduce predator movement efficiency and access by alternate prey.

Maintain peat surface topography (hummocks and hollows) using low-impact construction methods.

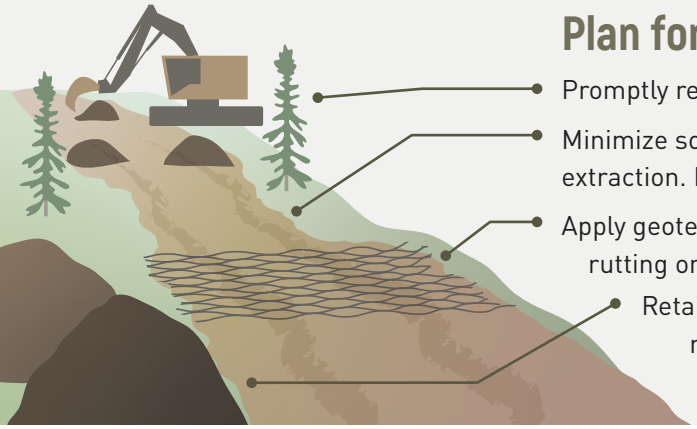
Create physical barriers at the end of the operational season to reduce predator movement efficiency.



Maintain hydrology and wetland integrity in peatland areas



Plan for faster reclamation from the start



- Promptly reclaim temporary roads and plant the same or following season.
- Minimize soil movement by disturbing only what is needed for safe timber extraction. Limit compaction and rutting, which can hinder regeneration.
- Apply geotextiles or grids during construction to support roads and reduce rutting on soft/wet sites.
- Retain and store topsoil and organic material for use during reclamation to enhance planting success.

Future considerations

- **Lichen transplanting** can support caribou food sources, despite slow establishment (primarily peatlands, but applicable more broadly) (Philips, 2009).
- **Maintaining hunter access** on select roads can assist with moose and wolf management during early recovery phases in all site types and provide opportunities for collaboration with First Nation partners.

Further reading

Alberta WaterCourse Crossing Collaborative [AWC3]. 2024. Alberta Watercourse Crossing Guidebook. Available for download from https://www.awccc.ca/.

Government of Alberta. 2012. Caribou Protection Plan Guidelines and Caribou Calving Information.

Kleinke, K., Davidson, S., Schmidt, M., Xu, B. and Strack, M. 2022. How mounds are made matters: seismic line restoration techniques affect peat physical and chemical properties throughout the peat profile. Canadian Journal of Forest Research. https://doi.org/10.1139/cjfr-2022-0015.

Shellian, C.A., Linke, J., McDermid G.J., Cody, M. and Neilsen S.E. 2024. Silviculture treatments hasten seedling growth on seismic disturbances in boreal treed fens. Restoration Ecology. https://doi.org/10.1111/rec.14086.

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