WOODLAND CARIBOU RECOVERY

Audit of Operating Practices and Mitigation Measures Employed within Woodland Caribou Ranges
BACKGROUND

The Forest Products Association of Canada (FPAC) and the Caribou Landscape Management Association (CLMA) commissioned Golder Associates of Edmonton, Alberta, to prepare an Audit of Operating Practices and Mitigation Measures Employed within Woodland Caribou Ranges, 2007. This technical paper provides a summary of the key findings from the Audit.
SUMMARY

Results from a literature review and expert opinion survey from across Canada were synthesized to audit the effectiveness of current operating practices and mitigation measures applied by the forestry and oil and gas industries within threatened woodland caribou (Rangifer tarandus caribou) ranges (CLMA and FPAC 2007). The following observations were made during the audit:

1. **Blanket prescriptive operating practices are applied on an individual basis, rather than integrated into an overall landscape plan or adaptive management plan.** As a result, even though the forest industry has implemented an extensive number (over 70+) of operating practices and mitigation within caribou landscapes for more than a decade, woodland caribou population numbers are still declining.

2. Even though operating practices and mitigation measures have been used for a long time, there has been **no formal monitoring to evaluate the effectiveness of these measures in terms of their value for achieving caribou recovery goals.** Exceptions included forestry operators who monitor roads for road use and preliminary line-blocking experiments.

3. **Given the lack of monitoring and the importance of monitoring, this audit was inconclusive when ranking the effectiveness of mitigation and operating practices.** Implementation of an adaptive management plan with experimental trials to test mitigation is recommended to wildlife and land managers/operators. The need to monitor responses of caribou, primary prey, and predators to land management experiments is stressed. Additionally, a recommended landscape plan is discussed involving an adaptive management planning approach where intact habitat areas would become temporal/spatial caribou refuge areas, surrounded by areas to be recruited as future intact habitat areas.

4. Although the ranking of effectiveness of mitigation and operating practices was inconclusive, it is suggested that with limited time and resources, managers should **focus the adaptive management plan and experimental trials around those measures rated as being highly effective.**

Based on the audit, the most effective mitigation measures are those which minimize development footprints through the use of long-term and cooperative planning, between and within industries, to ensure the maintenance of caribou habitat and subsequently reduce the need for future habitat restoration work.
I. ACCESS MANAGEMENT

A total of 26 forestry-related operating practices aimed at managing linear disturbances and access were identified during the audit. The focus on controlling and minimizing access within woodland caribou ranges stems from research which indicates that caribou are at greater risk of predation near or on access right-of-ways [RoWs] and that habitat is less effective and may be avoided around access RoWs. Access development (roads, utility RoWs, cutlines) can also affect caribou by increasing hunting pressures (legal and illegal), by creating barriers to movement, and by increasing vehicle–wildlife collisions. As a result, access control measures are commonly recommended for the protection of caribou.

The following operating practices and mitigation measures aimed at managing linear disturbances and access within woodland caribou ranges are classified according to their effectiveness.

HIGH EFFECTIVENESS

- Use of Existing Access.
- Use of Shared/Common Access and Utility Corridors.
- Integrated Land Use Plans with Shared and Coordinated (central) Access and Infrastructure (with overlapping or adjacent forestry timber quota holders and with other industries).
- Reduce line-of-sight on linear corridors using techniques such as bends in RoW, or techniques to maintain vegetation screening [e.g., tree planting].
- Strive to conduct operations using minimal access on frozen ground. No new permanent access development within caribou core habitats.
- Minimize snow removal to reduce predator travel along RoWs.
- Maintenance of large contiguous patches of caribou habitat. Patch sizes/shape/distribution to be reflective of caribou habitat supply.
- Long-term planning of harvest to minimize access requirements.
- Operators should seek opportunities to reclaim and/or reforest access and RoWs no longer required for operations. Access on recovered areas to be blocked to discourage access and encourage recovery.
- Focus re-vegetation efforts on upland ridges within broader peatland complexes. This accelerates visual screening and discourages predator access in adjacent peatlands (boreal ecotype).
- Although not mitigation measures, deferred harvest and the establishment of protected areas are recognized as practices which may buy time for woodland caribou range planning.
- Central access corridors to be monitored or have manned gate/security in place, during periods of high activity.

MODERATE EFFECTIVENESS

- Avoid short- to medium-term (10-to-20-year) sequencing of major harvesting operations in portions of caribou range that currently receive high levels of caribou use.
- Total width of access ROWs to be minimized during routing, planning, construction, and reclamation.
- Prevent use of inactive access through combined use of physical control measures including: rollback, selective use of timber, berms, removal of creek crossings, re-contouring to surrounding topography, revegetating/reforesting, barriers at junctions with active access and to render linear corridors impassable.
- Concentrate summer operations in areas of existing graded access.
- Summer silviculture/survey activities to create only temporary access.
- Locate camps in close proximity to construction sites to reduce traffic. Consider shared transportation.
- Remove sections of road grade (in peatland areas), wood bridges, log fills, culverts, or snow fills before breakup to restore natural water flow.
- Plan contingency blocks outside of caribou range to minimize access requirements.
- In-block roads to be reforested to a shrub/tree successional pathway.

**LOW EFFECTIVENESS**
- Control, manage, and/or restrict public use of access.
- Access control gates (unmanned) to control public highway vehicle travel on industrial roadways.
- Reduce traffic and road standard which can be easily de-activated. Defer haul of summer wood until freeze-up to reduce road standard. *(Experts suggested these measures are costly for industry in terms of reduced ability to travel and may not be very effective for caribou as predator travel and potential predation is not reduced.)*
- Reduce the number of site visits.

**HIGH EFFECTIVENESS**
- Pre-planning is used to avoid critical caribou areas altogether during the spring and summer months (i.e., summer activities postponed to winter in calving or rut areas, and calving habitats buffered).
- Whatever the season, operations should be scheduled to avoid known key habitat features at key times.
- Typical timing windows for development specify a critical boreal caribou calving period of April 15–June 30, a cautionary fall rut period between September 15 and October 15, and a late-winter cautionary period of January 15 to April 14.

**MODERATE EFFECTIVENESS**
- Winter operations preferred due to the increased ability to minimize the class of access on frozen ground. Summer operations will be minimized and will be strategically planned to shift operations to drier periods and to avoid calving areas in the spring. *(Experts noted that this strategy may differ depending upon local biology. For example, in west-central Alberta, caribou ranges do not overlap operating areas during the summer and therefore summer harvest and hauling may be preferred to minimize sensory disturbance impacts. However, accessibility/ground conditions and potential damage to terrestrial lichens must still be considered.)*
- Winter work will commence immediately after freeze-up, with the appropriate steps taken to complete most or all of the work within caribou ranges in the earlier part of the winter season (early-in/early-out management philosophy; may need to compress work time within caribou ranges).

**LOW EFFECTIVENESS**
- Defer haul of summer wood until freeze-up to reduce road standards and sensory disturbance during the snowfree period.
Although calf and adult caribou mortality has been reported to be greatest during the spring and over the snowfree period, some forestry operations are still carried out within caribou ranges during the spring and/or summer seasons. To minimize sensory disturbance to caribou during these time periods, respondents indicated that the following strategies are implemented.

- Use of existing all-grade/all-weather access in summer (or winter equivalent access) or operations occur close to existing access.
- Majority of work completed prior to calving and stay out of caribou ranges during calving season.
- Shift summer operations to drier periods to avoid unnecessary damage to vegetation and duff layer. Matting may be used to gain access into wet areas during summer.
- Utilize remote operation techniques (e.g., helicopter operations).
- During the outlined critical windows (includes calving), some operations are considered not appropriate (e.g., helicopter-supported activities are to be avoided).
- Annual maintenance activities in remote locations are scheduled outside of sensitive timing windows. To achieve this, winter access site visitations are scheduled in the caribou ranges first upon freeze-up. Access into an area during spring/summer only if there is an emergency.

III. BARRIERS TO MOVEMENT

Physical barriers to movement recorded for caribou have included roads (e.g., Dyer et al. 2002), steep road cuts, berms, and slash piles along roads and main highways, snowberms, snow fences, pipelines laid on or near the ground, and above-ground pipelines. Caribou movements can be affected through the creation of physical or psychological barriers to movement (e.g., roads, cutblocks, facilities). Barriers can indirectly result in habitat loss by preventing caribou from accessing suitable habitat, and/or may decrease gene flow between segments of a population if a barrier becomes extensive and long-term. Large disturbances (e.g., permanent infrastructure), as well as small disturbances (e.g., roads) can affect caribou movement.

The following operating practices and mitigation measures are aimed at minimizing physical barriers to caribou movement within woodland caribou ranges. As primary roads are recognized as acting as a barrier to caribou movements, the majority of mitigation is focused on minimizing the extent of road access within caribou habitats, as well as the volume of traffic occurring along primary roads.

HIGH EFFECTIVENESS

- Use of Existing Access.
- Use of Shared/Common Access and Utility Corridors.
- Maintenance of large contiguous patches of caribou habitat. Patch sizes/shape/distribution to be reflective of caribou habitat supply.
- Long-term planning of harvest to minimize access requirements.
- Operators should seek opportunities to reclaim and/or reforest access and RoWs no longer required for operations. Access on recovered areas to be blocked to discourage access and encourage recovery.
- Central access corridors to be monitored or have manned gate/security in place, during periods of high activity.

MODERATE EFFECTIVENESS

- Windrows or snow-berms should alternate from side to side or have gaps large enough for wildlife passage approximately every 300 m in order to allow for caribou movement across access right-of-ways.
- Locate camps in close proximity to construction sites to reduce traffic. Consider shared transportation.
- Plan contingency blocks outside of caribou range to minimize access requirements.
- In-block roads to be reforested to a shrub/tree successional pathway.
LOW EFFECTIVENESS
- Road design (height) to consider the ability of caribou to have a clear line-of-sight to habitat on the other side of the road, at least along portions of the road at regular intervals.

Literature Cited

IV. HABITAT LOSS AND ALTERATION
The following operating practices and mitigation measures are aimed at minimizing habitat loss and alteration within woodland caribou ranges.

HIGH EFFECTIVENESS
- Minimize amount of cumulative clearing through integrated land-use plans, area operating agreements, and the use of shared/coordinated and existing access roads.
- Reduce amount of duplicated activity through sharing of infrastructure and services, where reasonable (e.g., sharing camps, RoWs, utilities, maintenance equipment, overlapping forest tenures to integrate planning and operations in DFMPs).
- Timber management planning to consider caribou habitat supply (i.e., stand types, patch size, and age class amount and distribution which maintains habitat). Planning must ensure that adequate amount of identified key, critical, and unique habitat features are retained within each range, including the maintenance of large contiguous patches of caribou habitat. Patch sizes/shape/distribution to be reflective of caribou habitat requirements and supply.
- Locate roads and harvest in the least desirable caribou habitat, in proximity to existing access routes.
- Area required for operations should be as small as practical.
- Deferred harvest in an effort to maintain caribou habitat supply. May need to consider some core habitats to be established as protected areas, or delineated as “intact caribou areas.”
- Minimal disturbance techniques used during operations to prevent topsoil removal and to promote natural re-vegetation. For example, access harvest areas on frozen ground.
- Avoid disruption of key habitat features such as using variable setbacks to buffer large and small lakes and lake complexes, avoidance of terrestrial islands within peatland areas (100 m setbacks), and avoidance of mineral licks (100 m setbacks) and unburned areas within wildfire perimeters.
- Reduce line-of-sight on linear corridors using techniques such as bends or vegetation screening.

MODERATE EFFECTIVENESS
- Protection of lichens through stand level dynamics (e.g., partial cutting in spruce/fir to conserve arboreal lichen) or use of silviculture techniques which promote lichen regeneration (e.g., thinning of mature pine to promote lichen regeneration and discourage mosses).
- Vegetation control (i.e., shrubs) to decrease food for primary prey (moose, deer) and increase food for caribou (e.g., lichen protection, planting).
- Ensure adequate water movement where an all-weather road crosses peatlands by using appropriate bridges, half culverts on pilings, or other drainage techniques. Remove sections of road grade (in peatland areas), wood bridges, log fills, culverts, or snow fills before breakup to restore natural water flow.
- Minimize total width of roads during routing, planning, construction, and reclamation as much as practical.
- Select harvest rotation and stand age distribution which maintains old seral stage stands.
- Remote operations with no all-weather surface access.
- Timber harvesting should only remove specified merchantable timber once alternate timber has become suitable (and become occupied caribou habitat) as a result of forest succession.
Timber harvest planning should utilize a strategy which attempts to emulate a natural pattern of habitat renewal. Wildfire must be considered when developing long-term plans for caribou habitat.

Where caribou ranges have overlapping forest tenures, DFMPs will integrate planning and operations for deciduous and coniferous interests.

Avoid short- to medium-term (10-to-20-year) sequencing of major harvesting operations in areas of caribou range that currently receive high levels of caribou use.

Harvest sequencing which considers maintenance of caribou habitat (e.g., harvest less favourable caribou habitat first in critical areas).

Rapid reforestation to promote crown closure in an effort to remove food for moose and other primary prey. Ensure that hauling, restoration, and silviculture take place in a timely fashion following the harvesting of a block.

LOW EFFECTIVENESS

- Maintenance of habitat within caribou movement corridors.
- Implementation of caribou habitat supply models to forecast supply of habitat under different timber harvesting options.

V. RANGE RECOVERY AND RESTORATION

Management of boreal caribou habitat to maintain viable populations over time will require both minimizing the impact of future development and recovery of the existing industrial footprint. Rehabilitation of existing anthropogenic disturbances not currently in use by industry within caribou range will reduce functional habitat degradation and fragmentation from these disturbances. The forest industry utilizes planning, harvesting operations, silviculture, and monitoring to ensure reforestation of harvested sites.

Forestry operations can assist in providing future woodland caribou habitat supplies, primarily by cycling older forest stands and shortening the period required to cycle these areas back to high-quality caribou habitat. Through the use of various harvesting methods (e.g., specialized site preparation techniques which retain terrestrial lichen cover, or cut-to-length versus full tree harvesting methods results in reduced disturbance and increases restoration rates) and silviculture techniques (e.g., planting to coniferous species and avoidance of hardwoods, shrub control through spraying, provide spacing for regenerating pine stands to enhance lichen growth), access control measures on reclaimed areas and based on local site conditions, forest companies operating within caribou ranges will, over time, return their operating landbase back into suitable habitat. A primary goal of restoration within forest management plans is to not enhance the quality of the existing primary prey/moose habitat.

The following operating practices and mitigation measures are aimed at caribou habitat recovery and restoration within woodland caribou ranges.

HIGH EFFECTIVENESS

- Timber management planning to consider caribou habitat supply (i.e., stand types, patch size, and age class amount and distribution which maintains old seral age stands). Planning must ensure that adequate amount of identified key, critical, and unique habitat features are retained within each range, including the maintenance of large contiguous patches of caribou habitat. Forestry respondents indicated that in general it appears to take 30–50 years post harvest for lichens and proper stand structure to appear.

- Minimize amount of cumulative clearing through integrated land-use plans and area operating agreements and shared/coordinated access. Reduce amount of duplicated activity through sharing of infrastructure and services, where reasonable (e.g., sharing camps, RoWs, utilities, maintenance equipment, overlapping forest tenures to integrate planning and operations in DFMPs).
- Use minimal disturbance techniques, such as road access on frozen ground, during operations to prevent topsoil damage and promote natural re-vegetation. Minimizing ground disturbance during harvest and site preparation will promote lichen persistence after logging.

- Operators should seek opportunities to reclaim and/or reforest existing roads no longer required for operations. Access on recovered areas to be blocked to discourage human access and encourage recovery.

- Focus re-vegetation efforts on upland ridges within broader peatland complexes.

**MODERATE EFFECTIVENESS**

- Reclamation/silviculture prescriptions should consider maintaining or improving caribou habitat.

- Avoid artificial seeding of grass and legume based seed mixes which will create competition for native shrub and tree species.

- Vegetation control (i.e., shrubs) to decrease food for primary prey (i.e., moose, deer) and increase food for caribou (e.g., lichen planting). Examples include: intensification of pre-commercial thinning to eliminate hardwoods which attract moose; aerial seeding for conifer along abandoned roads [requires that the roads are pre-treated by turning up organic soils in an effort for the seed to make it into the organic layer]; and spraying of poplar along roads and trails in an attempt to reduce moose forage species.

- Rapid reforestation to promote crown closure in an effort to remove food for moose and other primary prey. Ensure that hauling, restoration, and silviculture take place in a timely fashion following the harvesting of a block.

- Reforest in-block roads to a shrub/tree successional pathway to remove footprint.

- Protection of lichens through stand level dynamics (e.g., partial cutting in spruce/fir to conserve arboreal lichen) or use of silviculture techniques which promote lichen regeneration (e.g., thinning of mature pine to promote lichen regeneration and discourage mosses).

- Remove sections of road grade (e.g., in peatland areas), wood bridges, log fills, culverts, or snow fills before breakup to restore natural water flow.

- Prevent ongoing use of inactive access through combined use of physical control measures including: rollback, removal of creek crossings, re-contouring to surrounding topography, revegetating/reforesting, and/or barriers at junctions with active access.

- Timber harvesting should only remove specified merchantable timber once alternate timber has become suitable as caribou habitat as a result of forest succession.

**VI. INCREASED AWARENESS AND MINIMIZING HUMAN-CAUSED CARIBOU MORTALITY**

The following operating practices and mitigation measures are aimed at increasing awareness of caribou conservation issues and ultimately minimizing human-caused caribou mortality within woodland caribou ranges. Human-caused caribou mortalities result from both legal (First Nations’ harvest) and illegal (poaching) hunting, as well as from vehicle collisions. Forestry respondents indicated that a number of mitigation measures are currently employed with the assumed benefit of minimizing human-caused caribou mortality. Relative costs of these measures were considered to be low to negligible, as well as easy to implement.
**HIGH EFFECTIVENESS**

- Participation in a caribou awareness education session for employees and contract supervisors working in key caribou habitat on a permanent or long-term contract basis. Typically, awareness sessions are linked to ongoing caribou monitoring through the use of employee-based caribou sighting card programs.

- Employee and contractor restrictions when working in caribou areas, which include prohibition of:
  - Firearms and bows (except for authorized safety purposes).
  - Pets.
  - Personal snowmobiles, ATVs, and other motorized recreational vehicles.
  - Speeding on roads.

- To reduce the number of caribou–vehicle collisions which were recorded along a major highway in west-central Alberta, a very successful and site-specific “caribou cowboy” program was implemented in 1992. The program involves chasing migratory mountain caribou off the highway when attracted to road salt.

**MODERATE EFFECTIVENESS**

- Education on woodland caribou extended to local schools, communities, residents, contractors, and organizations, where appropriate.

**LOW EFFECTIVENESS**

- Implementation of speed zones and signage in areas of potential caribou–vehicle collisions.

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**VII. IMPROVED PLANNING**

The following operating practices and mitigation measures are aimed at improved planning within woodland caribou ranges.

**HIGH EFFECTIVENESS**

- Timber management planning to consider caribou habitat supply (i.e., stand types, patch size, and age class amount and distribution which maintains old seral age stands). Planning must ensure that adequate amount of identified key, critical, and unique habitat features are retained within each range, including the maintenance of large contiguous patches of caribou habitat. Forestry respondents indicated that in general it appears to take 30–50 years post harvest for lichens and proper stand structure to appear.

- Minimize amount of cumulative clearing through integrated land-use plans and area operating agreements and shared/coordinated access. Reduce amount of duplicated activity through sharing of infrastructure and services, where reasonable (e.g., sharing camps, RoWs, utilities, maintenance equipment, overlapping forest tenures to integrate planning and operations in DFMPs).

- Locate roads and harvest areas in the least desirable caribou habitat and in proximity to existing access routes.

- No new permanent access development within boreal caribou core habitats. Strive to conduct operations using minimal access on frozen ground.

- Whatever the season, operations should be scheduled to avoid known key caribou habitat features at key times (e.g., avoid critical calving time periods and habitats).

- Avoid disruption of key habitat features by using variable setbacks to buffer large and small lakes and lake complexes, avoiding terrestrial islands within peatland areas (100 m setbacks), and avoiding mineral licks (100 m setbacks) and unburned areas within wildfire perimeters.
Deferred harvest in an effort to maintain caribou habitat supply. May need to consider some core habitats to be established as protected areas, or delineated as "intact caribou areas," which serve over a long time period as refuge areas from development activities but which may shift spatially through time to account for natural disturbances and recruitment areas.

MODERATE EFFECTIVENESS

- Attempt to emulate a natural pattern of habitat renewal during timber harvest planning. Wildfire must be considered when developing long-term plans for caribou habitat.
- Avoid short- to medium-term (10-to-20-year) sequencing of major harvesting operations in areas of caribou range that currently receive high levels of caribou use.
- DFMPs will integrate planning and operations for deciduous and coniferous interests where caribou ranges have overlapping tenures.
- Plan contingency blocks outside of caribou range to minimize number of entries into a range and access requirements.
- Sequence harvest to consider maintenance of caribou habitat (e.g., harvest less favourable caribou habitat first in critical areas).
- Concentrate activities spatially and temporally (e.g., situate activities within 100 m of existing access; adopt sequential development strategy).
- Implement rapid reforestation systems to promote crown closure in an effort to remove food for moose and other primary prey.

LOW EFFECTIVENESS

- Implement caribou habitat supply models to forecast supply of habitat under different timber harvesting options.

In addition to the existing operating practices and mitigation measures aimed at improving planning, the audit identified that a next step required for recovering caribou populations will include the implementation of an active adaptive management planning approach for resource use in critical caribou areas versus surrounding range areas. There is a need to have new procedures and policy in place for core/critical areas which should be delineated as temporal and spatial refugia (intact areas) for caribou. These refuge areas should include substantial areas of intactness (i.e., no new disturbance and restoration of habitat focused in these areas), managed and designed over long temporal scales, but able to shift spatially as sufficient adjacent habitat capable of maintaining viable herds and discourage predation and primary prey becomes available.

By allowing refuges to be “floating” within the larger landscape over time, landscape planners can shift the refuge areas to more appropriate habitats if natural disturbances such as fire or insects modify habitat and occurrence of predators within these areas. In order to designate and manage temporary refuge areas there must first be mobilization of the political will to decide, fund, and manage recovery actions and provide compensation where necessary to the current lease and tenure holders of these areas.

ORIGINAL REPORT


To obtain a copy of the original report, please contact Mr. Andrew de Vries, Director, Conservation Biology, Forest Products Association of Canada at adevries@fpac.ca.
FOREST PRODUCTS ASSOCIATION OF CANADA

The Forest Products Association of Canada (FPAC) provides a voice for Canada’s wood, pulp, and paper producers nationally and internationally in government, trade, and environmental affairs. The $65-billion-a-year forest products industry represents almost 2% of Canada’s GDP and is one of Canada’s largest employers, operating in hundreds of communities and providing hundreds of thousands of direct and indirect jobs across the country.

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