




# 2017

Bipole III Transmission Project

Summary of Environmental Monitoring





Each year Manitoba Hydro shares monitoring results and mitigation outcomes for the Bipole III Transmission Project. This report provides a summary of outcomes from 2017, or the fourth construction season. More details on the Bipole III Biophysical Monitoring and Mitigation program can be found online at

[www.hydro.mb.ca/projects/bipoleIII/](http://www.hydro.mb.ca/projects/bipoleIII/)

The Bipole III Biophysical Monitoring Program (BMP) is designed to ask the questions:

- Are we seeing the effects we predicted in the environmental impact assessment?
- How effective are the mitigation measures put into action?
- How have we responded to unforeseen events and unexpected results?

Answers to these questions are organized here by topic, and include: Aquatics, Wildlife, Access and Wildlife Interactions, Restoring the land to a healthy right-of-way, Soils and Terrain, and Heritage. Also included is a discussion on how results we've received so far will influence future monitoring.

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# Update on Project Monitoring

Bipole III is 1 of the 20 largest projects under construction in North America. From its northernmost point at Keewatinohk converter station to its southern extent at the Riel converter station, the Bipole III Project includes 3,076 towers that span 1,364 km across Manitoba.

Due to this long length, the Project is often described in sections, or segments of the transmission line (see Map 1, right). The Project is described in sections, where different construction crews were responsible for different sections of the Project. There are eight sections in total, grouped into northern, central and southern areas.

There are four northern sections:

- N1 - Keewatinohk converter station to Odie Lake
- N2 - Odie Lake to the Wabowden area
- N3 - Wabowden area to the Pas
- N4 - The Pas to Swan River

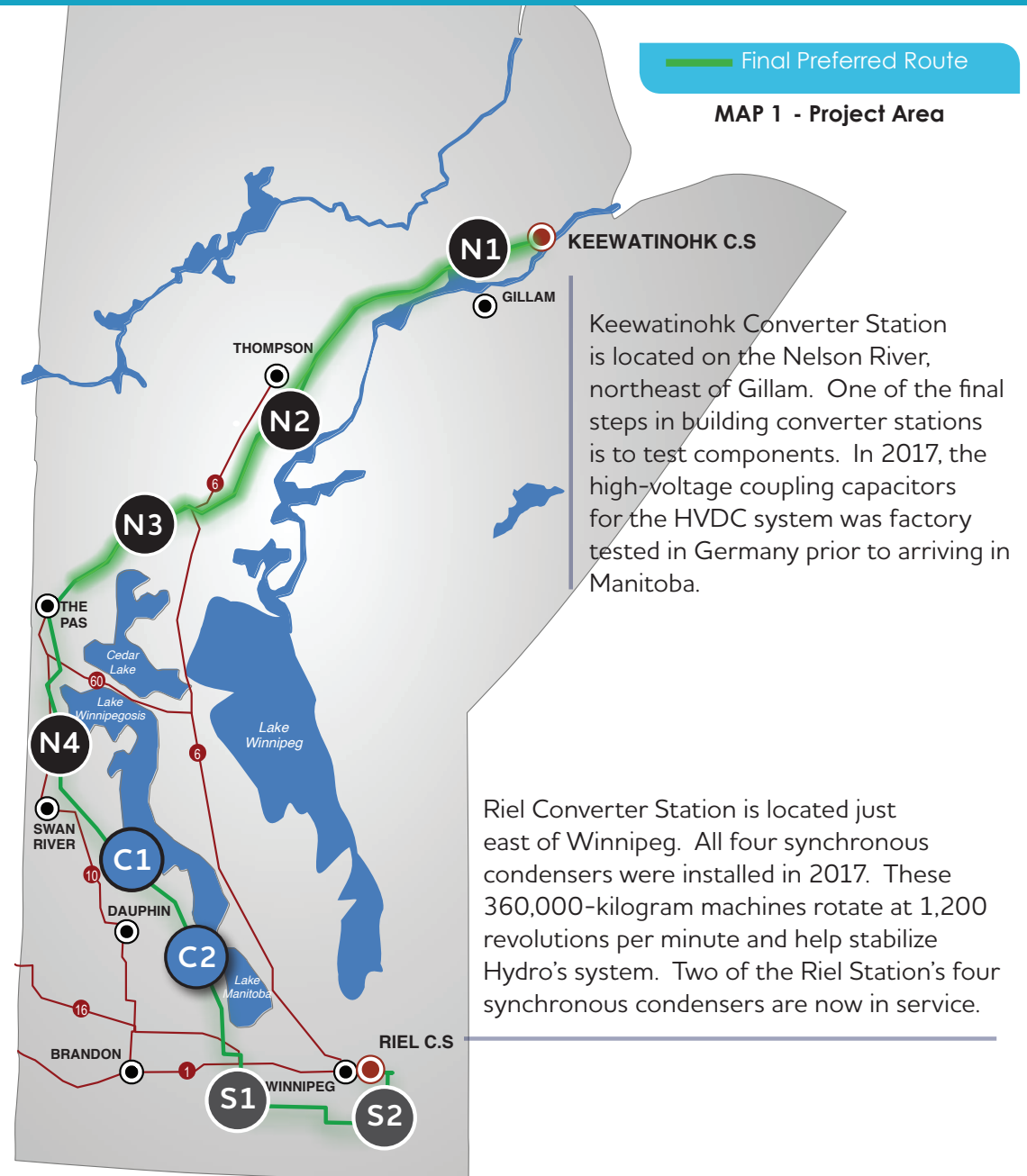
There are two central sections:

- C1 - Swan River to Rorketon area
- C2 - Rorketon area to north of Langruth

There are two southern sections:

- S1 - north of Langruth to Elm Creek
- S2 - Elm Creek to Riel converter station

These construction sections are also used to tailor mitigation measures and monitoring efforts to the terrain and environmental conditions that characterize each section.





# The Monitoring Program

## Roles

Monitoring Bipole III is a team effort where staff from Manitoba Hydro work with monitors from First Nations, Northern Affairs Communities, the Manitoba Metis Federation (MMF) and specialists from a variety of fields. There are different roles played by team members, including:

**Construction Environmental Inspectors** are Manitoba Hydro employees who conduct field inspection according to Construction Environmental Protection plans developed for the Project. They work closely with Environmental Monitors.

**Environmental Monitors** are representatives from local Indigenous communities or organizations who are funded by Manitoba Hydro to monitor mitigation measures and collect wildlife observations in active construction areas. Environment monitors work alongside Construction Environmental Inspectors.

**Community Liaisons** are also representatives from local communities or organizations who observe construction activities and report back to their community. Liaisons may also take part in socio-economic monitoring efforts.

An Environmental Protection Management Team meets regularly to discuss the outcomes of inspections, monitoring results and project events. This management team also coordinates with contractors, executive staff and regulators to develop mitigations strategies, solve problems and report outcomes.

As you may imagine, this diverse program produces an enormous amount of data. Data is stored and organized in an internal Environmental Protection Information Management System (EPIMS). Staff depend on this database to help them to sort years of information, see trends and create reports.



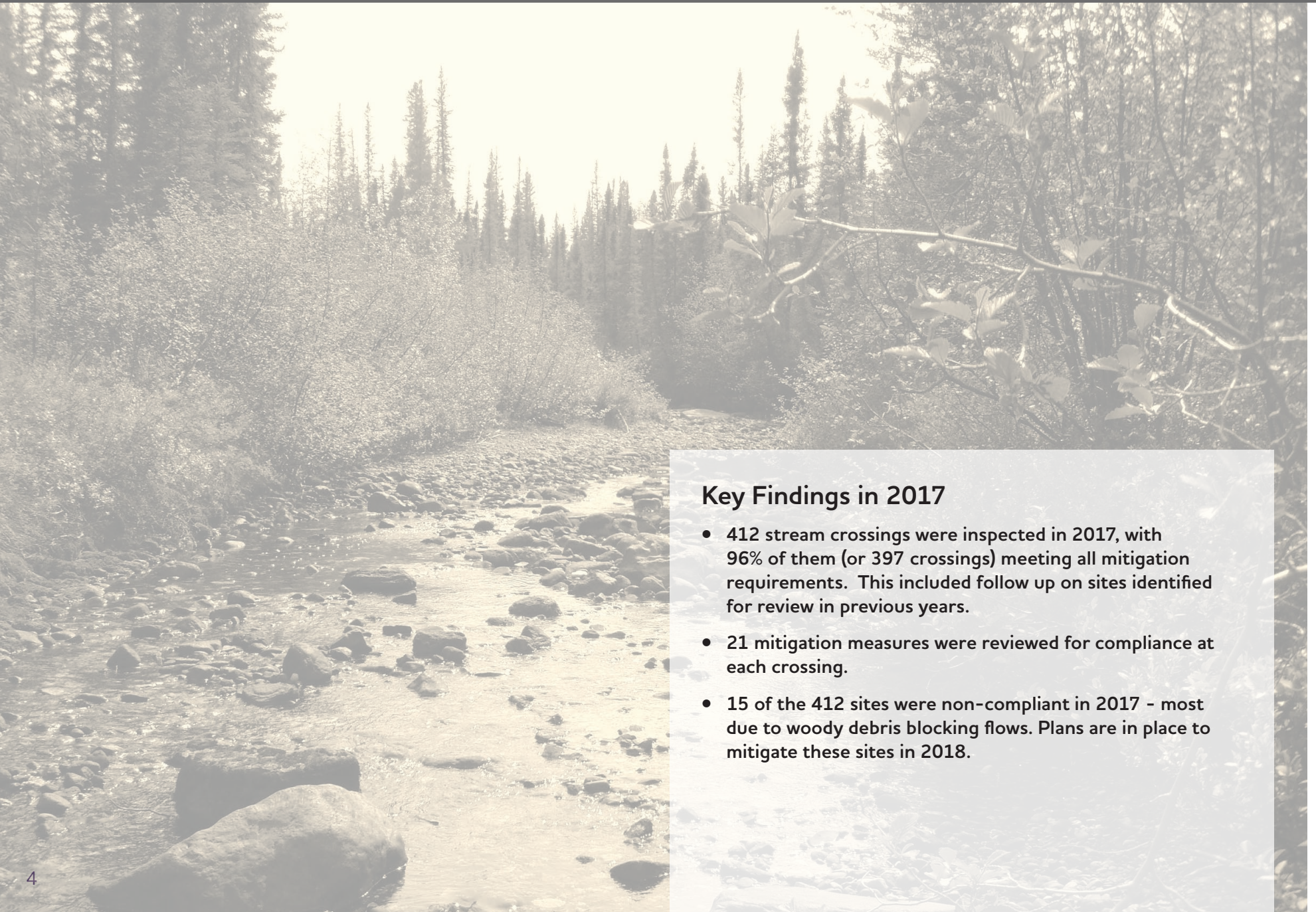
Riel Converter Station



Vegetation sampling along the right-of-way



# Aquatics



## Key Findings in 2017

- 412 stream crossings were inspected in 2017, with 96% of them (or 397 crossings) meeting all mitigation requirements. This included follow up on sites identified for review in previous years.
- 21 mitigation measures were reviewed for compliance at each crossing.
- 15 of the 412 sites were non-compliant in 2017 - most due to woody debris blocking flows. Plans are in place to mitigate these sites in 2018.



## Key Predictions

The environmental impact statement predicted that there may be potential for:

- A loss of riparian habitat which could affect fish habitat;
- An increase in sedimentation to waterways; and,
- Altered stream flows.

## Monitoring Aquatics

The transmission line traverses the Saskatchewan River, the Assiniboine and Red River and many smaller streams and tributaries. Many of these waterways contain fish habitat that can be susceptible to impacts from construction projects like Bipole III. This program reviews 21 different mitigation measures at each waterway crossing, considering things like the condition of riparian buffers or whether erosion control measures have been put in place. The types of things inspectors look for when reviewing a site include asking questions like:

- Has the riparian buffer remained intact?
- Have the waterways been crossed at an appropriate angle and grade?
- Is there woody debris remaining on temporary crossing sites?

- Was the stream crossed at the correct location, and was it crossed just once, or many times?
- Was work conducted at the appropriate time of year?
- Were erosion control measures installed if needed and were they effective?

Inspectors also consider whether the mitigation measures put in place were effective. For example, we ask if erosion control measures actually worked to prevent erosion. These questions are answered by ground and aerial inspections as well as consideration of the quality of habitat before construction began.

During the summer of 2017, 412 site visits were conducted on watercourse crossings along the Bipole III Transmission Line and the four smaller lines that connect Keewatinohk CS and Henday CS, Keewatinohk CS and Long Spruce GS, and the Keewatinohk and Riel Ground Electrode lines) as well as the sites identified in 2016 as requiring follow up.

Of the 412 sites inspected, 15 were considered non-compliant or require further follow up. Woody debris was found at nine sites. Of the nine sites that contained woody debris, eight had been characterized as having 'marginal' fish habitat prior to construction,

and one characterized as 'important' (Brooks Creek, located downstream of the Limestone Generating Station). Plans are in place to remove debris and remediate conditions.

Bank slumping or bank erosion was noted at five sites, and one waterway contained debris from a temporary crossing left in place. All six sites will be reviewed in 2018 to determine the best solution for each.

All waterways crossed on the southern segments of the transmission line (C1, C2, S1 and S2) were compliant in 2017. These segments are, for the most part, in agricultural landscapes and require less clearing.



Riparian habitat left intact along a tributary of Lake Winnipegosis

## Key Findings in 2017

- In 2017, woodland caribou populations across the Bipole III study area continued to show signs of being stable or increasing slightly.
- There is minimal evidence to date of white-tailed deer ingress into the Pasquia-Bog Caribou range and no evidence of elk ingress into areas outside of historical occurrence as a result of the ROW and associated Project disturbance.
- Over the course of the study we have learned that, 81% of all caribou mortalities found can be attributed to predators. The most common predator is the wolf, where 76% of deaths can be attributed to wolves.
- 2017 results indicate that brainworm is present in 41% of the regional white-tailed deer population.
- As expected during construction, due to noise the density of marten, fisher, wolf and hare tracks increased the further away you were from the Project. There was no difference between the density of tracks found on or off the right-of-way for other species, such as moose, lynx, ermine and weasel.



## Goals of the program

The overall objectives of the mammals monitoring program are to:

- better understand use, population and habitat requirements of valued species;
- ensure compliance with regulatory requirements and EIS commitments;
- monitor and measure mammal responses to ROW creation and operation; and,
- assess the success of mitigation measures.

## Key predictions for Moose, Caribou & White-tailed Deer

The environmental impact statement predicted that effects would include:

- increased mortality due to:
  - increased predator mobility
  - increased harvest because it will be easier to access wilderness areas that were previously difficult to access
  - increased transfer of disease, such as chronic wasting disease, where new corridors may contribute to increasing movement, which influence the spread of disease
- less habitat available due to clearing for the project

- fewer calves born due to disturbance from the Project or because the animals are forced to move away from their preferred habitat.

One of the challenges with understanding the effects of a project on moose, caribou and deer, is that these animals typically range widely and are affected by other stresses in their environment. For example, moose had been experiencing population declines in areas along the Project route before initiating the Project. The abundance of these populations had already been affected by factors like deep snow conditions, over harvesting, disease, or a combination of these stresses. To understand potential cumulative effects to the population, Manitoba Hydro is supporting the Province in conducting surveys in the Tom Lamb Wildlife Management Area (WMA), Moose Meadows, and Pine River area.

In February of 2017 Manitoba Hydro conducted its third helicopter survey of the project area where broad information is collected about winter wildlife in the area. The survey uses the right-of-way as the center-point and flies the project area in wide strips, like a grid. The helicopter flies over areas 0.25 km, 1.25 km, 3.25 km, 5.25 km away from the center-point of the right-of-way along construction segments N1, N2, N3, N4 and north half of C1.

These surveys help biologists understand the number of animals in key areas and their interaction with the Project. In 2017 surveys focused on the Tom Lamb Wildlife Management Area, the Pine River area south of Swan River and along the right-of-way from Thompson to the Keewatinohk Converter Station.



## Moose – Key Findings

Manitoba Hydro has developed two moose stewardship programs, as part of the Bipole III Project Environment Act Licence, as follows:

1. The moose stewardship study program, to investigate factors affecting moose population dynamics in Manitoba  
Manitoba Hydro and Manitoba Sustainable Development are CoChairs of this program.
2. The moose stewardship conservation program, to enhance and sustain moose populations in Manitoba.

The Programs will be administered and delivered with total project funding in the amount of up to \$800,000 to be allocated between 2018 and 2020.

Manitoba Sustainable Development continues to be the authority responsible for moose management, and is leading the effort to recover moose populations in western Manitoba. Manitoba Hydro supports these efforts and continues to be open to solutions to maintain these valued populations. For more information on big game population abundance in Manitoba, see Sustainable Developments 'Big Game Aerial Surveys' web page: [www.gov.mb.ca/sd/wildlife/hunting/biggame/survey/index.html](http://www.gov.mb.ca/sd/wildlife/hunting/biggame/survey/index.html)



caribou caught on camera

2039





## Caribou – Key Findings

Monitoring of woodland caribou continued in 2017 with two major study components. Aerial and DNA surveys were used to record regional population abundance and trends, and GPS-collaring studies continued to document home range size and movement patterns.

In 2017, woodland caribou populations across the Bipole III study area continued to show signs of stability or are increasing slightly based on the number of caribou calves detected. These results build on observations and analysis conducted throughout the construction phase on the Project. Advancements in genetic testing and analysis will serve to improve this analysis in the post-construction phase of the project.

In 2017, GPS collaring studies showed that individual woodland caribou continued to exhibit consistent year over year home range size, wintering areas and calving area preferences. Woodland caribou from the Naosap-Reed population were the one exception with this population utilizing a different wintering area in 2017. This shift in winter range use did not appear related to the Project activities.

The degree to which woodland caribou changed their behavior, habitat selection and distribution relative to the Bipole III project was also assessed in 2017. Results showed

that GPS collared caribou tended to have reduced activity within 1-2 km of the Project areas and slightly reduced transmission line crossing rates. Collared caribou crossed the Project in this area less frequently than what was expected with no development; however, these results also show that the caribou cross the about the same amount as when there was just a railway. The Project did not represent a significant barrier to caribou movements across their range.

As part of the environmental protection plan Manitoba Hydro utilized specialized vegetation clearing practices in areas known to support annual caribou movements. Three years of GPS data has shown that caribou are continuing to use these specialized cleared areas, which demonstrates the success of this mitigation activity.

No Pen Islands, Cape Churchill or Barren-ground caribou were present along the right-of-way during winter construction. The last known occurrence of Barren-ground caribou in the project area was in 2004.

One GPS collared caribou was killed 18 km from the Project area in a vehicle collision unrelated to the Project.

## Woodland Caribou

Woodland caribou are generally grouped into boreal and forest-tundra woodland caribou. Each population have different ways in which they use their habitat. Our monitoring program considers differences in how these subgroups use and migrate through their area.

### Boreal Woodland Caribou

The boreal woodland caribou are typically found in low densities in large, un-fragmented tracts of mature boreal forest. They congregate during winter in common areas. To calve, pregnant cows travel to isolated, relatively predator-free areas where forage is available, such as islands in lakes, peat lands and lakeshores. A key consideration during the Bipole III routing process was to avoid these critical areas.

The Project intersects three boreal woodland caribou ranges, called: The Pasquia Bog, Naosap-Reed, and Wabowden. Animals from each of these ranges are collared, as well as animals from a fourth range called Charron Lake. The collars are equipped with units that connect to satellites and transmit information about their movement patterns. Understanding movement patterns helps in understanding responses of the herd to the Project. Charron Lake acts as a control as it is not located by any development. Data from these animals will be compared to herds in the other three ranges.

- The Pasquia Bog –the Project created a new linear corridor in this area. Caribou avoided this area by about 1 km during construction, and may have avoided the area by as much as 3 km during the spring and summer. Despite this buffer the caribou seem to keep around the Project, another study aimed at testing how caribou traverse the Project suggests that collared caribou have not changed the way they cross the Project area. Natural crossing areas were mapped, then clearing was reduced in these areas to improve landscape connectivity. These mitigated areas appear to be effective and likely helped as caribou continue to move across the Project.
- Naosap-Reed – A recent fire in this area may be a contributing factor for the suspected declining population trend and subsequent lower adult female survival relative to other monitored ranges.
- Wabowden - the Project widened an existing corridor created by the railroad line. Results suggest that female boreal caribou avoided this existing corridor by 1 to 2 km prior to the Project being constructed. Telemetry results show that this avoidance has not changed since Project construction, as caribou continue to have reduced occurrences within 2 km of the Project. Results also showed that collared caribou crossed the Project in this area less frequently than what was expected

with no development; however, these results also show that the caribou cross the about the same amount as when there was just a railway.

### Forest-Tundra Woodland Caribou

There is an eight-year study involving the Province, Manitoba Hydro and Integrated Resource Management Boards to better understand two ranges of the forest-tundra woodland caribou, the Cape Churchill and Pen Island ranges. This study monitors how these caribou use their range seasonally, how caribou use their ranges after calving, and identifies changes in population abundance. Cape Churchill and Pen Islands caribou periodically migrate from the Hudson Bay coast and overlap with the northern extent of the N1 construction segment. These occurrences are infrequent. No Cape Churchill or Pen Island caribou were present in the Project area in 2015. In 2016 a group of what are believed to be Cape Churchill animals were observed in the Bird-Gillam area.



## Barren-ground Caribou

The barren-ground caribou are lighter and smaller than the boreal woodland caribou. They are found in the far north of Manitoba. They travel in large herds named after their calving grounds. Members of this population give birth on the open arctic tundra, and have significant cultural and social value to northern Indigenous peoples. The Qamanirjuaq herd had declined from approximately 349,000 in 2008 to 264,000 individuals in 2014. A portion of this herd, mainly bulls, occasionally move into the Project area near the N1 segment. The last known occurrence of this herd travelling into the Project area was in 2004 where approximately 10,000 barren ground caribou were observed.



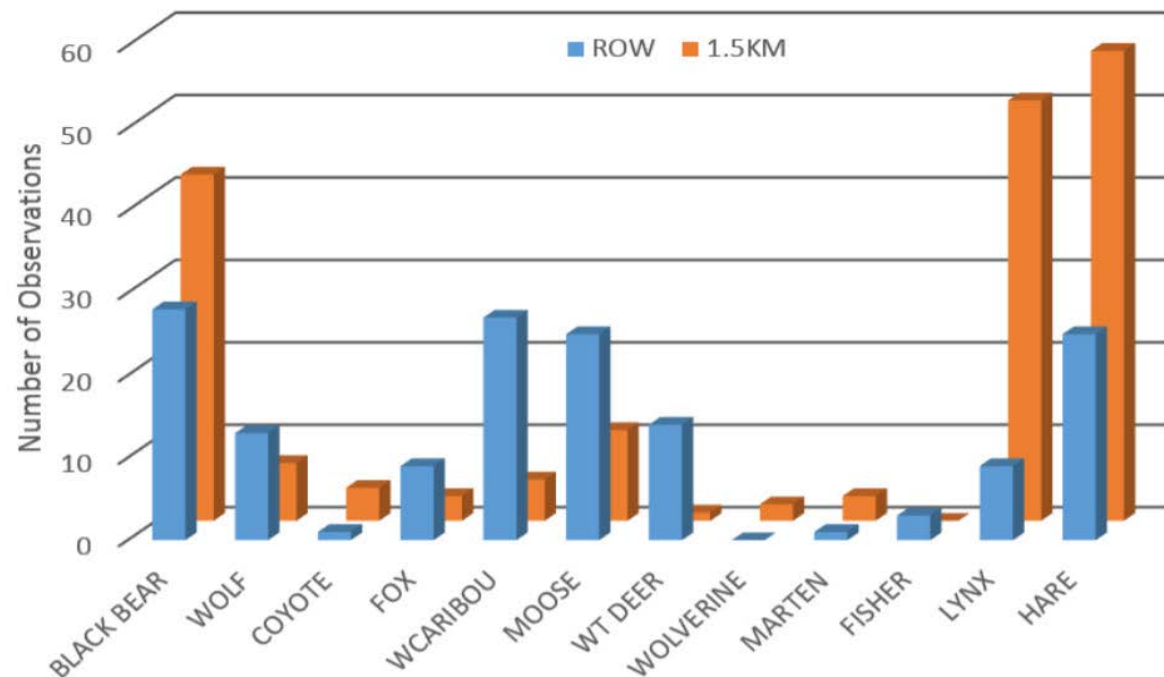
# Wildlife

## White-tailed deer

Deer and elk can bring disease and predators to an area, creating increased risk for other prey animals such as caribou and moose. Multiple data collection methods are used to understand where deer and elk occur around the Project, such as remote cameras, track surveys, focused distribution surveys that look for signs of animals in key study areas and a Multi-species Aerial Survey using transects parallel to the right-of-way at various distances.

There were more observations of white tailed deer at camera traps positioned close to the right-of-way compared to those 1.5 km from the ROW. In fact, there were more observations of wolves, fox, fisher, woodland caribou, moose and white-tailed deer at camera traps positioned close to the right-of-way compared to those 1.5 km from the ROW (see Figure 1, at right)

Multi-species track surveys conducted in 2017 show that white-tailed deer may be moving into the northern periphery of the P-Bog Caribou range.



The above graph shows the number of mammals photographed on the right-of-way (in blue) compared to those photographed 1.5 km away from the right-of-way (in orange)



## P. tenuis

The brainworm, *Parelaphostrongylus tenuis* (P. tenuis), is a parasite that causes sickness in animals like moose, elk and caribou. White-tailed deer can carry the brainworm and create a risk for moose, caribou or elk (other ungulate species) by passing on the parasite through their scat in areas grazed by other species. Rights-of-way can act as corridors that enable deer to move into areas frequented by other ungulate species. While deer carry no signs of distress when they are infected, other ungulates will exhibit symptoms like tilting of the head and neck, apparent blindness, and walking in circles. By collecting fecal pellets at sites moose, deer and caribou are known to graze, we can conduct genetic testing to determine if the disease is present in the area. This is a relatively simple non-lethal way of sampling for this disease. The pellets are tested for the presence of spiny-tailed larvae as its presence is a good indicator of the presence of brainworm in an area.

Manitoba Hydro asks student volunteers from Opaskwayak Cree Nation and University College of the North to help collect fecal pellets where students gained experience working in the field.

In 2017 226 pellets were sent to the University of Saskatchewan to test for the presence of spiny-tailed larvae, where results indicated that brainworm is present in 41%

of the regional white-tailed deer population. Prevalence was lower in areas north of the Pasquia Bog. Sampling will be repeated in 5 years to assess for changes in deer distribution along the ROW as well as changes in P. tenuis prevalence.



# Wildlife

## Furbearers - Key Findings

- Prior to project construction studies revealed that most boreal woodland caribou deaths were caused by wolves.
- During project construction we understand that predators, primarily wolves, continue to be the most common predator of caribou
- Where wolves may prefer the right-of-way over natural areas, bears tend to avoid it
- The location of kill sites suggests that the project right-of-way is not a likely contributor to predation events between wolves and caribou

## Key predictions for Furbearers

- The Project will create more opportunity for deer or moose movement along the right-of-way, likely increasing populations like wolf and bear.
- One of the predictions made by Opaskwayak Cree Nation was that construction may attract predation to an area and that there would be an imbalance of fragile ecosystems.
- Wolves may attack moose and caribou more frequently because they may use the new right-of-way to more easily access areas that they previously couldn't.



### Grey wolf

To better understand the risk to caribou from increased predation, surveys were conducted in the four woodland caribou ranges in 2017 (Pasquia-Bog, Wabowden, N-Reed and Charron Lake, described on page 10). Monitors looked for signs of recent moose, deer, elk, wolverine and wolf activity and observations were recorded in each woodland caribou survey area. The presence and activity of these species in an area give us clues to how caribou are distributed in an area.

When a collared caribou dies, the study team

will endeavor to track down the animal to retrieve the collar and try to determine the cause of death. The manner in which a caribou dies tells you something about both that animal and the predator that may have killed it. Over the course of the study we have learned that 81% of all caribou mortalities found can be attributed to predators. The most common predator is the wolf, where 76% of predator-caused deaths can be attributed to wolves.

The locations of kill sites were measured to see how far they were from the Project right-of-way. The closest kill site was over 3 km away, with most greater than 15 km away. This suggests that the project right-of-way was not a likely contributor to these predation events.

Ground surveys and remote cameras show that wolves occurred more frequently on the right-of-way than compared to areas 1.5 km away. More research is needed to understand if wolves prefer the right-of-way over natural areas.



## Bears

Field data indicated that bears may avoid the right-of-way more than wolves.

No bear dens were found during construction in 2017; however, bears were found in the vicinity of the Project.

In August of 2017, after a large male black bear approached two Manitoba Hydro employees near the Keewatinohk boat launch. A wildlife advisory was issued warning of a bear in the area. On August 19, 2017 the bear was live trapped and safely relocated from site.

Later that same month a site advisory was issued at Keewatinohk CS after a polar bear was spotted on the boat launch access road. Manitoba Sustainable Development was immediately alerted, and the siting was confirmed. The polar bear left the area shortly thereafter.

Wildlife interactions with the project are further discussed on page 19.



grey wolves photo captured from helicopter

## Furbearer Harvest

The Bipole III Transmission Project directly intersects 42 registered traplines. Annual harvest statistics for each trapline were obtained from Manitoba Sustainable Development to calculate baseline harvest statistics by furbearer species for each construction segment intersecting the registered traplines.



Trapline data from Opaskwayak Cree Nation (OCN) is also shared and reviewed. Community trapline data was collected on two traplines in 2016/17. OCN made predictions in their Aboriginal Traditional Knowledge study about potential effects of the Project. One of the predictions described how environmental noise may frighten species from a given area, that species may avoid a given area and that dens may be abandoned.

It is challenging to compare harvest statistics before, during and after construction, and relate changes to the Project as annual harvest rates are highly variable. Trapping effort can be influenced by trapping success, pelt prices, trapper interest or weather conditions. Also, many furbearers have cyclical population fluctuations where populations change based on predator populations. For example, marten populations are on a four year cycle where populations could be quite different from year to year naturally. The EIS predicted that four furbearer species may be affected by the Project because of increased access, direct habitat loss and sensory disturbance, including beaver, marten, wolf, and wolverine.

Beaver - The data show that beaver harvest was lower during the initial construction phase (2014/15 and 2015/16) relative to the 5-year pre-construction average. This suggests there may be a reduced harvest of

beavers in traplines intersected by the right-of-way during construction. This is expected to change once construction is complete.

Marten -The data show that the marten harvest rate was significantly higher in the N3 construction segment during the initial 2 years of construction when compared to the preconstruction average. This suggests there may be an increased harvest of marten in traplines intersected by the right-of-way in the N3 area during construction. This understanding is different in N4 where the data show that the marten harvest was significantly lower in N4 when compared to the pre-construction average.

Wolf – No differences in wolf harvest rate have been found when comparing construction to pre-construction data.

Wolverine – No differences in harvest rate have been found when comparing construction to pre-construction data.







## Birds

2017 was year four of a five-year monitoring program designed to study potential effects of the project on birds. A series of surveys have been repeated over time to understand effects to birds. In 2017 we understand more about:

- songbirds (such as many varieties of sparrows and warblers)
- marsh birds (such as Virginia Rail, Least Bittern, Yellow Rail, Sora)
- night time (crepuscular) birds, and
- sharp-tailed grouse

The data suggests that the transmission corridor has not adversely affected songbird populations; on the contrary, the transmission corridor appears to have provided increased habitat opportunities for songbirds within the corridor and in the areas immediately surrounding the corridor.

Marsh bird monitoring indicates the project has not adversely affected the abundance of target marsh bird species within the monitoring areas. However, there appears to be a general decline in abundance at both impact and control sites between monitoring years.

Night time bird surveys show that the abundance of Eastern Whip-poor-will has increased between 2014 and 2017, but the

increase was also observed between control sites.

Sharp-tailed Grouse surveys were challenging as grouse leks are uncommon. Only six lekking sites were documented, two of which were close to the transmission corridor (<1 km). Sharp-tailed Grouse occurrences were too few to support any statistical analysis; however, evidence of lekking has been documented near the transmission corridor in section C2 and S1 suggesting Grouse have some level of tolerance to the transmission corridor clearing.

Some of the earlier surveys were aimed at identifying locations considered 'high-risk' for bird-wire collisions. Larger birds, such as cranes, herons, geese and ducks, are typically less agile than smaller birds, making them more vulnerable to collisions with the conductors that connect transmission towers. Features likely to attract these larger birds were mapped and bird diverters will be installed at these high-risk locations. Bird-wire mortality will be tracked to determine effectiveness. As the conductor was only partially strung in 2017, the effectiveness of bird diverters will be studied in year five, or 2018.



# Access and Wildlife Interactions

1 Riel - Tower 12 - PTZ - Camera - 01



## Key Findings in 2017

- The vast majority of access to the Project is related to construction activities
- More wildlife interactions occurred at both Keewatinohk and Riel converter stations this year



## Wildlife

A variety of wildlife were observed at both converter stations, including caribou, black bear, red foxes, arctic foxes, wolves, pine marten, and many bird species. The Riel converter station also had visits from house pets, all safely returned home.

In total 11 nests were identified at the Riel Converter Station in 2017 with species such as Canada geese, killdeer, barn swallow and American robins. When encountered, bird nests were protected until vacated at the end of their breeding season. To reduce the instances of nesting a number of decoys were set up including coyotes, owls, and reflective ribbon. Inspectors also conducted foot patrols to identify and discourage nesting.

Keewatinohk Converter Station wildlife interactions included nine mortalities in 2017 (five arctic fox, three ptarmigan and a raven).

In January of 2017 Manitoba Hydro was approved to live trap foxes from site that had become conditioned and unafraid of humans. A total of 15 arctic foxes and two red foxes were live trapped and removed from site.

Bank swallows had been making nests in Keewatinohk CS borrow stockpiles for the last three years. To prevent nesting, contractors kept piles angled, but the swallows were persistent. To protect the nesting sites for the



signage posted in an active nest area

duration of their stay, nesting areas were taped off and contractors were asked to keep clear of the areas. The intent was to keep bird nests clear of construction disturbance until birds fledged; however, foxes raided the nests before that time. The stockpiles have since been removed.

There have been three deer-vehicle collisions involving Project vehicles in proximity to the S1 construction segment. One collision occurred during year 2 (7 December 2015)

and two occurred during Year 4 (August 6, 2017 and September 16, 2017).

## People

Trail cameras placed at several all-weather access points to monitor human access of the right-of-way at those locations indicates the vast majority of use is related to Project construction, with very limited local access for recreation or resource use.



# Restoring the land to a healthy right-of-way



## Key Findings in 2017

- 201 different plant species were observed on the right-of-way during vegetation surveys
- The most frequently found invasive species are sow thistle and sweet white clover
- As you would expect after 1-2 years post clearing there is less vegetative cover and a reduced variety of plants along the right-of-way compared to the sites off the right-of-way



## Healthy rights-of-way

After a right-of-way is cleared, seeds that naturally occur in local soils will take advantage of limited competition from tall plants and begin growing. As early as the year after clearing, rights-of-way will show new growth. Manitoba Hydro monitors this regeneration to watch for invasive species, species of conservation concern and to monitor plant communities that are important to many Manitobans, such as native grassland prairie, wetlands, and traditionally valued species.

In 2017 twenty-six sites were revisited to sample vegetation across Sections N1, N2, N3, N4 and along the northern AC collector lines and construction power line.

## Native grasslands

Native grasslands are a valued ecosystem in Manitoba. Native grasslands have been identified at nine locations along the right-of-way, each one marked as an Environmentally Sensitive Site. Protections are placed around these sites so clearing activities reduce effects to these valuable species.

Approximately 755 ha of the grassland cover (agricultural pastureland) have the potential to be affected by Project activities. Over the last three years a grassland site located in S1 has been monitored. The first year of

monitoring was conducted prior to construction. The second two years monitored recovery of the right-of-way. The total amount of grassland covered by vegetation increased from 52% to 74% between 2016 and 2017. Four species of conservation concern were relocated, including silky prairie-clover, Schweinitz's flatsedge, linear-leaved puccoon and skeletonweed.

The total species cover, or the amount of ground covered by vegetation increased from 2016 to 2017 from 53% to 74% with 33 different species found within the survey plot. Vegetation cover is dominated by Kentucky blue grass and big blue stem.

## Plant species important to Indigenous peoples

A number of plants and plant communities have been identified as being particularly important to Indigenous people (e.g., Cowan blueberry area, Assiniboine River). These areas are valued by Indigenous people as plants in this area are harvested for food and medicines.

Clearing and construction of transmission line rights-of-way as well as the creation of new access roads and trails for the Project can



vegetation sampling at a control point off the right-of-way

allow increased access to areas important to Indigenous communities and can result in the potential loss of important vegetation resources found at these sites.

Ten sites that supported the growth of traditionally important species were revisited in the Cowan blueberry resource area. This season, blueberry plants were recorded at seven sites on the right-of-way, more than all previous years. Two species of blueberry plants were observed again during surveys; velvetleaf blueberry and low sweet blueberry.

Total blueberry cover for sites supporting blueberries on the right-of-way in 2017 increased since initial pre-clearing surveys in 2014. Total species cover was lower on the right-of-way then off.

# Restoring the land to a healthy right-of-way

## Forests

The Project will result in the loss of native forest vegetation during clearing and construction activities. It is estimated that 3,355 ha of upland forest vegetation will be affected from clearing activities. Removal and long-term loss of forest cover as a result of right-of-way clearing as well as potential damage to adjacent forest vegetation during clearing and construction has been identified as an effect of transmission line development.

Twenty-six sites were revisited in 2017. The sites continued to show lower average values for total vegetation cover and number of species present on the right-of-way than off; however, the general trend for sites on the right-of-way is that cover is increasing.

for sites on the right-of-way compared with previous years. Species richness on the ROW shows a slight increase.

## Invasive species

The abundance of non-native or invasive plant species may increase as a result of the Project. Non-native species are plants that grow outside of their normal range while invasive species are plants that out-compete native species when introduced outside of their natural setting. Non-native and invasive species may outcompete native species, shifting the vegetation composition and community where they occur.

Construction equipment and vehicles can introduce non-native plants. During the field assessments in 2010, 27 non-native species were observed throughout the Project area, five of which were invasive plants.

Forty sites were visited to sample invasive and non-native vegetation. A total of 50 noxious, invasive or non-native species were recorded at these sites. Fifteen species are listed as noxious weeds, while 20 species are considered invasive. The most commonly observed non-native species were field sow-thistle, common dandelion, and sweet clovers.



vegetation sampling along the right-of-way



silky prairie-clover (Photo credit: Keir Morse)

## Wetlands

Bog, fen and marsh wetlands identified along the right-of-way cover approximately 1,456 ha. Potential effects include the disruption, alteration or loss of wetlands from Project activities. Approximately 535 ha of patterned fen wetlands occur along the right-of-way.

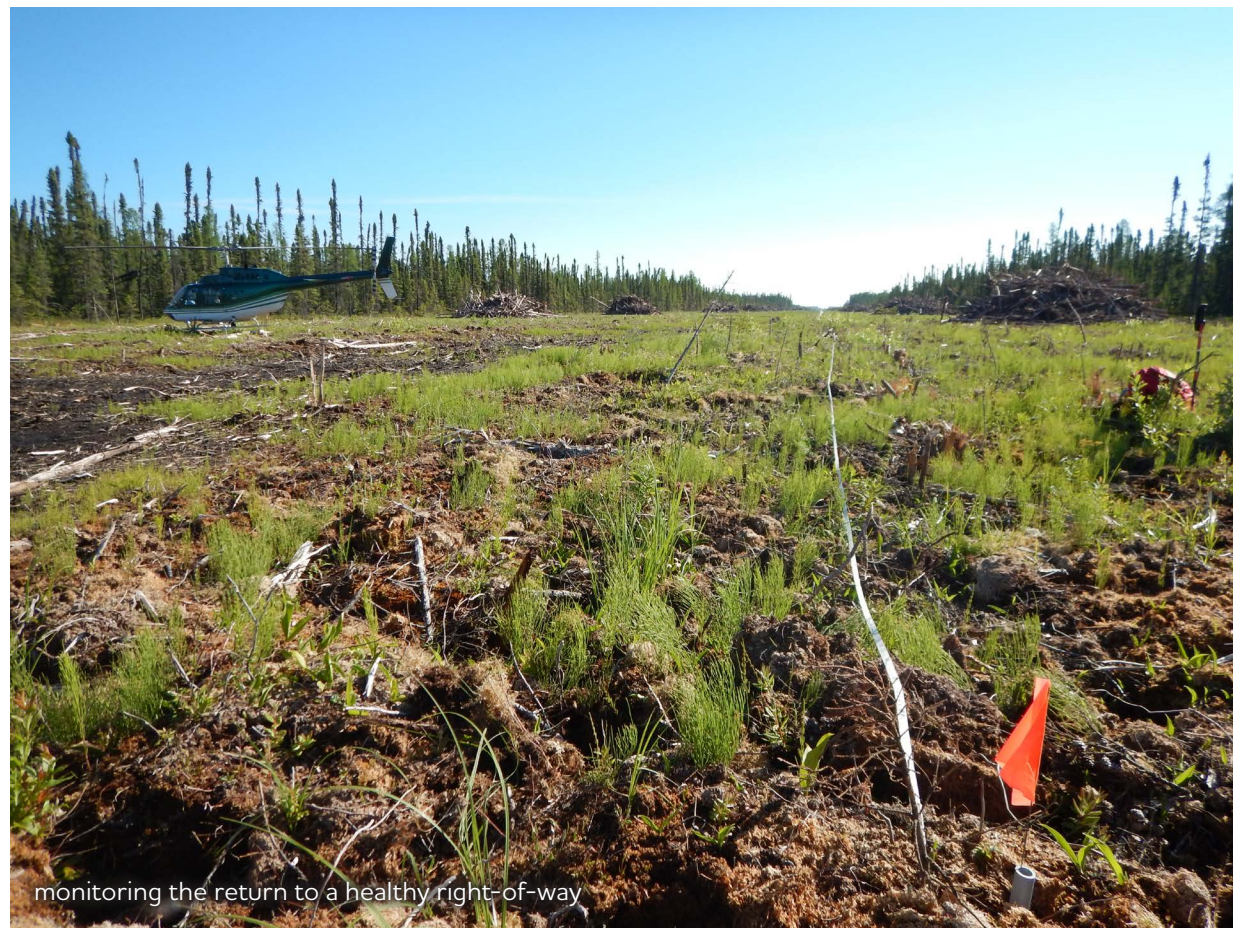
Seven sites were revisited in 2017 to sample wetland vegetation. Sites located on the right-of-way continue to show lower species cover than those off the right-of-way. This year there is a marked increase in vegetation cover



## Species of conservation concern

Species of conservation concern include species of plants that are protected under *Manitoba's Endangered Species and Ecosystems Act*, The federal *Species at Risk Act*, the Committee on the Status of Endangered Wildlife in Canada, or that are listed as very rare to uncommon by the Manitoba Conservation Data Center.

Fifty species of conservation concern were recorded during sampling in 2017. Seventeen species are ranked very rare to rare, with the remaining 33 species ranked uncommon. The most frequent number of observations, and the greatest number of species of conservation concern were recorded in S1, near the Assiniboine River crossing. Silky prairie-clover (*Dalea villosa*), listed as Threatened under *The Endangered Species and Ecosystems Act* and the *Species at Risk Act*, and Special Concern under the Committee on the Status of Endangered Wildlife in Canada. Silky prairie-clover was first observed in 2010. The effect prediction for species of conservation concern was determined to be accurate.



monitoring the return to a healthy right-of-way



# Soils and Terrain



## Key Findings in 2017

- Construction activities have resulted in disturbance to crop and soil productivity.
- Permafrost thawing will occur more rapidly in areas that were cleared using general clearing methods than areas cleared by low disturbance or selective clearing methods.



## Soil Productivity

In 2017 Manitoba Hydro conducted monitoring of soil productivity along the portion of the Project under agricultural crop production. The objective of the monitoring program was to monitor crop performance as a key indicator of effects to soil productivity.

As expected, the results of the monitoring program suggest that construction activities have resulted in disturbance to crop and soil productivity. Monitoring will continue as the right-of-way returns to an environment that support crops and low-growing vegetation.

## Permafrost

The goal of the permafrost monitoring program is to determine if the clearing activities speed up the degradation of permafrost and is there a difference in impact between the type of clearing method used by Manitoba Hydro and permafrost degradation.

Ground temperature data suggest there is limited acceleration of permafrost degradation as a result of right-of-way clearing; however, this interpretation is based on just one year of data. More sampling is required to make a more confident conclusion.

An assessment of the depth of permafrost penetration into the ground indicates that the permafrost is generally shallower in

undisturbed terrain than along the cleared portion of the right-of-way. This data is in line with the assumption that the vegetation cover (just like snow cover) acts as an insulation layer.

Permafrost thawing will occur more rapidly in areas that were cleared using general clearing methods than areas cleared by low disturbance or selective clearing methods.

## Waste & hazardous materials

Many precautionary measures were taken to reduce risk to sensitive areas around the Project, like streams or areas with sensitive vegetation. Hazardous materials are stored away from waterways and protocols are in place for their safe handling. All hazardous material storage areas, active work areas, camp facilities, heavy equipment and fuel storage areas are monitored daily.

Contractors must report all spills to Manitoba Hydro, and spill reports are further submitted to regulatory agencies depending on the volume and the material. In 2017 there were 20 reportable spills. This is an increase from previous years. With a busier construction year in 2017 there were more contractors and more activities underway, leading to this increase.

Two releases of hazardous materials occurred

at the Riel converter station, and five at the Keewatinohk converter station. These materials included insulating oil, glycol, used engine oil and SF<sub>6</sub>. SF<sub>6</sub>, or sulfur hexafluoride is a greenhouse gas used as an insulator. Manitoba Hydro reports releases of both liquid and gas as required by the Manitoba government. All spills were cleaned up as soon as identified to reduce environmental impact.

Table 1. Spills over time on the Bipole III Transmission Project

Spills	2015	2016	2017
<b>Keewatinohk Converter Station</b>			
Reportable	3	6	5
Non reportable	91	124	104
<b>Riel Converter Station</b>			
Reportable	0	1	2
Non reportable	22	47	56
<b>Transmission Line</b>			
Reportable	1	1	13
Non reportable	125	19	301
<b>TOTAL</b>			
Reportable	4	8	20
Non reportable	238	190	461

# Heritage



## Key Findings in 2017

- During installation of optical cable along the Limestone Keewatinohk collector line, rocks and cobbles that had cultural and heritage significance were discovered and subsequently disturbed. Manitoba Hydro immediately implemented the protocols outlined in the Cultural and Heritage Resources Protection Plan.
- Trees were found with fabric tied around their trunks in the Rural Municipality of Westlake-Gladstone. Manitoba Hydro notified Sandy Bay Ojibway First Nation and Ebb and Flow First Nation and worked together to determine the appropriate handling of these trees
- The results of the 2017 monitoring activities at the Red and Assiniboine rivers did not result in the discovery of cultural or heritage resources



## Heritage Resources

Manitoba Hydro maintains a Culture and Heritage Resources Protection Plan (CHRPP). This plan tells contractors and Manitoba Hydro staff what to do and who to contact should something be discovered during Project activities. The focus of the 2017 field program was to complete investigations for environmentally sensitive sites that had not yet been investigated for potential cultural and heritage resources prior to construction.

Archeological work tends to focus on areas where people were likely to live, camp and travel. People often camped and travelled in higher elevations areas or places that would have been dry in the past. People also tended to stay close to water, so our Project archeologist examines areas nearby waterways or lakeshores by conducting 'shovel tests' or small excavations, or 'pedestrian surveys' where they investigate the terrain and landscape to look for mounds or other signs of surface disturbance.

### Sections S1 and S2 Red & Assiniboine Rivers

In 2015, the Project Archaeologist found a heritage site at the Red River Crossing. Because of the potential for more finds, heritage monitoring took place while digging foundations for two towers. While digging foundations for a tower (tower 7136), the heritage team found a single fragment



of mammal bone, which they sent to the Paleontologist at the Manitoba Museum, who could not identify the species and agreed that it might be from the pre-glacial Lake Agassiz timeframe. There were no heritage resources found at tower 7137.

Both Swan Lake First Nation and archaeologists identified the Assiniboine River as high potential for finding cultural and heritage resources. Heritage monitoring took

place at the Assiniboine River crossing while trenches were dug and distribution lines were installed. Heritage monitoring also occurred before three towers were installed. Each tower had shovel testing done on each of the four footings and at the centre of the tower site.

The 2017 monitoring activities at the Red and Assiniboine rivers did not result in the discovery of cultural or heritage resources. All Heritage ESS locations that need

# Heritage

archaeological monitoring within sections S1 and S2 have been assessed or mitigated.

## **Prayer trees**

On February 9, 2017, during clearing in the Rural Municipality of Westlake-Gladstone for the Project, crews came upon a number of trees within the right-of-way that had fabric cloths tied around their trunks. Following the CHRPP protocols, Manitoba Hydro notified Sandy Bay Ojibway First Nation and Ebb and Flow First Nation of the cultural resource find and worked together to determine the appropriate handling of these trees. Councillors and Elders were invited to visit the site to provide cultural support. The communities indicated that they were not aware of these prayer trees but provided guidance that the trees located within the right-of-way may be taken down and either burned or left within the intact tree line to return to the earth. A ceremony was held on February 13, 2017 to remove the trees that were within the right-of-way, some were burnt and some were left intact in the untouched forested areas bordering the right-of-way. Trees located outside of the right-of-way will remain in place and will be unaffected by the Project.

The Project archaeologist conducted archaeological monitoring of four tower



footings within 100 metres of the prayer trees. The project archaeologist assessed the surrounding areas to identify if additional prayer trees were nearby and to monitor digging of tower footings within 100 metres of a prayer tree. No additional prayer trees in the surrounding area were found and there was no evidence of heritage resources found during the digging of three tower footings.

## **Keewatinohk Converter Station**

In March 2017, an optical cable system was installed along the Limestone Keewatinohk collector line. This work included digging trenches near a registered archaeological site. A Fox Lake Cree Nation (FLCN) Environmental Monitor was watching a video taken by the contractor and noticed exposed rocks and cobbles that had local cultural significance and asked that the Project archaeologist assess the finds.

The following day a Manitoba Hydro Environmental Inspector met with the FLCN Environmental Monitor to discuss the concern and directed the Contractor foreman to stop work in the area in case this site was part of the existing archaeological site. Unfortunately Manitoba Hydro and the FLCN monitor revisited the site and noticed that the contractor had already buried the specific area of concern, further disturbing



the area while refilling the trench. Manitoba Hydro immediately implemented the protocols outlined in the CHRPP and conducted two site visits by the Project Archaeologist on April 5 and June 27, 2017 to assess the disturbed area and determine if the area is an extension of the nearby archaeological site. During the visits, no evidence of artifacts or cultural layers were found. The Project Archaeologist conducted additional Archaeological Awareness Training for Transmission Line and Civil Construction staff.

Both of the archaeological sites around the Keewatinohk Converter Station are protected with permanent chain link fencing. There are no further concerns with these sites as long as the fencing is maintained through construction of the Bipole III Transmission Project and associated construction activities.



heritage monitoring

# Summary

## Construction Status

- By the end of 2017 all 3,076 towers along the Bipole III Transmission Project (Bipole III) had been erected.
- Major equipment was tested at both Keewatinohk and Riel converter stations.

## Aquatics

- 412 stream crossings were inspected in 2017, with 96% of them (or 397 crossings) meeting all mitigation requirements. This included follow up on sites identified for review in previous years.
- 21 mitigation measures were reviewed for compliance at each crossing.
- 15 of the 412 sites were non-compliant in 2017 – most due to woody debris blocking flows. Plans are in place to mitigate these sites in 2018.

## Wildlife

- In 2017, woodland caribou populations across the Bipole III study area continued to show signs of being stable or increasing slightly.
- There is minimal evidence to date of

white-tailed deer ingress into the Pasquia-Bog Caribou range and no evidence of elk ingress into areas outside of historical occurrence as a result of the Project.

- Over the course of the study we have learned that, 81% of all caribou mortalities found can be attributed to predators. The most common predator is the wolf, where 76% of deaths can be attributed to wolves.
- 2017 results indicate that brainworm is present in 41% of the regional white-tailed deer population.
- As expected during construction, due to noise the density of marten, fisher, wolf and hare tracks increased the further away you were from the Project. There was no difference between the density of tracks found on or off the right-of-way for other species, such as moose, lynx, ermine and weasel.

## Access and Wildlife Interactions

- The vast majority of access to the Project is related to construction activities
- More wildlife interactions occurred at both converter stations in 2017

## Restoring the land to a healthy right-of-way

- 201 different plant species were observed on the right-of-way during vegetation surveys
- The most frequently found invasive species are sow thistle and sweet white clover
- As expected after 1-2 years post clearing there is less vegetative cover and a reduced variety of plants along the right-of-way compared to the sites off the right-of-way

## Soils and terrain

- As expected, construction activities have resulted in disturbance to crop and soil productivity.
- Permafrost thawing will occur more rapidly in areas that were cleared using general clearing methods than areas cleared by low disturbance or selective clearing methods.





## For more information about the Bipole III Transmission Reliability Project:

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