

February 18, 2016

Mr. André Boisclair, president
Mr. Daniel Berrouard
Mr. Brian Craik
Mr. Robert Joly
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Comité d'examen (COMEX)
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Québec, QC
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Subject: **Construction of forest access road in H section West and I**

Distinguished committee members,

I address you today in my capacity as a wildlife ecologist with recognized expertise in the behaviour and population dynamics of woodland caribou of the James Bay region (Eeyou Istchee). Since 2007 I have played a significant role in the acquisition and transmission of scientific knowledge as it pertains to regional recovery planning for this species-at-risk. I am therefore aptly qualified to speak to the project in question from an expert science perspective. In the interests of disclosure, I was mandated by the Cree First Nation of Waswanipi to conduct this assessment of the roads under study. However, the views expressed herein reflect my professional informed opinion and were not subject to approval by any third party.

Upon thorough review, it is my assessment that **approval of proposed forest access roads H and I would jeopardize the prospect of caribou population recovery in the James Bay region**. A number of compelling facts support this notion, not the least of which include presently insufficient critical habitat supplies and the continued inexistence of an acceptable science-based recovery plan. In addition, the particular role of the Broadback forest as the central hub of a dispersal corridor facilitating genetic exchange between regional populations makes its protection vital to long-term woodland caribou persistence on the landscape. Indeed, evidence suggests that the anthropogenic footprint resulting from forestry activities associated with the access roads in question would render the area affected by logging inhospitable to caribou indefinitely. When we also consider the

inevitable likelihood of stand-replacing wildfire occurring in what remains of the woodland caribou distribution range to the north, it becomes clear that the decision presently before you has the potential to either bolster or markedly weaken population recovery efforts in the region.

As you are likely aware, boreal populations of woodland caribou received a “threatened” designation by the Committee on the Status of Endangered Wildlife in Canada in 2002, and were subsequently classified as “vulnerable” by the Province of Quebec in 2005. Because the project in question is expected to significantly impact woodland caribou, it is important that factual information be presented to you by a credible source. To that effect, in a letter addressed to the Deputy Minister Mme Christyne Tremblay¹ on December 03, 2015², EnviroCree Environmental Services made a number of unsubstantiated claims on behalf of the proponent that stand to be corrected. Importantly, the author indicated that “self-sustainability of... woodland caribou is described as ‘uncertain’ in the study area” and that “the woodland caribou still has assets for self-sustainability”³. These claims appear to be based on an incorrect interpretation of Environment Canada’s 2011 scientific assessment⁴ and a failure to acknowledge the recent findings of an expert science panel commissioned by the Quebec government to assess the status of caribou in the James Bay region⁵. As the primary author of said report, it is my duty to correct the proponent and assert for the record that **based on empirical evidence, all three regional populations are in fact considered ‘not self-sustaining’ (NSS)**, “the Assinica and Temiscamie herds definitively so, and the Nottaway more likely than not”⁶. Furthermore, “current amounts of cumulative range disturbance are in excess of what is theoretically required... to ensure population persistence”⁷.

¹ Of the Ministère du Développement durable, de l’Environnement et de la Lutte contre les changements climatiques du Québec.

² EnviroCree Environmental Services (Dec. 03, 2015). Answers to Questions & Comments. ESIA – Construction of “west section H” & “I” Forest Access Roads. Matériaux Blanchet inc. & Beneficiaries of MU 086-65. 31 pp.

³ EnviroCree Environmental Services (Dec. 03, 2015), pg. 16.

⁴ Environment Canada (2011). Scientific assessment to inform the identification of critical habitat for woodland caribou (*Rangifer tarandus caribou*), boreal population, in Canada: 2011 update. Ottawa, Ontario, Canada. 102 pp.

⁵ Rudolph, T., P. Drapeau, M.-H. St-Laurent & I. Imbeau (2012). Status of woodland caribou (*Rangifer tarandus caribou*) in the James Bay Region of Northern Quebec. Presented to the Ministère des Ressources naturelles et de la Faune du Québec and the Grand Council of the Crees (Eeyou Istchee). Montreal, QC. Scientific Advisory Group, Woodland Caribou Recovery Task Force, Nord-du-Québec. 85 pp.

⁶ Rudolph, Drapeau, Imbeau & St-Laurent (2012), pg. 31.

⁷ Rudolph, Drapeau, Imbeau & St-Laurent (2012), Executive Summary.

At an albeit arbitrary and thus largely uninformative scale⁸, the proponents estimate **current disturbance levels in the project study area to exceed by at least 7% the 35% maximum disturbance management threshold set by Environment Canada**⁹. They then proceed to argue that since levels are only expected to increase by an additional 3.9% if the project is approved (which is grossly underestimated, as I will argue), its associated impact “does not appear significant”¹⁰. The proponent thus misconstrues as a *loose management objective* what in actual fact is a *maximum disturbance threshold*, a practice often refuted in the scientific literature¹¹. In actual fact, ecological thresholds reflect critical boundaries in non-linear population responses to habitat loss, and **no degree of rhetoric can circumvent that range disturbance levels in Eeyou Istchee already exceed the tolerance threshold of woodland caribou**. Furthermore, since populations are expected to decline exponentially beyond the 35% precautionary threshold, even minor cumulative increases in total range disturbance are expected to substantially diminish the prospect of population recovery¹². When we consider that approval of the roads in question would directly result in 15-20 years of forest harvesting activities within a previously intact forest, it is evident that **the total anthropogenic footprint associated with the project in question would far exceed 3.9% over 2 years as estimated by the proponent**¹³. In your evaluation of the project in question as it pertains to cumulative impacts on woodland caribou, **it is therefore essential that you consider the ultimate long-term (i.e. 15-20 years) anthropogenic footprint expected to result from the project’s approval**. It must likewise be recognized that the methods used by the Chief Forester may significantly underestimate future disturbance levels in the James Bay region as they do not explicitly consider the added contribution of stochastic wildfire, nor do they consider a 500-metre zone of influence surrounding future harvesting treatments as per Environment Canada (2011)¹⁴.

⁸ The notion of woodland caribou critical habitat as defined by Environment Canada (2012) is derived from the empirical relationship between calf recruitment and total disturbance measured at the scale of the local population range.

⁹ EnviroCree Environmental Services (Dec. 03, 2015), pg. 15.

¹⁰ EnviroCree Environmental Services (Dec. 03, 2015), pg. 27.

¹¹ van der Hoek, Y., B. Zuckerberg and L. L. Manne (2015). Application of habitat thresholds in conservation: Considerations, limitations, and future directions. *Global Ecology and Conservation* 3: 736-743.

¹² Due to exceeding difficulty in reversing population declines when increasingly set into motion.

¹³ EnviroCree Environmental Services (Dec. 03, 2015), pg. 27.

¹⁴ Bureau du forestier en chef (2015). Caribou forestier - Effet des stratégies actuelles d'aménagement forestier sur les taux de perturbation de l'habitat. Avis du Forestier en chef (FEC-AVIS-03-2014). Roberval, QC. 21 pp.

As detailed by Environment Canada (2011) and reiterated by Rudolph, Drapeau et al. (2012), “if predator-prey dynamics are not conducive to caribou persistence at large spatial scales, more proximal factors will not be important”. After over a decade of implementing the adapted forestry regime, it is now clear that mosaic cutting is detrimental to woodland caribou in Eeyou Istchee, in large part due to the extensive road network it produces¹⁵. It is also apparent that ecosystemic forestry is unlikely to replace the trapline-based system currently in place. Under these circumstances, **mitigation measures available to forest managers are unlikely to serve a great purpose in stemming population declines**. Furthermore, despite years of discussion concerning the necessity of road rehabilitation for woodland caribou recovery, for legal and socio-economic reasons there is very little evidence to suggest this is even possible, and certainly not at a scale that would be effective for woodland caribou. Considering the legacy of industrial forestry to the immediate south, **it is reasonable to assume that the project in question will render the area affected by logging inhospitable to caribou indefinitely**.

Concerning the proponent’s response to question QC-12 posed by the COMEX on October 13, 2015¹⁶, I would like to draw your attention to the fact that woodland caribou in Eeyou Istchee tend to avoid areas situated within 1.5 to 2 km of roads and other linear features¹⁷, although their avoidance of linear features may be detected at distances of up to 15 km during spring dispersal¹⁸. The 500-m anthropogenic buffer employed by Environment Canada is distinctly different in that it reflects the *demographic*, as opposed to behavioural, response of caribou populations to *total range* disturbance. **The buffer distance used by the proponent is therefore insufficient and should be more than doubled in order to effectively estimate functional habitat loss. Furthermore, in order to gauge the extent of expected functional habitat loss arising from construction of the roads in question, one must necessarily know the future state of the area affected by logging as a result of the project’s approval. This corresponds with a 15-20 year time horizon as per the proponent’s development forecast for the study area.**

¹⁵ Linear features being an important driver of declines in caribou population recruitment

¹⁶ EnviroCree Environmental Services (Dec. 03, 2015), pp 13-16.

¹⁷ Rudolph, Drapeau, Imbeau & St-Laurent (2012), pg. 42.

¹⁸ Rudolph, T. D. (2011). Spring dispersal and habitat selection of boreal caribou in northern Quebec. M.Sc. thesis. Department of Biological Sciences, University of Quebec in Montreal. 184 pp.

In order to appreciate the significance of the intact forest at risk of being harvested as a result of the roads under review, one must understand its importance to woodland caribou in the greater landscape context. **The Broadback forest**, of which roughly the southern half is presently at risk of being harvested, **lies squarely within the area of overlap between the Nottaway and Assinica population ranges** (Figure 1). Serving the Cree Nation Government as a consulting biologist on the technical committee of the regional woodland caribou recovery task force, I recently conducted a quantitative analysis of functional landscape connectivity for woodland caribou in Eeyou Istchee¹⁹. I subsequently employed similar methods to evaluate the role of the Broadback forest in terms of its importance for woodland caribou on behalf of the Cree First Nation of Waswanipi. Results indicate that **the Broadback forest is the overall top-ranking forested habitat patch** on the combined range (Nottaway & Assinica) **in terms of its contribution to functional landscape connectivity**²⁰. It is also the top-ranking patch in terms of betweenness centrality (Figure 2), a measure proportional to its role as a connectivity ‘hub’ facilitating dispersal between more distant habitats comprising the core ranges of the Nottaway and Assinica populations. **The Broadback forest thus serves a vital purpose as the centerpiece of a dispersal corridor facilitating immigration and emigration between the Nottaway and Assinica populations.** At the risk of mutual genetic isolation and diminished population resilience, this is particularly important for the long-term persistence of both populations.

Approval of the roads in question would not impact all of the Broadback forest, and it would not directly impact the area most frequented by woodland caribou north of the Broadback river²¹. As previously mentioned, however, it is expected to compromise population viability (as measured by the probability of a self-sustaining population) via reductions in the amount of critical habitat at the population range level. Furthermore, because wildfire is frequent in the boreal forest of northwestern Quebec²², **it would compromise the resilience of the critical habitat network to stand-replacing wildfire by substantially reducing the size of the Broadback forest, thereby jeopardizing its functionality as a regional connectivity hub.**

¹⁹ Rudolph, T. 2015. A quantitative analysis of functional habitat connectivity for woodland caribou in Eeyou Istchee. Final draft submitted for comments to the Cree Nation Government (Eeyou Istchee) on Sept. 13, 2015. Montreal, QC. 35 pp.

²⁰ As a function of both a) betweenness centrality and b) equivalent connectivity.

²¹ Excepting the functional habitat loss attributed to peripheral forestry activities.

²² Jobidon, R., Y. Bergeron, A. Robitaille, F. Raulier, S. Gauthier, L. Imbeau, J.-P. Saucier and C. Boudreault (2015). "A biophysical approach to delineate a northern limit to commercial forestry: the case of Quebec's boreal forest 1." *Canadian Journal of Forest Research* 45(5): 515-528.

In a letter addressed to Minister Laurent Lessard²³ on September 29, 2015, Grand Chief Matthew Coon Comb urged the Quebec government to "suspend all current and future industrial activities in... critical core habitat areas for woodland caribou in Eeyou Istchee" until consensus is reached on a long-term management plan. It bears mentioning that one such core use area associated with the Assinica population is located south of the Broadback river and north of Lake Rocher²⁴. Accordingly, in efforts to minimize impacts on woodland caribou, it is of great importance that the COMEX ensure forest management planners take adequate measures to avoid impacting such areas.

In conclusion, the roads in question are inadvisable from a woodland caribou conservation standpoint due to the negative impacts they are expected to have on the likelihood of population recovery²⁵. Insufficient critical habitat supplies and the continued inexistence of an acceptable science-based recovery plan are alone adequate grounds for rejection of the proposal. Furthermore, as the central hub of a dispersal corridor facilitating genetic exchange between regional populations, protection of the Broadback forest is vital to long-term woodland caribou persistence on the landscape. **Approving the project at hand would compromise the resilience of the Broadback forest to stochastic wildfire and increase the risk of genetically isolating local populations.** To reiterate a recommendation made by scientific experts in 2012:

"Efforts to stem population declines cannot be effective if we continue to expand the road network into previously undisturbed portions of caribou range. Preventing new incursions and strictly controlling access may serve to buffer the longer-term changes in predator-prey dynamics that can lead to population extirpation. **The goal at present should be no net increase in road surface area, with an emphasis on the deactivation and rehabilitation of unused forest access roads.**²⁶"

²³ Of the Ministère des Forêts, de la Faune et des Parcs du Québec.

²⁴ Rudolph, T. (2014). Towards a woodland caribou conservation strategy for Eeyou Istchee: A review of interim protection measures and proposed modifications to the adapted forestry regime. Submitted to the Cree Nation Government and Grand Council of the Crees (Eeyou Istchee) on June 05, 2014. Montreal, QC. 42 pp.

²⁵ Due to exceeding difficulty in reversing population declines when increasingly set into motion.

²⁶ Rudolph, Drapeau, Imbeau & St-Laurent (2012), pg. 56.

I am thankful for this opportunity to share my thoughts on the proposed construction of “forest access road in H section West and I”. I trust that in the course of your deliberations as the members of the COMEX, you will take seriously into consideration the information I have presented herein.

Yours truly,

Tyler D. Rudolph, M.Sc., B.Sc.

Consulting biologist

- Scientific expertise in biodiversity conservation
- Statistical analysis of biological data
- Risk assessment and decision-making tools

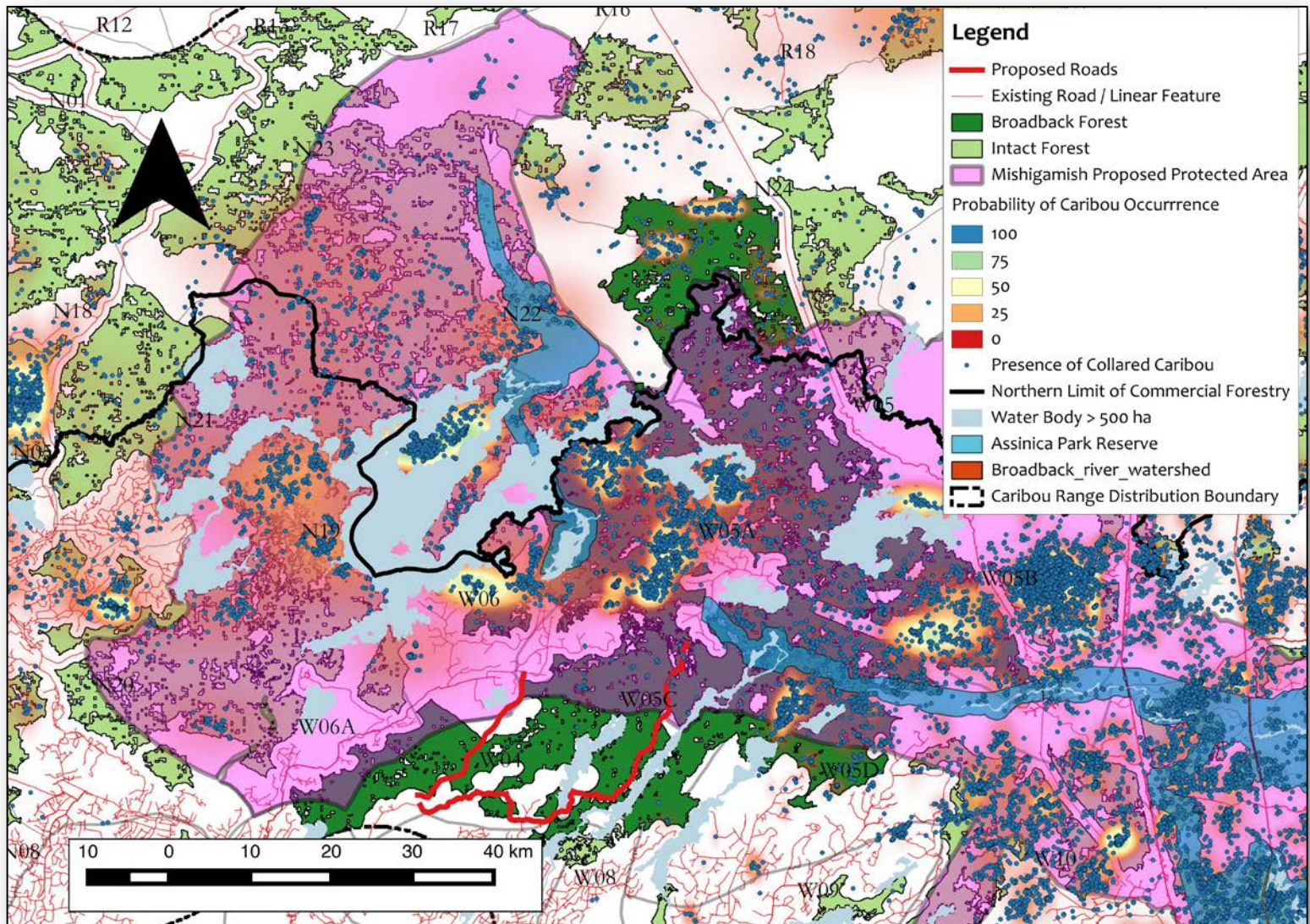


Figure 1: Location of proposed forest access roads in relation to the Broadback forest and other features of interest including caribou probability of occurrence based on GPS collar telemetry data (as described in Rudolph, 2014). The area north of the Broadback River is more intensively frequented than the area to the south, although collared animals and Cree traditional knowledge confirm the presence of woodland caribou.

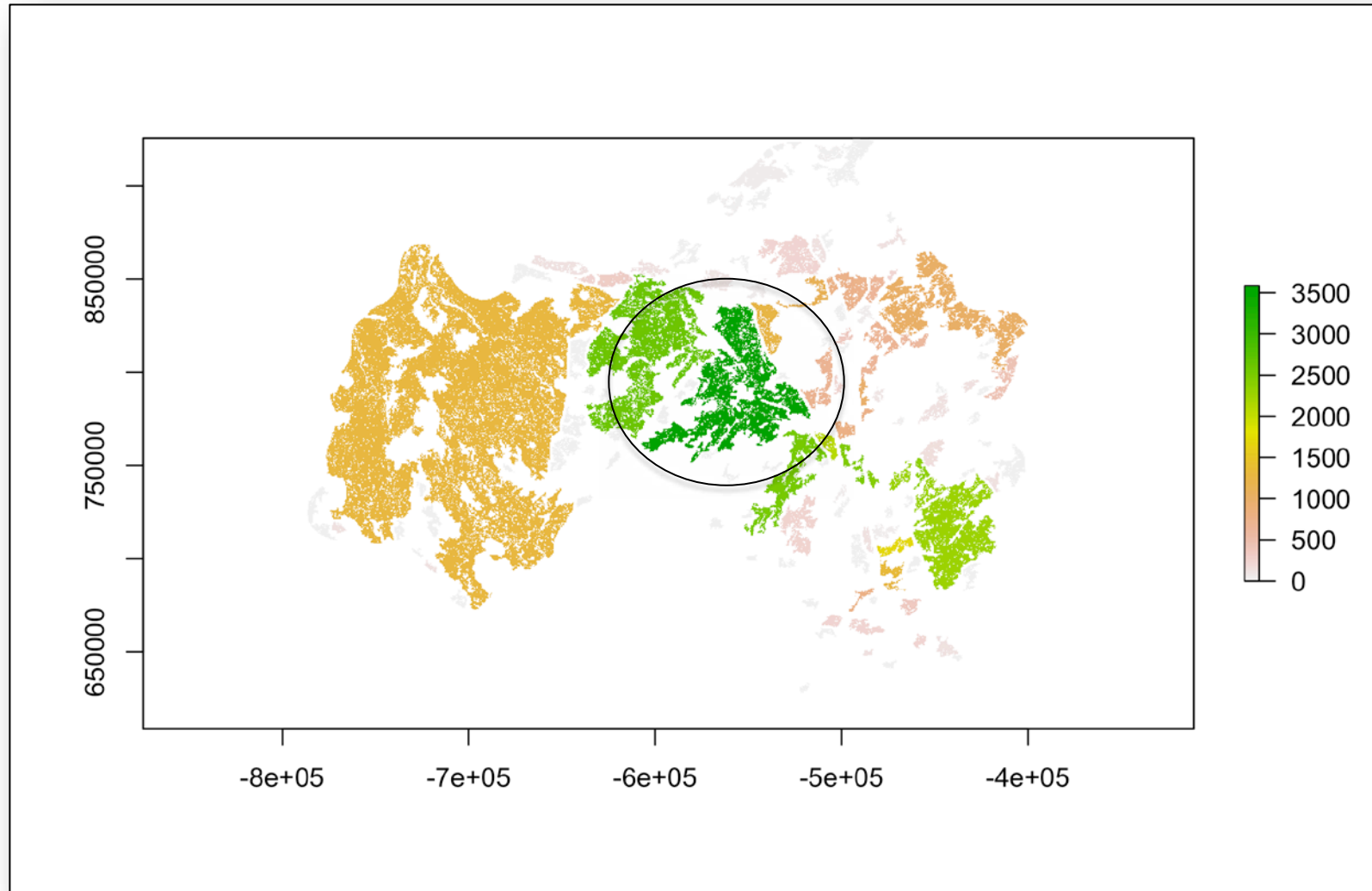


Figure 2: Results of a spatial graph analysis of functional landscape connectivity considering intact forested habitat patches $> 1 \text{ km}^2$ located within the 100% kernel probability contours of the Nottaway and Assinica population ranges combined (for methods see Rudolph (2015): *A quantitative analysis of functional landscape connectivity for woodland caribou*). Shown are betweenness centrality (BC) values associated with individual patches (greener and darker is better). The Broadback forest (circled) is the most important habitat patch in terms of BC and the overall top-rated patch in terms of both BC and equivalent connectivity.