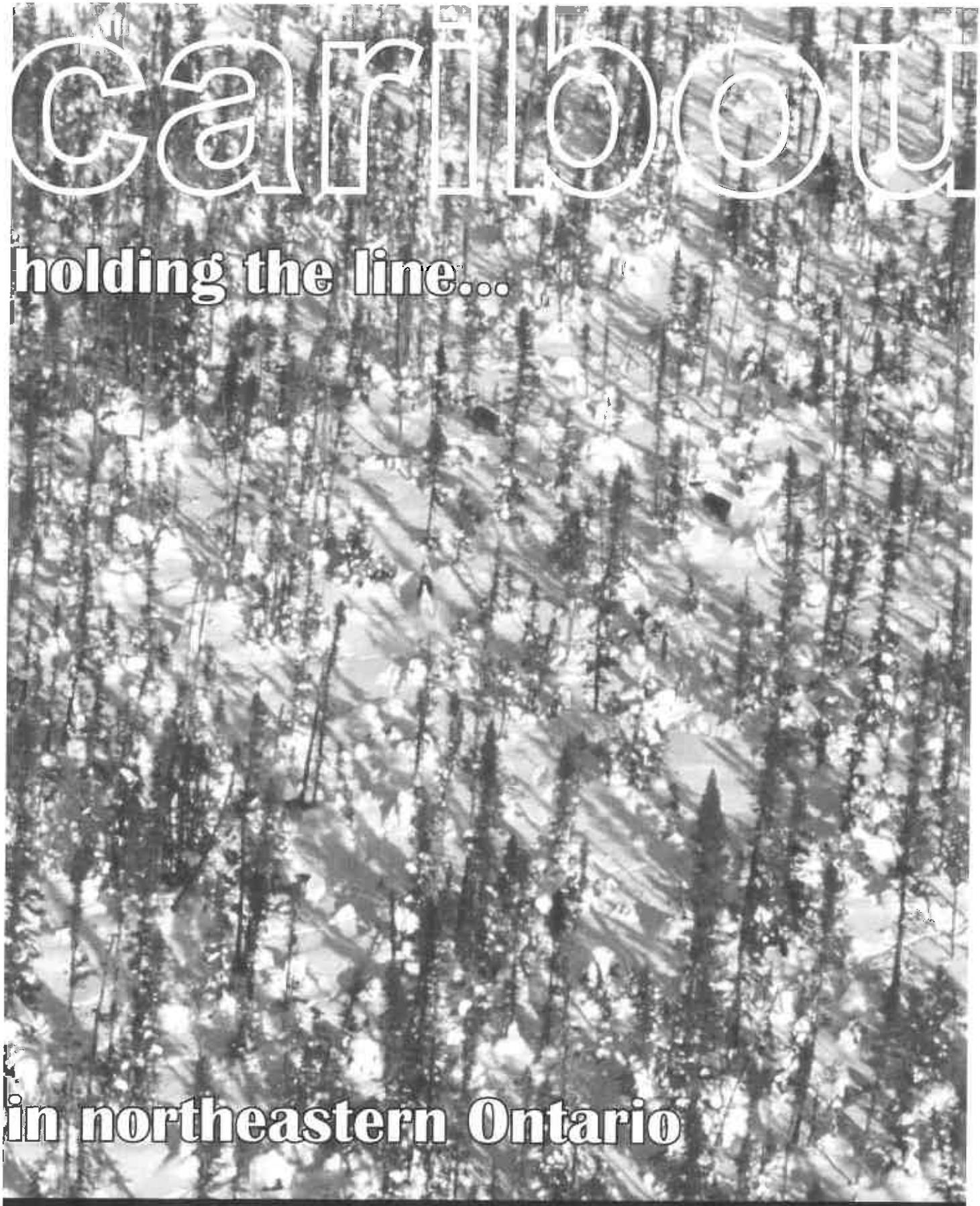

caribou

holding the line...

in northeastern Ontario

prepared for the Ontario Ministry of Natural Resources
with a grant from the Species at Risk Fund, 2007-08

WILDLANDS LEAGUE
A chapter of the Canadian Parks and Wilderness Society

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Although we are indebted to the contribution of many and have attempted to represent their views and research accurately, this document is the product of CPAWS Wildlands League. It represents our interpretation of the best conservation biology in advice to government. Any errors and omissions are our own.

1.0 - Summary...

Currently, there is no overarching direction available to Ontario's forest managers for the specific purposes of maintaining existing caribou range and setting the stage for recovering woodland caribou range on the managed landscape.

The gap between forest management and maintaining caribou range is becoming increasingly pronounced, and is a potential source of conflict between stakeholders, as the provincial Endangered Species Act and recovery planning efforts mature. Caribou persistence is contingent upon specific management actions and tools, which must be developed. Because recovery cannot begin until population decline is halted, effective management actions must be developed quickly.

Further, operating in and around caribou habitat without such tools is recognized by companies as posing a number of business risks: exposure to criticism, negative public perception, market loss, and the loss of credibility of operations and certification are very real risks.

For all of these reasons, scientists, industry, ENGOs and government alike increasingly realize that conserving Caribou will mean planning for long timeframes and over entire landscapes. The remaining intact forests in Ontario's allocated Boreal forest represent a rare opportunity for such action. In certain circumstances this will mean caribou range and harvesting need to be "disentangled," (i.e. separated spatially).

This case study specifically examines the southern edge of caribou range in north-eastern Ontario, south of James Bay and north of Cochrane, between 49 degrees north and 50 degrees, 30 minutes north and between 79 degrees and 83 degrees, 15 minutes degrees west.

Beginning with the proactive efforts of a leading, FSC-certified company, Tembec initiated dialogue with interested Environmental stakeholders on its tenures in the area. That dialogue resulted in a negotiated map, or "Conservation Plan", attainable within the bounds of industrial and policy constraints of the day. The follow-up analysis by an independent science review team fills an identified need, and adds another critical layer of detail to the case, providing a perfomance filter and value-added management direction. Through it, performance for caribou habitat is attributed to three primary criteria: distance from roads and cut-overs, current and projected quality of stands (age, composition), and connectivity to other range, particularly known continuous range to the north.

Together, these activities demonstrate that significant caribou management advice can be generated with available information in a timely fashion to inform managers of the effects of logging in caribou habitat. By providing this key counterweight to traditional forest management planning activities, both business stability and a cessation to range recession can be readily achieved and provide a credible basis from which to discuss species recovery.

This north-eastern Ontario case study offers many lessons to provincial managers and policy makers. This platform can now serve as a point of departure for effectively managing these often competing values on the landscape in this region. Additional analysis of the wood supply impacts of the Science Team recommendations, consideration of available traditional ecological knowledge, and an analysis of area mineral potential will provide decision-makers with a complete picture of how best to "hold the line" for woodland caribou range in northeastern Ontario.

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MAPS...

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PART I - The Tembec Conservation Plan

2.0 - Project History...

Timber harvest and conservation of woodland caribou habitat are frequently at odds, given the opposing ideals of environmental protection and industrial advancement. Partnerships between industry and environmental non-governmental organizations (ENGOs) are a crucial step towards reconciling these goals and setting the stage for long-term conservation of functional caribou habitat and viable caribou populations. This project originally came about as a result of voluntary discussions between Tembec and CPAWS Wildlands League (a chapter of the Canadian Parks and Wilderness Society) on the outstanding liability of ongoing caribou range recession and concurrent lack of effective management understanding and tools in Ontario. The subsequent Science Team Review component was a result of a specific grant through the Species at Risk Fund, Ministry of Natural Resources (MNR), 2007-08 to bring the necessary science to bear on the Draft Conservation Plan product.

2.1 - Critical policy gap identified

This initiative is directed towards a key gap identified by all parties involved in the development of the Conservation Plan, namely:

There is no overarching direction to forest managers available for the specific purposes of maintaining existing caribou range and setting the stage for recovering woodland caribou range on the managed landscape.

This case study specifically examines the southern edge of caribou range in north-eastern Ontario and western Quebec, south of James Bay and north of Cochrane, between 49°N and 50°30' N and between 79° W and 83° 15" W (Figure 2a).

The gap between forest management and maintaining caribou range is becoming increasingly pronounced, and is a potential source of conflict between stakeholders, as the provincial Endangered Species Act and recovery planning efforts mature. Caribou persistence is contingent upon specific management actions and tools, which must be developed. Because recovery cannot begin until population decline is halted, industry leaders such as Tembec wish to act pro-actively to minimize further conflicts around this threatened species.

Further, operating in and around caribou habitat without appropriate tools is recognized by companies as posing a number of business risks: exposure to criticism, negative public perception, market loss, and the loss of credibility of operations and certification are very real risks.

For these reasons, scientists, industry, ENGOs and government alike realize that in many cases remaining caribou range and harvesting need to be "disentangled," (i.e. separated spatially) in the remaining intact forests in Ontario's allocated Boreal Forest.

The original voluntary initiative was intended to illustrate how significant conservation action can be attained with little economic impact. If successful, it will demonstrate how readily disentanglement can be initiated and achieved, actively moving towards halting caribou range recession, and also reducing risks to companies operating in these areas.

Figure 2a. *- Northeastern Ontario: Area Considered in the Tembec Caribou Conservation Plan*

2.2 - Risk drivers

In developing this Plan, it is recognized that many risks exist that warrant this immediate attention.

These include risks to:

(1) Woodland caribou persistence:

Woodland caribou have risen in prominence as a focal species for boreal conservation over the last 6 to 7 years. This began with the change in the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status from Vulnerable to Threatened (COSEWIC 2000). Every jurisdiction in Canada with woodland caribou is struggling with the development of recovery plans that will reverse the prevailing trend. Failure to act risks local extirpation of woodland caribou populations.

(2) Ontario's sustainable forest management credibility

There is a high probability that extirpation of woodland caribou from forest industry tenures could result in international attention from environmental organizations, with consequent negative media and loss of market share of Canadian forest products. Failure to act risks this negative exposure and loss of credibility of Ontario's system.

(3) Ontario's market advantage

Forestry companies in Ontario are world leaders in Forest Stewardship Council (FSC) certification of forest landscapes. These companies have been highly rated by investment companies using sustainability criteria for environmental considerations in business decisions. In some cases, this has matured into significant business advantages in the

marketplace. For example, Tembec officials credit FSC certification with helping the company through recent market turbulence. As well, Domtar Inc. has experienced increased sales of the EarthChoice paper line as a result of FSC content. This is notable, as the North American paper segment is experiencing decline. Failure to recognize a collaborative proposal brought forward by stakeholders involved in FSC success jeopardizes the FSC and companies that have made an FSC commitment.

(4) Economic stability of companies

The collaborative conservation design of Tembec's deferrals and protected areas attempts to maximize woodland caribou conservation while minimizing economic conflicts. Wood supply impacts have been calculated at approximately 3% or 65,000 m^3 for Tembec Inc. operations. Mineral conflicts have been minimized, but require further assessment. Wood supply costs may be offset by anticipated gains in operational confidence in security of access to resources. Failure to act risks exposure to criticism, negative public perception, market loss, and loss of credibility of operations.

2.3 - Regulatory and policy context

While the activity of forest management is regulated under the Crown Forest Sustainability Act, many specific policy directions have implications to this issue.

Endangered Species Act

This legislation is new and, hence, has no track record of application or success. The collaborative conservation design serves as a test case for the implementation of the new ESA.

Crown Forest Sustainability Act / Forest Management Planning

The Forest Management Guide for Landscapes (Landscape Guide) is a streamlined guide in progress and constitutes one of the main changes to forest management planning at scales that affect caribou conservation. Thresholds and directions for the Landscape Guide are currently being tested in pilot study areas. But, it is important to note that the Landscape Guide only addresses "how" to cut, not "where" to cut – the fundamental issue affecting caribou range. This Guide makes many assumptions, including presuming that cutting effectively emulates natural disturbance and is therefore compatible with caribou persistence. This assumption is not supported by recent peer reviewed scientific literature (e.g. Bergeron et al. 2006, Carlson and Kurz 2007) and remains untested by time. The effectiveness of forest harvesting prescriptions can only be confirmed after decades of post treatment monitoring. Until then the prescriptions are hypotheses being tested.

Tenure Allocation

Specifically, MNR discussions regarding tenure modifications to merge Sustainable Forest Licences (SFLs) and create cooperative tenure arrangements constitutes one significant policy change that could affect wood flow and conservation planning within existing forest management planning guidelines. These arrangements could be used as a tool to further strengthen the conservation design, while mitigating wood supply impacts. Mergin SFLs is and opportunity to match the sizes and distributions of areas for forest management with those appropriate for caribou management. In some cases, FSC certified units will be merged with non-FSC units and industry players. This development may challenge FSC conservation gains by introducing industry players either lacking in FSC experience or by corporate cultures not committed to FSC ideals.

Climate Change policy

Canada's boreal forests constitute one of the planet's largest carbon stores. The boreal forest stores in excess of 186 billion tonnes of carbon – 27 years' worth of carbon emissions from burning fossil fuels. Leaving large areas of the boreal forest intact will help address climate change as well as caribou conservation, as these forests will continue to serve as vast carbon storehouses

2.4 - Current economic context

The forest industry in Ontario (and Canada) has recently experienced a dramatic decline in economic viability. It has often been referred to as a "***perfect storm***" of factors, which include housing starts in the United States, the softwood lumber duties on Canadian exports to the United States, the rising power of the Canadian dollar versus the American dollar, and the long-standing lack of capital investment in aging production facilities. The result is a shrinking industry which has been steadily closing the least viable facilities over the past few years, shutting down machines, and laying off shifts of workers. Experts point to a return to profitability in the future, but flag a substantially different-looking sector involving fewer, more efficient facilities and workers.

As a result of this downturn, there is a currently reduced demand for wood fibre. For caribou and caribou management efforts, this means two things:

(1) there should be NO need currently to push operations deeper into intact forests, and

(2) NOW is the time to rethink harvest pressures before re-allocating fibre from closed facilities.

This is necessary to effectively stop extirpation and set a reasonable chance of recovery for the species, without the need for impacting operating facilities. We are at a turning point in the economics of the forest sector; it is the perfect time to carefully disentangle forest operations from ongoing range recession for the benefit of both caribou persistence and business stability for surviving and emergent operations.

2.5 - Affected aboriginal communities

The forest management units in northeastern Ontario that are the focus of this project overlap with the traditional territories of two First Nations – including Moose Cree, and Taykwa Tagamou. CPAWS Wildlands Leaguehas initiated a project with the Moose Cree to support interviews and the collection of Traditional Ecological Knowledge in the Moose Cree territory which covers a wide area of the Cochrane- Moose River Unit and others. This project is also intended to build a dialogue with these communities on caribou conservation.

2.6 - Primary stakeholders

(1) Ontario's public, and environmental organizations representing the public interest and including WWF Canada, CPAWS Wildlands League, and others

(2) Forestry companies, primarily Tembec, but including Abitibi-Bowater as well

(3) Tourism operators

(4) Mining

2.7 - Description of the process

As part of their Forest Stewardship Council (FSC) certification, Tembec Inc. currently safeguards 270,197 hectares of candidate protected areas across four tenures in the Lake Abitibi Ecoregion (3E). This was the result of joint protected areas planning conducted with WWF-Canada and CPAWS Wildlands League in 2002. Three of these areas have interim protection as a result of the Woman River (C1453) site replacement exercise.

With new species at risk legislation in Ontario and the rising prominence of woodland caribou as a Boreal Forest focal and flagship species, the three organizations collaborated in 2007 to redesign the candidate protected areas in order to better identify and safeguard caribou habitat. Existing FSC candidate protected areas were reassessed based on objectives to maximize conservation of woodland caribou habitat while operating under a pragmatic design constraint. This would minimize wood supply impacts, given the current forest harvesting allocation of these Crown tenures under the Ontario Crown Forest Sustainability Act.

During this collaboration period Tembec Inc. and CPAWS Wildlands League consulted with government biologists and academics to assist in developing approaches for identifying woodland caribou habitat. WWF-Canada developed further information to rank candidate protected areas in existing FSC tenures and re-assess their contribution to ecological representation related to requirements to meet FSC criterion 6.4.

Workshops.

Through a series of workshop exercises, conservation and harvesting priorities were put on the table by the collaborators and examined to identify key opportunities and first steps. These workshops generated two distinct and relevant concepts/products: (1) "concurrence" areas, where agreement could be achieved, and (2) "conflict" areas, where agreement on the acceptability of harvest pressures was deferred to independent scientific assessment.

Identification of Concurrence.

These were areas where harvesting operations were unlikely to pose a significant risk to caribou range, or represented areas that were not economically feasible or essential that overlapped with likely caribou habitat. These latter opportunities are captured in the final mapping provided. For example, the economic costs of building extensive new roads into low-yield areas, particularly in the Moose unit, were highlighted as one such opportunity worth further exploration. As these areas constituted questionable areas from a financial feasibility perspective, and overlapped with the area of continuous occupancy for woodland caribou, early win-wins were quickly sketched out.

Identification of Conflicts.

Other outputs from the workshop exercises included some areas which had high value to both conservation and harvesting. These areas are less easily resolved between the collaborative parties and within the current management context. These conflict areas were highlighted in the workshops, but left from the final design until independent science review is available to comment.

Summary:

The resulting modified conservation design spans four forest tenures in northeast Ontario (***Maps 1 and 2***) and has the following proposed conservation areas:

417,557 hectares for permanent withdrawal primarily for providing caribou habitat (Map 2 Possible Withdrawal);

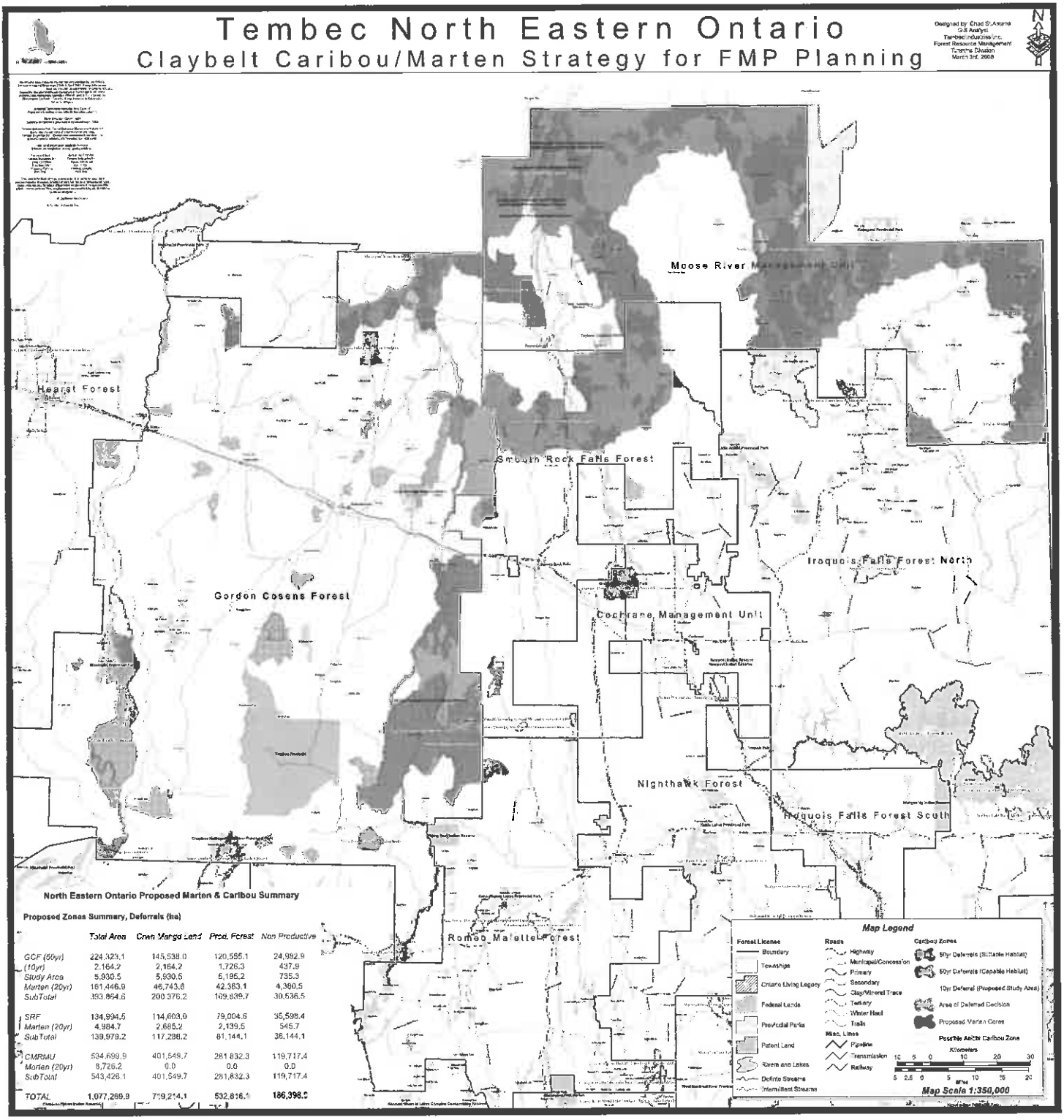
86,545 hectares for permanent withdrawal with high conservation values, including caribou habitat, but primarily to meet ecosystem representation requirements under FSC criterion 6.4 (***Map 2*** FSC Candidates);

414,515 hectares deferred for 50 years with the primary purpose to provide connectivity for woodland caribou between areas of permanent protection consistent with the development of the MNR's upcoming Landscape Guide (***Map 2,*** 50yr and 10yr Deferrals).

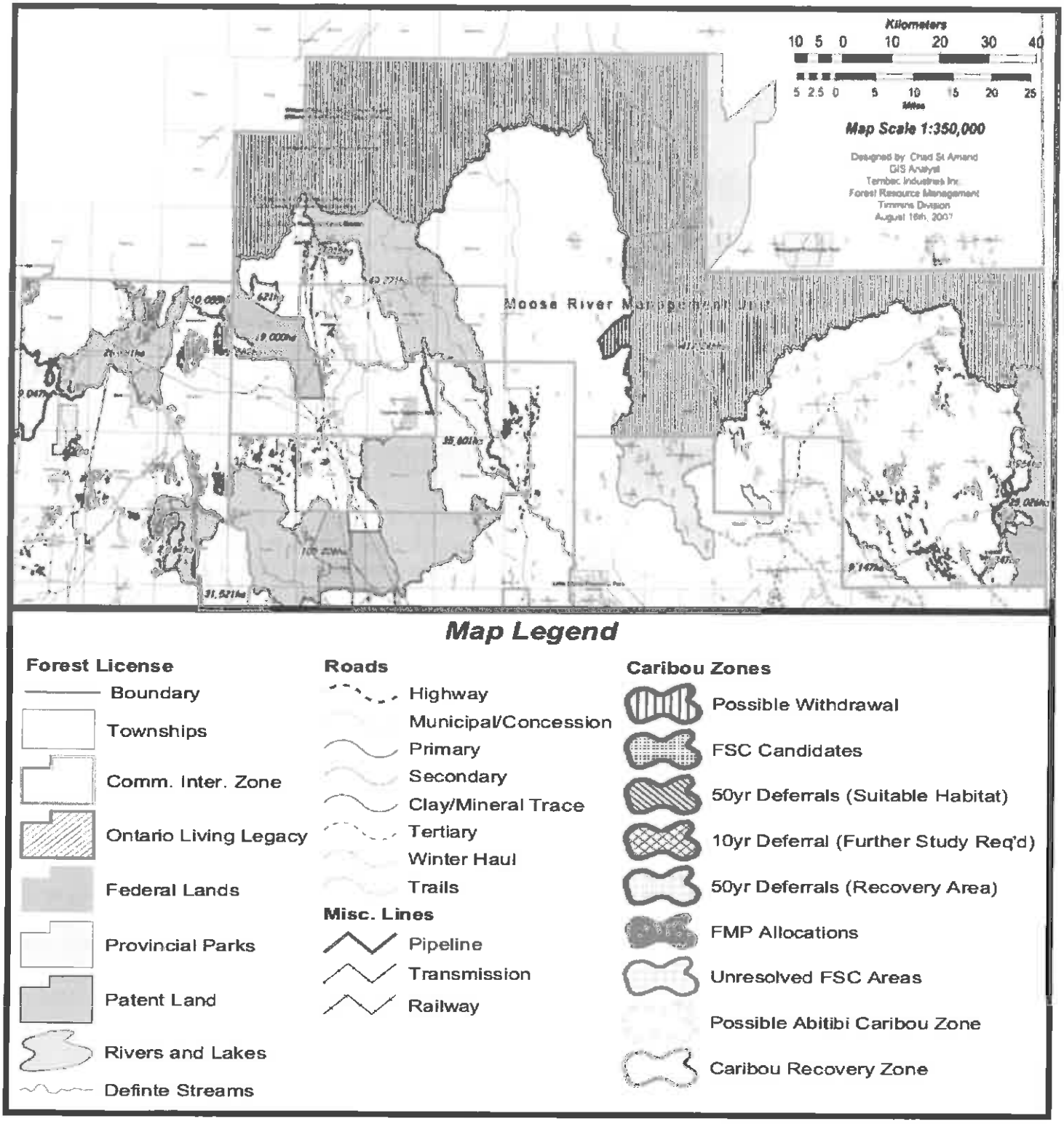
caribou, when visible across open spaces

2.8 - Primary map product developed

The primary product developed through this process is a summary map delineating the proposed conservation design as it would sit on the landscape, and originally entitled "Regional Caribou / Conservation Plan." The three geographic areas described above are all depicted on this map. This map was developed through several collaborative workshops between the parties, as well as a suite of adjustments in response to comments by Ministry of Natural Resources field staff from the Northeast region (Map2).



Map 1. *- The most recent Tembec design proposal, including marten cores (Tembec, 2008)*



Map 2. *- A close-up of the northern part of the Tembec design proposal (reviewed version, 2007)*

2.9 - Need for third party science review identified

The Conservation Plan is the result of discussions by Tembec, CPAWS Wildlands Leagueand WWF staff with government and some initial dialogue with academic caribou experts. It must be recognized that this product demonstrates how far an industry leader can go within the existing economic, operational, and regulatory constraints. While the emerging literature suggests that additional management steps will likely be needed to conserve caribou, an evaluation of the likelihood of long-term persistence of woodland caribou populations was not undertaken. In other words, the efficacy of the Conservation Plan was not independently tested at the time of its design.

PART II... The Science Team Review

This is the portion of the process that has been suported by the Species at Risk Fund, 2008.

3.0 - Science Team Priorities

The primary objective of this project is to have a credible, third party science team examine the proposed Conservation Plan specifically for its likelihood to halt range recession of woodland caribou in northeastern Ontario. It is recognized that Tembec has other objectives besides caribou in mind during the design of the Conservation Plan (e.g. enduring features, wood supply, marten cores, trap lines and/or remote tourism); nonetheless, this evaluation of its likely effectiveness is based upon examining caribou conservation only. Similarly, caribou recovery in previously-impacted areas is a secondary goal, and is not the focus of this report.

4.0 - Project Assumptions / Knowledge Gaps

This project is based on a number of assumptions about how caribou use the landscape of northeastern Ontario both north and south of the area of undertaking, and how anthropogenic disturbance impacts caribou. There are also many gaps in our knowledge that need to be filled in order to get a more complete picture of the state of caribou populations and what needs to be done to conserve them. The following assumptions and knowledge gaps were agreed upon by the Science Team at a workshop on February 5-6, 2008.

4.1 - Project Assumptions

Stop-first priority

Successful conservation of a declining species entails stopping range recession as a priority before recovery of former range is attempted. At a minimum, this involves the recognition and removal of know threats.

Undisturbed habitat more valuable

Current habitat undisturbed by humans is of higher conservation value than human-disturbed habitat that may or may not regenerate to high quality caribou habitat in the future. Caribou are generally absent from older cuts where moose and wolf numbers may be higher (Boertje et al. 1996, Rettie and Messier 2000, Weclaw and Hudson 2004) and lichen availability may be lower (Johnson et al. 2004). In addition, immature forest stands comprise very small proportions of caribou home ranges (Mosnier et al. 2003). Undisturbed habitat provides security in the face of uncertainty about the ability of forest management activities to produce viable caribou habitat.

Intactness in the unallocated

Continuous caribou range north of the cutline will remain intact. The existing forest within this area must not be fragmented further by roads, hydro corridors, mines or other infrastructure. Linear disturbances in particular may facilitate predator travel speed and efficiency (James 1999)and hinder caribou movements (Dyer *et al.* 2002 If intactness in this area is not maintained, then even large withdrawals from industrial activity south of the cutline will not be effective.

Proximity to continuous range / large patch sizes better

Large areas of good caribou habitat in proximity to contiguous occupied range are more valuable for conservation purposes than small or fragmented areas distant from contiguous occupied range. For example, the annual home ranges of adult female caribou in northeastern Ontario range from 3212-4790 km2 (Brown et al. 2003).The value of any area as caribou habitat decreases significantly as one proceeds south, away from continuous caribou range and further into a habitat matrix that contains an increasing proportion of industrially-disturbed habitat. All hectares, ir-

respective of stand age and species composition, are not of equal value to caribou. An 80 year old black spruce stand is of no value as caribou habitat if it is surrounded by unsuitable habitat or located far from continuous caribou range. Habitat becomes more valuable as one moves towards continuous range.

Definition of most suitable habitat

Brown (2005) suggested that the most suitable caribou habitat in northeastern Ontario includes all ages of shrub-rich treed muskeg and mature spruce >50 years old, and that based on resource selection function (RSF) modeling, the probability of caribou occurrence was greatest where mature black spruce was abundant. These forest cover attributes provide the stand-level qualities that caribou require to carry out their life processes.

There are thresholds of disturbance impacts

Caribou range consists of suitable caribou habitat that is not fragmented by human disturbance, and is connected to other contiguous caribou range. Caribou range occupancy is often reduced 1-13 km from anthropogenic disturbances (Edmonds 1988, Duchesne et al. 2000, Johnson et al. 2004, Cameron et al. 2005, Mahoney and Schaefer 2007, Vors et al. 2007). Caribou range is therefore more than 13 km from anthropogenic disturbance. Although the effects might not be evident for as long as 20 years, such factors must figure into the definition of caribou range until such time as caribou are known to reoccupy sites that have recovered into potential caribou habitat.

Assumed occupancy

Inclusion as caribou range is assumed to imply occupancy. Caribou use different parts of their home range, which varies from year to year (Cumming and Beange 1987). At a fine scale, caribou may be there one year and gone the next, but it does not mean that the areas are not being used, or will not be used in the future. We use this assumption, in association with available caribou sightings and collaring data to establish a realistic southern extent of continuous caribou range.

Effective north-south connectivity is critical

The northern portion of caribou range in Ontario (i.e. above the cutline) is still continuous, and thus any caribou habitat that is connected to the frontier of continuous caribou range has a higher probability of supporting caribou. Furthermore, any industrial activity that severs the north-south connection between a piece of caribou habitat and continuous range will lower the probability of maintaining caribou habitat occupancy in the area that is separated from continuous range.

Population dynamics likely affected by rivers in the region

Caribou are often organized into local populations, using an area that circumscribes its movements and activities over the course of a year. Major rivers and infrastructure may function as semi-permeable barriers that constrain caribou movements and divide populations across the landscape. Work by Brown (2005) indicate that caribou are constrained between the Abitibi River and the Harricana River, and consequently may be one population (Map 3). OMNR's (2008) observations also support the idea that major rivers may act as barriers (Map 7). Conservation efforts or forestry within one population may not impact animals on the other side of one of these barriers. This also means that the scale of management decisions should conform to the boundaries of the population , as management decisions in one part has a good chance of affecting the entire population. In Ontario our knowledge is handicapped. We assume that animals between the Albany and the Missinaibi Rivers may be a separate population.

Deferral value is contingent on quality

Deferrals are useful for caribou conservation only to the extent that the forests within them meet our definition of "caribou range." Cutover deferrals are not useful for slowing or stopping range recession if they contain none of these values. If partially logged, they may provide some buffering to adjacent caribou range if logging is curtailed.

Corridor width and quality critical to utility

Present or future corridors between intact forest fragments must be wide enough to be considered "range" for a population. In this part of Ontario, annual home ranges for female caribou are generally greater than 3000 km2 (Brown et al. 2003).The thin peninsular corridors proposed in the recovery plan are not wide enough on their own to buffer the

effects of surrounding habitat disturbance, and would likely not provide real connectivity. Caribou movements range widely and do not necessarily follow predictable patterns (Cumming and Beange 1987); therefore, there is little evidence that narrow corridors would be effective (Ferguson and Elkie 2004b).

Forestry and road-building represent a known threat

More road building and forest harvesting in intact areas of caribou habitat will lead to further population decline of caribou. Roads, harvesting and other infrastructure alter the predator-prey balance so that caribou in the vicinity are more vulnerable to predation and ultimately decline (Bergerud and Elliott 1986, Seip 1992, Stuart-Smith et al. 1997, Rettie and Messier 1998, James 1999, Schaefer et al. 1999). Also these developments act as physical and behavioural barriers to movement for individuals and populations (Dyer et al. 2001, 2002). Effects of road, cutblocks and other developments go beyond their immediate geographic footprint. Vors et al. (2007) predicted a 50% chance of extirpation at13 km from cuts, 4 km from unimproved roads and an even greater edge effect of power corridors and rail lines. Because we lack cutblock data, we use roads as a surrogate. Presence of roads is considered an accurate indicator of the human footprint in an environment (Andrews 1990, Fenech et al. 2001). The road layer in our possession includes tertiary (operational) roads (Map 4). We assume that cut blocks extend less than 500 m from the end of tertiary roads.

Potential negative effect of road subsidies

Concentrating forestry operations on areas with existing road access is cheaper for the forest industry. New roads cost time and money for construction and any environmental assessment. To the extent that the province is footing the bill for roads, they may be facilitating caribou extirpation as well as road building - an example of a perverse subsidy (Myers, 1998).

Implications of unit amalgamation

Amalgamation of the forest management units has implications. Amalgamation means that planning can be done at a scale that is meaningful, relevant and appropriate for caribou. This corresponds with the landscape approach to forest management envisioned in the Forest Management Guide for Landscapes. However, the wood sharing cooperation essential for the Guide to be effective will not happen without amalgamation. With amalgamation, there are more options for Tembec to source its wood from areas other than caribou range. There may also be negative impacts to amalgamation as mentioned on page 9.

Likely a declining population trend in region

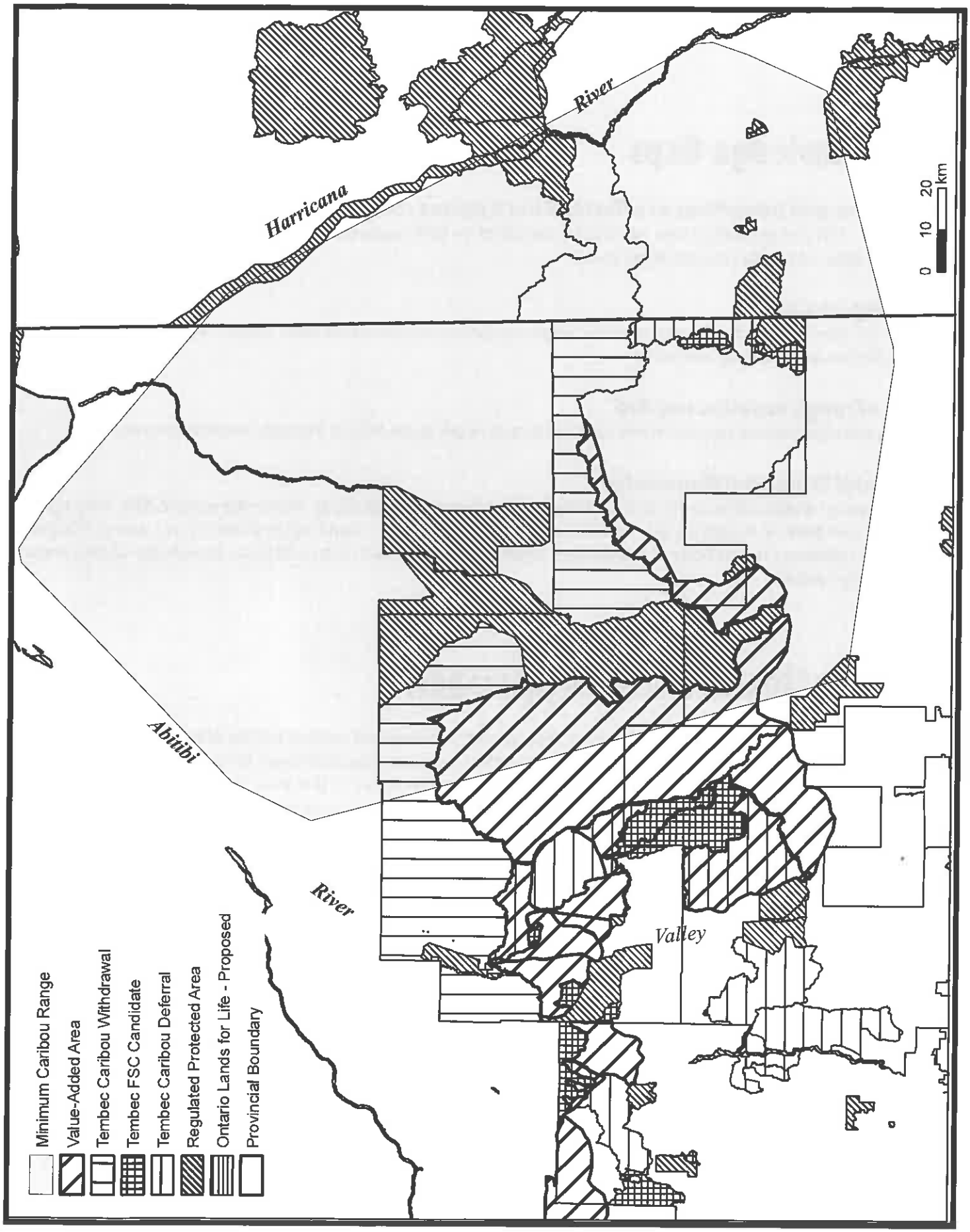
The sole recent study of woodland caribou population trends in northeastern Ontario documented an 11% decline per year from 1998-2001 (Brown 2005), illustrating negative population growth. This study is the most comprehensive in the province. We have no knowledge about the population trends since the radiotelemetry study concluded. There may be an opportunity for this population to stabilize if we curtail further industrial disturbances in this area and allow the forest to regenerate.

Range occupancy trends - performance measure

Calving success and distribution is the most important measure of the quality of caribou habitat and health of a population, but is difficult to evaluate. Because woodland caribou calve in a dispersed distribution at secluded sites, it would need intensive telemetry data gathering. A minimum of 15 % calves is necessary to sustain a caribou population in the presence of predation and low hunting mortality (Bergerud 1996). Recognizing the expense and difficulty in maintaining radio collar studies, the success of conservation efforts will be measured according to how well caribou maintain their range relative to the present occupancy over the next 20 years. If occupied range shrinks, then conservation measures have failed. If occupied range is maintained or expands, then efforts have been successful. Range occupancy as a performance measure is consistent with the recommendations of the Draft Ontario Woodland Caribou Recovery Strategy (Ontario Woodland Caribou Recovery Team 2005).

Efficacy of current forestry guidelines for caribou remains unproven.

Guidelines are linked to winter habitat. We suspect this is because winter habitat is easiest to survey and define on the basis of Forest Resource Inventory. But most mortality happens in non-winter months (Brown 2005), with the fate of calves determined largely during the summer (Mahoney et al, 1990). The only current provincial guidance for caribou management is specific to Northwestern Ontario, has no demonstrable management benefits to range maintenance,



Map 3. - *One estimated population range, constrained by major rivers (based on telemetry data. Brown, 2001)*

and is premised on the risky assumption that logging impacts can be successfully mitigated in the range of a threatened species. Application of the OMNR approach in northwestern Ontario must be regarded as an experiment in progress.

4.2 - Knowledge Gaps

Aspirations and intentions of affected First Nations communities

Moose Cree , TTN and possibly others need to be consulted on their aspirations for their traditional territories that lie within the same area as this conservation plan.

Assessing success

How can we effectively and efficiently monitor range occupancy in order to measure success in actually stopping range recession and allowing recovery?

Extent of range baseline needed

Southern extent of caribou range in north eastern Ontario needs to be refined through systematic surveys.

Traditional Ecological Knowledge

This is an area of research that needs to be collated and analyzed for its ability to inform the work to date. One such study has been done by Russell Turner. Another is being undertaken by Lillian Trapper currently as a part of this project and will contribute to this body of knowledge. Together, this work will help to fill in our knowledge of how areas are utilized by caribou.

5.0 - Rationale and Approach

This project examines the critical gap between forest harvest planning and caribou habitat planning. The impetus for this project arose from the overlap, and perceived conflict, between allocated forest tenure and caribou habitat in northeastern Ontario, and the need to stop further caribou range recession in this area. Tembec's willingness to participate in this project has provided the opportunity to explore, and to test our assumptions about the value of boreal caribou habitat for stopping range recession. The project itself does not guarantee cessation of caribou range recession, rather it serves as a testable hypothesis as part of an adaptive management framework. Our rationale is clear: we must stop woodland caribou range recession in this area through astute habitat planning, using our best information and a precautionary approach.

5.1 - Criteria

The Science Team evaluated the suitability of areas designated by Tembec using the following criteria. In the absence of a robust set of caribou occupancy and radio telemetry data representing the current caribou use of the landscape, we had to rely on several proxy variables for this. The Team has identified key variables to evaluate the value of land for woodland caribou occupancy that serve as a foundation. They define an area as definitively ***"caribou habitat"*** based on its proximity to roads and cutblocks (Map 4), the age and species composition of the forest (Map 5), and its connectivity to adjacent blocks of caribou habitat, particularly those to the north (i.e. connected to the remaining continuous caribou range in Ontario).

5.2 - The Habitat Priority "matrix"

The Science Team prioritized each of the habitat patches identified by the original Conservation Plan based on three primary criteria:

1. proximity to roads and cutblocks

Caribou habitat occupancy is frequently reduced 1-10 km from an anthropogenic disturbance (Edmonds 1987, Duchesne et al. 2000, Johnson et al. 2004, Cameron et al. 2005, Mahoney and Schaefer 2007). Recent research (Vors et al. 2007) suggests that these distances are necessary to buffer intact caribou habitat from the faunal change and disturbance that accompany these features, and that the probability of extirpation is greater than 50% for caribou occupying areas that are less than 4 km and 13 km from roads and cutblocks, respectively.

2. age and species composition of the forest

The habitat criteria identified by Brown et al (2007) are the most relevant for this region.
Woodland caribou habitat in north eastern Ontario typically consists of mature and overmature black spruce (*Picea mariana*)-tamarack (*Larix lariciana*) peatland complexes, and to a lesser extent, lichen-rich jackpine (*Pinus banksiana*) forests (Bergerud 1985, Cumming et al. 1996, Antoniak and Cumming 1998, Cumming and Hyer 1998, Webb 1998, Proceviat et al. 2003, Ferguson and Elkie 2004a, 2004b, Brown 2005, Carr et al. 2006, Vors 2006). Stands of this composition and age are characterized by low predator density and high lichen availability. All ages of mixed-wood or hardwood stands, immature conifer stands, and recently harvested stands lack these characteristics and are therefore of little habitat value to woodland caribou.

3. range connectivity

Connectivity to adjacent blocks of caribou habitat, particularly to continuous caribou range to the north, and their overall contribution to continuous caribou habitat are important criteria for the value of any patch of habitat. Woodland caribou require extensive tracts of contiguous suitable habitat. The annual individual home ranges of woodland caribou in northeastern Ontario average 3212-4790 km2 (Brown et al. 2003). A small or isolated area, even if its species and age structure are suitable for caribou occupancy, is of little value to caribou if not firmly connected to other blocks of suitable habitat, considering the larger interannual variation in caribou movements and habitat use (Cumming and Beange 1987, Ferguson and Elkie 2004b) Connectivity to continuous caribou habitat to the north is more important than connectivity to habitat blocks in the south, as woodland caribou habitat is relatively intact north of the cutline. All of these criteria must be met for an area of land to be suitable for caribou occupancy.

This decision-making "matrix" is illustrated in ***Figure 5a***. For example, the highest priority for conservation would be an area that is far from roads, close to continuous range and of high quality habitat. Conversely, an area that is close to roads, far from continuous range and of low habitat quality would be the lowest priority for conservation.

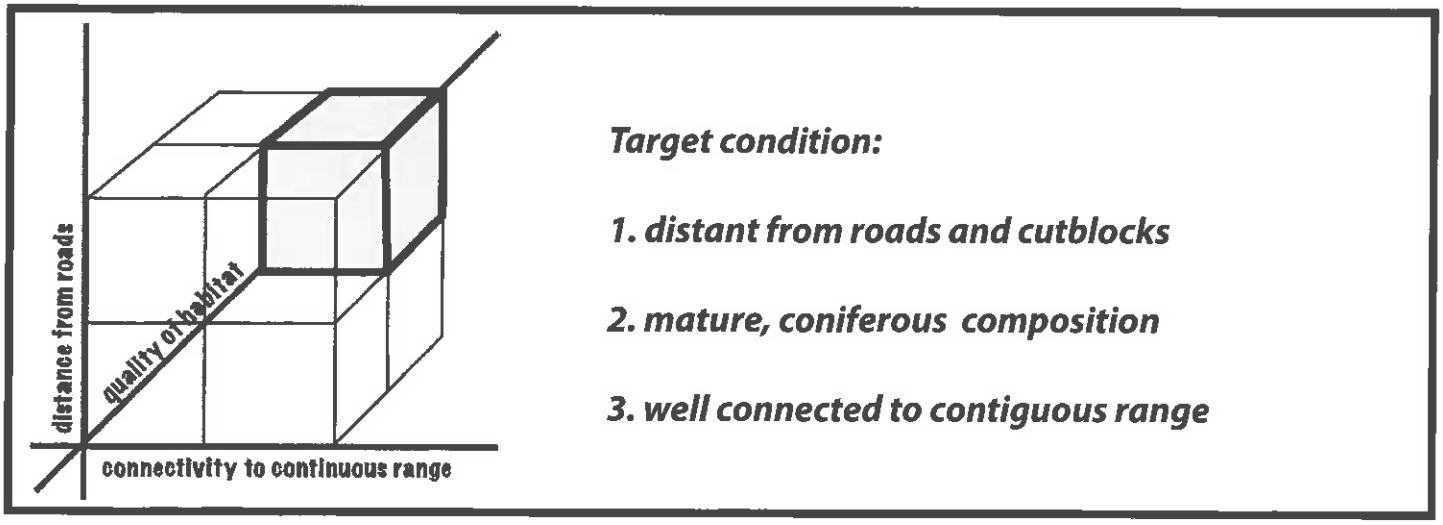
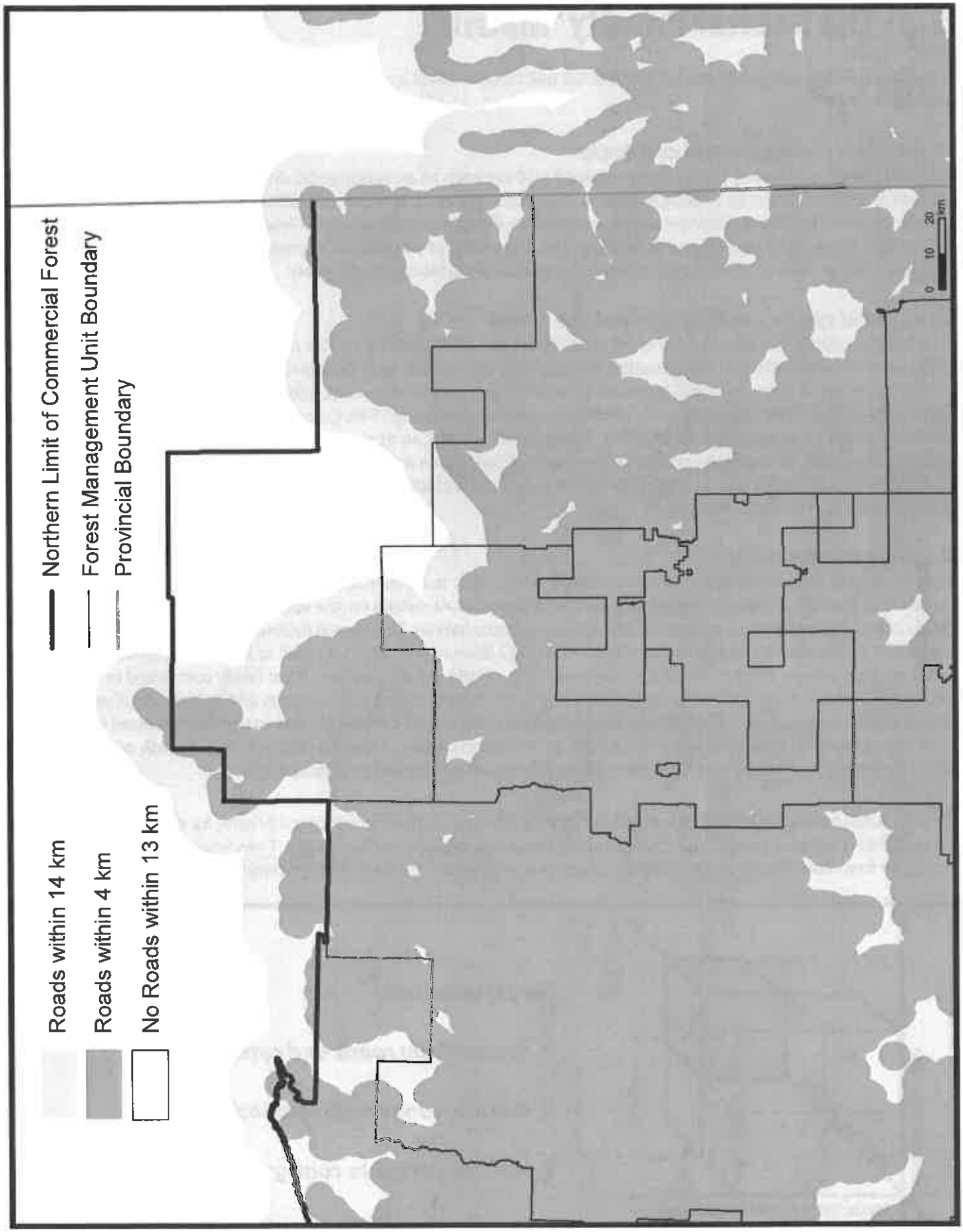
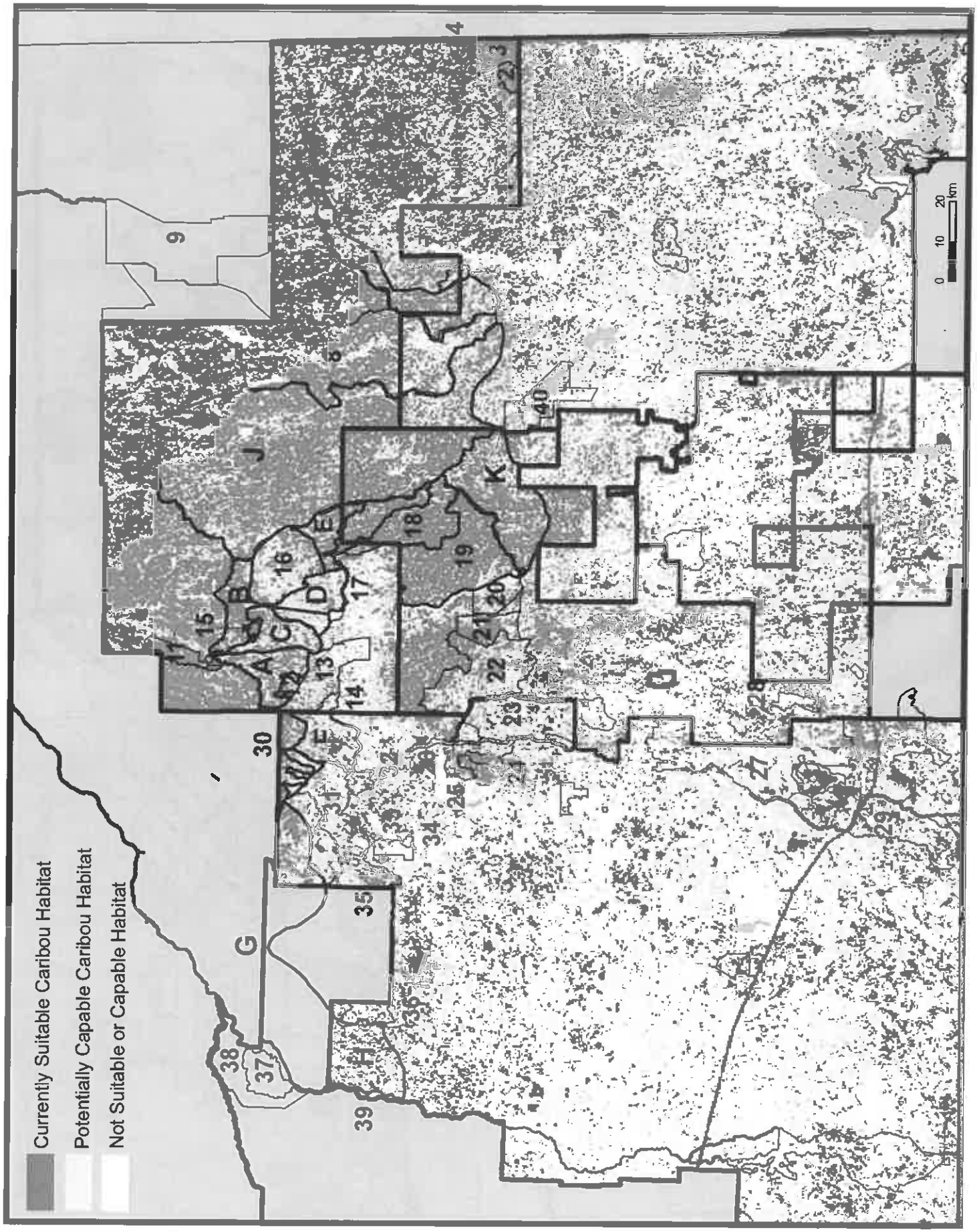


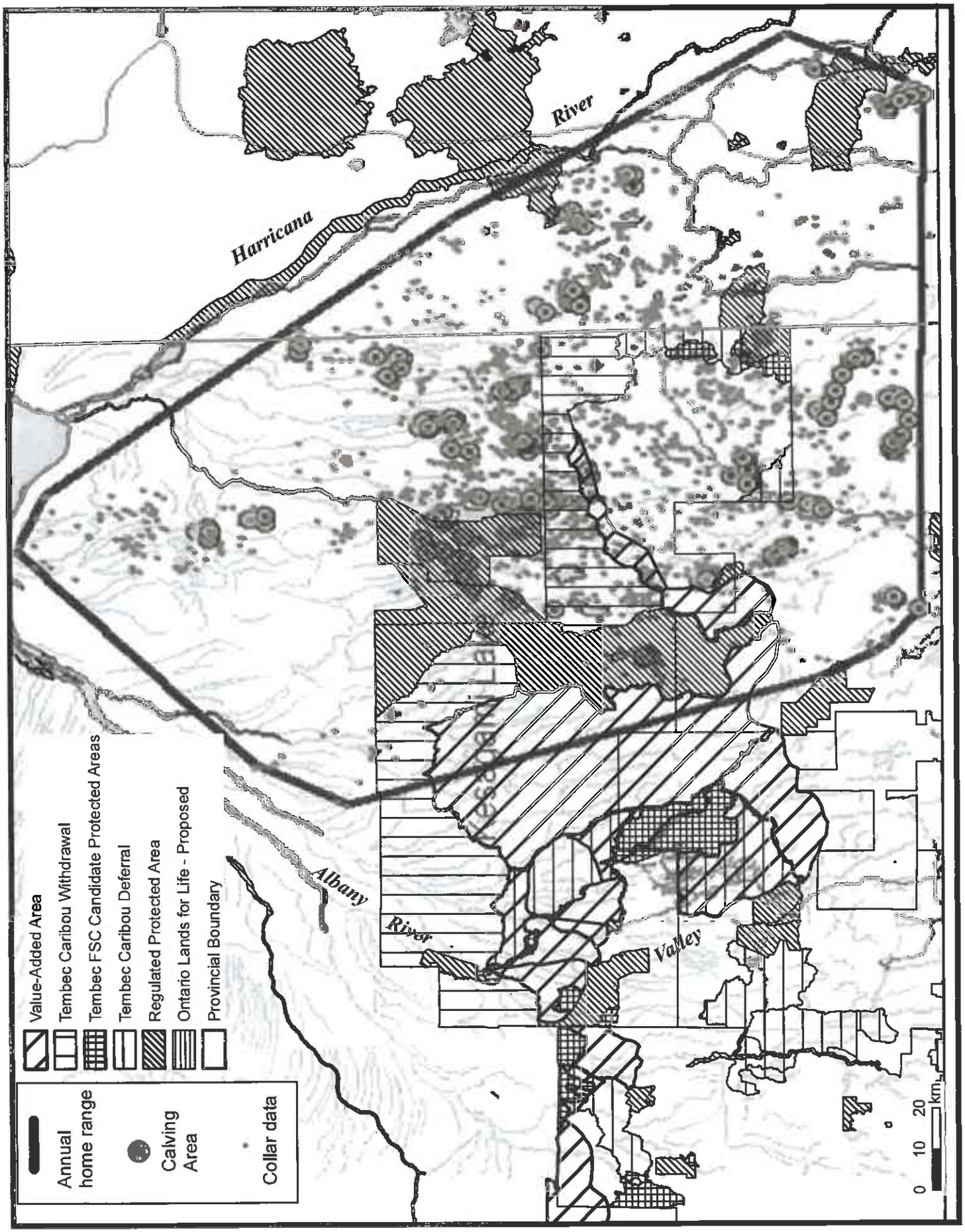
Figure 5a. - *Habitat Priority Matrix*



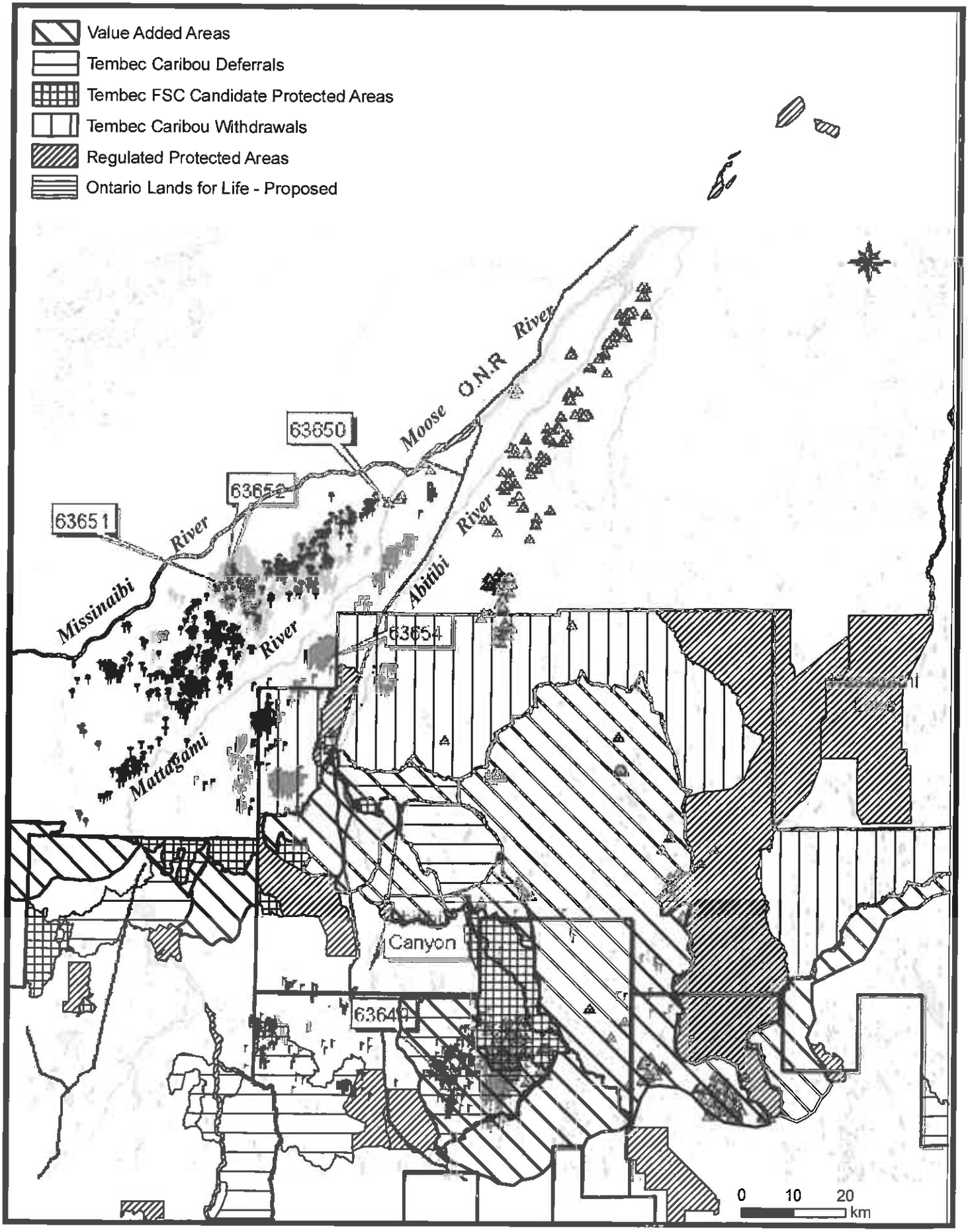
Map 4. *- Proximity to roads - an evaluation of study area*



Map 5. *- Forest Resource Inventory derived current suitability / potential capability habitat information -OMNR*



Map 6. *- Radio telemetry data - Brown 2001*



Map 7. *- Radio telemetry data showing individual caribou positions over time - OMNR 2008*

6.0 - Three Focus Areas

This project explicitly involves three Forest Management Units managed by Tembec in Northeastern Ontario: Cochrane Moose River, Smoothrock Falls and Gordon Cosens. For evaluation purposes, however, examination beyond these tenures is necessary, as caribou population ranges span multiple Units. The Science Team considered information from adjoining Units such as Iroquois Falls Forest and Hearst, as well as adjacent areas north of the cutline and in Quebec. Because examination of caribou habitat quality spills across all of these administrative boundaries, we grouped the geography into three broad "focus areas" that had similar issues and opportunities. We called these areas ***Chabbie/Detour, North French*** and ***Abitibi West*** (See Figure 6a) .

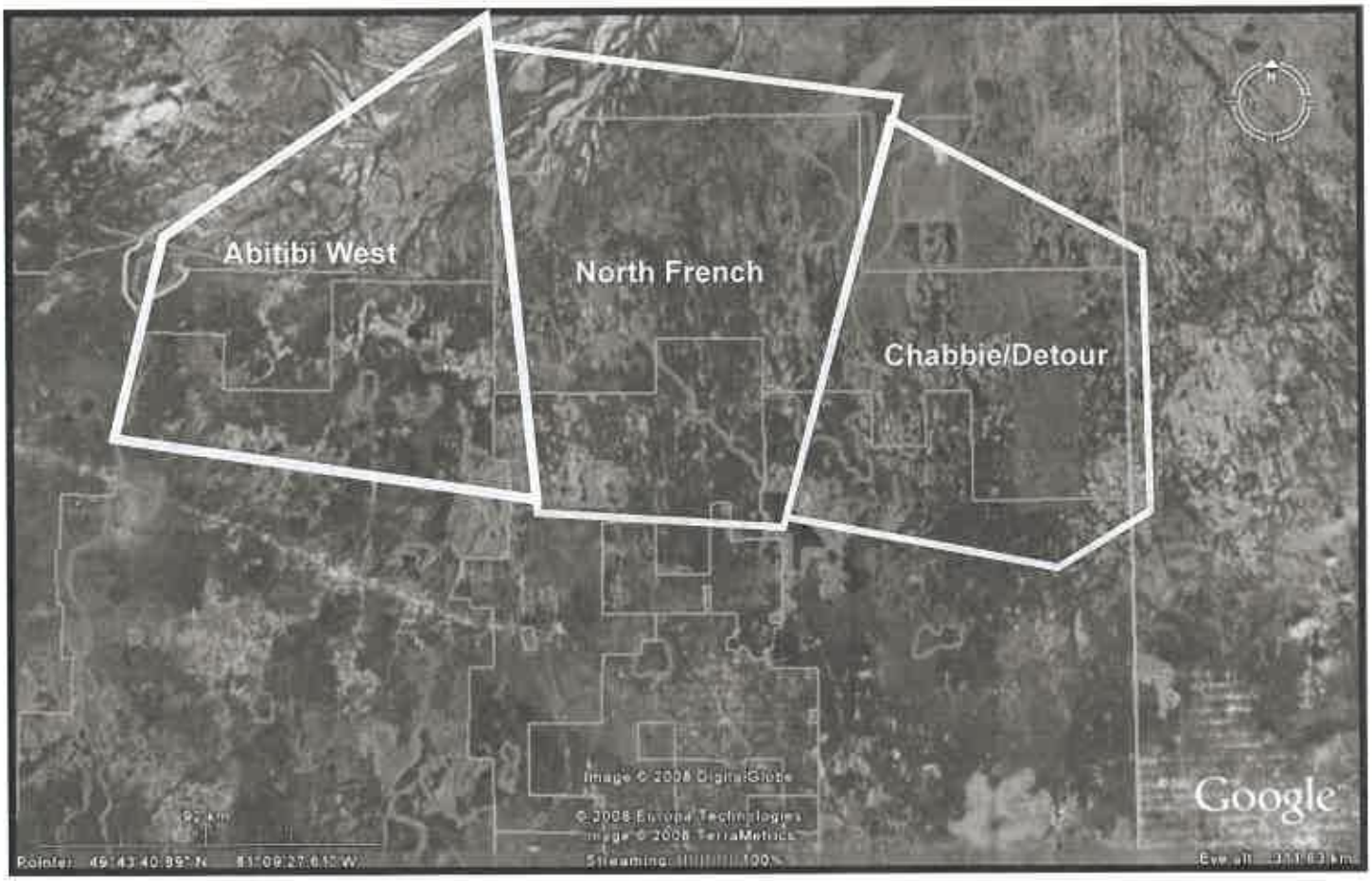
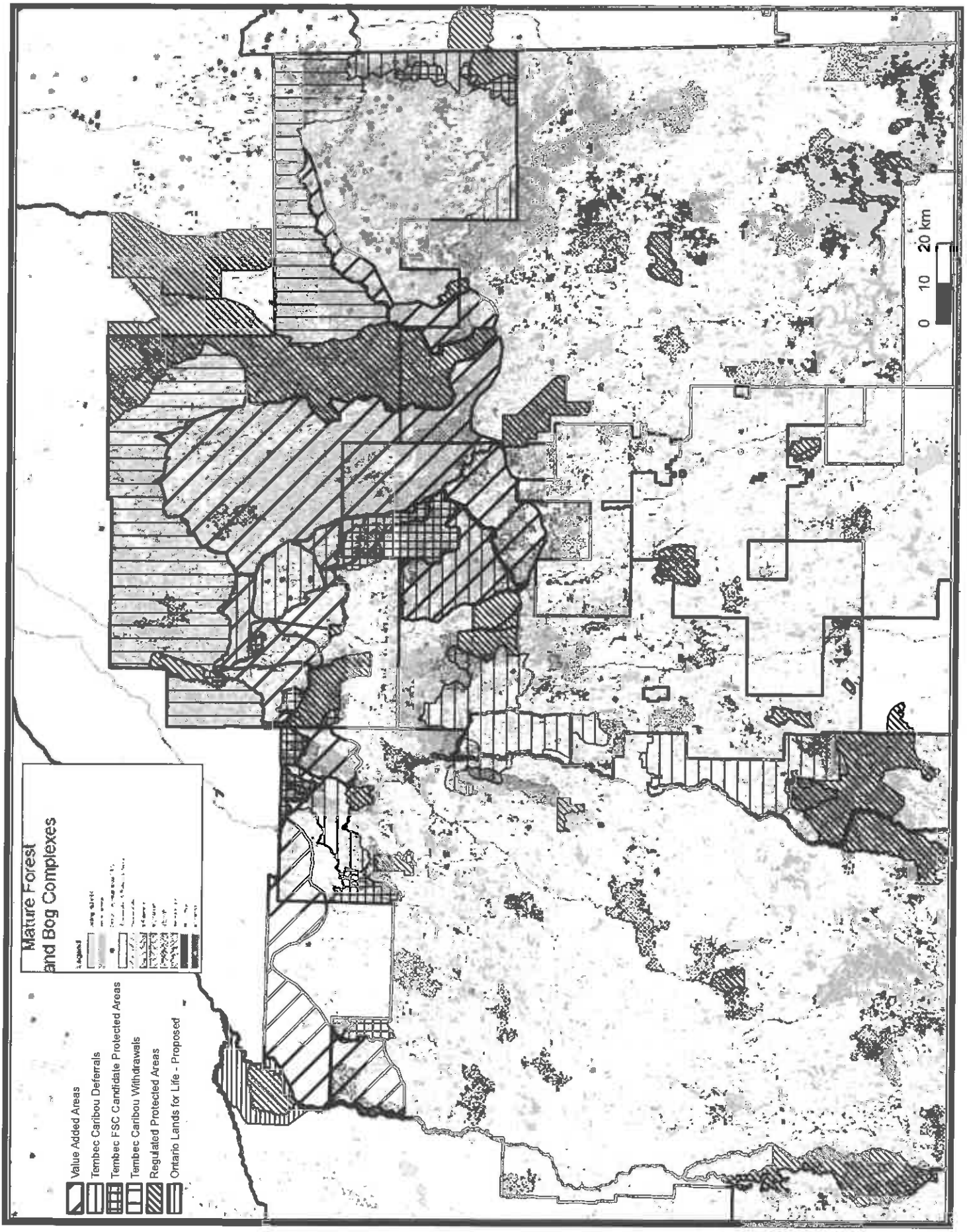


Figure 6a. *- The Three Focus Areas used in this study*

6.1 - Chabbie / Detour

This focus area extends from the Ontario/Quebec border area on the east to the North of the North French Conservation Reserve (CR) in the west. Most of this area is within the Moose River portion of the Cochrane-Moose River Forest Management Unit, although the south overlaps with the northern part of the Iroquois Falls Forest Management Unit. To the north is Kesagami Provincial Park and lands north of the Area of Undertaking (AOU; i.e. the area of forest allocated for timber harvest). This area also falls within the Moose Cree traditional territory. ***Chabbie/Detour*** area is dominated by lowland black spruce forest and bog, with some jack pine occurring on well-drained, higher ground. Two major roadways divide this area. The Detour highway arcs through the western and northern sections, while the Chabbie Lake road angles from the extreme southwest to the east. The impact of historical forest harvest is significant off the Detour Highway. Its terminus is the Detour Lake Gold Mine with tailings piles, ponds and the roads and ongoing exploration and activity associated with gold prospecting and mining. The Chabbie Road has had less historic cutting, but is a major focus of planned harvesting for Tembec.



Map 8. *- 2001 map product of Glen Brown study, with overlaid Science Team Review polygons*

In the late 1990s, an unprecedented number or caribou were found wintering in the eastern part of this area. Eventually 30 caribou were captured, fitted with satellite collars, and released (Map 8). These animals and the data they produced formed the basis for arguably the most comprehensive study of caribou in Ontario (Brown et al. 2003, Brown 2005, Brown et al. 2007). In this area, home range size corresponded to seasonal habitat features important to caribou. Caribou occupied smaller ranges when their preferred habitat, mature coniferous forest, was abundant. High amounts of cut blocks and high moose density were negatively correlated with caribou range size during sedentary periods. Brown (2005) used resource selection function models (RSFs) based on the caribou radiotelemetry data and forest resource inventory data to explore the relationship between caribou habitat selection and limiting factors, concluding that coarse-scale selection of mature black spruce forest was associated with reduced moose densities within seasonal ranges. Caribou also selected habitat with access to both arboreal and terrestrial lichens. Finally, by using a stochastic optimization model, the author concluded that forest management strategies that included caribou objectives produced greater probabilities of caribou occurrence than strategies without caribou objectives, and no strategy suggested a substantial loss of timber harvest volume. Brown (2005) concluded that a combination of spatial and aspatial habitat analysis is optimal for conserving caribou within Ontario's managed forests.

This area of documented high caribou use still contains intact, high quality caribou habitat. It is compromised, however, by being somewhat severed from continuous range to the north and west by the Detour highway, mine and associated disturbance. Though a central area of use for study animals in the work of Brown (2005), recruitment and adult survival amongst the study animals shows population declined, supporting our designation of the area as compromised range. Remaining connectivity to the north and east potentially occurs through Quebec, though it is constricted by known development there. Predictions on the current connectivity through Quebec are obscured by the difficulty in obtaining more recent data from Quebec. This area may also be cut off from any remaining quality caribou habitat to the south in the Iroquois falls forest by the Chabbie Road.

6.2 - North French

The North French area is centred on the North French River Watershed and is contained mostly in the Moose River portion of the CMR forest and the Smoothrock Falls Forest. East-west, this area extends from the eastern border of the north of the North French CR to the Abitibi River. To the north is the northern boundary of the AOU. Its southern limit is the northwestern portion of the Iroquois Falls Forest, the southern part of Little Abitibi River Provincial park and the southern portion of the Smoothrock Falls Forest. It is part of the traditional territory of both Moose Cree and Takwa Tagamou Nation (TTN).

Forest cover is dominated by lowland black spruce forest and bog, with upland areas of hardwoods following an esker complex in the North of the North French River CR and along the Little Abitibi and Abitibi Rivers. Information on caribou in this area is limited due to its remoteness, but it is assumed to have high value based on key habitat characteristics and its adjacency to the area used by study animals in the work of Brown (2005). While the North French watershed contains blocks of timber harvest planned by Tembec, it is mostly intact, unaccessed forest contiguous to the north with the areas beyond the AOU. It is also connected through the CR to the east with parts of the Chabbie/ Detour area north and west of the Detour Highway. Extensive cutting in the Northwest part of the Iroquois Falls Forest, the extreme southeast of the Smoothrock falls and in the Cochrane portion of the CMR forest define the southern limit of effective caribou range. The Abitibi River and the roads, rails, dams and transmission corridors act as a barrier to connection to the west. North of the last dam, infrastructure is reduced to a rail line that presents a less formidable barrier to caribou movement.The area around Fraserdale has extensive forestry activity, as well as large areas of hardwood-dominated forest. Both have negative impacts on caribou. In the future, the Abitibi River valley may become an increasingly formidable barrier as the addition of an all weather road is possible.

6.3 - Abitibi West

The Abitibi River and its associated infrastructure and logging form the eastern boundary of this area. Abitibi West extends to the Missinaibi River in the west; north to the cutline area and south to Highway 11. It is made up mostly of the northern part of the Gordon Cosens forest, with the western portions of the Moose River and Smoothrock Falls forests on the east, and the northeastern portion of the Hearst forest on the west. The area is dominated by cutover black spruce and mixed-wood forests. There is a ragged fringe of intact forest along the northern border contiguous with unallocated forest. In the east, some more isolated patches of intact forest still harbour caribou along the Groundhog River and between the Mattagami and the Abitibi Rivers south of Fraserdale. Connectivity between these remnants and intact forest to the east in the North French are thought to be tenuous because of the Abitibi valley barrier. They are separated from continuous range to the north by extensive roads and cutovers. Caribou are seldom sighted south of Highway 11.

7.0 - Analysis of Chabbie/Detour focus area

***Figure 7a** - Chabbie / Detour focus area*

7.1 - Present land use in Chabbie/Detour

See Figure 7b.

The Chabbie/Detour area is bordered by or surrounds four protected areas. Three (***Protected Area #7***, ***Protected Area #8*** and ***Protected Area #9***) are contiguous with northern caribou range, while ***Protected Area #3*** (Tembec Wetland Conservation Reserve) is connected via other pieces of allocated land. ***Protected Area #9*** (Kenogami Provincial Park) is known to be actively used by caribou in all seasons . ***Protected Area #8*** (North of the North French Conservation Reserve) while containing extensive suitable caribou habitat also posesses significant stands of hardwood (**Photo 3**) and so may have lower value as suitable caribou habitat than it would otherwise. Past cutting off the Detour highway is extensive The Detour mine has significantly impacted the northeast portion of this area. The Quebec region bordering Chabbie/Detour has been cut in several areas close to the border. Less cutting occurred near the Chabbie Road. The Iroquois Falls Forest has had extensive cutting to the south of this area.

Intact forest adjacent to continuous caribou range to the north occurs north and west of the Detour highway. A peninsula of intact forest hugs both sides of the border with Quebec and extends westward into the "V" between the Detour and Chabbie Roads. Habitat connectivity becomes patchier to the south within the Iroquois Falls Forest and eastward into Quebec. In the southwest of this area, Iroquois Falls Forest has been cut over extensively south of ***Protected Area #8*** as far west as ***Protected Area #40.***

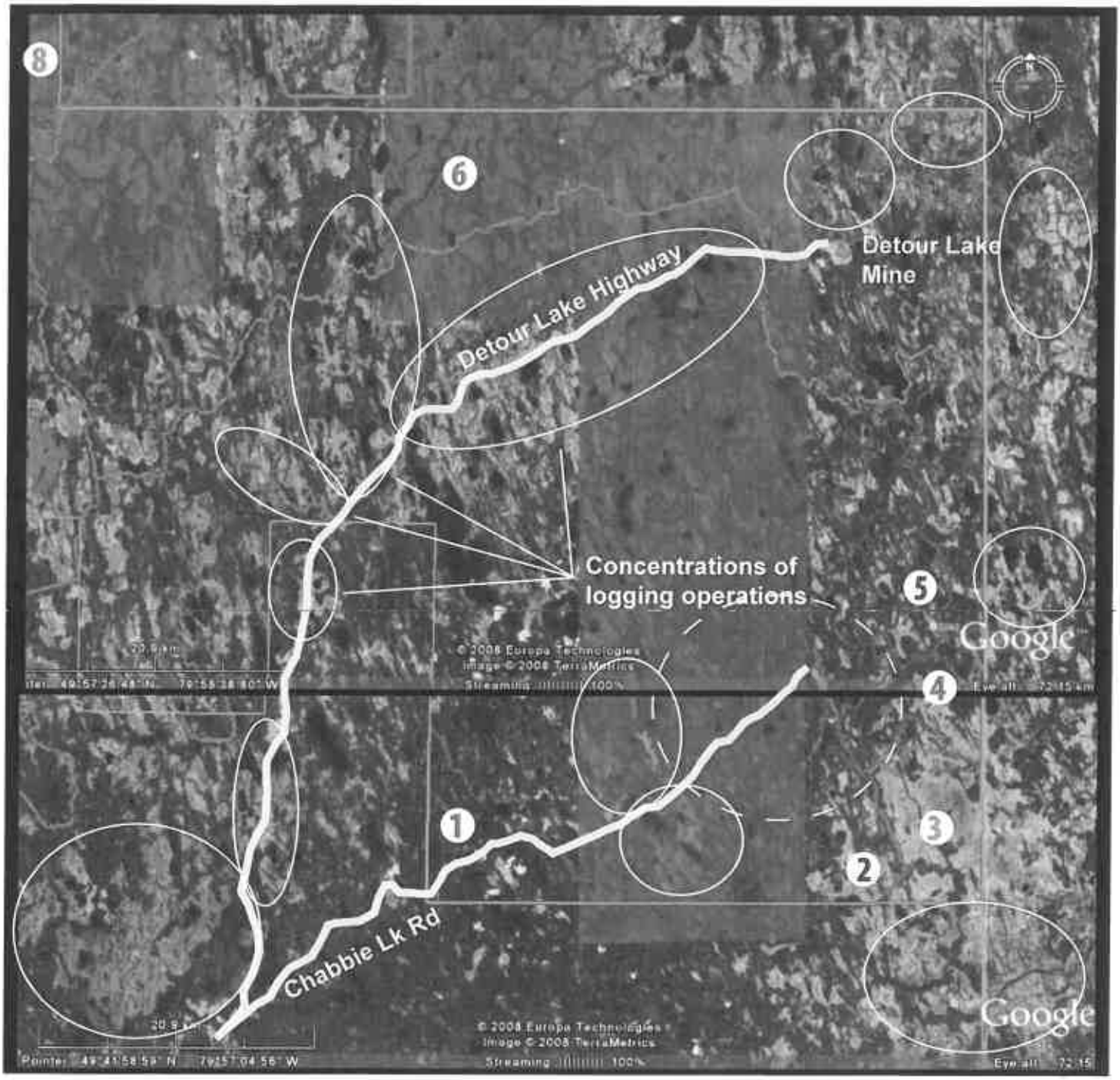


Figure 7b *- Satellite imagery showing industrial disturbance in the Chabbie/Detour area vs. Plan Areas Numbers correspond to Plan Areas discussed in the text.*

7.2 - Tembec Conservation Plan in Chabbie/Detour

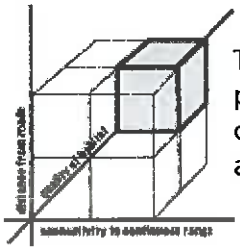
Within the Chabbie/Detour area, Tembec is proposing two deferrals (***Deferral Areas #1*** and ***Deferral Area #4***), two FSC candidate protected areas (***FSC Areas #2*** and ***FSC Area #5***) and an extensive area of permanent withdrawal (***Withdrawal Area #6***). See ***Figure 7c***.

Deferral Area #4 parallels the Quebec border, and its value as currently suitable caribou habitat is bolstered by the FSC candidates and ***Protected Area #3***, the existing protected area . This configuration is meant to provide some north- south connectivity. ***Deferral Area #1*** is isolated.

Withdrawal Area #6 does contain some harvesting, but is contiguous with intact range to the north, east into Quebec and west through the ***Protected Area #8*** to the North French.

Tembec intends to continue to harvest in the future on both sides of the Chabbie Lake road (dotted circle, ***Figure 7b***).

7.3 - Present quality of caribou habitat in Chabbie/Detour



The Science Team evaluated the individual pieces of the Tembec proposal in light of current and projected uses of this landscape. The Team also evaluated their knowledge and assumptions about caribou and their habitat in this area. Each aspect of the habitat quality matrix described in the approach was investigated on an area-by-area basis. See ***Figure 7b*** and ***Figure 7c***.

Deferral Area #2.

This proposed deferral is bisected by a primary road and isolated from other proposed deferrals and existing and proposed protected areas. It constitutes a mix of currently suitable and capable caribou habitat, is still connected to intact habitat through the northeast to the Quebec border. If planned cutting commences, this piece of land will be too isolated to provide any caribou conservation benefit on its own.

Deferral Area #1, FSC Area #2, FSC Area #5

This conglomeration represents currently suitable caribou habitat at the stand level. In association with protected Area 3, it contains year-round caribou habitat, including calving areas. If deferred and protected, this area would form a peninsula of caribou habitat, with potential linkages to the south in Iroquois Falls Forest and to the north with continuous caribou range. However, if planned logging were to proceed, this peninsula would be very narrow from east to west. If the edge impacts of roads and cuts suggested by Vors et al. (2007) are applied, the value of this peninsula for caribou habitat, particularly connectivity, is negated. Even with the present road network, the probability of caribou persistence here is low. In addition, existing disturbance along the Detour Road may compromise connectivity to more northern caribou range on the Ontario side of the border. The only unsullied connection with this northern range is through Quebec, but both the current and the future quality of this habitat is unknown. Satellite imagery of several years' vintage already illustrates a narrowing of the peninsula from the Quebec side. The direction of Quebec industry and government are outside the scope and influence of this report. To the south, connectivity is at risk because of existing harvesting within the Iroquois Falls Forest. ***Deferral Area #1*** and its associated FSC sites alone do not have a high probability of maintaining caribou in the Chabbie/Detour area.

Withdrawal Area #6

This proposal has a reasonably good chance of conserving caribou in the Chabbie/Detour area. The Withdrawal is adjacent to intact, continuous range on three sides. While it is impacted within by some limited historical harvesting, the ongoing effects of the Detour highway, and associated historical harvesting along the highway, removing this area from harvest is likely to buffer the continuous range from further impacts. The existing impacts from the highway

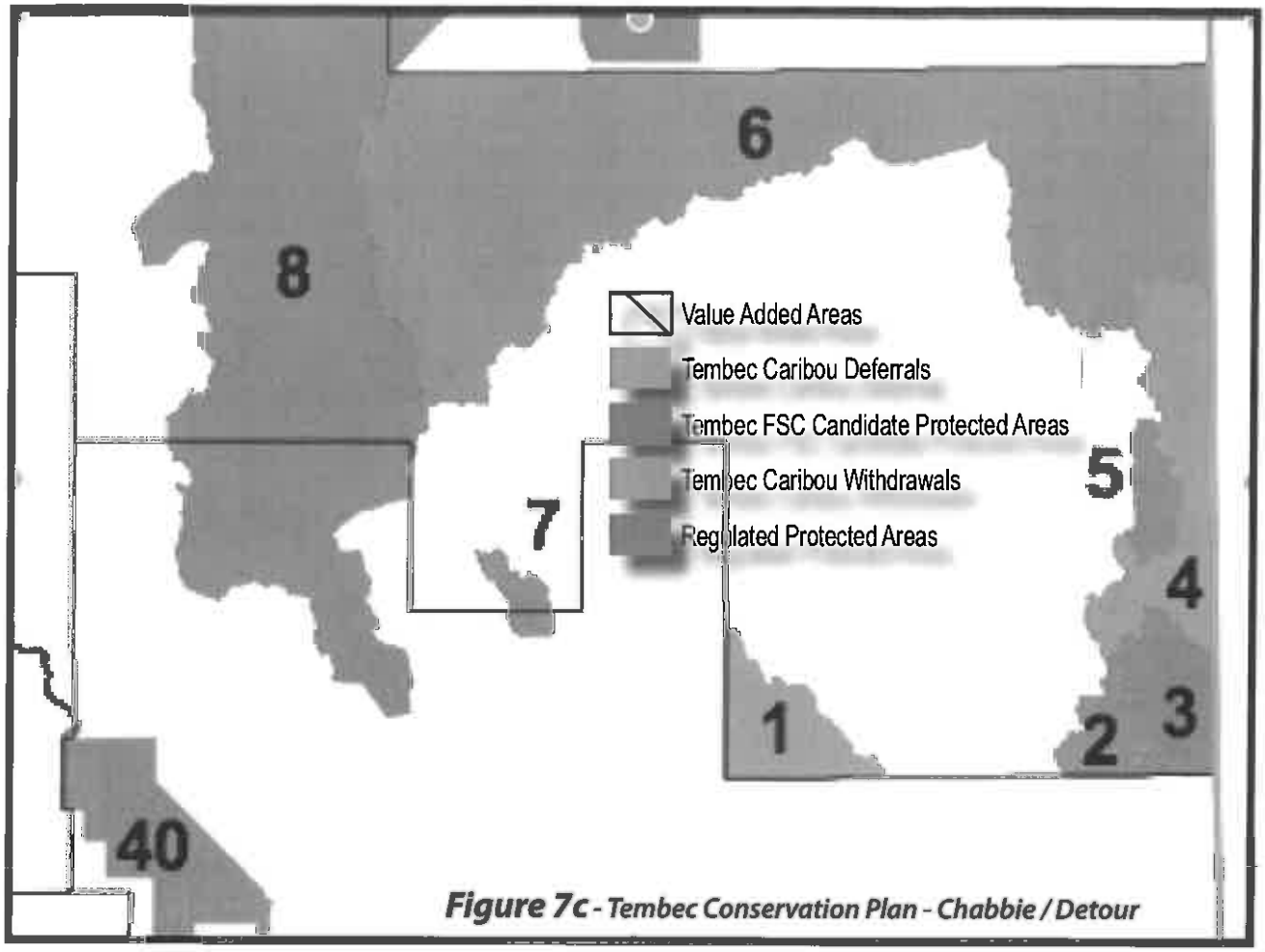


Figure 7c - *Tembec Conservation Plan - Chabbie / Detour*

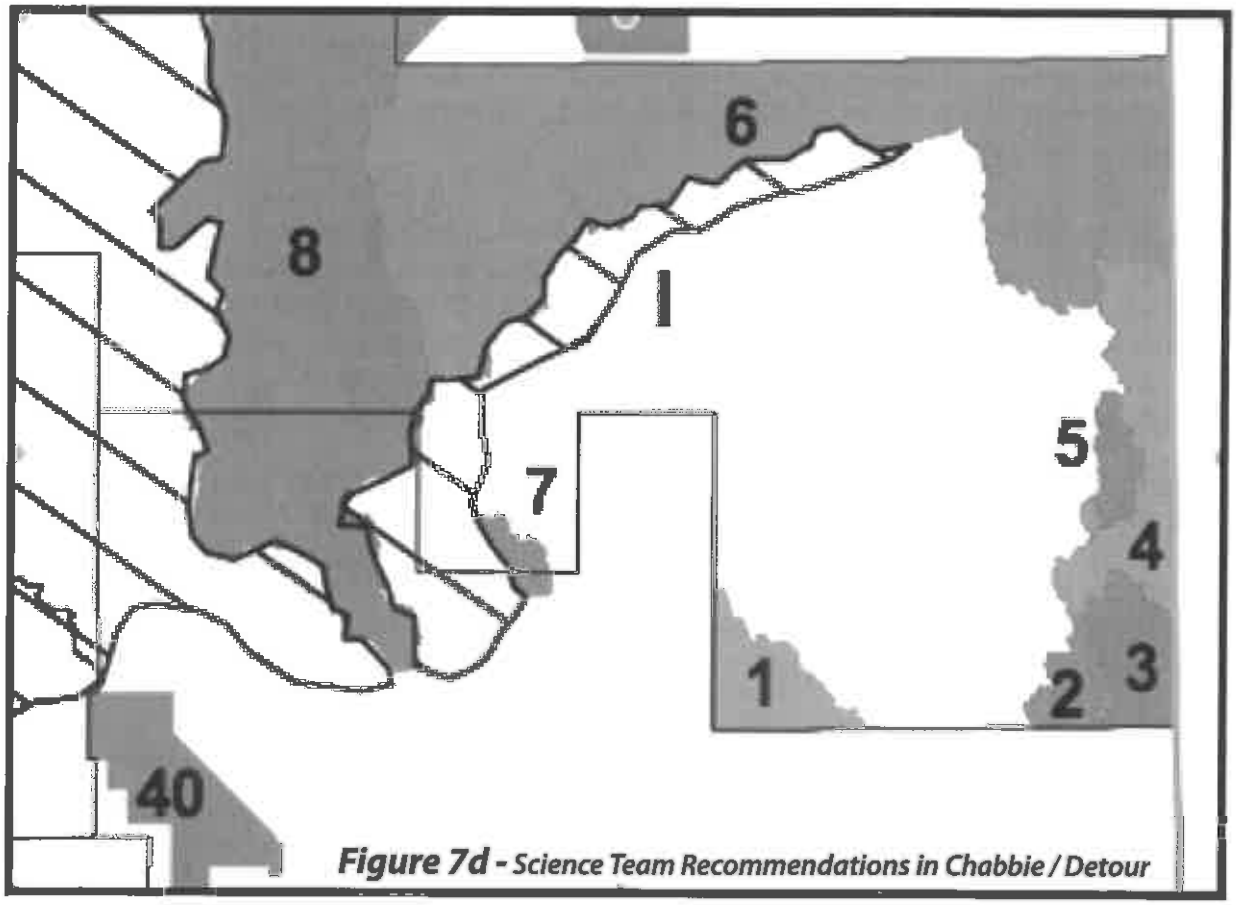


Figure 7d - *Science Team Recommendations in Chabbie / Detour*

would have a continued "shadow effect" on any caribou habitat to the south.

The Chabbie/Detour area represents a significant challenge for caribou conservation. Existing roads and cutovers compromise the ability of this area to maintain caribou in the future (Vors et al. 2007). The 13 km impact of cuts and roads far transcend their physical boundaries and significantly negatively impact the entire area (***Map 4***). To date, the studies of local caribou populations indicate negative population growth (Brown 2005). Once a population's trajectory becomes negative on a sustained basis, there is often little chance for recovery in the near or medium term, and those caribou remaining in heavily impacted areas represent an "extinction debt" of animals doomed to extirpation (Schaefer 2003, Vors et al. 2007). With the planned cutting for the Chabbie/Detour area, there is no realistic probability of caribou range being maintained. If the whole area was deferred and no new cutting or roads were allowed, the population may stabilize eventually, however the negative impacts of anthropogenic disturbance surrounding it make this a resounding "may". This area should be examined further from the perspective of range "recovery".

7.4 - Science team recommendations in Chabbie/Detour

To increase the probability of maintaining range occupancy, or reduce the extent of range recession for the caribou population that uses the Chabbie/Detour area, the Science Team recommends the following course of action in this area. See ***Figure 7d***.

Recommendations:

7.4.1 - Extend southern boundary of Withdrawal Area #6 to the Detour highway.

This has the potential to increase the efficacy of the Withdrawal as a buffer to the north. Expanding the Withdrawal to include the area between ***Protected Area #8*** and ***Protected Area #7*** would further enhance its value. This ***Value Added Area "I"*** would capture suitable caribou habitat that is part of continuous range. It also includes an area identified by Abitibi-Bowater as part of a potential deferral within the Iroquois Falls Forest. Expansion of ***Withdrawal Area #6*** has the most positive potential impact of any actions Tembec could take in the Chabbie/Detour area. This may slow the decline of the local caribou population and may allow it some time to stabilize. If this action is not pursued, any future harvest to the north of the Detour highway has a high probability of further eroding caribou range north of the Area of the Undertaking.

7.4.2 - No new road building or harvesting off the Chabbie road network.

Existing harvest areas could be finished, but no new areas should be accessed. The human footprint south of Detour Highway and around the Chabbie road is already significant and caribou habitat quality is severely compromised (***Figure 7b***). Regardless, these measures may buy time for the population to slow its decline and possibly stabilize if Quebec also commits to no further encroachment. Even these measures, however, are unlikely to stop the population decline and range recession occurring in this area.

Tembec's proposal has an even lower probability of stopping range recession than the suggestions above. However, that does not mean it should not be implemented. At the minimum, should Tembec proceed with ***Deferral Area #4*** and associated ***FSC Area #2*** and ***FSC Area #8***, there may be some mitigation effect and value for future caribou recovery. The planned harvests must be planned to minimize long term impacts on caribou and maximize the chance that caribou will recolonize this area. The area would have to be harvested quickly and then left alone for a minimum of 80-100 years. Connectivity to the north would have to be maintained or re-established. Conversely, if harvesting occurs continuously in the Chabbie/Detour area, or if adjacent, currently intact areas are harvested, especially to the north, even the present small probability of caribou recolonization would be nullified.

Deferral Area #1 has little value by itself. An equivalent area adjacent to continuous range as suggested above would be more effective in adding conservation value .

7.4.3 - Effective long-term monitoring needs to be undertaken in this area.

Long-term monitoring needs to be undertaken to document the effectiveness of the chosen course of action. High Conservation Value Forest commitments under FSC should support monitoring and recovery actions in this area.

Whatever action is taken on the Chabbie/Detour area, it needs to be recognized that the relative value gained overall is smaller than the potential benefits of action when compared to the North French area.

8.0 - North French focus area

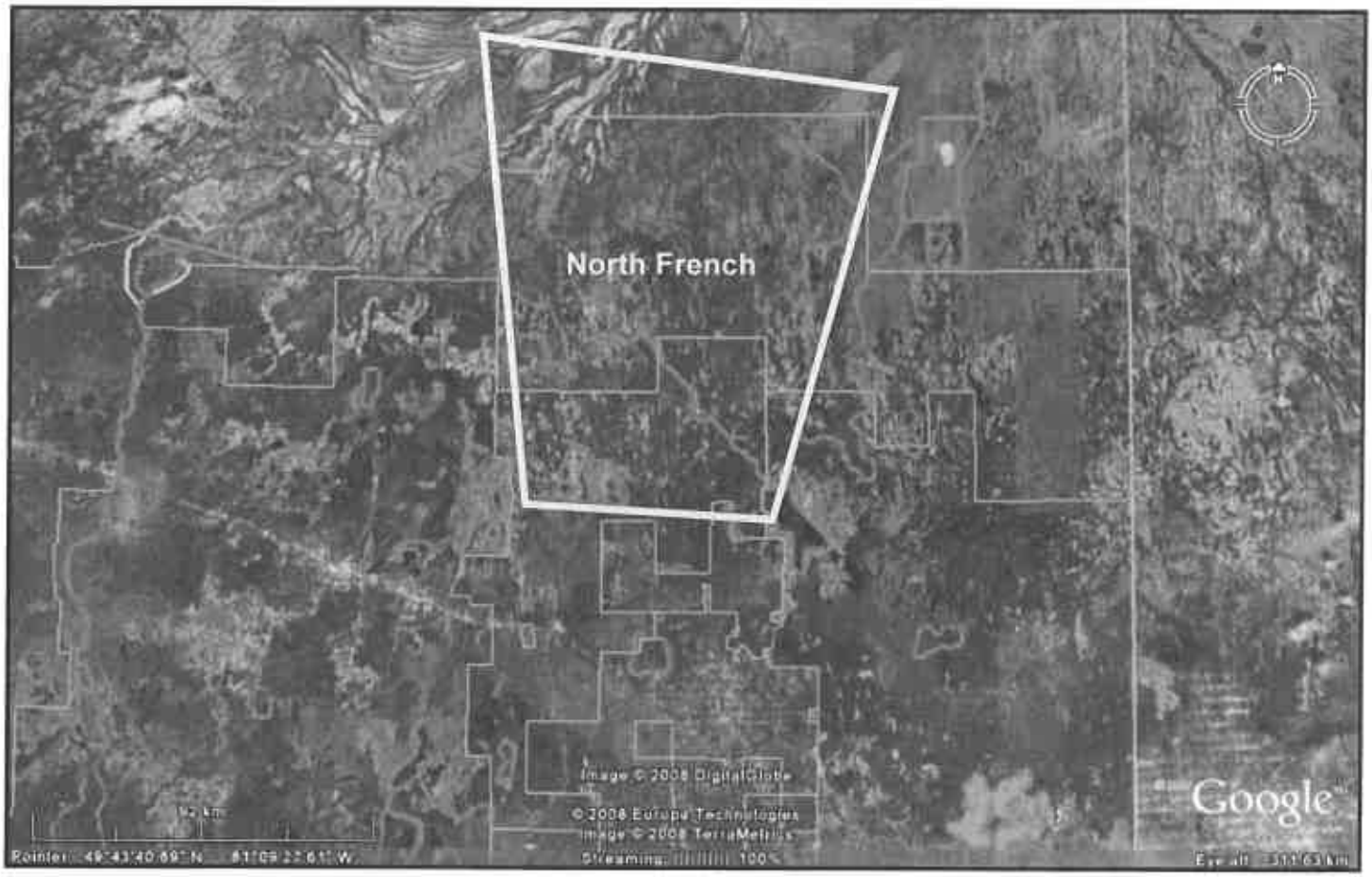


Figure 8a *- Location of North French focus area*

8.1 - Present land use in North French

See ***Figure 8b***.

The North French focus area contains or adjoins three existing protected areas: ***Protected Area #8***, the North of the North French Conservation Reserve, ***Protected Area #40***, Little Abitibi Provincial Park, and ***Protected Area #11***, Coral Rapids. Of these, only ***Protected Area #8*** has the size and connectivity that would allow it to function as caribou habitat. However, it also contains some higher ground and productive soils that support hardwood forests and moose populations, mitigating its caribou value to some extent (***Photo 3***). Little Abitibi is primarily a waterway park that protects a thin strip of forest on either side of a medium-sized river. The Little Abitibi park and river also supports hard-wood forests and moose population and, in the winter, wolf travel (***Photo5***). The larger part of the park around Pierre Lake is almost fully surrounded by extensive clearcuts (***Photo 6***). ***Protected Area #11*** has hydro, rail lines and roads running through it (***Photo 11***), negating any value that its small size might have had for caribou.

The majority of the North French area is intact forest with relatively little access or human disturbance. The major exception is the Abitibi valley, especially to the north and east of Fraserdale. The valley holds a permanent road, rail line, and multiple electrical transmission corridors along the entire eastern flank of the area (***Photo 7***) . In addition there are major hydro dams. Two power generation dams are on the Abitibi; one at Fraserdale Canyon (***Photo 8***), the other at Coral Rapids. Also, a diversion dam on the Little Abitibi diverts water into a massive dredged channel (***Photo 9***) and New Post Creek to provide additional flow to the Abitibi. The diversion ditch supports extensive hardwood growth on its banks. Cutover blocks extend east and north of Fraserdale throughout TTN's traditional territory and to the northeast. These areas and the river valley support forests with sufficient hardwood component to prevent them from being suitable caribou habitat.

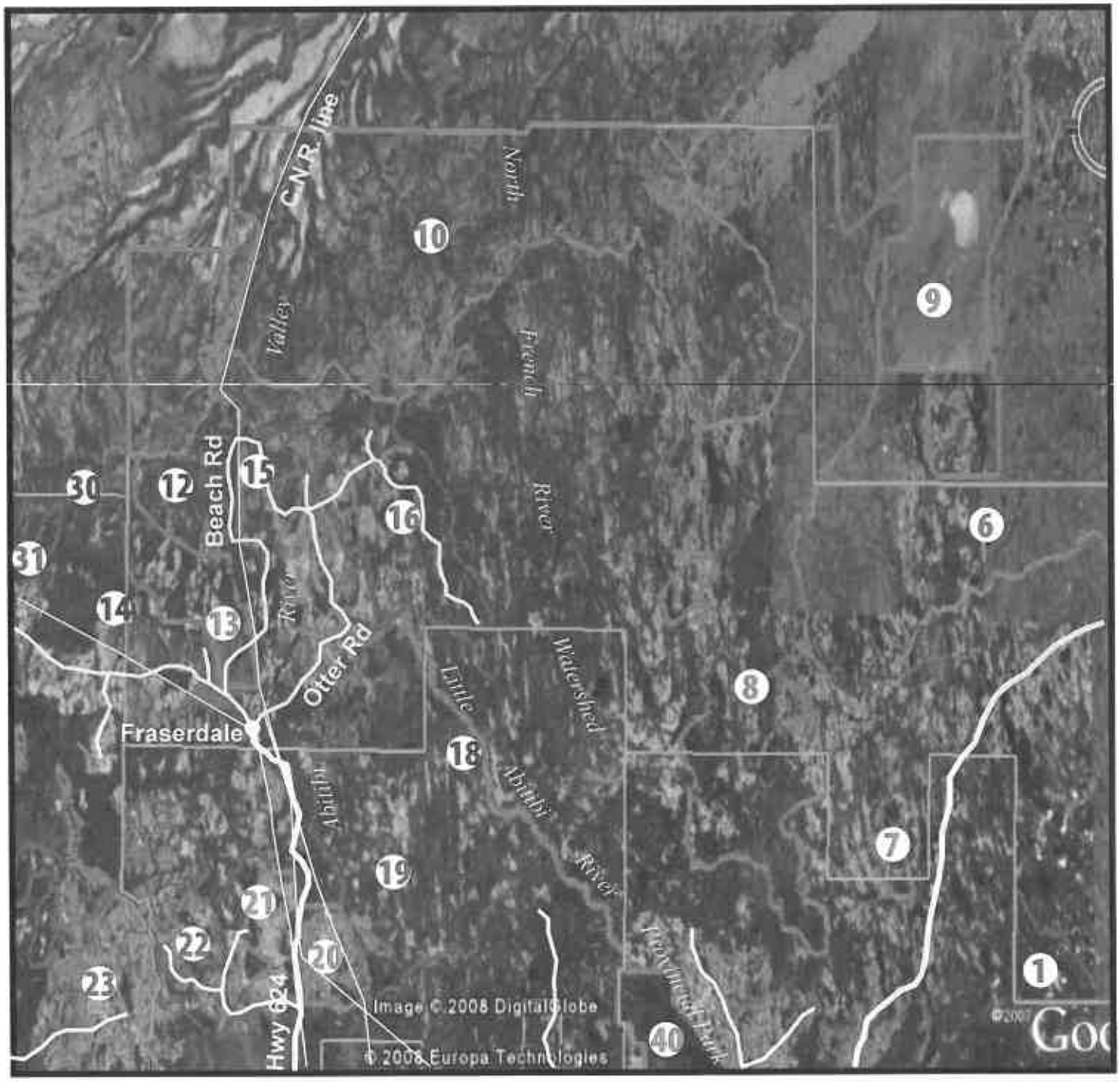


Figure 8b *- Satellite imagery showing industrial disturbance in the North French area vs. Plan Areas*

8.2 - Tembec Conservation Plan in North French

Tembec proposes two deferral areas (***Deferral Area #16*** and ***Deferral Area #19***), 2 FSC candidate protected areas (***FSC Area #15*** and ***FSC Area #18***) and a large area of permanent withdrawal (***Withdrawal Area #10***) in the North French area.

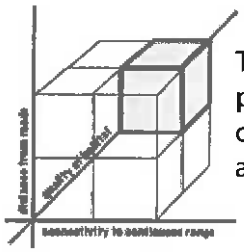
The deferrals and FSC sites form a peninsula that borders both the heavily disturbed Abitibi River and the intact headwaters of the North French River. More than half of ***Deferral Area #16*** has been harvested. The other proposed polygons remain intact.

Withdrawal Area #10 forms a thick crescent across the north part of the area connecting protected area 8 and the Abitibi valley to the area north of the cutline. The human footprint in this area is low, except for the infrastructure along the Abitibi River.

Tembec plans to cease harvesting in ***Deferral Area #16*** and defer cutting in ***Deferral aAea #19*** for 50 years. They intend to access the North French watershed from the south and eventually cut most of the area south of the withdrawal between ***Protected Area #8*** and the peninsula of proposed polygons.

The proposed deferrals and FSC areas are intended to provide an anchor of north-south oriented caribou habitat and connectivity for the next 50 years.

8.3 - Present Quality of Caribou Habitat in North French



The Science Team evaluated the individual pieces of the Tembec proposal in light of current and projected uses of this landscape. The Team also evaluated their knowledge and assumptions about caribou and their habitat in this area. Each aspect of the habitat quality matrix described in the approach was investigated on an area-by-area basis. See ***Figure 8b*** and ***Figure 8c***.

Deferral Area #16

More than half of this deferral area has been harvested and roaded. It has little present value for caribou and will not for many years if ever. In addition, the implications of disturbance for caribou extend at least 13 km beyond the explicit borders of roads and cuts (Vors et al. 2007). There is value in ceasing operations in ***Deferral Area #16***, in that impacts to caribou will not be extended any further either spatially or temporally. The remaining intact forest is currently contiguous with caribou range in ***Withdrawal Area #1*** to the north, the North French watershed to east and ***FSC Area #18*** to the south.

FSC Area #18

This area represents an intact block of currently suitable caribou habitat, contiguous with caribou range to the north, east and south. The area to the west has been harvested. This area contains high value for calving with many open and treed bogs, as well as closed canopy black spruce forest.

Deferral Area #19

The condition of ***Deferral Area #19*** is similar to ***FSC Area #18***. It is connected to continuous caribou range to the

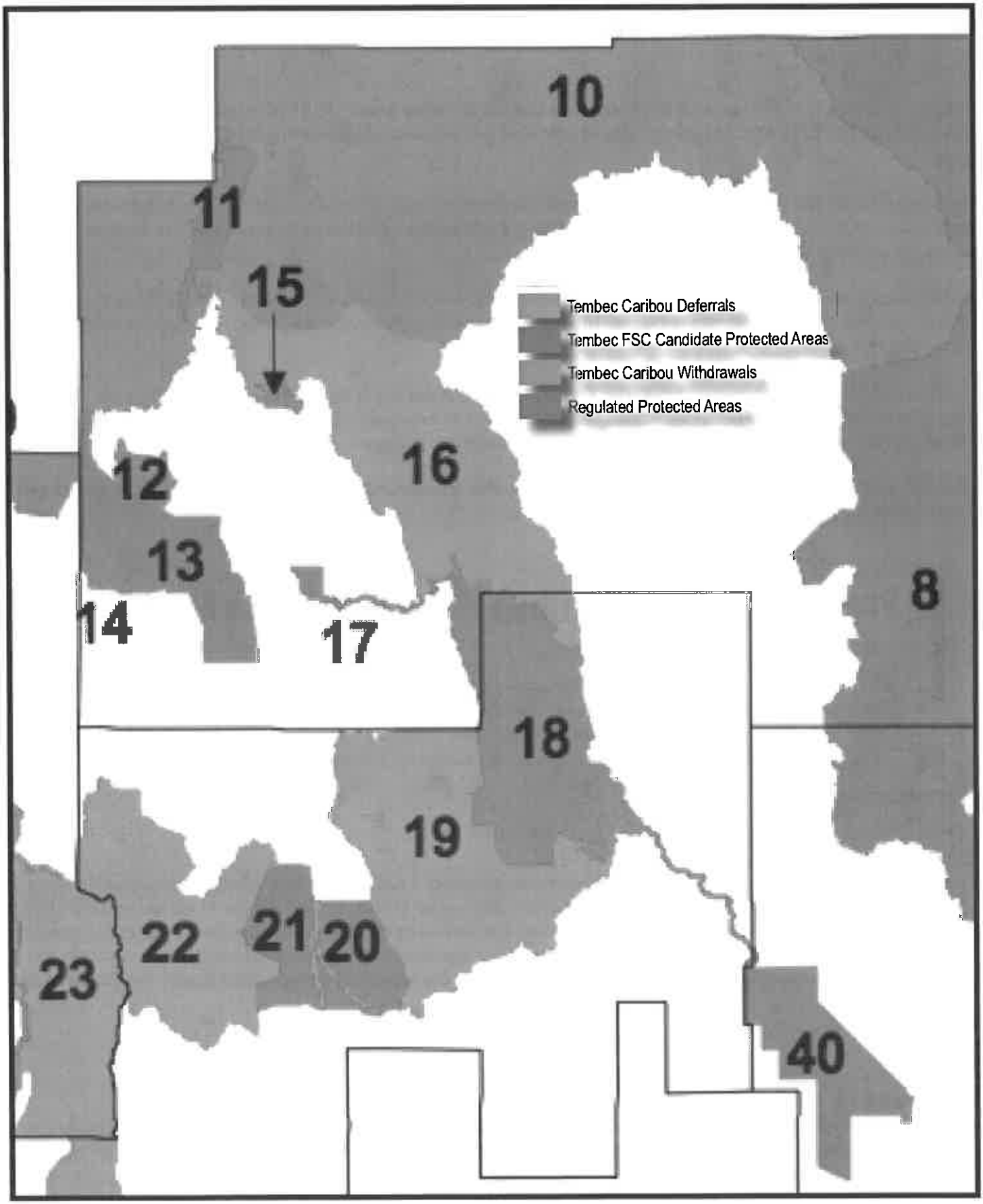


Figure 8c - *Tembec Conservation Plan - North French Plan Areas*

northeast, east and south. However, it approaches the southern limit of caribou range in the south. To the north, it borders a heavily logged and hardwood-dominated forest of low value to caribou. On the west side of the Abitibi River, hydro, road and rail corridors pose a barrier to caribou, but forest harvest has been minimal. ***Protected Area #20*** sits across the Abitibi for the southern third of deferral Area 19's western border. It has not been logged, but contains the full suite of transportation and energy infrastructure (***Photo 11***). ***Deferral Area #19*** is a good anchor at the southern end of more-or-less continuous range. It may not end up being continuously occupied but may be an important part of a "buffer zone" against adjacent industrial disturbance.

FSC Area #15

This area is too small and too close to permanent infrastructure along the Abitibi to add much value as caribou habitat, but encompasses other conservation values.

Withdrawal Area #10

This area represents a significant patch of quality caribou habitat that provides connectivity to continuous range in the area north of the cutline. Of all the Tembec proposals this Withdrawal has the single highest value for caribou.

The map of road and cut impacts (***Map 4***) is a reasonable surrogate of the extent of impact on caribou. Although the North French area is relatively intact, this image illustrates that there is only a small area that will likely remain free of the effects from existing disturbance over the coming decades. If Tembec harvests as planned within the North French these impacts will expand to enclose the whole area and into the area north of the allocated forest.

In this scenario, Tembec's proposed conservation plan will not prevent northward recession of caribou range. Even the significant ***Withdrawal Area #10*** will not conserve caribou within itself, but may provide a buffer preventing the impacts of harvesting from spreading further north.

The Science Team unanimously agreed that any harvest in the currently intact North French watershed will have a detrimental effect on the caribou population. This area has the highest value of any area under consideration in the Conservation plan. It is roadless, has high quality caribou habitat and connectivity to intact caribou habitat in all directions, save to the south. Aside from caribou, this area has value for Moose Cree and TTN traditional use, is without artificial barriers to fish movement, and is one of the least impacted watersheds in the region.

The proposed peninsula of collected deferrals and FSC sites on the west side of the North French is too narrow to maintain caribou over the long term if harvesting is expanded to the east. There is no evidence that caribou utilize narrow movement corridors (Ferguson and Elkie 2004b); rather, caribou require areas as wide as their population range to be useful. The existing disturbance in ***Deferral Area #16*** further cuts off north-south connectivity if logging proceeds in the North French watershed. This peninsula would then become isolated and any remaining caribou would likely be extirpated within 20 years. The deferrals do provide significant value ***if*** the North French watershed or some parts of it remain unlogged. They buffer the impacts from the extensive disturbance around the Abitibi River.

8.4 - Science Team recommendations in North French (see figure 8d)

The review team was unanimous in their opinion that the North French focus area represents the single most significant conservation opportunity for maintaining caribou range in this region. Because of the north-south movement patterns of caribou in this area and the almost continuous caribou range north of the cutline, areas further to the north have greater value for caribou than areas further to the south. If a given amount of land is to be deferred or withdrawn, it would be of more value to cluster this in the northern part of the North French area and provide a wider band east-west, rather than the current peninsular design. Following this north to south (higher to lower) priority, the Science Team recommended increasing protection by increments in this direction, first following the proposed peninsula of conservation efforts, then turning attention to the planned harvest areas of the North French watershed.

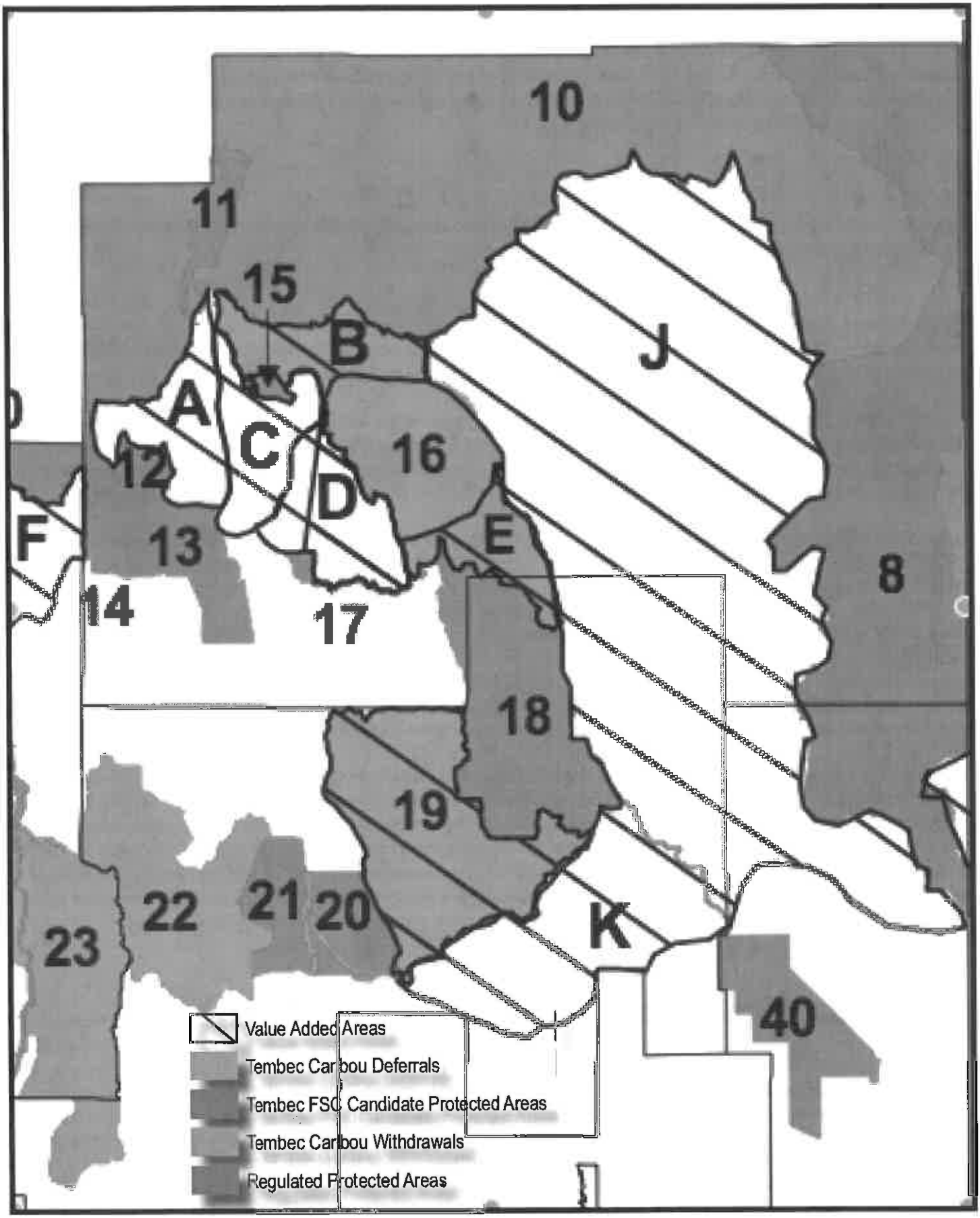


Figure 8d - *Tembec Conservation Plan , with Science Team additions - North French Plan Areas*

8.4.1 Proposed Peninsula of Conservation Efforts

Of highest value would be to drop the southern boundary of ***Withdrawal Area #10*** to absorb ***FSC Area #15***, and the northern intact part of ***Deferral Area #16*** . We refer to this addition as ***Value-added Area B***.

The area southwest of ***Value-added Area B***, to the limit of harvesting constitutes quality caribou habitat, is impacted by the Abitibi River infrastructure., but would buffer these impacts if added as a complimentary withdrawal. This addition is identified here as ***Value-added Area C***.

We recommend extending the size and time period for the harvested parts of ***Deferral Area #16***. While it does not provide caribou range maintenance value, such cutover areas may provide some experimental recovery value, worthy of monitoring. The length of the deferral should be extended from 50 years to at least 80 years to provide time for caribou occupancy before it is cut again. The deferral should be spatially extended to the south west as far as the Abitibi River and New Post Creek to capture areas that may be capable of providing caribou habitat in the future. Roads within this deferral block should be rehabilitated to forest cover and silvicultural treatments conducted to ensure regeneration to a conifer-dominated condition appropriate for caribou. We refer to this expanded deferral as ***Value-added Area D***. As an experiment, this area should be monitored for caribou presence and persistence. Adjacent intact areas should remain so. Otherwise the experiment will be confounded by continuing disturbance and caribou will not likely return or persist.

In line with this thinking and moving southward, the remaining intact areas of ***Deferral Area #16*** should be kept intact by either an 80 year deferral or joining them with ***FSC Area #18*** as a protected area. Similarly ***Deferral Area #19*** should be deferred for 80 years or joined with ***FSC Area #18***. This block from the intact southern part of ***Deferral Area #16*** to ***Deferral Area #19*** would comprise ***Value-added Area E***.

8.4.2 Protection of the North French Watershed

Any protection along the "peninsula" would be effective only to the extent that areas to the east, in the North French watershed, are conserved as well. For example, if the most northern parts of the North French in the proposed harvest map was logged, the shadow effect would mean that Deferrals or FSC protected areas to the south would lose connectivity with continuous caribou range, and therefore have greatly diminished caribou conservation value. The science team recommends expanding ***Withdrawal Area #10*** to include all planned harvest areas in the North French Watershed. This would include intact forest in the northwestern section of the Iroquois Falls Forest as well: see ***Value-added Area J***.

Finally, to provide maximum benefit to caribou conservation, the northern area of the Smoothrock falls forest that is both suitable caribou habitat and contiguous with ***Deferral Area #19*** and ***FSC Area #18*** should be added to the conservation plan (***Value-added Area K***). Extending the withdrawal area this far south not only shields the proposed peninsula of Tembec areas, but also increases the conservation value of ***Protected Area #8***. Itself a peninsula, this protected area is too narrow (and as mentioned previously (page 28), possibly too hospitable to moose) to maintain caribou populations on its own. However, if the withdrawal area is dropped as suggested, more conservation value can be added.

To maximize the probability of stopping or limiting caribou range recession in Northeastern Region, the North French focus area needs to expand the modified Conservation Plan to the full geographic extent recommended.

In general, any further expansion of the harvesting footprint will diminish the probability of successfully retaining caribou on the landscape.

The Science Team recognizes that while conservation priority increases the further one travels north, harvest costs also increase and profitability decreases. By segmenting this advice in a north-south manner, it is hoped that this will enable decision makers to prioritize conservation efforts and facilitate discussions with forest industry.

9.0 - Abitibi West focus area

Figure 9a *- Location of Abitibi West focus area*

9.1 - Present land use in Abitibi West

The Abitibi West geography (***Figure 9c***) contains 6 existing protected areas. Starting in the north east PA 13 contains several cutovers blocks of various vintages. ***Protected Area #20*** along the Abitibi River has 2 transmission corridors, a roadway and rail line passing through it. The Groundhog River Provinical Park, ***Protected Area #26***, and Missinaibi River Provincial Park, ***Protected Area #37***, enclose riverside habitat more beneficial to moose than it is to caribou. The other ***Protected Area #32*** and ***Protected Area #33*** are both too small and isolated from continuous caribou range to be useful in caribou conservation.

Past cutting west of the Abitibi River is extensive. Only a ragged fringe of intact forest, contiguous with caribou range to the north, overhangs the northern edge of this area. Another relatively large patch of forest southwest of Fraserdale remains as does a thin slice of unaccessed land west of the Groundhog River. The overall forest mosaic is patchwork of lowland black spruce and more mixed wood uplands in various seral stages not very conducive to caribou use (***Figure 9b***). There is little documented caribou use of this area. A few animals have been seen over the years and recently associated with the slice of quality caribou habitat on the west side of the Groundhog River (M. Gauthier pers comm.) Track evidence was seen both in this area and in the large patch south-west of Fraserdale (D. Pearce pers comm.).

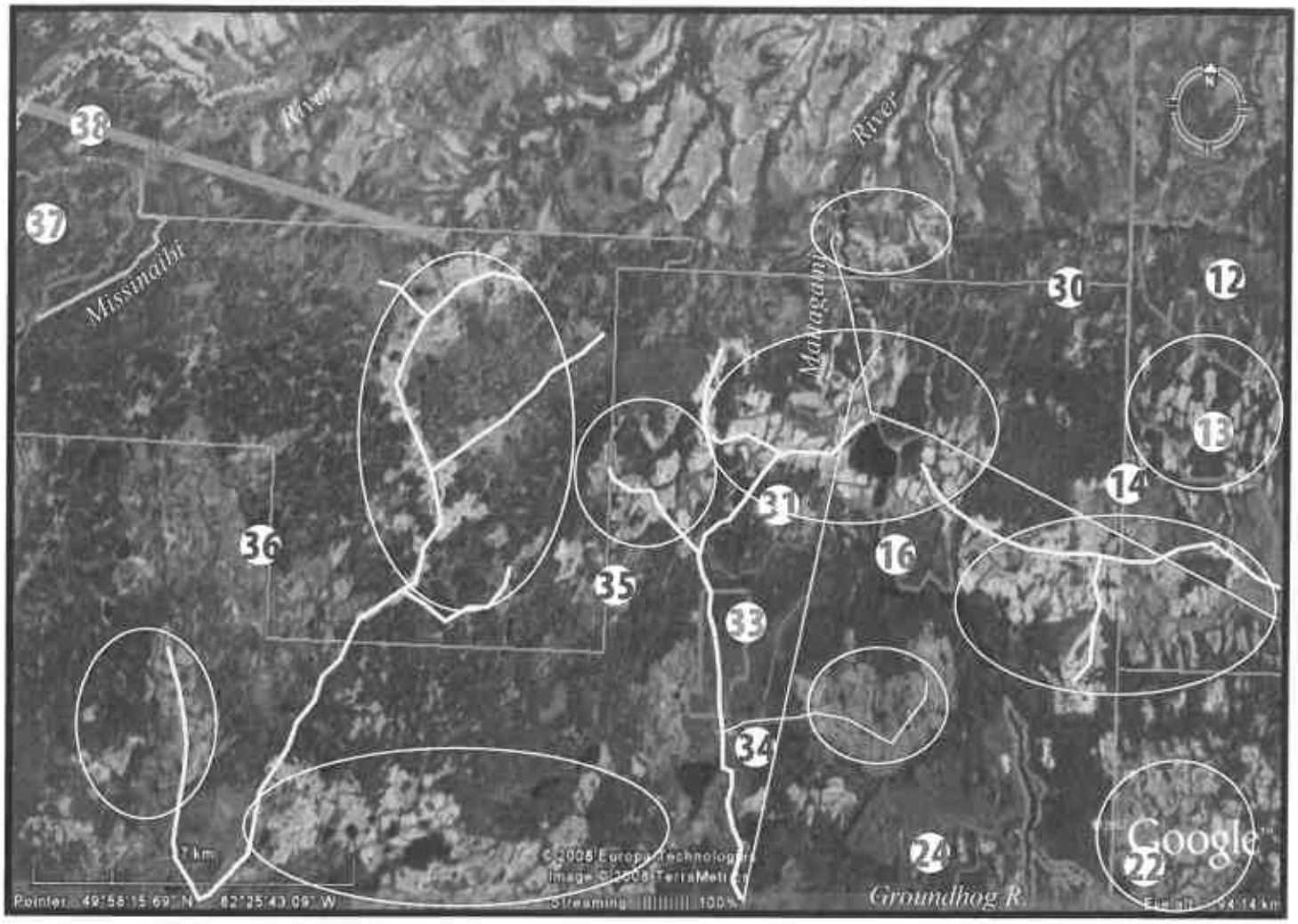


Figure 9b *- Satellite imagery showing industrial disturbance in the Abitibi West area vs. Plan Areas*

The north part of ***Abitibi West*** is the boundary of the AOU. It also forms the base of a triangle whose eastern side is the Abitibi River and Western edge is the Missinaibi River. Based on radio collar information and data from the Detour Lake collaring endeavour, it is suggested by the science team that this 'Missinaibi Triangle' may form the range of a population (***Map 7***). This triangle is split by the Mattagami River from south to north so there may be an even finer division of the population. It is assumed that any caribou conservation measures taken here would benefit animals inhabiting this area west of the Abitibi River and its relatively impermeable combination of river, infrastructure and human disturbance. Highway 11 forms a realistic southern boundary for considering caribou in this focus area.

9.2 - Tembec Conservation Plan in Abitibi West

Tembec plans to continue extensive forest management of this area consisting of the northern Gordon Cosens and northeastern Hearst forests. Its conservation plan consists of proposed deferrals, FSC candidate protected areas and existing Protected Areas in two "archipelagos".

One of these continues off of ***Deferral Area #19*** in the ***North French*** on the east side of the Abitibi River, through ***Protected Area #20*** and ***Protected Area #21*** and curves west then south through ***Deferral Area #22***, ***Deferral Area #23***, ***Deferral Area #24***, ***Deferral Area #25***,and across Highway 11 to ***Deferral Area #27*** and ***Protected Areas #28 &29***.

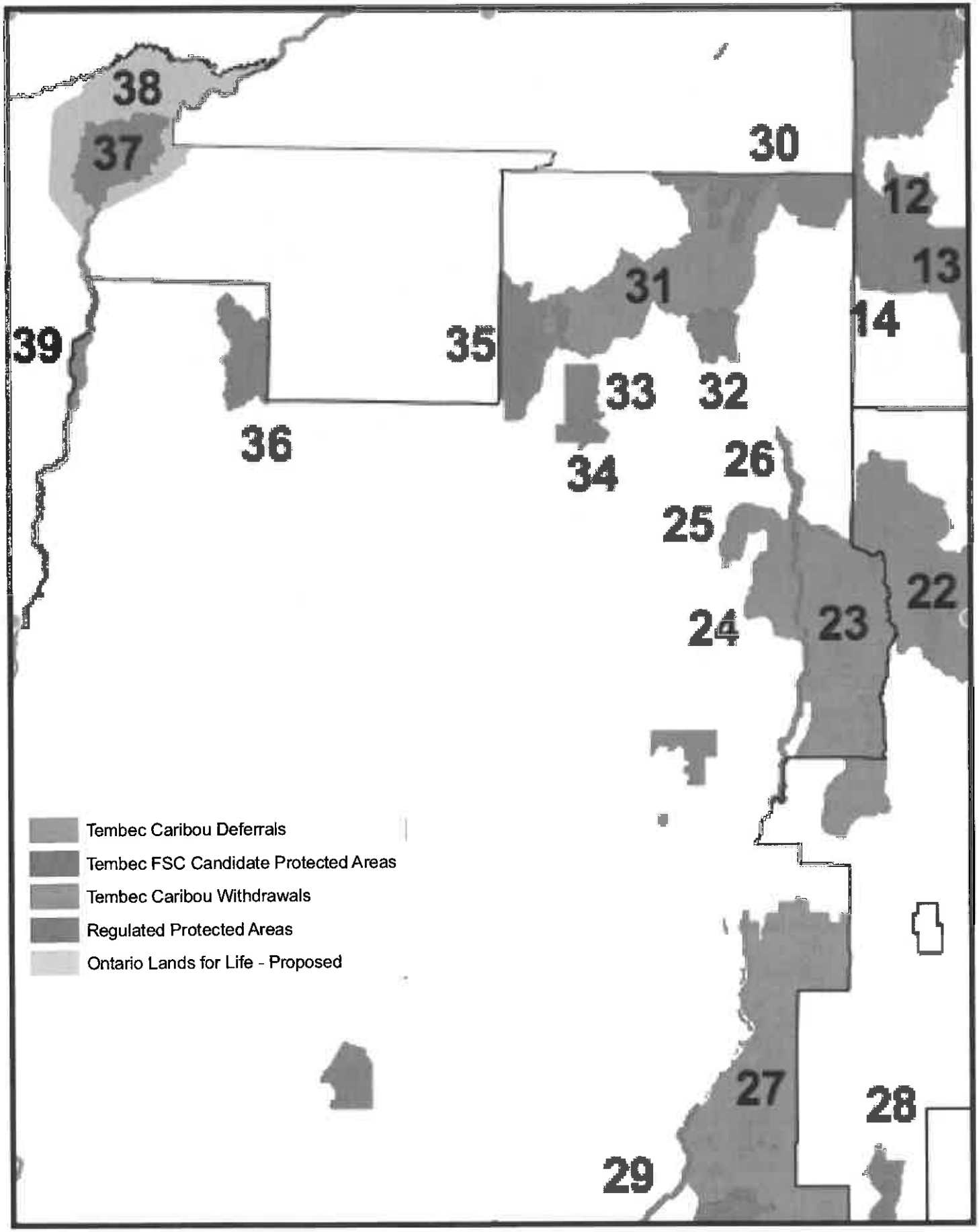
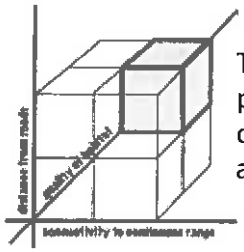


Figure 9c *- Tembec Conservation Plan - Abitibi West Plan Areas*

The other chain strings together ***FSC Area #12***, ***FSC Area #14***, ***FSC Area #30*** and ***FSC Area #35*** with ***Protected Area #13*** and ***Deferral Area #31*** across the northern border of the Gordon Cosens from the Abitibi River and ***Withdrawal Area #10*** in the Moose River forest management sub-unit to the extreme northeast arm of the Hearst Forest. Two small FSC candidates, ***FSC Area #34*** and ***FSC Area #36*** are outlying islands off this chain of conservation proposals.

Tembec proposes 50 years for all deferrals except for ***Deferral Area #24*** which would be a 10 year trial deferral. The landscape outside these proposed Deferals,FSC candidates and Protected areas would be open for forest management.

9.3 - Present quality of caribou habitat in Abitibi West



The Science Team evaluated the individual pieces of the Tembec proposal in light of current and projected uses of this landscape. The Team also evaluated their knowledge and assumptions about caribou and their habitat in this area. Each aspect of the habitat quality matrix described in the approach was investigated on an area-by-area basis.

All deferrals except for the small area of ***Deferral Area #24*** and ***Deferral Area #25*** have been extensively cut over. The two Protected Areas that are connected to quality caribou habitat are also compromised. ***Protected Area #13*** in the northwest has been cutover and ***Protected Area #20*** and ***Protected Area #21*** on the Abitibi River south of Fraserdale is fragmented by infrastructure as explained above. ***FSC Area #12*** and ***FSC Area #30*** are the only fully intact candidate protected areas that would have much value for stopping caribou range recession. They are both adjacent to potentially continuous caribou range.

Opportunities in ***Abitibi West*** for stopping range recession lie in the band of intact forest that extends down from the unallocated area or in the intact high quality caribou habitat that sits southwest of Fraserdale and links with the remnant west of the Groundhog.

The latter area was deemed to be too isolated from continuous habitat directly to the north to provide real hope that the animals that are still recorded there would persist. While there is tenuous potential connectivity across the Albany River to the east with the good habitat within Deferral Afrea #19, the Albany and its infrastructure were once again deemed too formidable a barrier to provide sufficient connectivity with the intact portion of the ***North French***. It was decided that this remaining intact, high quality patch, while still supporting some caribou was a lower priority for conservation effort.

The science team decided that more value would be added by combining the northern chain of proposals with the band of intact forest hugging the southern edge of the cutline.

9.4 - Science team recommendations in Abitibi West

The team examined the northern string of proposals and adjacent areas and formulated the following recommendations from east to west and in order of perceived conservation priority.

9.4.1 Link isolated Areas to northern Withdrawal:

The intact area between ***Withdrawal Area #10*** and ***FSC Area #12*** and ***Protected Area #13*** (identified as ***Value -added Area A***) should be added to the Withdrawal Area to the north. This move would ensure connectivity between the

Withdrawal and the area north of the undertaking with ***FSC Area #12*** and provide an opportunity for the cutovers of ***Protected Area #13*** to recover as caribou range. Again, the thinking is that areas in closer proximity to extant range and to the north have higher conservation value. If ***Value-added Area A*** were cut, the shadow effect would negate the value of the small area of ***FSC Area #12***. ***Protected Area #13*** would also be less likely to recover as caribou range.

9.4.2 Western extensions of northern Withdrawal:

The area identified as ***Value-added F*** is second in priority; the intact area bordered on the east by ***Protected Area #13***, to the north by ***FSC Area #30*** and to the west by ***Deferral Area #31***. Its contiguity with the northern boreal through ***FSC Area #30*** elevates its conservation priority. As there is no intact habitat or conservation proposal to the south for it to have a shadow effect on were it to be cut, this means that it less valuable than ***Value-added Area A*** .

FSC Area #30 would gain more value if the fingers that project down into ***Deferral Area #11*** would be joined together in ***Value-added Area F***. This would prevent future harvesting from fragmenting this area and losing it as caribou habitat.

If ***Value-added Area G*** were added to a permanent withdrawal, it would cast a beneficial shadow over the harvested land to the south. The cutovers in and around ***Deferral Area #31*** would have a greater possibility of someday being restored as caribou range. Conversely, if ***Value-added Area G*** were harvested, the shadow it would cast to the south would be detrimental to caribou recovery.

To have a reasonable period of use by caribou, should it recover as high quality caribou habitat, ***Deferral Area #31*** should be deferred for a minimum of 80 years, an extension of the current 50 year deferral.

Finally ***Value-added Area #H*** should be added as a caribou protection zone within the Hearst forest. This intact patch of forest and bog maintains connectivity with caribou range north of the cutline and would make the protection of ***FSC Area #36*** more useful for conservation by extending security of continued connectivity to this protected area. It also makes is more likely that existing cutblocks would one day support caribou again.

The addition of these intact value-added pieces to the Conservation Plan extends connectivity east-west across ***Abitibi West*** and supports the base of the "Missinaibi Triangle". It would provide a buffer to areas north of the cutline that may still harbor a complete population range and provides an additional refuge from which caribou could recolonize regenerating cuts to the south.

As all value added blocks in ***Abitibi West*** are connected to continuous caribou range their north–south conservation priority is similar. ***Value-added Area A*** stands out because of the opportunity to provide a beneficial shadow to the south as discussed above. Priority for these areas decrease as one moves from east to west in the following order ***Value-added Area A, F, G, H***. Those further to the east are more connected with the centre of the caribou conservation plan and will be most impacted by decisions made by Tembec and OMNR. The further west one goes, the more influence the managers of Hearst have. Hearst has not yet been formally included In theNortheast Conservation Plan.

Of the three geogrpahic parts of the Plan examined, ***Abitibi West*** has the lowest potential to stop range recession because it has the most limited amount of intact, quality caribou habitat that is contiguous with caribou range north of the cutline. However, it can contribute to the overall value of northern range by taking the steps outlined above.

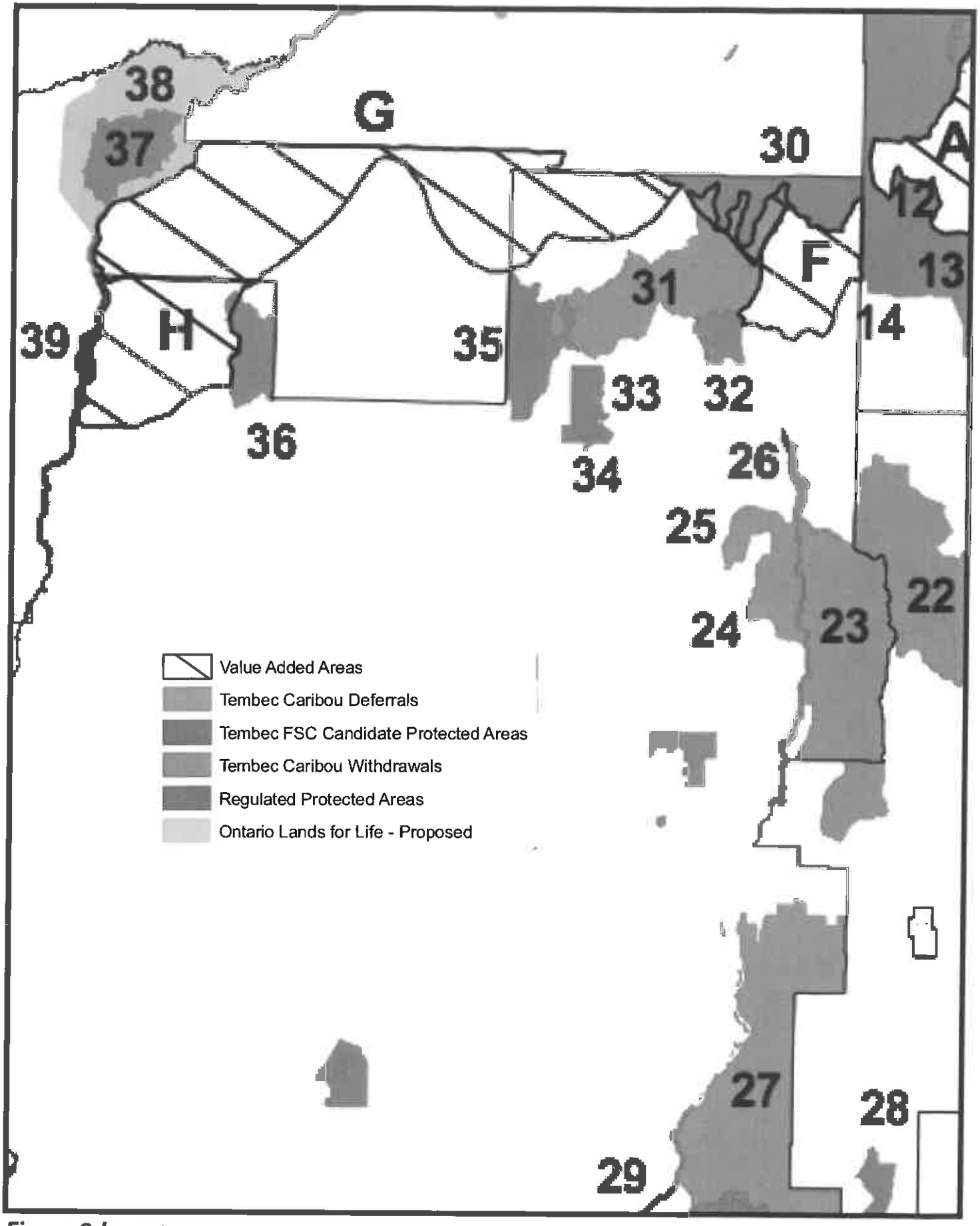


Figure 9d *- Tembec Conservation Plan , with Science Team additions - Abitibi West Plan Areas*

Photo 1. - *can you see the six caribou?*

Photo 2. - *moose using road*

Photo 3. - *hardwood ridge in Protected Area #8*

Photo 4. - *Detour Lake mine site*

Photo 5. - *Little Abitibi River*

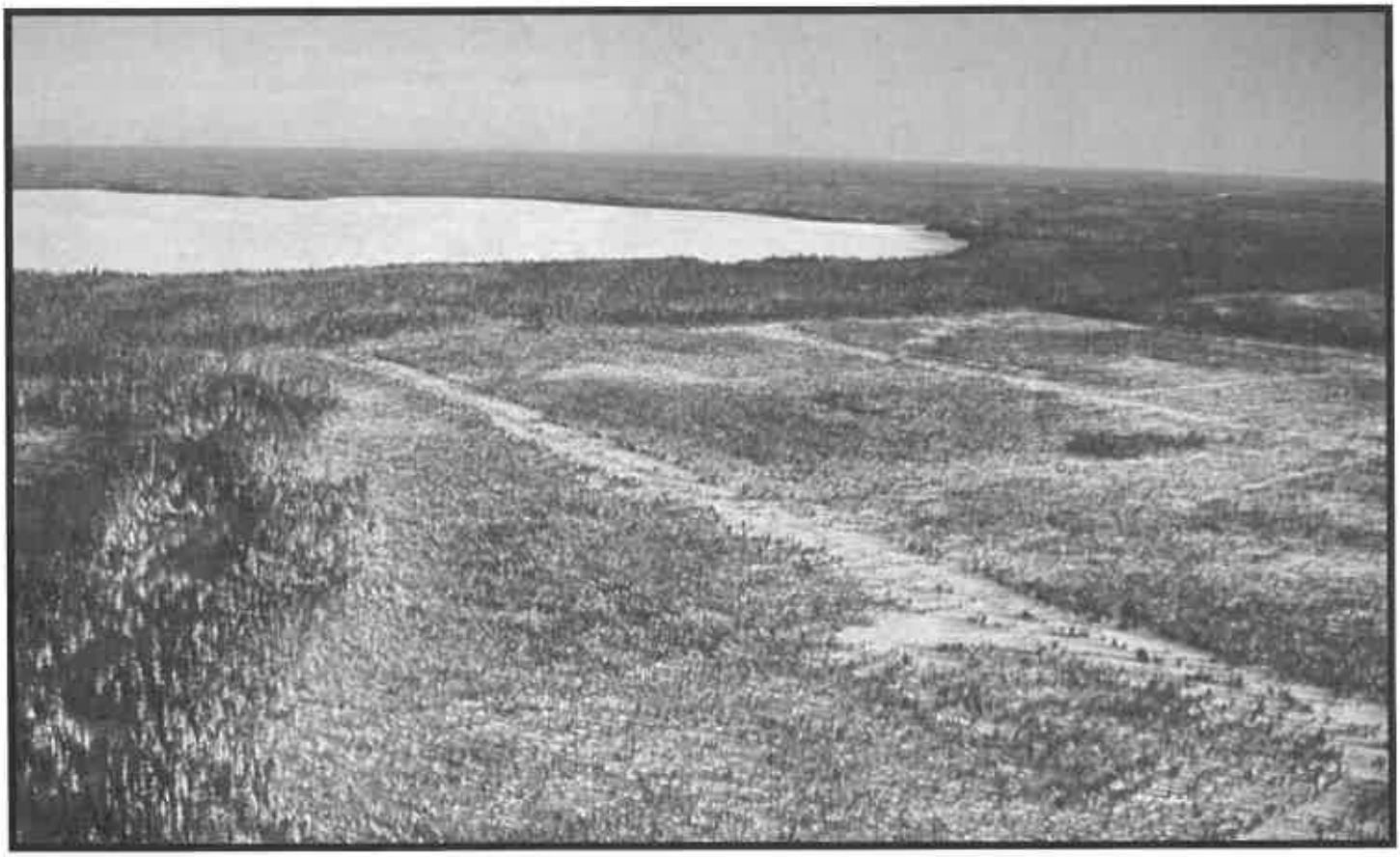


Photo 6. - *extensive cutting around Little Abitibi Provincial Park (this near Pierre Lake)*

Photo 7. - *multiple infrastructure impacts in Abitibi valley*

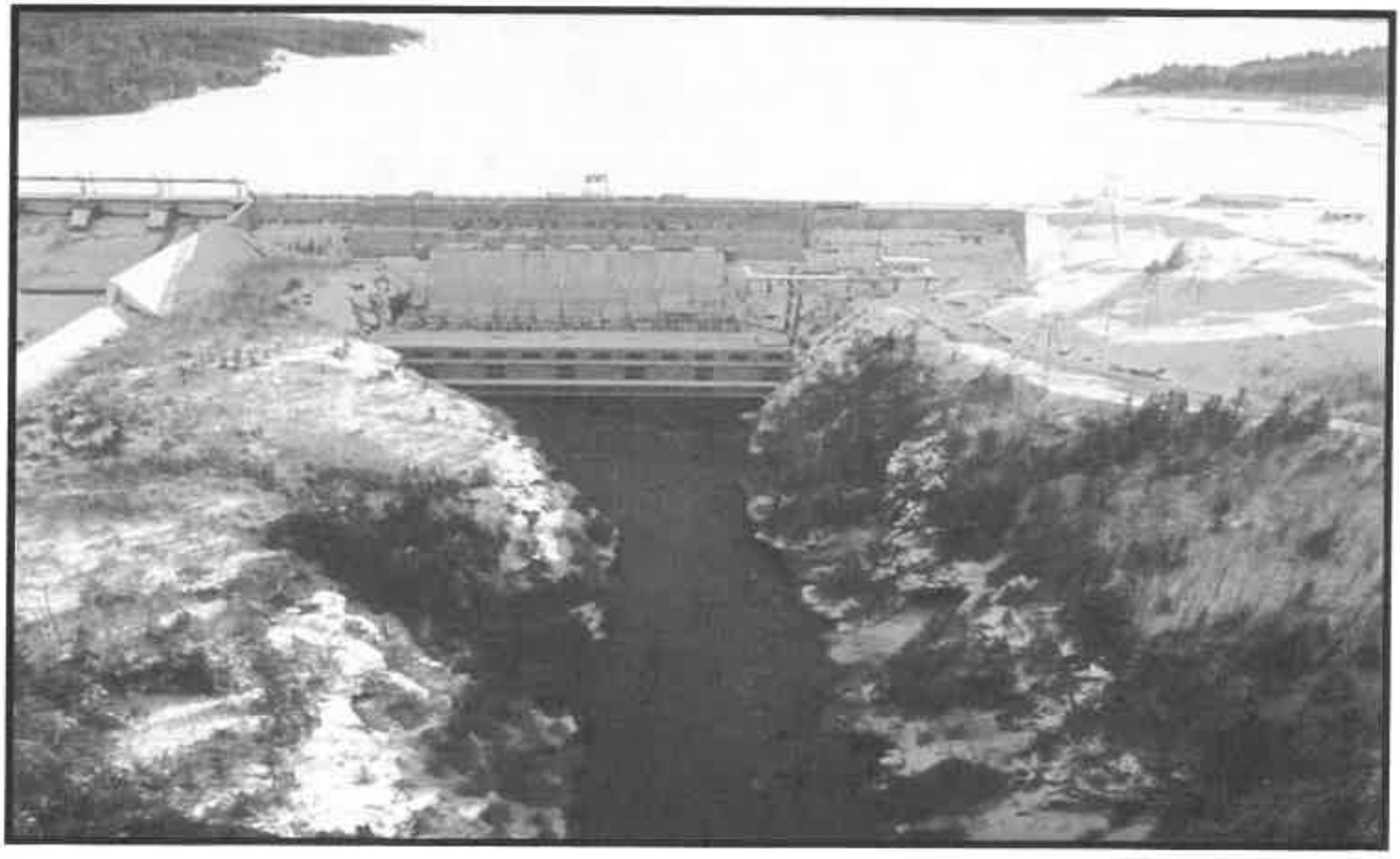


Photo 8. - *Abitibi Dam*

Photo 9. - *Diversion ditch off the Little Abitibi River with hardwood banks*

Photo 10. - *Intact boreal forest in the North French*

Photo 11. - *Huge footprint of power corridors*

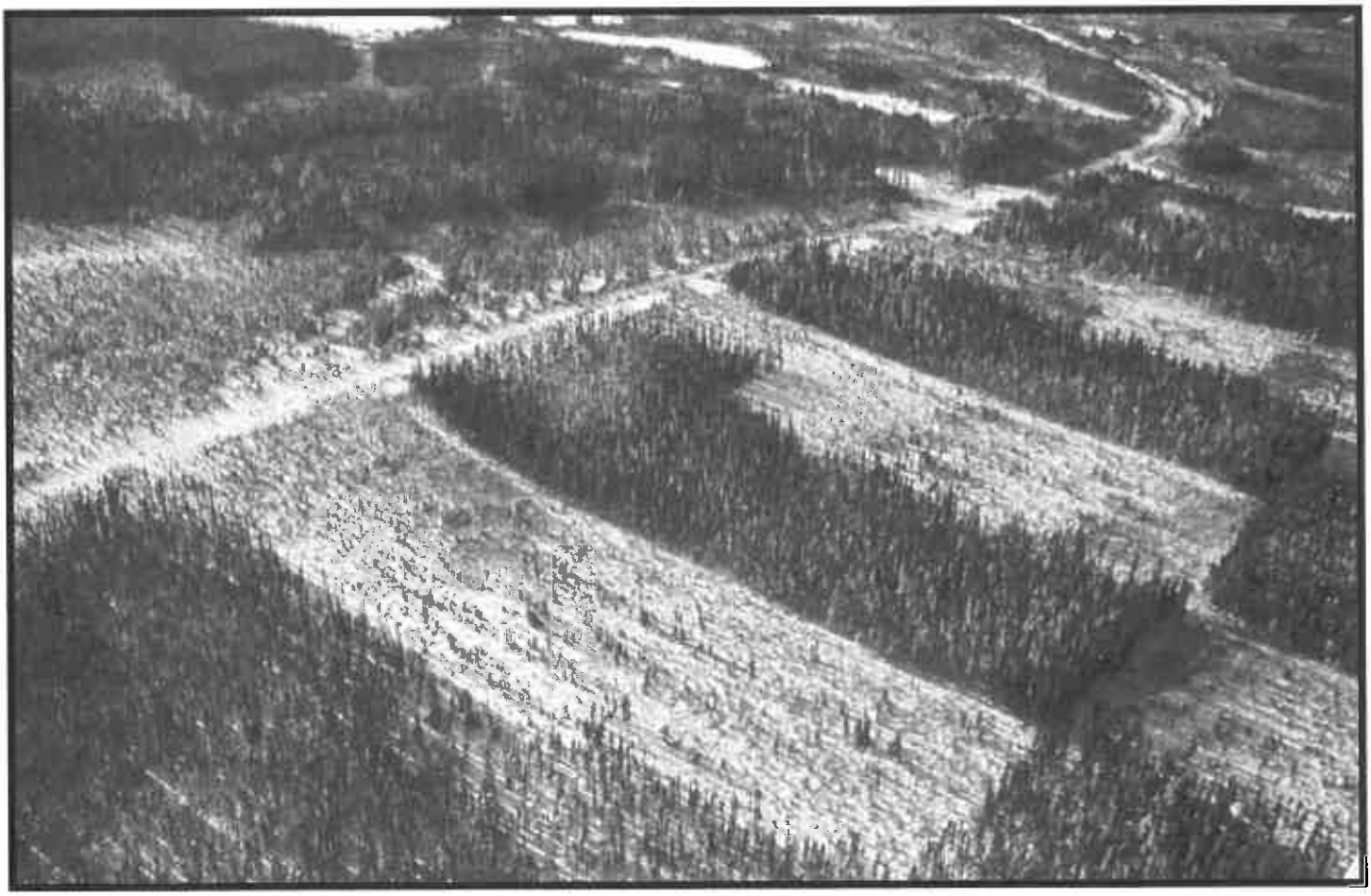


Photo 12. - *Extensive cutovers in most deferral areas in area - "moose motel" zipper-cuts evident.*

10. Summary Recommendations

10.1 - Recommended design alterations to Conservation Plan

In summary, the original Conservation Plan has over-valued some areas for caribou (to the south and not contiguous) and undervalued other areas to the north (more proximate to northern contiguous range). In order to meet the objective of effectively reducing range recession pressures of logging in the region, further action is required. The science team recommends adding deferrals and withdrawals of currently suitable and contiguous habitat as summarized on the Summary Area Recommendations Map and in the specific analysis of each of the three focus areas in the sections above.

Unless otherwise noted, all withdrawals proposed should be considered permanent. In the future, re-consideration of this status should only be allowed ***if*** adjacent logged areas are definitively recolonized and used (especially for calving).

10.2 - Suggested Management Directions for Government

Recent changes to the Parks Act, Endangered Species Act and forthcoming Forest Management guide development provide the opportunity to act immediately to recognize this collaborative proposal from diverse stakeholders of public forest land.

A credible response from the Ontario government includes the following actions:

10.2.1 - Interim Protection

Immediate recognition of all of the area north of the continuous "summary range line" (blue line on the recommendation Map 9) as formal candidate sites for permanent protection, subject to public and Aboriginal consultation. These areas would need to be withdrawn from mining and from the calculation of the Annual Allowable Cut and area of productive commercial forest.

10.2.2 - Amalgamation

Another tool may be to use existing forest management unit amalgamation exercises to remove identified withdrawal areas from the newly established unit, particularly along the northern limits of the commercial forest. This may be a most critical step in assisting caribou conservation while mitigating impacts on the forest industry.

10.2.3 - Establish Public Consultation

Consistent with the Parks Act, establish dates and a process for public consultation.

10.2.4 - Establish Aboriginal dialogue

Establish an acceptable process to collaborate on these measures with interested Aboriginal communities.

10.2.5 - Effective Long-term Monitoring

These land allocations must be viewed in an experimental context. Ongoing monitoring, e.g. through strategic radiotelemetry and baseline performance monitoring (see Section 11.), is necessary to evaluate the efficacy of this project in stopping caribou range recession. Continued monitoring may be used to detect failure to halt extirpation or document success in stabilizing populations and range occupancy. The former may be evident within years, while the latter may take decades.

Map 9. *- Recommended alterations to Conservation Plan*

10.2.6 - Export of Process

A broader commitment to boreal conservation, recognizing the utility of the proposed conservation design for the managed forest portion of northeast Ontario as a potential process model towards implementing policy and legislative obligations in all of the northernmost management units that border the current frontier of caribou range. This delivers an expedient "stopping extirpation" tool; this is a necessary prerequisite and complement to the "recovery" discussions that have occurred to date.

Taking these actions is necessary to extricate remaining caribou habitat from forest management activities. This is the only option that has a high probability of maintaining woodland caribou populations and allowing for their recovery in Ontario, thus filling a critical gap in policy.

10.3 - Recommended Performance Assessment

Attainable performance assessment

Caribou range occupancy, as assessed through aerial surveys, is an easily quantifiable measure of success. Unless these surveys are conducted using consistent methodology and covering vast spatial and temporal scales, its sensitivity for detecting changes in range occupancy is low. The two stage surveys recently used by the province are not efficient everywhere. The aerial survey methodology originally developed for wolverine surveys by Magoun et al. (2007) is recommended as one example of a standarized occupancy monitoring protocol which could be modfied for smaller areas.

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