Technical Memo – Springpole Project Information Requests August 2025

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1.0 BACKGROUND

First Mining Gold (FMG) received information requests (IR's) on the Springpole Project Final Environmental Impact Statement / Environmental Assessment (WSP, October 2024) from the Ministry of the Environment, Conservation and Parks (MECP) Species at Risk, including Boreal Caribou, on April 24th, 2025. In order to address the comments received related to the results of the effects assessment for Boreal Caribou pertaining to vital rate and habitat models; additional work has been undertaken including the provision of error rates, sensitivity analysis through use of stochastic models, disturbance layers and General Habitat Description (GHD), incorporation of variability and uncertainty in demographic rates and inclusion of future condition scenario's. In addition, further detail requested on the disturbance increment within the Churchill Range has also been provided. In addition, MECP requested projecting future disturbance conditions under active forest harvest and climate change and running habitat analysis using GHD layers updated in Spring 2025 as well as additional movement modelling using MECP's telemetry data from 1995 -2015 in conjunction with FMG's more recent telemetry data from 2023.

To support the responses, a suite of new analysis was undertaken by FERIT Consulting and WSP including:

- Circuitscape, Brownian Bridge and Activity Centre movement models were compared across the historical MECP data (1995 to 2015) and the more recent FMG telemetry data.
- Re-calculated vital rates of recruitment, survivorship, and lambda using the new version of caribouMetrics, and using stochastic simulation. This allowed providing estimates of variance, including standard deviation, standard error, and 95% confidence limits. This also enabled testing the hypothesis that none of these 3 metrics differ significantly between current condition and future condition.
- Creating long-term population trend using the newly calculated estimates of lambda and associated standard deviation to compare current condition with future condition lambda.
- Calculated the same vital rate metrics using a Bayesian model that allowed the integration of recruitment data from 2015 to 2025 as well as a survivorship estimate based on collaring data with data simulated using the ECCC Federal model.
- Future disturbance (fire and harvest) under climate change (GHG scenario 8.5):
  - Previous simulations of fire and harvest in the study area were used to estimate disturbance rates (anthropogenic and fire) over a 40-year period (2020-2060).
  - The disturbance rates under climate change (RCP 8.5) were then used to estimate persistence metrics of survivorship, recruitment, and lambda.
  - These vital rates were estimated under current conditions versus future conditions with Springpole Project added to the landscape.
- GHD analysis was updated using MECP data that became available in April 2025 to compare the minor differences between the most recent Category 2 GHD that MECP just finalized versus the GHD that WSP had available to update using the most recent disturbance data available in 2024 as input into the Final EIS/EA including:
  - Comparison of GHD Cat 2 maps for current condition for Churchill range (RSA-Hab) between original permanent disturbance, roads, and harvest, versus the latest MECP versions.
  - Comparison of GHD Cat 2 maps for current condition and future condition under Future Condition (FC) scenario MAR 1, TL 1.

In addition, MECP had independently contracted with FERIT for the development of a new Category 1 model designed for Province-wide use that used revised statistical modelling methods to improve strength of the model. This model is not generally available outside of MECP, however, an example of output from this model was included in MECP comments concerning potential errors in using predictive models to estimate Category 1 habitat. Details on model development are in the contractor's report submitted to MECP entitled "Report on Category 1 Modelling April 29th".

2.0 METHODS

Vital rates were modelled to include elements of stochasticity, including sampling of paired recruitment and vital rates. The updated caribouMetrics was used to generate the estimates, together with standard errors and 95% confidence limits. This then allowed estimates of long-term population growth, lambda, to also be estimated with standard errors and confidence limits. Population growth, in this case decline, was then simulated over 100 years to evaluate the effect of the Springpole Project on long-term population trend for Caribou in the Berens, Kinloch, and Churchill Ranges. For analysis, the approach outlined in the caribouMetrics vignette (https://landscitech.github.io/caribouMetrics/articles/caribouDemography.html) was followed.

Details of the model estimates for vital rates were based on the [10] Johnson et al. 2020 M1 model for survival, and M4 model for recruitment. Estimates of variance associated with both the vital rates and lambda for testing the hypothesis of no difference under current and future disturbance levels were generated.

Timber harvest comprises a large portion of forest disturbance in Churchill Range and climate change is also occurring. To account for these changes in long-term estimates of sustainability, simulation results from a previously published study for this area were integrated using ALCES Online modelling system over a 60-year period. Details of the climate projections and simulations for forest harvest, road construction and decommission, natural disturbance, and salvage logging after burns are based on [14] Rempel et al. 2021. Monthly temperature and precipitation projections for 2010 to 2060 from the Second Generation Earth System Model ([4] ECCC 2017) were downscaled to a 1 km resolution across the study area. Downscaled climate data were derived from a digital elevation model, baseline, and anomaly grids using methods presented in [17] Wang et al. 2016. Climate data were prepared for the representative (conservative) concentration pathway (RCP) 8.5 emission scenario predicted by the Intergovernmental Panel on Climate Change, in which greenhouse emissions continue to rise past the year 2100 ([9] Iturbide et al 2020).

The simulated rate of forest harvest was based on 80% of the planned harvest area as specified in forest management plans for the numerous forest management units spanning the southern portion of the study area [13] MNRF 2020, and thus it was assumed no northward expansion of harvesting. Harvest level was reduced by 20% from the planned level because companies in northern Ontario are currently harvesting ≤60% of the maximum permitted ([13] MNRF 2020). Simulated burned forest was treated as salvage logged, thereby reducing planned harvest area. Timber harvest was limited to dense forest >65 years and followed an aggregated block schedule to represent forestry guidelines for caribou range ([12] MNRF 2018). Regenerating stands retained their pre-harvest forest type.

The model created secondary roads linking cutblocks to the road network, where 5% of harvested area was automatically converted to in-block road (i.e., temporary roads located within the harvest cutblocks). A linear allocation method was used, which uses a least cost paths approach to link cells with newly harvested forest to the existing road network. If the cell is already linked to the road network, no new road is created. In-block roads were dispersed across newly harvested areas because the resolution of the simulations (i.e., 1 km^2) is too coarse to represent in-block roads as segments. Forest access roads in northern Ontario that were >20 years old and naturally abandoned had greater tree and shrub density on the roadbeds than comparable roads that were <20 years old ([8] Hall et al. 2016). This increased tree and shrub density suggests that these older roads are less functional for people and predators to use, and thus, provides some support for our use of a 20-year threshold for in-block roads to be reclaimed to a natural state.

To represent spatial and temporal patterns in the burn rate, a regional-scale assessment of fire rate under current and potential future climate was combined ([2] Boulanger et al. 2014) with local-scale fire selection ratios that respond to spatial variation in cover type and age ([1] Bernier et al. 2016). Two fire scenarios were simulated: historical, for which the fire rate equals the observed average during 1959 to 1999; and increasing fire under the pessimistic (RCP 8.5) emission scenarios. Ratios of future relative to historical fire rates for each climate scenario were obtained (Y. Boulanger, Natural Resources Canada, personal communication) for 2011-2040 and 2041-2070, and multiplied by the historical fire rate to derive future fire rates. Simulated fire size was based on fire size class distribution observed in the study area over the past 20 years (1997-2016). Fire size class distributions were calculated separately for the western and eastern portions of the study area to reflect the substantially larger fire sizes recorded in the western portion.

Information obtained from the simulation was then used to estimate future levels of fire (excluding anthropogenic disturbance), anthropogenic disturbance, and total disturbance, to generate estimates of vital rates and population sustainability estimates over a 60-year period of forest harvest and wildfire burns using the caribouMetrics program.

The simulation model uses the same Boreal Caribou Resource Selection Function (RSF) models used for categorizing GHD Category 2 and 3 habitats, but rather than categories, it uses the average of the continuous seasonal range RSFs as an index of relative habitat carrying capacity. This habitat index is responsive to changes in climate through the natural disturbance simulation, future forest harvest, and future changes in anthropogenic linear-feature density. The results of the population dynamics model from 2010 to 2060 are presented and represent change in population trend expected under simulated forest harvest and climate change.

Changes in Caribou General Habitat Description (GHD) classes Category 2 and Category 3 under current and future habitat conditions were assessed using the Project Development Area (PDA). In addition, maps indicating probability of an area belonging to Nursery Area or Winter Area habitat were also created. Two scenarios were assessed: current condition and future condition of the Springpole Project.

3.0 RESULTS

3.1 FREQUENTIST APPROACH

In all updated analysis scenarios, the results are the same or very similar to what was presented in the Final EIS/EA (see Section 6.13 and Appendix P 2.4 of the Final EIS/EA). For comparison, disturbance levels for % Anthropogenic and % Fire (non-overlapping) were assigned the same way at the Final EIS/EA for both RSA-Pop (Berens, Kinloch, and Churchill Ranges) and RSA-Hab (Churchill Range) landscapes. The overall current level of disturbances in the RSA-Pop versus the RSA-Hab are similar but in different proportions. The proportional distribution of disturbance between Anthropogenic (including forest harvest) versus Fire origin are (Table 3-1):

- RSA-Pop – Anthropogenic (7%) and Fire (25%); and,
- RSA-Hab- Anthropogenic (35%) and Fire (7%) in RSA-Hab, for Anthropogenic and Fire origin disturbance, respectively (Table 3-1).

The addition of the Springpole Project added < 1% additional disturbance to each overall RSA (Table 3-1).

Using these disturbance levels for RSA-Pop, estimates of vital rates (Figure 3-1, Table 3-2) and lambda (Figure 3-1, Table 3-3) were generated. There was no significant difference between estimates when considering the current level of disturbance versus future proposed disturbance for any of lambda (*p*=

0.4984), recruitment (*p= 0.6595*), or survivorship (*p=0.2112*). In contrast with RSA-Pop, results for the RSA-Hab revealed lower recruitment, survivorship, and lambda (Table 3-1, Table 3-2, Figure 3-2). As with RSA-Pop, the difference between the Current Conditions (CC) and Future Conditions (FC) were very small.

Using the estimates of lambda for both CC and FC scenario's, slopes were simulated using the standard errors (SE) and plotted for RSA-Pop and RSA-Hab (Figure 3-3). The simulated population trajectories show little difference between CC and FC. With a starting population of 262 animals, the population declines, but never reaches 0 for the RSA-Pop with the CC and FC curves almost identical (Figure 3-3). In contrast, with the lower vital rates found for the RSA-Hab, the population declines and reaches 0 after 50 years (Figure 3-4) but the CC and FC curves reveal almost no difference.

Table 3-1: Disturbance in RSA-Pop and RSA-Hab

Scale	Condition	% Anthro	% Fire
RSA-Pop	CC	7.07	24.61
RSA-Hab	CC	34.66	6.96
RSA-Pop	FC	7.18	24.61
RSA-Hab	FC	34.90	6.96

Table 3-2: Vital rates

Scale	Condition	S_bar	S_stdErr	R_bar	R_stdErr
RSA-Pop	CC	0.8708	0.0420	0.2612	0.0944
RSA-Pop	FC	0.8707	0.0442	0.2607	0.1027
RSA-Hab	CC	0.8515	0.0451	0.1885	0.0827
RSA-Hab	FC	0.8514	0.0469	0.1878	0.0884

Table 3-3: Lambda-True, and associated standard errors and confidence limits, for current and future conditions.

Scale	condition	mean_LT	se_LT	sd_LT	95% LL	95% UL
RSA-Pop	CC	0.9735	0.0029	0.0639	0.9678	0.9791
RSA-Pop	FC	0.9783	0.0030	0.0667	0.9724	0.9842
RSA-Hab	CC	0.9317	0.0028	0.0630	0.9262	0.9373
RSA-Hab	FC	0.9264	0.0031	0.0686	0.9204	0.9325

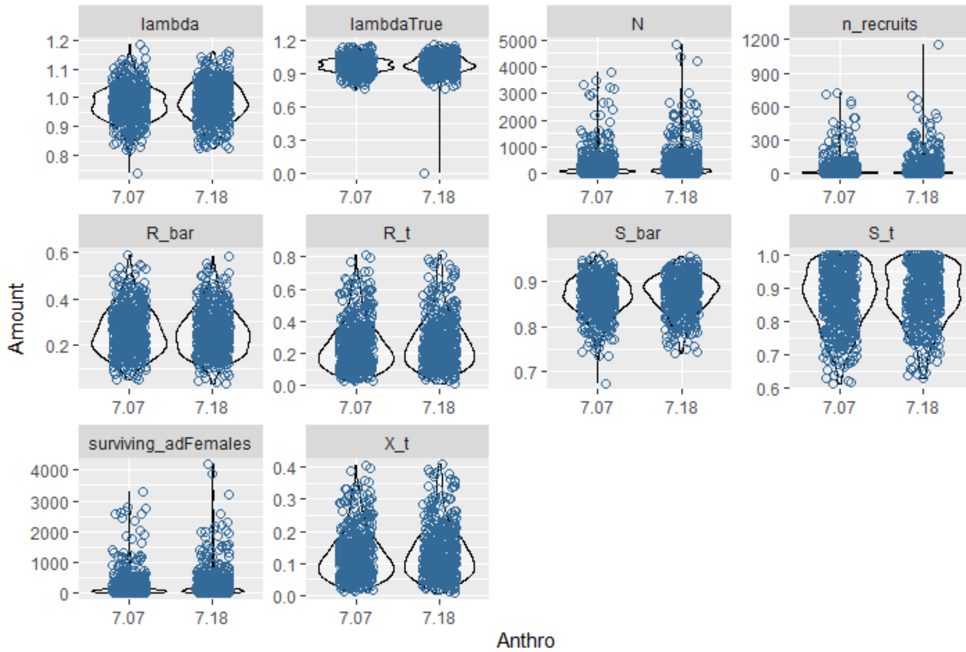


Figure 1: Plot for RSA-Pop vital rates

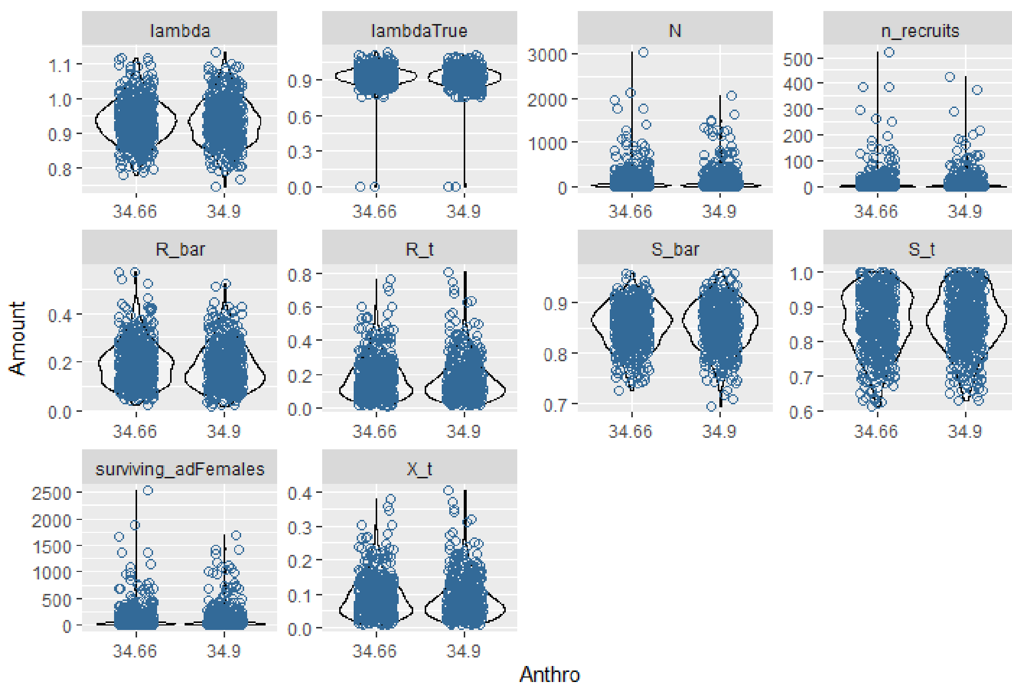


Figure 2: Plot for RSA-Hab vital rates

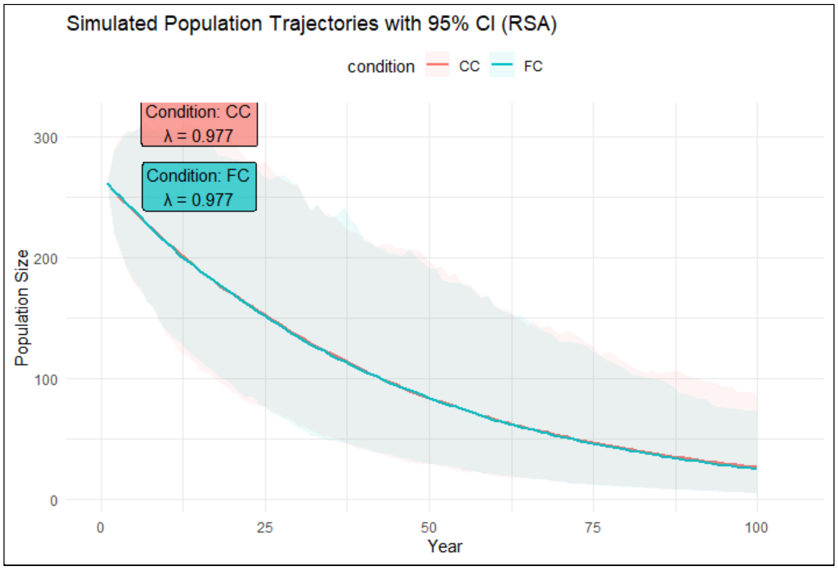


Figure 3: Population trajectory for RSA-Pop (Berens, Kinloch and Churchill Ranges)

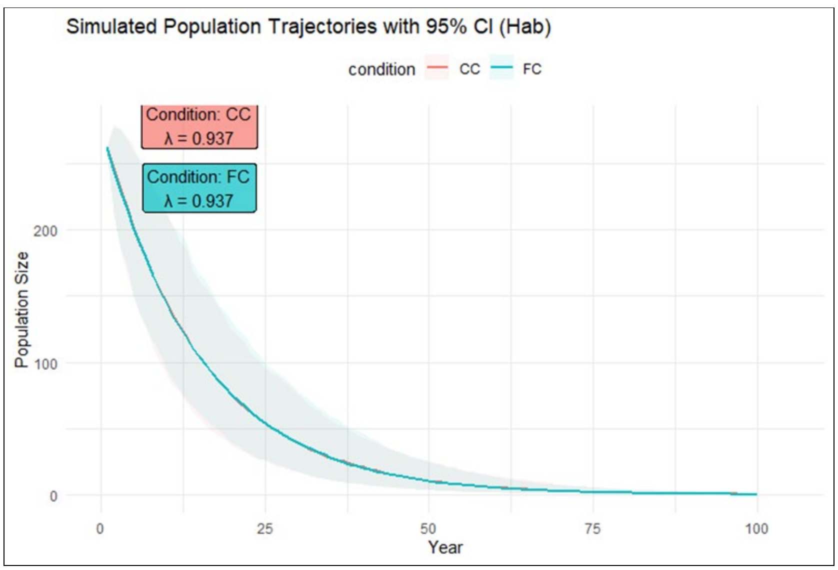


Figure 4: Population trajectory for RSA-Hab (Churchill Range)

3.2 BAYESIAN APPROACH

CaribouMetrics also provides a Bayesian population model that integrates prior information from [10] Johnson et al.'s (2020) national analysis of demographic-disturbance relationships with available local demographic data to project population growth. In addition, methods are provided for simulating local population dynamics.

Local recruitment data on cow and calf population structure that included historical information (2012-2015), and recent surveys conducted by WSP for MECP (MECP 2024) as well as for FMG for the Springpole Project (2021-2023) (Figure 3-5) were integrated. Annual survivorship data from the collaring study conducted by WSP was also integrated.

Disturbance levels were defined for both CC (2012-2025) and FC(2026-2036). For the simulation a simple two-level disturbance estimate was defined for the CC and FC conditions, where disturbance was set to 1% higher in FC than CC for years >2025. This 1% is greater than the estimated Project disturbance from the Springpole Project (Table 3-1).

Bayesian vital rate estimates for the RSA-Pop and RSA-Hab (Table 3-4 and Table 3-5) were similar to those found using the traditional frequentist approach (Table 3-2 and Table 3-3), but the estimates are improved using the Bayesian method because local data was integrated into the estimates (Table 3-4 and Table 3-5). Simulations over time reveal the effect of increasing the disturbance level by 1% after 2025, but the effect size was very small (Figure 3-5,Figure 3-6, Figure 3-7, Figure 3-8, Figure 3-9 and Figure 3-10). These figures also reveal how the local data for recruitment and survivorship were integrated into the simulation and estimates of vital rates and lambda, and the effect of integrating this data relative to estimates based solely on the original ECCC National model and its relationship with disturbance level. As with the frequentist approach, this Bayesian approach also found a decrease in vital rates and lambda when analysis was conducted for the RSA-Hab relative to the RSA-Pop, but there was little difference between current conditions (CC) and future (FC) conditions.

Table 3-4: Bayesian vital rate estimates for the RSA-Pop Scale

Parameter	condition	Mean	LCL	UCL
Adjusted recruitment[1]	cc	0.127	0.088	0.175
Adjusted recruitment	fc	0.129	0.084	0.182
Adult female survival	cc	0.848	0.709	0.957
Adult female survival	fc	0.855	0.689	0.975
Population growth rate	cc	0.970	0.896	1.049
Population growth rate	fc	0.967	0.894	1.047
Recruitment	cc	0.243	0.173	0.323
Recruitment	fc	0.245	0.165	0.338

1. Sex and bias adjusted recruitment ([6] Hughes et al. 2025)

Table 3-5: Bayesian vital rate estimates for the RSA-Hab

Parameter	condition	Mean	LCL	UCL
Adjusted recruitment[1]	cc	0.125	0.079	0.181
Adjusted recruitment	fc	0.121	0.065	0.187
Adult female survival	cc	0.837	0.686	0.962
Adult female survival	fc	0.837	0.683	0.964
Population growth rate	cc	0.944	0.868	1.026
Population growth rate	fc	0.939	0.863	1.022
Recruitment	cc	0.239	0.155	0.336
Recruitment	fc	0.231	0.126	0.351

1. Sex and bias adjusted recruitment ([6] Hughes et al. 2025)

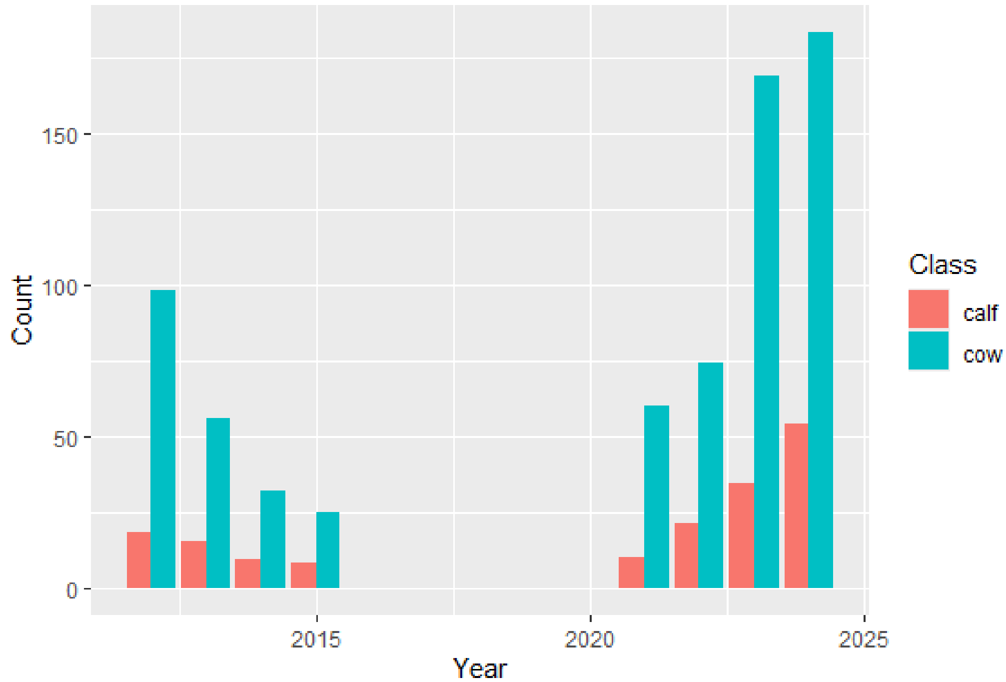


Figure 5: Age-ratio (recruitment) data from 2015 to 2025

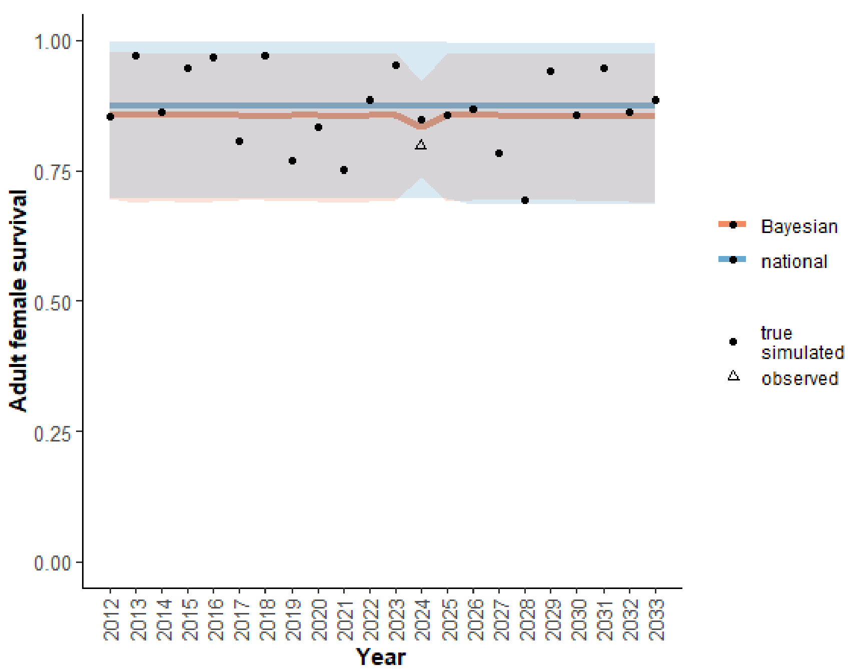


Figure 6: Comparison of National and Bayesian model for survival in RSA-Pop. Multiple years of observed data from satellite collars were included and yielded one observed estimate of survivorship (triangle).

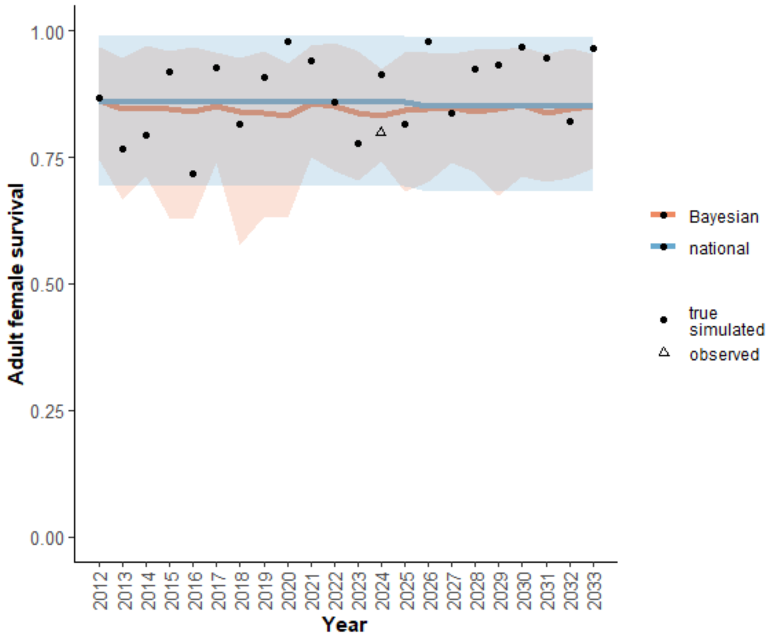


Figure 7: Comparison of National and Bayesian model for survival in RSA-Hab scale. Multiple years of observed data from satellite collars were included and yielded one observed estimate of survival (triangle).

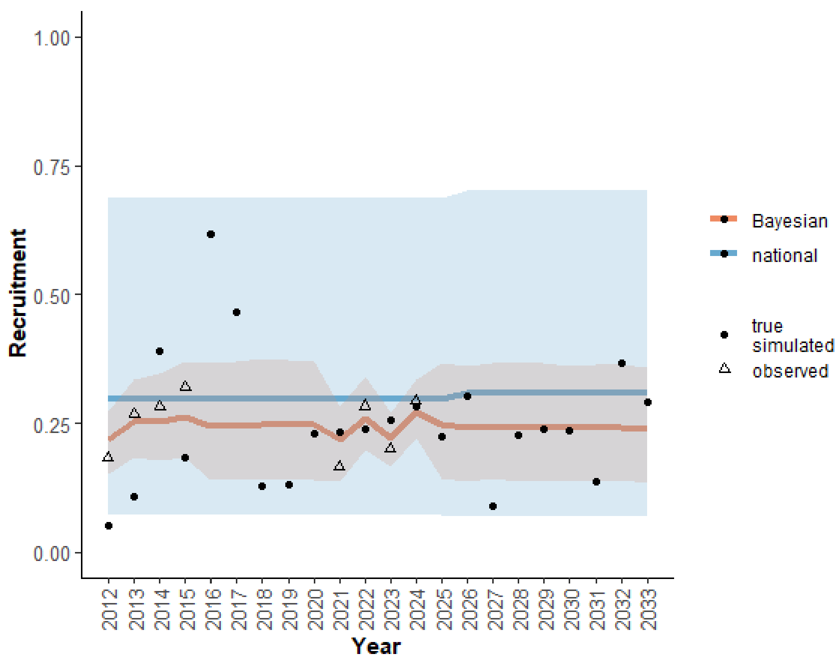


Figure 8: Comparison of National and Bayesian model for recruitment in RSA-Pop scale. Multiple years of observed recruitment data were included in the Bayesian model (triangles).

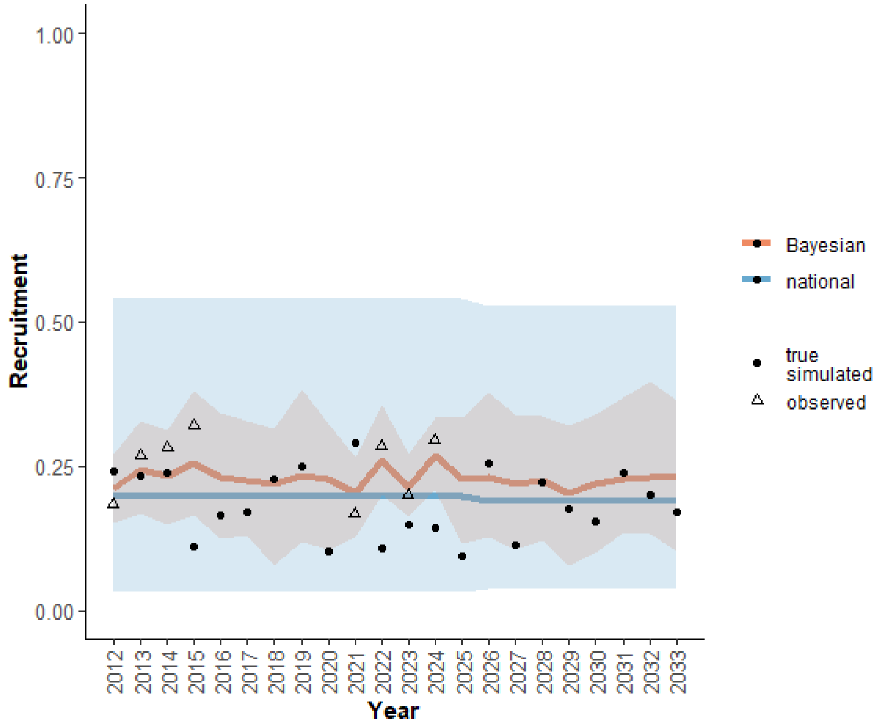


Figure 9: Comparison of National and Bayesian model for recruitment in RSA-Hab scale. Multiple years of observed recruitment data were included in the Bayesian model (triangles).

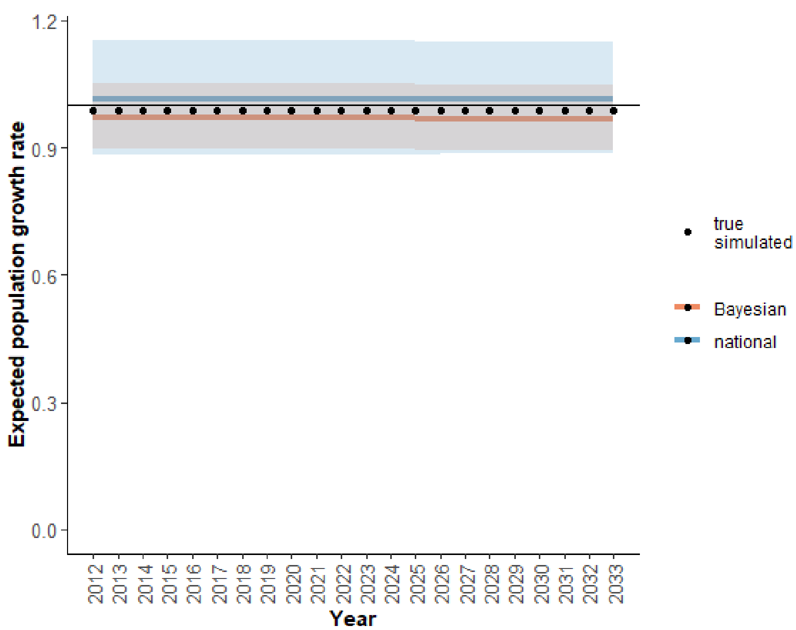


Figure 10: Modelled population growth for RSA-Pop scale

3.3 SIMULATION OF CLIMATE CHANGE AND FUTURE HARVEST

Fire and timber harvest was simulated in the study area for the period 2020-2060, at ten-year increments, under RCP 8.5 and 80% of current allowable harvest (Figure 3- 11). Current levels of disturbance plus additional disturbance were used to estimate disturbance levels in the first two time periods (2020 to 2040), but after this current disturbance is no longer classed as disturbance, so for periods 2050 and 2060 disturbance was estimated entirely by simulated estimates (Table 3-6). Currently, fire disturbance is low for this area, and under RCP 8.5 natural disturbance increases substantially (Table 3-6). Using these estimates, vital rates were estimated for each of unique disturbance levels found between CC and FC (Figure 3-11 and Table 3-7 and Table 3-8). These rates were then used for population projection under the CC and FC conditions (Table 3-9). There was almost no difference in the long-term projections of lambda under either CC and FC conditions.

Table 3-6: Simulated disturbance under GHG climate change scenario RCP 8.5, and with simulation of natural disturbance and timber harvest, for RSA-Hab scale.

Condition	fire_excl_anthro	Anthro	Total_dist	AnthroFC
2020	7	34.7	41.7	1.0
2030	8	34.7	42.7	1.0
2040	13	34.7	47.7	1.0
2050	12.2	34.5	46.7	1.0
2060	18.5	34.1	52.6	1.0

Table 3-7: Vital rates, by decade, under timber harvest and natural disturbance simulations, where disturbance from the Springpole Project is not included.

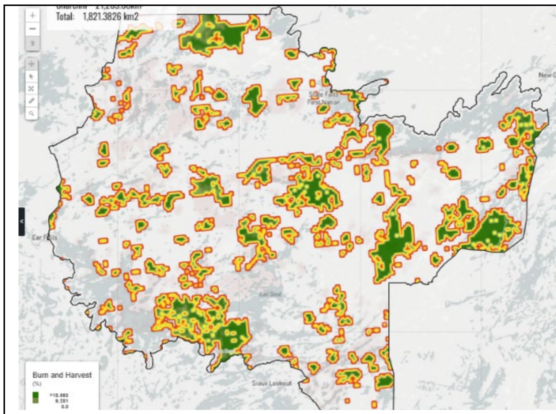
Current	Condition	S bar	S std Err	S PI low	S PI high	R bar	R std Err	R PI low	R PI high
RCP 8.5	2020	0.852	0.046	0.751	0.933	0.188	0.083	0.051	0.374
RCP 8.5	2030	0.852	0.047	0.751	0.938	0.187	0.087	0.055	0.393
RCP 8.5	2040	0.852	0.045	0.758	0.923	0.179	0.082	0.045	0.344
RCP 8.5	2050	0.852	0.045	0.759	0.931	0.181	0.086	0.051	0.374
RCP 8.5	2060	0.852	0.042	0.760	0.927	0.173	0.078	0.046	0.334

Table 3-8: Vital rates, by decade, under timber harvest and natural disturbance simulations, where disturbance from the Springpole Project is included.

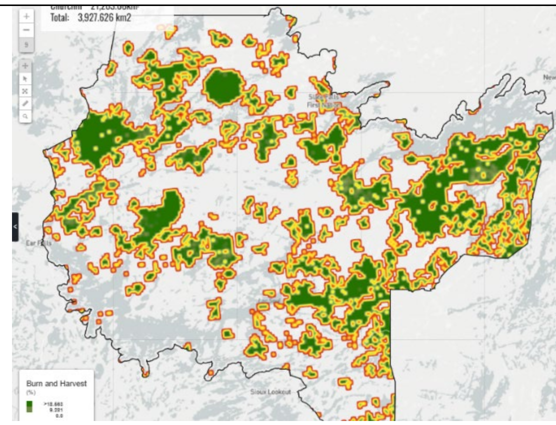
Future	Condition	S bar	S std Err	S PI low	S PI high	R bar	R std Err	R PI low	R PI high
RCP 8.5	2020	0.8508	0.0482	0.7443	0.9276	0.1851	0.0909	0.0553	0.3918
RCP 8.5	2030	0.8508	0.0449	0.7590	0.9261	0.1837	0.0860	0.0503	0.3806
RCP 8.5	2040	0.8508	0.0449	0.7601	0.9268	0.1764	0.0884	0.0431	0.3736
RCP 8.5	2050	0.8510	0.0488	0.7472	0.9286	0.1781	0.0808	0.0510	0.3456
RCP 8.5	2060	0.8512	0.0448	0.7461	0.9305	0.1704	0.0822	0.0507	0.3589

Table 3-9: Lambda-true (LT), by decade, under timber harvest and natural disturbance simulations, where disturbance from the Springpole Project is not included (CC), and where it is included (FC).

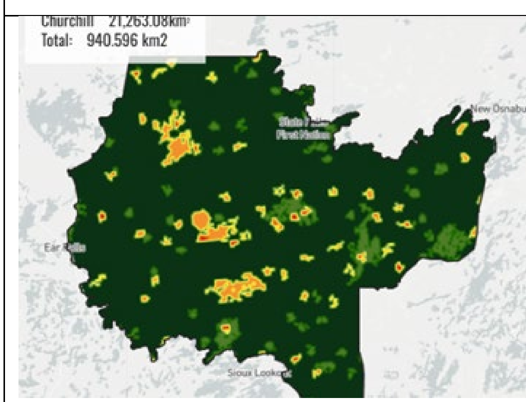
Condition	Decade	mean LT	se LT	ci95 lower LT	ci95 upper LT	Mean L
CC	2020	0.9291	0.0031	0.0681	0.9231	0.9351
CC	2030	0.9281	0.0030	0.0669	0.9222	0.9340
CC	2040	0.9282	0.0029	0.0647	0.9225	0.9339
CC	2050	0.9297	0.0028	0.0622	0.9242	0.9351
CC	2060	0.9173	0.0028	0.0629	0.9118	0.9229
FC	2020	0.9295	0.0029	0.0653	0.9237	0.9352
FC	2030	0.9259	0.0027	0.0607	0.9205	0.9312
FC	2040	0.9200	0.0030	0.0669	0.9141	0.9259
FC	2050	0.9256	0.0030	0.0669	0.9197	0.9315
FC	2060	0.9198	0.0029	0.0637	0.9142	0.9254



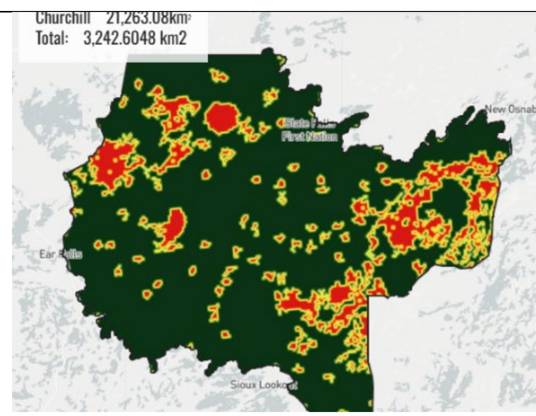
2020: Fire and Harvest, 1821km²



2060: Fire and Harvest, 3927 km²



2020: Fire only, 940 km²



2060: Fire only, 3242 km²

Figure 11: Simulated Fire and Harvest and Fire only levels between 2020 and 2060 in the RSA-Hab scales.

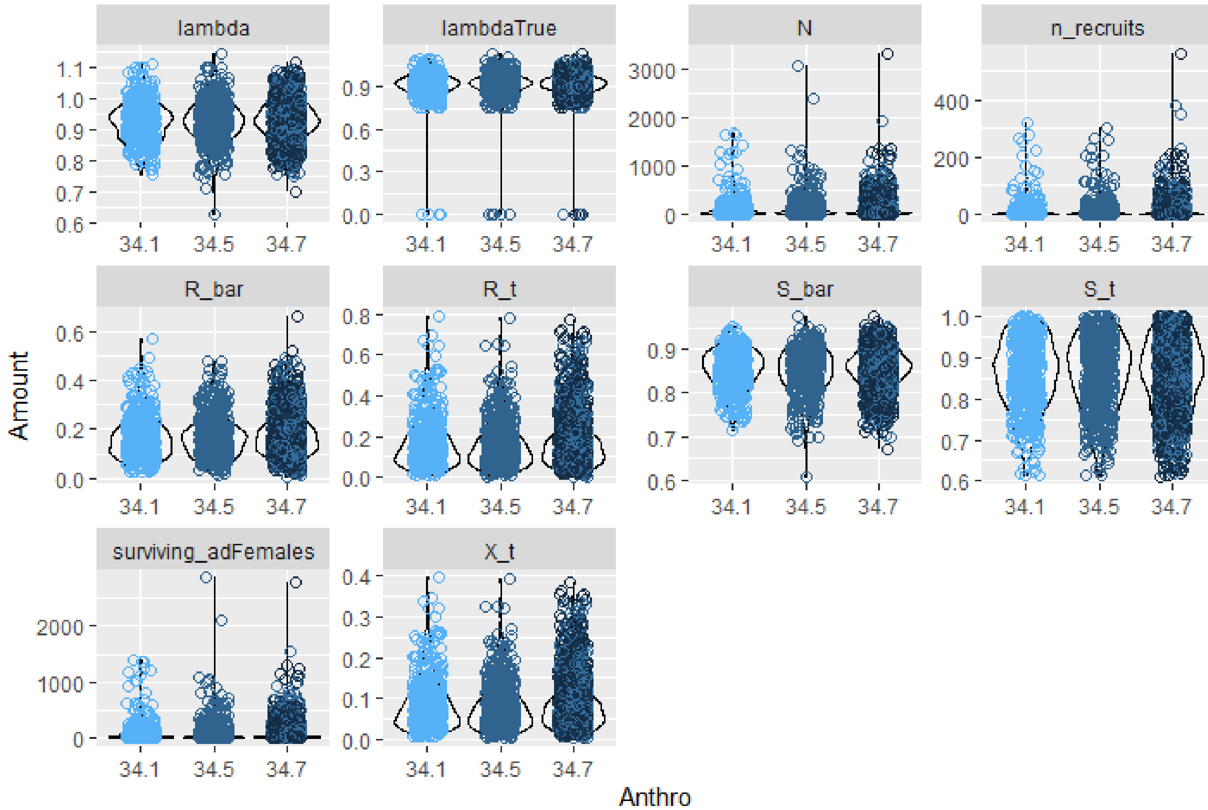


Figure 12: Demographic rates under the 3 unique levels of disturbance.

3.4 GENERAL HABITAT DESCRIPTION (GHD)

As was the case in the Final EIS/EA (Section 6.13 and Appendices P 2.2, P 2.3, P 2.4) GHD Category 2 and 3 habitats were assessed under current and future conditions, with the Springpole Project added (Table 3-10; Figure 3-13). Probability that an area belongs to Nursery or Winter Use areas were also assessed (Figure 3-13). Given that most of the area from the Project was already in disturbed habitat, there was almost no detectable effect of the Springpole Project on GHD habitat.

To address a comment that original analysis using a slightly older version of disturbance data could result in substantive differences in analysis, results were compared using the original versus the updated data. The updated data included the new MECP disturbance data for roads, harvest, burns, and permanent disturbance. Almost no visible change occurred in the GHD Category 2 between analyses using the two data sets (Figure 3- 14), although there was some difference in the calculated averages (Table 3-11), with values being lower using the new disturbance data. Maps were also created for Category 1 probabilities for the two data sets (Figure 3-15). These differences were almost exclusively from using the new roads layer, which caused a small decrease in habitat value across all seasons.

Table 3-10: Comparing Category 2 averages under CC and FC for RSA-Hab, using the new MECP data.

Variable	Season	CC	FC
Category 2/3	Cat 2	0.4780	0.4769
Prob of Use (high)	Spring	0.1386	0.1357
Prob of Use (high)	Summer	0.4476	0.4465
Prob of Use (high)	Fall	0.2979	0.2952
Prob of Use (high)	Winter	0.2414	0.2406

Table 3-11: Comparison of Category 2 results using new (MECP) versus original disturbance data used in Final EIS/EA.

Variable	Season	New Data	Original Data
Category 2/3	Cat2	0.4780	0.5084
Prob of Use (high)	Spring	0.1386	0.1495
Prob of Use (high)	Summer	0.4476	0.4678
Prob of Use (high)	Fall	0.2979	0.3352
Prob of Use (high)	Winter	0.2414	0.2667

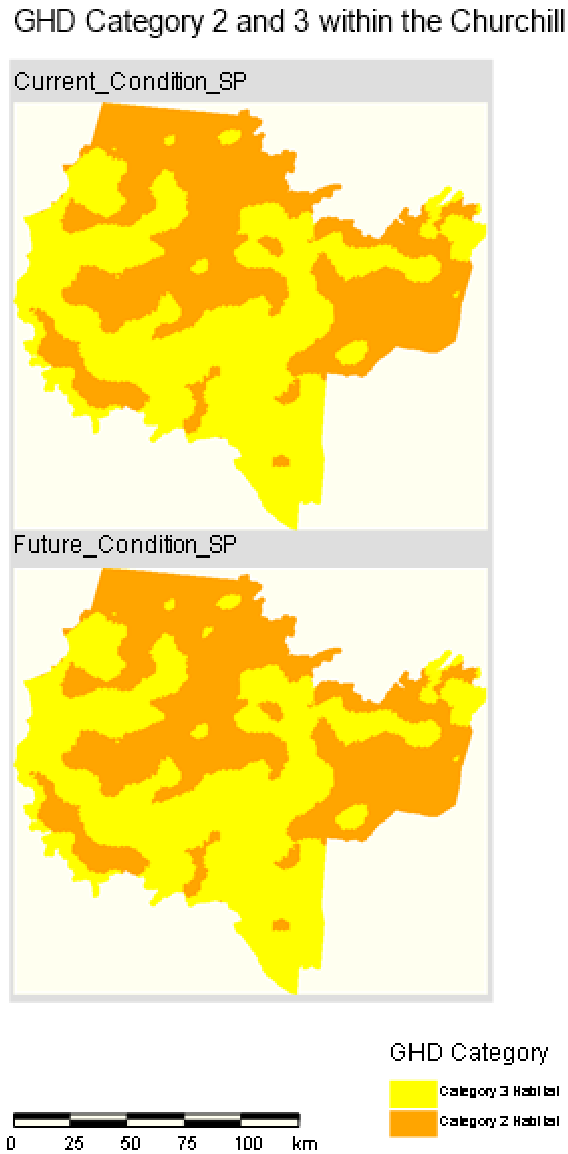


Figure 13: Category 2 and 3 habitat with the RSA-Hab using the new MECP disturbance data (SP).

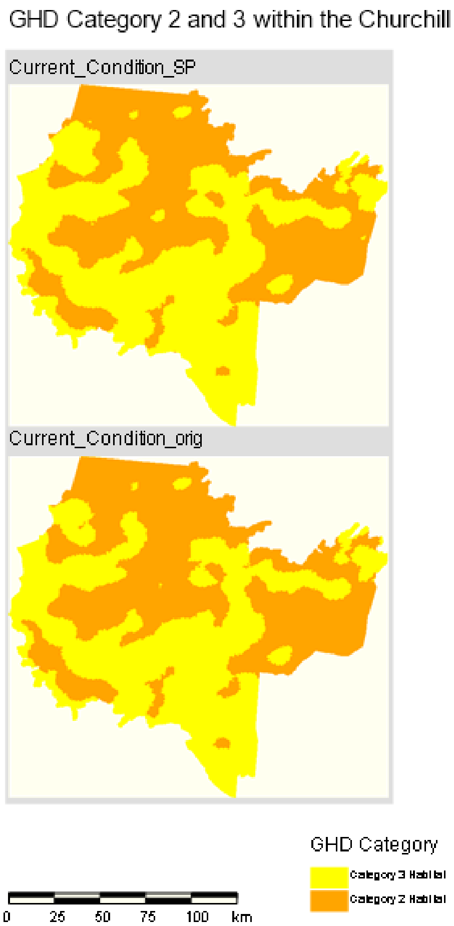


Figure 14: Comparison of GHD Category 2 mapping for current condition using latest updated data from MECP (Current Condition_SP) versus original disturbance data (Current Condition_orig) used in the Final EIS/EA.

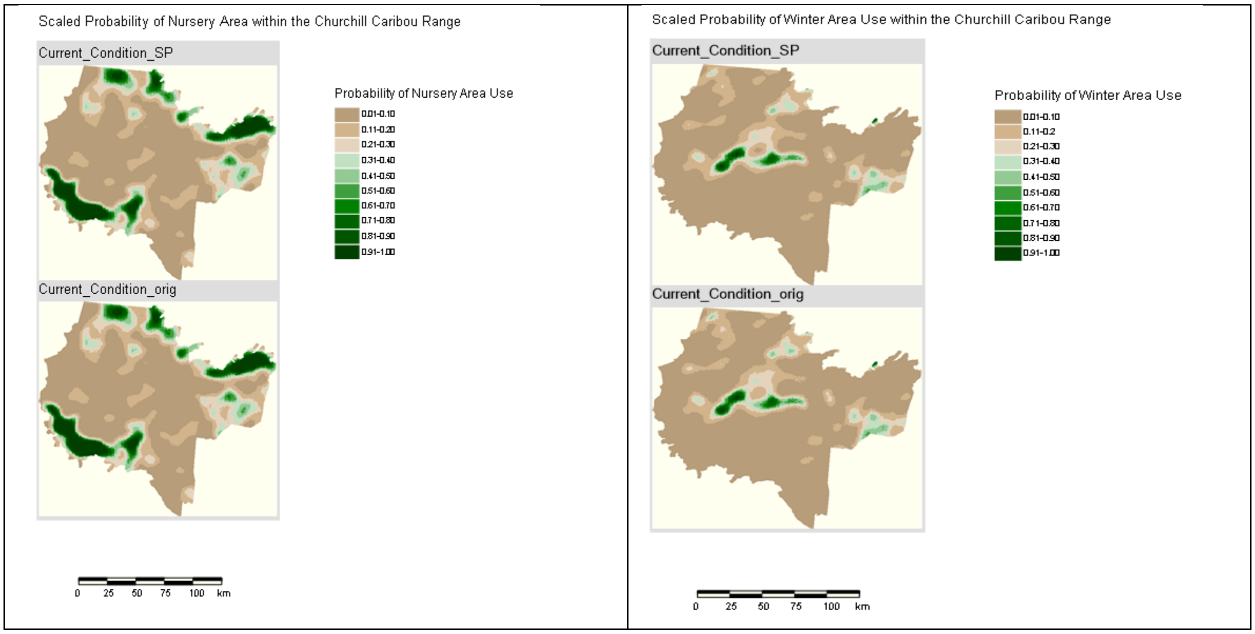


Figure 15: Comparison of Category 1 probability mapping for current conditions using original disturbance data versus latest updated data.

In addition to the updated data, MECP had contracted with FERIT for the development of a new Category 1 model that would be applicable Province-wide and address some identified concerns with the original modelling approach. MECP provided data, and the contractor worked with Kevin Green, Natalie Watts, and Dr Jen Shuter to develop the new model, and details on model development are in the report for MECP entitled “Report on Category 1 Modelling April 29th”. Several key changes were made, including:

- Using a mixed-effects linear model to deal with pseudo replication of samples
- Using a paired sampling approach consistent with the mixed-effects modelling (samples inside existing mapped polygons and paired samples outside the polygons)
- Including additional disturbance variables that were not included in the original RSF variables, i.e., timber harvest, permanent anthropogenic disturbance, and distance to high and low use linear features.
- Creating a backcast landscape map for model development where harvest, natural disturbance, and roads were backcast to the 2015 period, when the MECP mapping of Category 1 polygons was conducted.
- Evaluating landscape variables at multiple scales (e.g., 5,000, 10,000 and 30,000 ha). Distance to linear feature variables always kept at the finest scale (3 ha) to maintain spatial precision.
- Evaluating collinearity using variance inflation factor (VIF)
- Evaluating alternative threshold methods to create a binary classified map from the continuous distribution.
- Providing detailed reporting of model performance, including statistical significance of coefficients and model performance on an “out-of-sample” test data set (overall accuracy from AUC, and false negative and positive prediction rates from model sensitivity and specificity).

- Clarifying that the model is not a new Resource Selection Function (RSF), but instead a basic logistic regression model used to estimate the probability that a given area is part of a nursery-use landscape, based on its landscape condition.

To assess whether predicted Category 1 habitat from this new model with updated modelling approach would differ from the relative habitat values produced by the original model used in the Final EIS/EA, scaled predictions from the two models for an area of approximately 30 km around the proposed mine location were compared. Although the absolute values of the predictive probabilities differ between maps, the relative predicted values were similar, and a regression of the old model values versus new model values produced a slope close to 1 of 1.0151, with an intercept close to 0 (0.0347). A slope close to 1 indicates the two models interpret habitat in a similar manner, and having slope close to 0 indicates that neither model over nor under predicts the other model. This confirms that the 2024 Category 1 model used in Final EIS/EA has no inherent bias and produces similar patterns of relative probability to the new model that uses revised statistical methods. Interpretation and application of the Category 1 predictive maps is focused on identifying potential nursery habitat at the landscape scale from a perspective of relative (not absolute) value.

3.3 MOVEMENT ANALYSIS

In the Final EIS/EA, landscape connectivity for Boreal Caribou was evaluated using three methods to support a lines-of-evidence assessment (Section 6.13 of the Final EIS/EA for detailed methods)

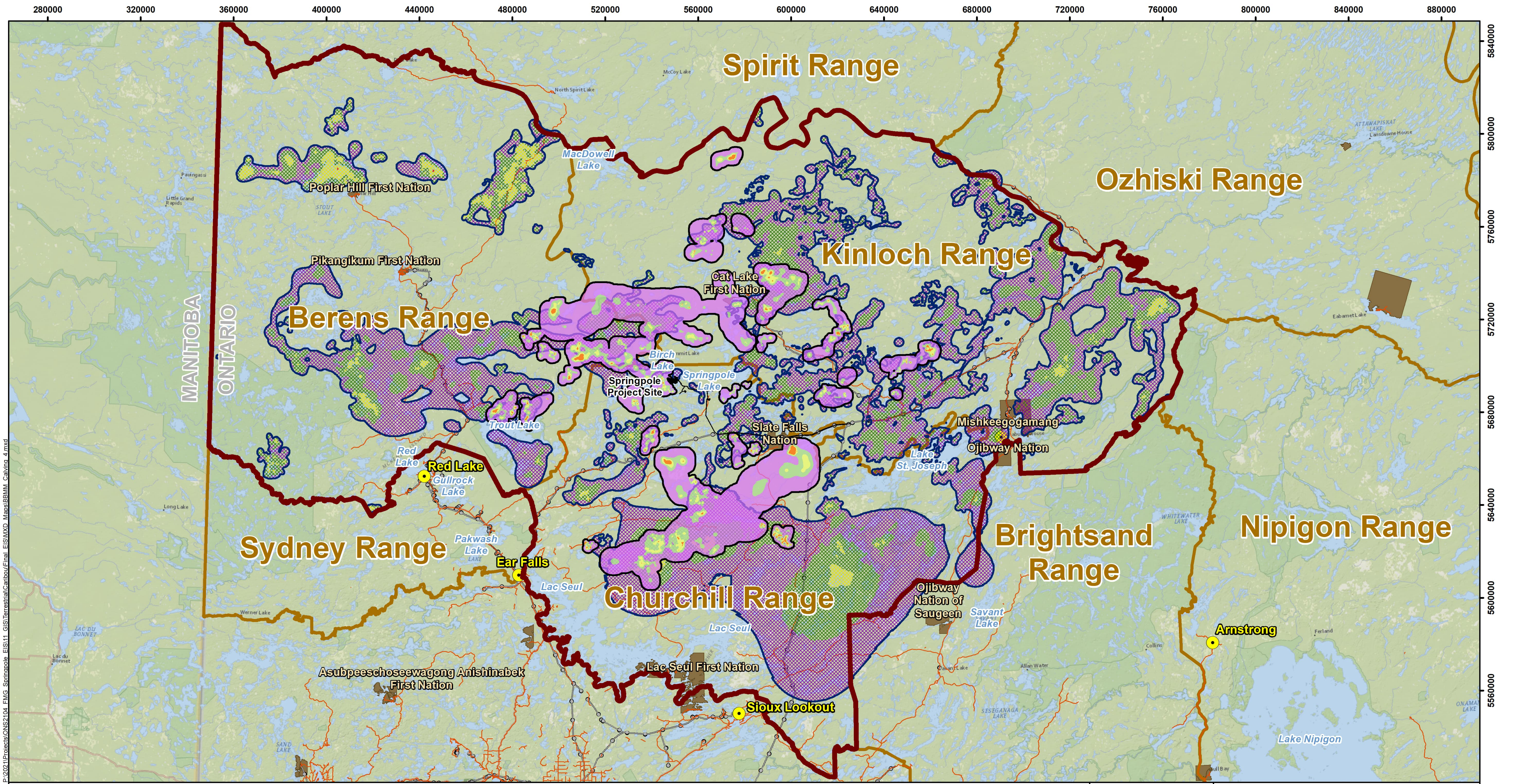
- Kernel Density Estimator (KDE+) method to identify areas of significant intersection of Boreal Caribou movements and activity relative to the Project within the RSHA.
- Brownian Bridge Movement Models (BBMM's) to evaluate Boreal Caribou patterns of movements across the landscape in relation to habitat use and biological season within the RSHA and Population RSA.
- Circuitscape Models to assess connectivity in the context of habitat-based resistance surfaces across landscape within the RSA- Hab and RSA-Pop scales.

In the draft EIS/EA, older data from MECP (1995-2015) was used for a KDE+ analysis. In the Final EIS/EA, more recent 2023 telemetry data was used to incorporate updated FRI, disturbance and landscape data into habitat co-variates and resistance surfaces as inputs in the movement models. This level of detailed co-variate information is not readily available for the 1995 -2015 data and developing the historical RSF as inputs into Circuitscape model is not possible. A caveat of the interpretation of the older data is that without associated landscape data drivers of movement cannot be discerned, however it can be used to qualitatively see where Boreal Caribou chose to move across the landscape. Therefore, BBMMs were developed using the older MECP data (1995 – 2015) and then plotted against the more recent 2023 – 2024 data for comparison shown in Figure 3-15 to Figure 3-19 (these figures were presented in the final EIS/EA as Figures 6.13-15 to 6.13-19). In addition, KDEs developed using the older MECP data (1995-2015) in the draft EIS/EA were plotted against the KDEs modelled in the Final EIS/EA for comparison (Figure 3-19 and Figure 3-20).

In areas where the KDE or BBMM results overlap both data sets, the more recent data sets can be interpreted as indicating that Boreal Caribou are continuing to use these areas to move across the landscape. However, in areas where there is no overlap from historical to recent data sets, this does not necessarily indicate a change in movement behaviour. The data set from 2023 to 2024 is specifically generated from Boreal Caribou captured within 100 km of the Project site for 1 year, the older data spans 18 years and capture efforts and targets were not limited to Boreal Caribou within a specific radius from the Project. Neither program collared the majority of Boreal Caribou in the range and therefore results simply reflect the Boreal Caribou that were captured. Therefore, areas where there is no overlap could indicate changes in landscape use due to forestry or fire disturbance, or the opposite that Boreal Caribou continue to use areas for movement despite changes in the landscape due to disturbance and/or differences in sampling design or other unknown factors. Therefore, interpretation should focus on areas where there is overlap as that indicates ongoing, frequent use of the same areas across both collaring programs – areas without use could be reflecting a number of behavioural responses or simply different sampling designs.

Lastly, all movement trajectories from 1995 to 2015 and 2023 to 2024 were mapped, these trajectories are just the raw inputs used in the movement models (Figure 3-23 and Figure 3-24).

In general, all figures (Figure 3-16 to Figure 3-22) show areas of overlap between the older and newer datasets.



LEGEND

- Proposed Mine Features
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Caribou Regional Population Study Area (RPSA) Boundary

Brownian Bridge Movement Model Results for Calving (May 7 – Jul. 14)

Based on recent FMG telemetry data (2023-2024)	Based on MECP/MNR telemetry data (1995 – 2015)
Outline of Analysis Results (FMG 2023-2024)	Outline of Analysis Results (MECP/MNRF 1995-2015)
Occurrence Probability of 75% (higher use)	Occurrence Probability of 75% (higher use)
Occurrence Probability of 95%	Occurrence Probability of 95%
Occurrence Probability of 99%	Occurrence Probability of 99%
Occurrence Probability of 99.9% (lower use)	Occurrence Probability of 99.9% (lower use)

0 25 50 100 150 200 250 300 350 400 450 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in BBMM analysis - FMG 2023-2024 and MECP/MNR 1995-2015

Datum: NAD83
Projection: UTM Zone 15N

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SPRINGPOLE GOLD PROJECT

Brownian Bridge Movement Model Results - Calving

PROJECT N°: CA0048147

FIGURE: 3-15

SCALE: 1:1,526,800

DATE: July 2025

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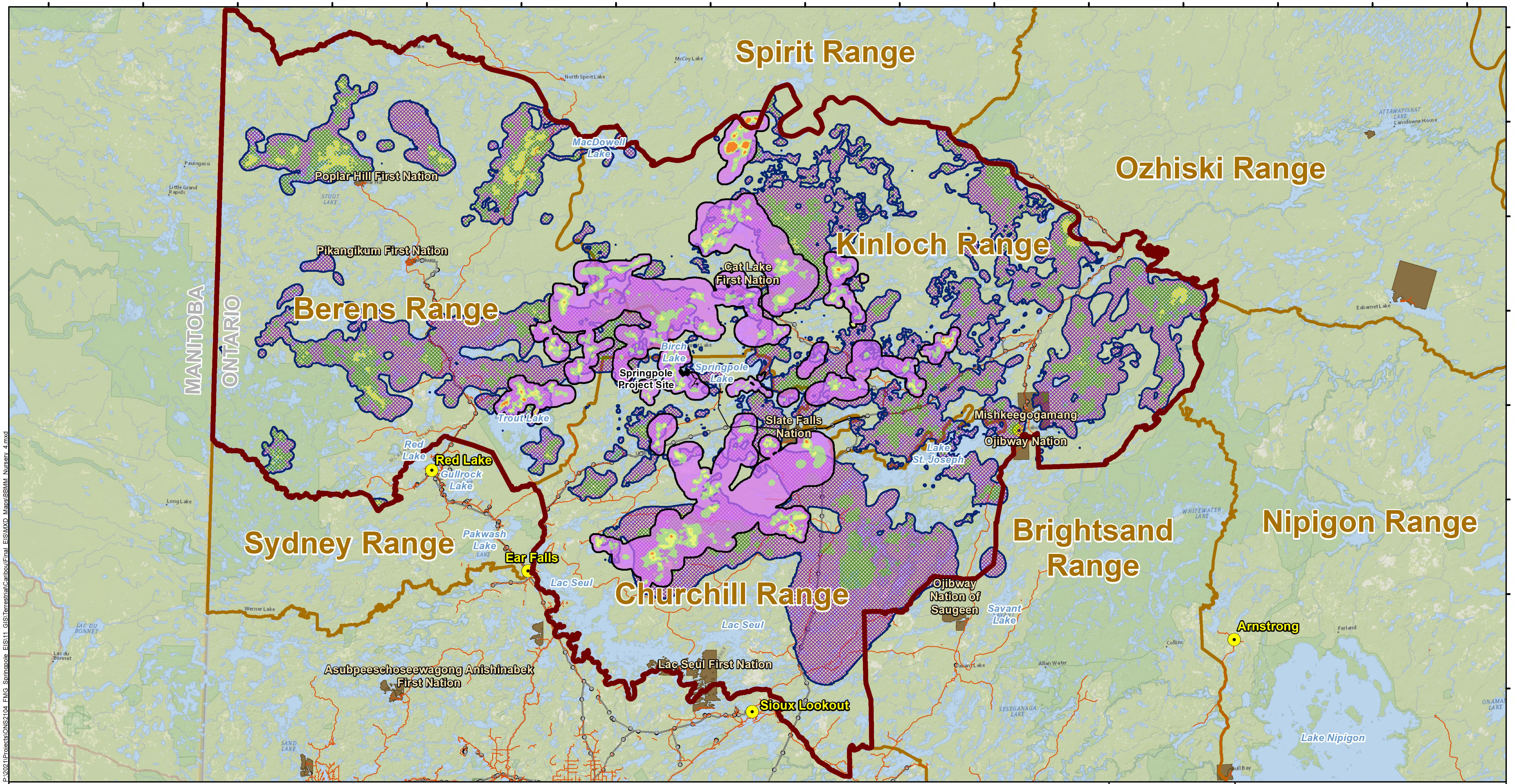

LEGEND

- Proposed Mine Features
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Caribou Regional Population Study Area (RPSA) Boundary

Brownian Bridge Movement Model Results for Nursery (May 1 – Sep. 15)

Based on recent FMG telemetry data (2023-2024)	Based on MECP/MNR telemetry data (1995 – 2015)
Outline of Analysis Results (FMG 2023-2024)	Outline of Analysis Results (MECP/MNRF 1995-2015)
Occurrence Probability of 75% (higher use)	Occurrence Probability of 75% (higher use)
Occurrence Probability of 95%	Occurrence Probability of 95%
Occurrence Probability of 99%	Occurrence Probability of 99%
Occurrence Probability of 99.9% (lower use)	Occurrence Probability of 99.9% (lower use)

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in BBMM analysis - FMG 2023-2024 and MECP/MNR 1995-2015

Datum: NAD83
Projection: UTM Zone 15N

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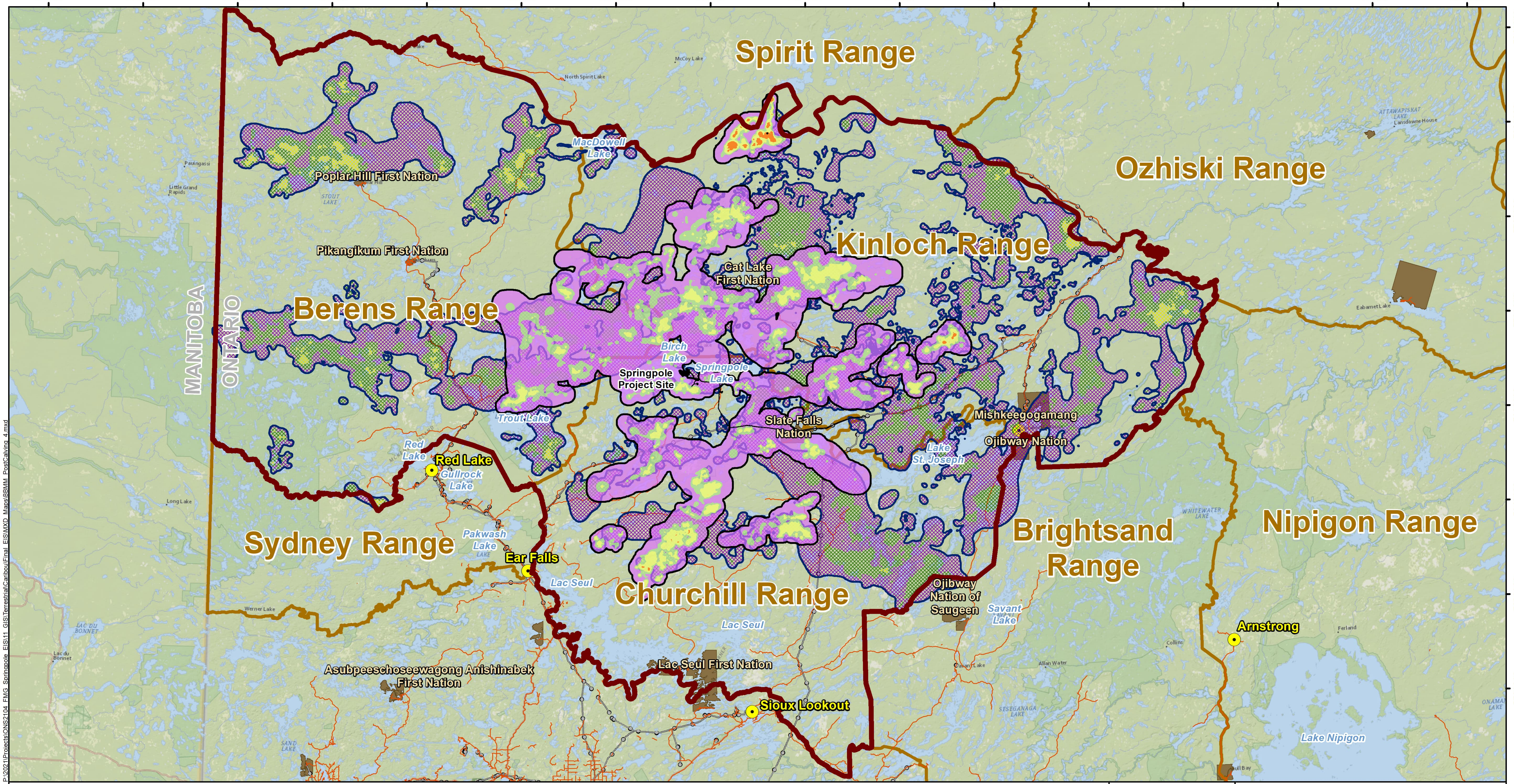
SPRINGPOLE GOLD PROJECT

Brownian Bridge Movement Model Results – Nursery

PROJECT Nº: CA0048147 | FIGURE: 3-16

SCALE: 1:1,526,800 | DATE: July 2025



LEGEND

- Proposed Mine Features
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Caribou Regional Population Study Area (RPSA) Boundary

Brownian Bridge Movement Model Results for Post-calving (Jul. 15 – Nov. 14)

Based on recent FMG telemetry data (2023-2024)	Based on MECP/MNR telemetry data (1995 – 2015)
Outline of Analysis Results (FMG 2023-2024)	Outline of Analysis Results (MECP/MNR 1995-2015)
Occurrence Probability of 75% (higher use)	Occurrence Probability of 75% (higher use)
Occurrence Probability of 95%	Occurrence Probability of 95%
Occurrence Probability of 99%	Occurrence Probability of 99%
Occurrence Probability of 99.9% (lower use)	Occurrence Probability of 99.9% (lower use)

0 25 50 100 150 200 250 300 350 400 450 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in BBMM analysis - FMG 2023-2024 and MECP/MNR 1995-2015

Datum: NAD83
Projection: UTM Zone 15N

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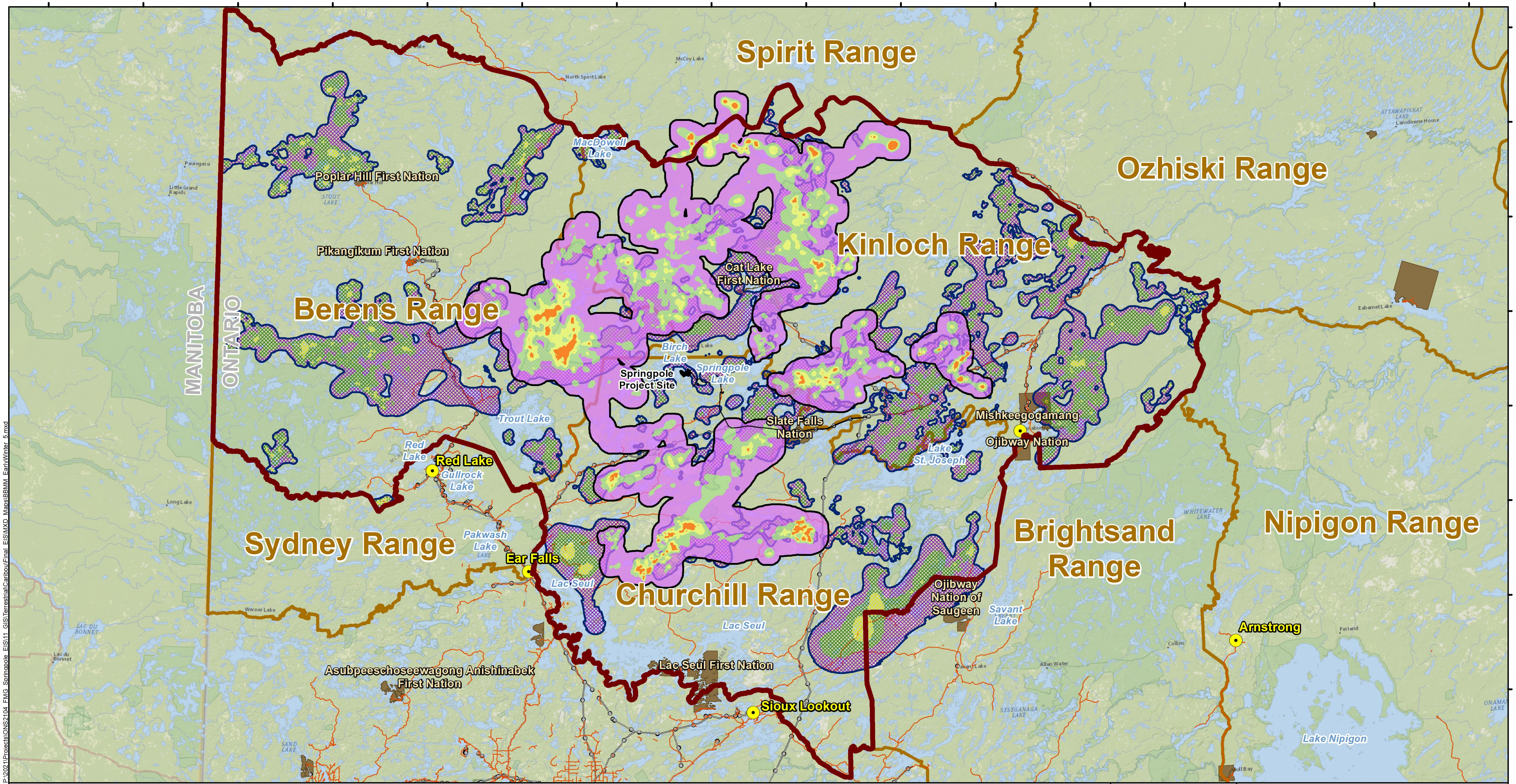
Brownian Bridge Movement Model Results – Post Calving

PROJECT Nº: CA0048147 | FIGURE: 3-17

SCALE: 1:1,526,800 | DATE: July 2025



LEGEND

- Proposed Mine Features
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Caribou Regional Population Study Area (RPSA) Boundary

Brownian Bridge Movement Model Results for Early Winter (Nov. 15 – Jan. 20)

Based on recent FMG telemetry data (2023-2024)	Based on MECP/MNR telemetry data (1995 – 2015)
Outline of Analysis Results (FMG 2023-2024)	Outline of Analysis Results (MECP/MNR 1995-2015)
Occurrence Probability of 75% (higher use)	Occurrence Probability of 75% (higher use)
Occurrence Probability of 95%	Occurrence Probability of 95%
Occurrence Probability of 99%	Occurrence Probability of 99%
Occurrence Probability of 99.9% (lower use)	Occurrence Probability of 99.9% (lower use)

0 25 50 100 150 200 250 300 350 400 450 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in BBMM analysis - FMG 2023-2024 and MECP/MNR 1995-2015

Datum: NAD83
Projection: UTM Zone 15N

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SPRINGPOLE GOLD PROJECT

Brownian Bridge Movement Model Results – Early Winter

PROJECT Nº: CA0048147	FIGURE: 3-18
SCALE: 1:1,526,800	DATE: July 2025

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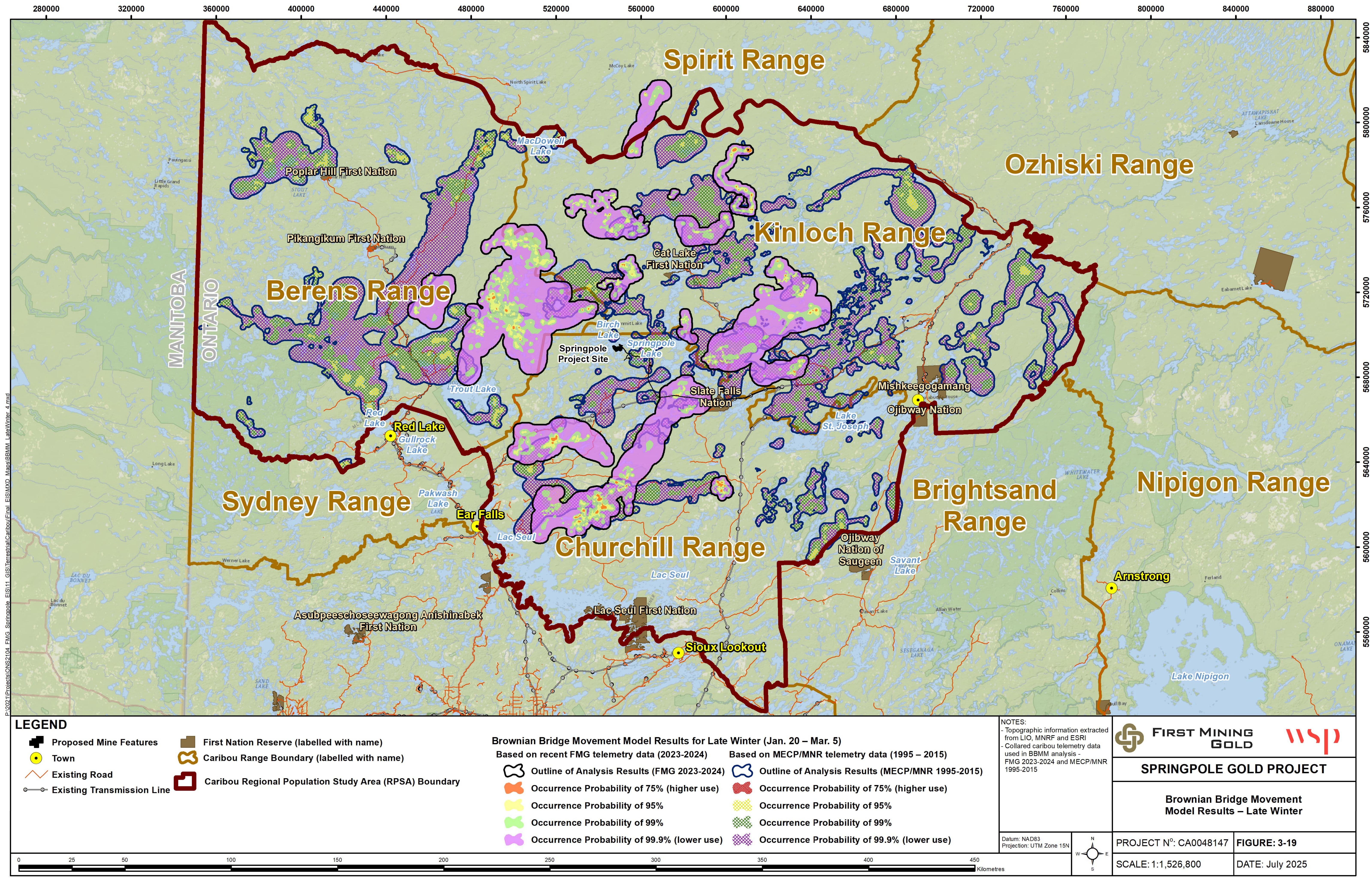
Spirit Range
Ozhiski Range
Kinloch Range
Berens Range
Sydney Range
Churchill Range
Brightsand Range
Nipigon Range
MANITOBA
ONTARIO
Poplar Hill First Nation
Pikangikum First Nation
Cat Lake First Nation
MacDowell Lake
Birch Lake
Springpole Lake
Springpole Project Site
Trout Lake
Red Lake
Cullrock Lake
Slate Falls Nation
Mishkeegogamang
Ojibway Nation
Lake St. Joseph
Pakwash Lake
Ear Falls
Lac Seul
Ojibway Nation of Saugeen
Savant Lake
Arnstrong
Lac Seul First Nation
Asubpeeschoseewagong Anishinabek First Nation
Sioux Lookout
Lake Nipigon
280000
320000
360000
400000
440000
480000
520000
560000
600000
640000
680000
720000
760000
800000
840000
880000
5840000
5800000
5760000
5720000
5680000
5640000
5600000
5560000
LEGEND
Proposed Mine Features
Town
Existing Road
Existing Transmission Line
First Nation Reserve (labelled with name)
Caribou Range Boundary (labelled with name)
Caribou Regional Population Study Area (RPSA) Boundary
Brownian Bridge Movement Model Results for Late Winter (Jan. 20 – Mar. 5)
Based on recent FMG telemetry data (2023-2024)
Outline of Analysis Results (FMG 2023-2024)
Occurrence Probability of 75% (higher use)
Occurrence Probability of 95%
Occurrence Probability of 99%
Occurrence Probability of 99.9% (lower use)
Based on MECP/MNR telemetry data (1995 – 2015)
Outline of Analysis Results (MECP/MNR 1995-2015)
Occurrence Probability of 75% (higher use)
Occurrence Probability of 95%
Occurrence Probability of 99%
Occurrence Probability of 99.9% (lower use)
0 25 50 100 150 200 250 300 350 400 450
Kilometres
NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in BBMM analysis - FMG 2023-2024 and MECP/MNR 1995-2015
Datum: NAD83
Projection: UTM Zone 15N
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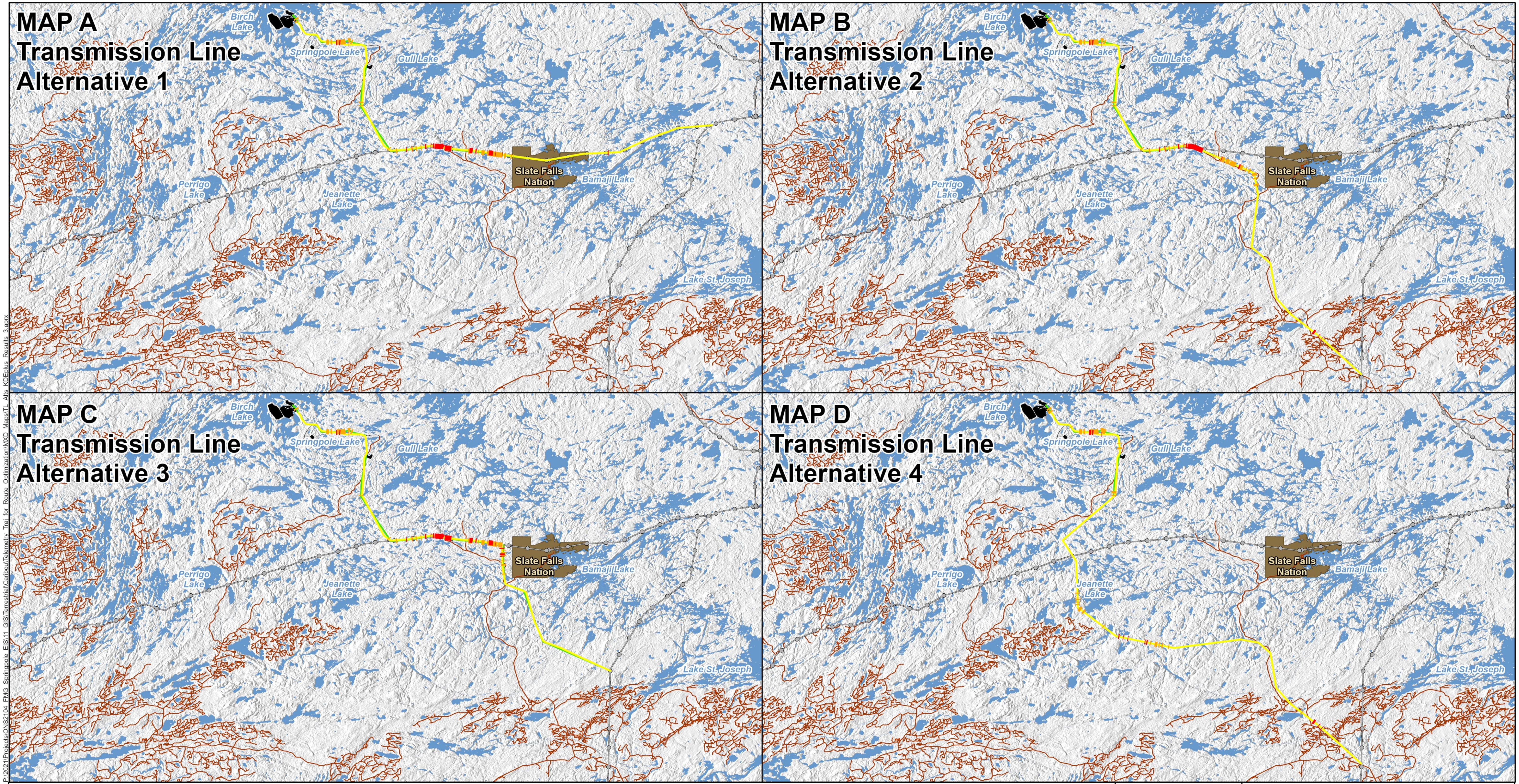
SPRINGPOLE GOLD PROJECT
Brownian Bridge Movement Model Results – Late Winter
PROJECT N°: CA0048147
FIGURE: 3-19
SCALE: 1:1,526,800
DATE: July 2025



LEGEND

- Transmission Line Alternative (Final EIS)
- Transmission Line Alternative (Draft EIS, Alternative 1, 2, 3 and 4)
- Identified Significant Hot Spot (cluster) Locations along Alternative (based on recent FMG telemetry data (2023-2024)) *
- Identified Significant Hot Spot (cluster) Locations along Alternative (based on MECP/MNR telemetry data (1995-2015)) **
- Proposed Mine Site Features
- Existing Road / Resource Road
- First Nation Reserve (labelled with name)
- Waterbody

0 10 20 40 60 80 100 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP 2023.

* KDE clusters identified using FMG collar telemetry data trajectory crossings and fix locations within 500 m of proposed TL route.

** KDE clusters identified using MECP/MNR telemetry data trajectory crossings along proposed TL route.

Datum: NAD83
Projection: UTM Zone 15N

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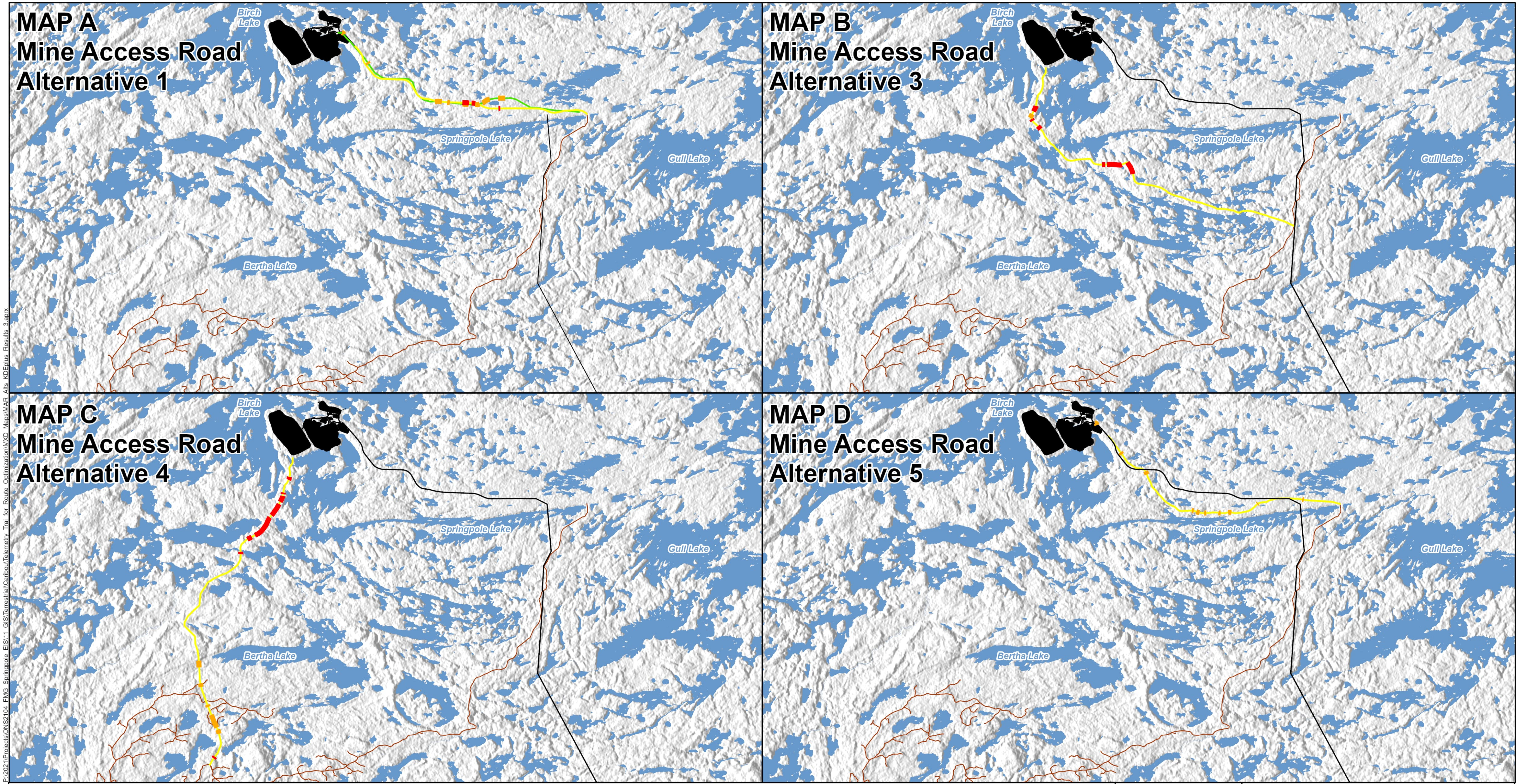
SPRINGPOLE GOLD PROJECT

Hot Spots Identified through KDE+ Analysis using Collared Caribou Telemetry Crossing Locations and Proximal Telemetry Locations for Transmission Line Alternatives

PROJECT N°: CA0048147	**FIGURE:** 3-20
SCALE: 1:645,000	DATE: July 2025



LEGEND

- Mine Access Road Alternative (Final EIS)
- Mine Access Road Alternative (Draft EIS, Alternative 1)
- Identified Significant Hot Spot (cluster) Locations along Alternative (based on recent FMG telemetry data (2023-2024)) *
- Identified Significant Hot Spot (cluster) Locations along Alternative (based on MECP/MNR telemetry data (1995-2015)) **
- Proposed Mine Site Features
- Existing Road / Resource Road
- Waterbody

0 2.5 5 10 15 20 25 30 35 40 45 50 Kilometres

NOTES:
- Topographic information extracted from LIO, NDMNRF.
- Proposed site plan provided by Ausenco, drawing number 104496-GX-03000-31344-003, Rev 1. 26 June 2023 and modified by WSP 2023.

* KDE clusters identified using FMG collar telemetry data trajectory crossings and fix locations within 500 m of proposed road route.

** KDE clusters identified using MECP/MNR telemetry data trajectory crossings along proposed road route.

Datum: NAD83
Projection: UTM Zone 15N

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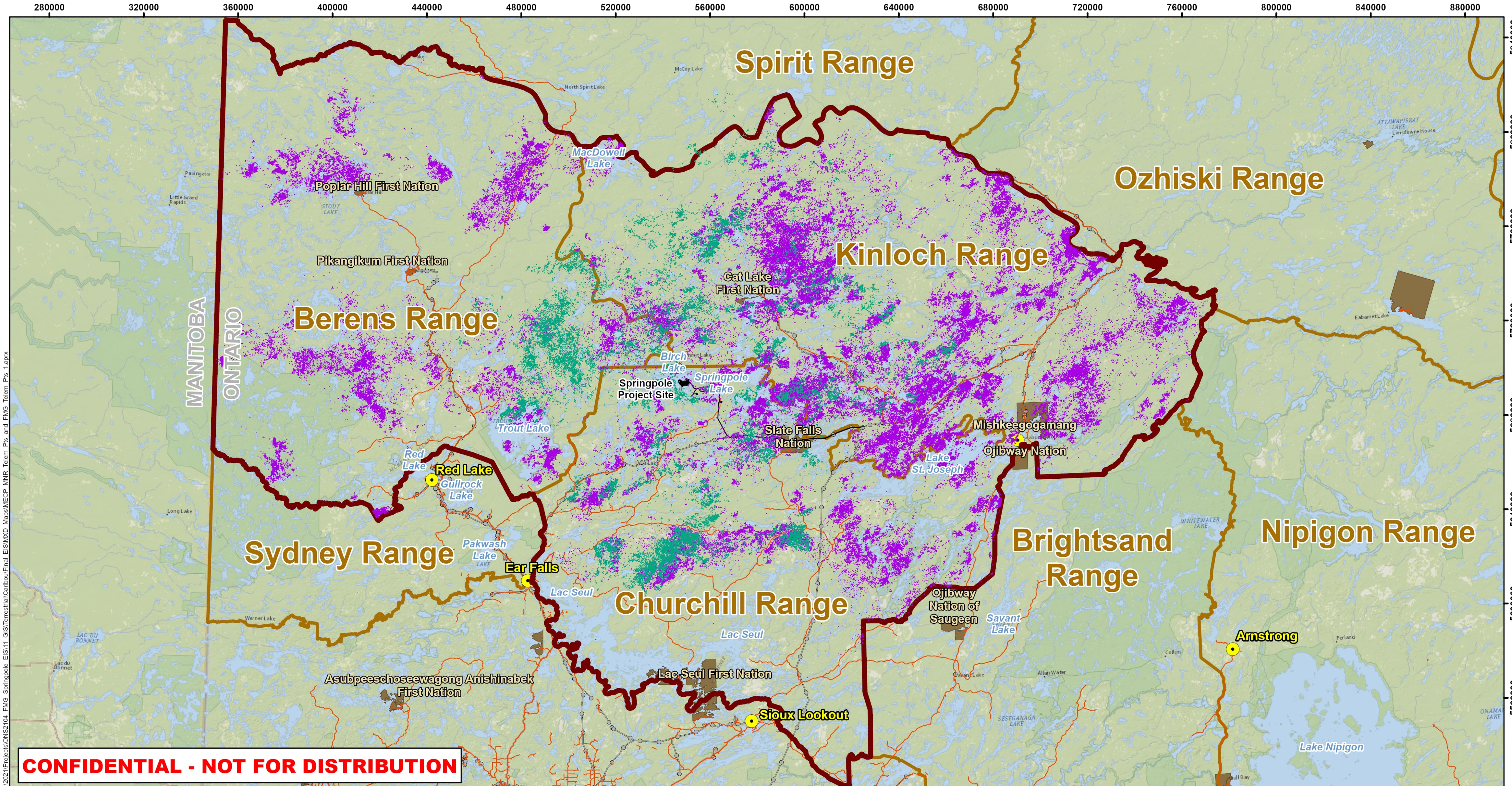
SPRINGPOLE GOLD PROJECT

Hot Spots Identified through KDE+ Analysis using Collared Caribou Telemetry Crossing Locations and Proximal Telemetry Locations for Mine Access Road Alternatives

PROJECT Nº: CA0048147	FIGURE: 3-21
SCALE: 1:225,000	DATE: July 2025



LEGEND

- Proposed Mine Features
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Caribou Regional Population Study Area (RPSA) Boundary
- Collared Caribou Telemetry Fix Points (based on recent FMG telemetry data, 2023 - 2024)
- Collared Caribou Telemetry Fix Points (based on MECP/MNR telemetry data, 1995 - 2015)

0 50 100 200 300 400 Kilometres

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in fix point analysis - FMG 2023-2024 and MECP/MNR 1995-2015

Datum: NAD83
Projection: UTM Zone 15N

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SPRINGPOLE GOLD PROJECT

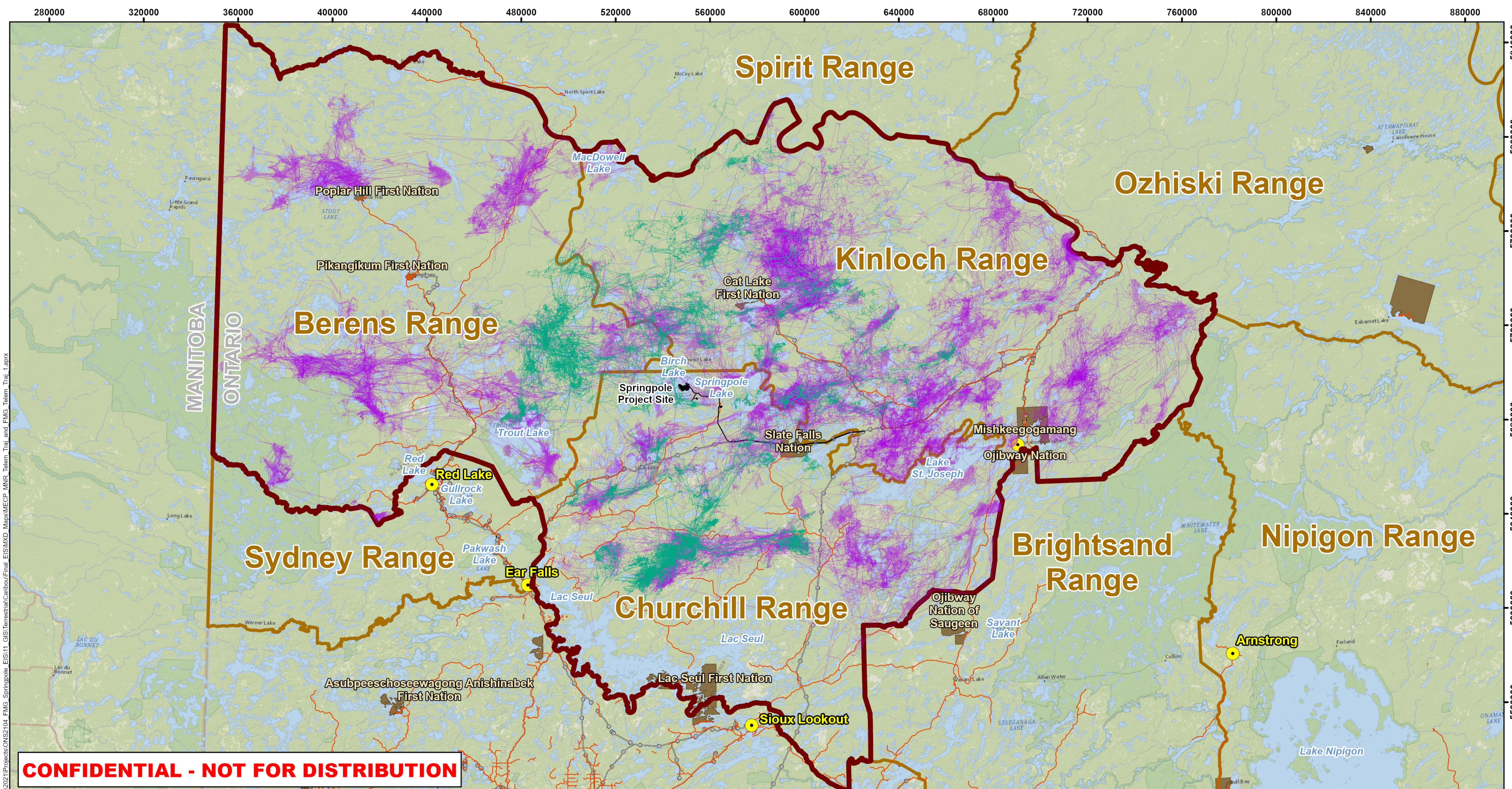
Collared Caribou Telemetry Fix Point Summary Map within the Caribou Regional Population Study Area

PROJECT N°: CA0048147

FIGURE: 3-22

SCALE: 1:1,526,800

DATE: August 2025



LEGEND

- Proposed Mine Features
- Town
- Existing Road
- Existing Transmission Line
- First Nation Reserve (labelled with name)
- Caribou Range Boundary (labelled with name)
- Caribou Regional Population Study Area (RPSA) Boundary
- Collared Caribou Trajectory Lines (based on recent FMG telemetry data, 2023 - 2024)
- Collared Caribou Trajectory Lines (based on MECP/MNR telemetry data, 1995 - 2015)

NOTES:
- Topographic information extracted from LIO, MNRF and ESRI
- Collared caribou telemetry data used in trajectory analysis - FMG 2023-2024 and MECP/MNR 1995-2015

Datum: NAD83
Projection: UTM Zone 15N

0 50 100 200 300 400 Kilometres

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Collared Caribou Trajectory Summary Map within the Caribou Regional Population Study Area

PROJECT N°: CA0048147	FIGURE: 3-23
SCALE: 1:1,526,800	DATE: August 2025

4.0 SUMMARY AND CONCLUSIONS

Supplemental analyses for population sustainability were conducted to address comments received from the MECP on the Springpole Project Final EIS/EA including:

- Simulations using caribouMetrics, with disturbance relationships with vital rates based on the original ECCC national model and updates by [10] Johnson et al. (2020).
- Analyses provided estimates of variance and statistical significance between current (CC) and future conditions (FC).
- A plot of long-term population trajectory was also created using simulation methods and lambda mean and variance estimates.
- Bayesian methods were also conducted to allow for integration of locally collected data to improve the estimates, and deal with ECCC comment about adequately using local data in the analysis.
- Results from previous simulations of natural disturbance and timber harvest were used to assess population sustainability and provide additional insight into how populations would fare under climate change and future timber harvest (under conditions where Springpole Project was versus was not included in the analysis).
- Supplemental GHD habitat analysis were conducted, and these analyses used the latest versions of the models, together with the latest version of disturbance data from the MECP disturbance mapping program. To address a comment that original analysis using a slightly older version of disturbance data could result in substantive differences in analysis, the original GHD Category 2 versus newer Category 2 using the latest MECP data were run.

The GHD habitat analysis showed that given the small change in disturbance profile resulting from the Springpole Project (< 1%), the change in maps was very small. Overall, relative patterns were the same, but values decreased slightly using the newer disturbance data. To address the comment that a new version of the model would give different results, output from both models were compared, and relative patterns were nearly identical.

In areas where the KDE or BBMM results overlap, the more recent data sets versus the older data set can be interpreted as indicating that Boreal Caribou are continuing to use these areas to move across the landscape. There were no new areas of overlapping use around the Project identified in this current analysis that were not otherwise known through seasonal kernel analysis or movement models using the more recent data. Areas where there is no overlap (from historical to recent data sets), do not necessarily indicate a change in movement behaviour. Based on the supplemental analysis, there are no changes to the assessment of effects, mitigation measures, or conclusions identified in the Final EIS/EA.

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