



Bipole III Transmission Project

# 2015 Biophysical Monitoring and Mitigation Report

Report to Manitoba Sustainable  
Development (Licence No. 3055)

Submitted December 2016  
Revised March 10, 2017

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## Abbreviations

AC	Alternating Current
ATK	Aboriginal Traditional Knowledge
BMP	Biophysical Monitoring Plan
BWC	Boreal Woodland Caribou
CEnvPP	Construction Environmental Protection Plan
CHRPP	Cultural and Heritage Resource Protection Plan
DC	Direct Current
DIHRT	Data Inventory Heritage Resource Tracking
EIS	Environmental Impact Statement
EPIMS	Environmental Protection Information Management System
EPP	Environmental Protection Program
ESS	Environmentally Sensitive Site
GHA	Game Hunting Area
GPS	Geographic Positioning System
ha	Hectares
HVDC	High voltage direct current
I&NN	Invasive and Non-Native
IR	Infra-red
ISO	International Standards Organization
km	Kilometre
kV	Kilovolt
m	Metres
MSD	Manitoba Sustainable Development
MESEA	Manitoba Endangered Species and Ecosystems Act
NACC	Northern Association of Community Councils
PTH	Provincial Trunk Highway
ROW	Right-of-way
SARA	Species at Risk Act
SOCC	Species of Conservation Concern
WMA	Wildlife Management Area
ZOI	Zone of Influence

## 1 INTRODUCTION

Manitoba Hydro is pleased to present the results of the Bipole III Transmission Project (the Project) Biophysical Monitoring and Mitigation program. Construction ramped up significantly in 2015 with many contracts and worker facilities in place. Environmental monitoring and inspection services increased as well to keep up with this increased activity to collect data, ensure compliance, and respond to potential unforeseen events and potential effects.

Review and communication of monitoring results are an essential part of the Environmental Protection Program that Manitoba Hydro has implemented for this Project. This report is designed to inform regulators, Indigenous communities and organizations, stakeholders and the general public of progress made on construction and implementation of mitigation measures that minimize environmental effects.

The objective of this report is to present information and data on the results of the Bipole III Transmission Project biophysical environmental monitoring program that includes monitoring and mitigation actions in compliance with clauses 57 and 58 of the Project *Environment Act* licence (No. 3055). The monitoring is carried out in accordance with the Biophysical Monitoring Plan (BMP) per clause 18 of the *Environmental Act* licence. On December 30, 2015, the BMP was formally approved with one exception by Manitoba Sustainable Development.

The BMP is designed to check on impact predictions and the effectiveness of measures to mitigate them, with the intent of confirming outcomes and responding to unexpected results with appropriate follow-up actions.

This report is the second of a series of annual reports covering the Project's construction through to October of 2015. Socio-economic monitoring and mitigation for the Project will be addressed in a separate annual report.

## 2 PROJECT OVERVIEW

The Bipole III Transmission Project is a new high voltage direct current transmission project required to improve overall system reliability and dependability. The Project involves the construction of a 500 kV DC line that links the northern power generating complex on the Lower Nelson River with the conversion and delivery system in southern Manitoba. The Project also involves the construction of two converter stations (Keewatinohk Converter Station in northern Manitoba and Riel Converter Station in southern Manitoba, east of Winnipeg), two ground electrodes, and additional 230 kV transmission line interconnections in the north to tie the new Keewatinohk Converter Station into the existing northern AC system. The 500 kV DC transmission line is divided into eight construction segments (N1 to N4, C1, C2, and S1 and S2) as shown on Map 1. The projected in-service date for the Project is 2018.

The need for the Project is based on the current heavy reliance on a single transmission corridor containing the Bipole I and II transmission lines and a single converter station in the south. Because of this concentration, Manitoba Hydro's system is vulnerable to extensive power outages from severe weather, fires, or other events. The Bipole III Transmission Project will provide long-term power supply and reliability essential to the Manitoba Hydro system.



**Photo 1 Newly erected tower on construction segment N2**



### 3 PROJECT STATUS

Construction of the Bipole III Transmission Project began in late 2013, initially on northern components including the Keewatinohk Converter Station site, the Construction Power Station and Line, the AC collector lines, and the 500 kV HVDC transmission line right-of-way. Work in 2014 - 2015 progressed extensively with work on all components of the electrical complex from Keewatinohk to Winnipeg. Expansion work began at the Riel Converter Station in October 2015, and includes the 500 kV AC switchyard, converter station, synchronous condensers and associated facilities. The following summarizes work completed to the end of October 2015 as this is the basis of the biophysical monitoring program schedule for aquatics, birds, mammals and vegetation. Biophysical surveys were generally conducted in the spring and summer seasons based on transmission line work completed during the winter construction season. Winter ungulate surveys are conducted early in the calendar year.



**Photo 2 Aerial view of Keewatinohk Converter Station showing extent of development in August 2015**



**Photo 3 Aerial view of Riel Converter Station in 2015**

#### 3.1 Keewatinohk Converter Station

Major components of the Keewatinohk Converter Station were advanced in 2015. The converter station continued development with placement of granular material, pilings for the converter building, and installation of construction roads and light standards (Photo 3-1). A concrete batch plant has now been installed complete with lined washwater cells. All the field offices have been sited and three fuel depots established including one larger licensed facility. The lodge for construction workers now has a capacity of 400 rooms and a fully operational kitchen and dining facilities. Recreational and emergency facilities are still under development. The ground electrode site was cleared to allow installation of the circular iron electrode. Rehabilitation of various sites began with the closure of borrow pits N6 and N8. Side slopes were graded to 4:1 and stockpiled soil replaced on the slopes to allow natural re-vegetation to begin.

### 3.2 Riel Converter Station

The Riel Converter Station site is being further developed to include the 500 kV AC switchyard, converter station, synchronous condensers and associated facilities. Site infrastructure upgrades related to the parking lot, fencing, turnstiles, and the removal of insulating stone in the DC switchyard and AC filter bank areas progressed in advance of converter station construction (Photo 4). Construction contractors completed exploratory drilling during this reporting period and commenced piling installation for the AC switchyard and the HVDC building.

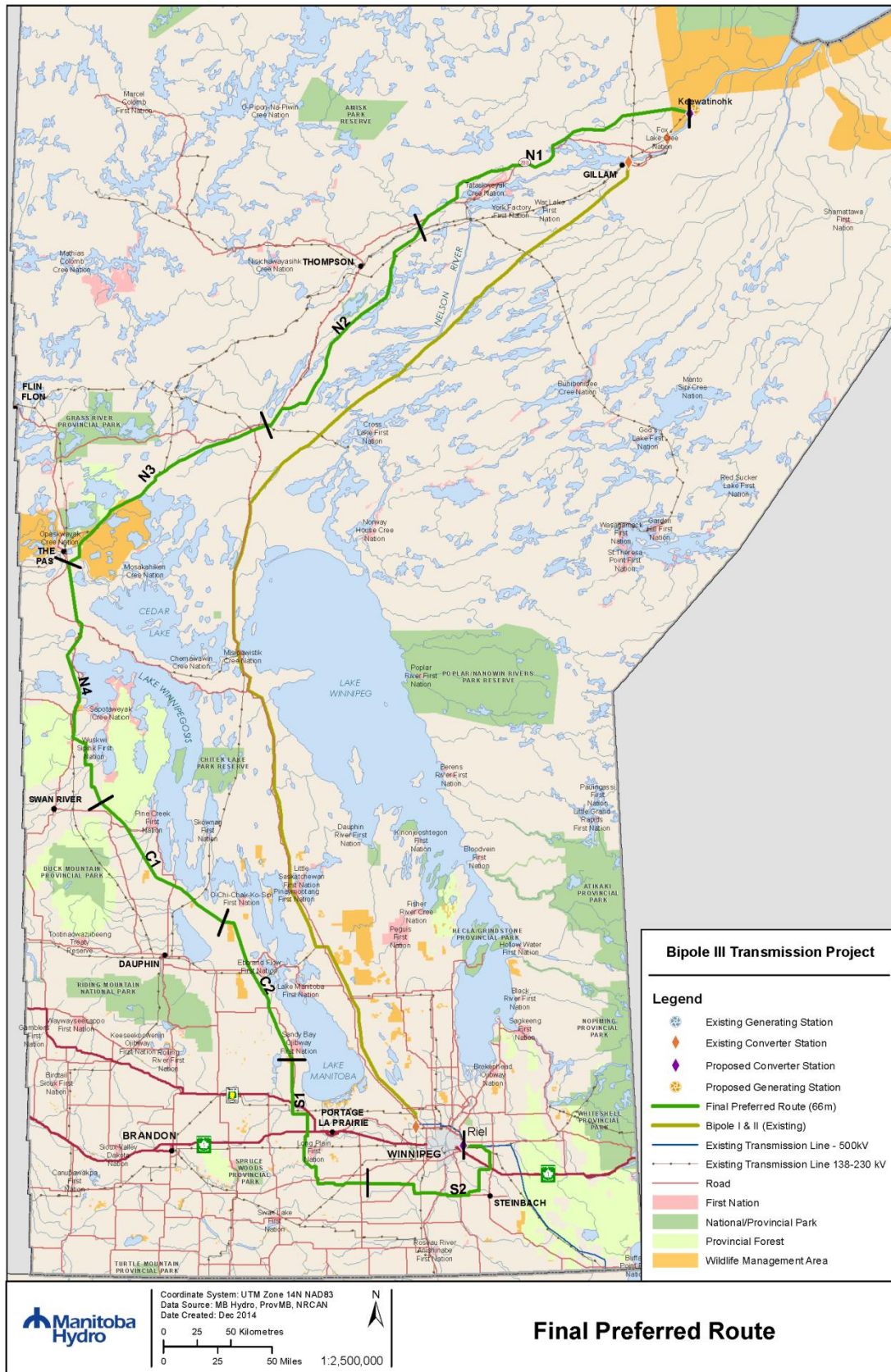


**Photo 4 Installation of concrete batch plant at Keewatinohk**

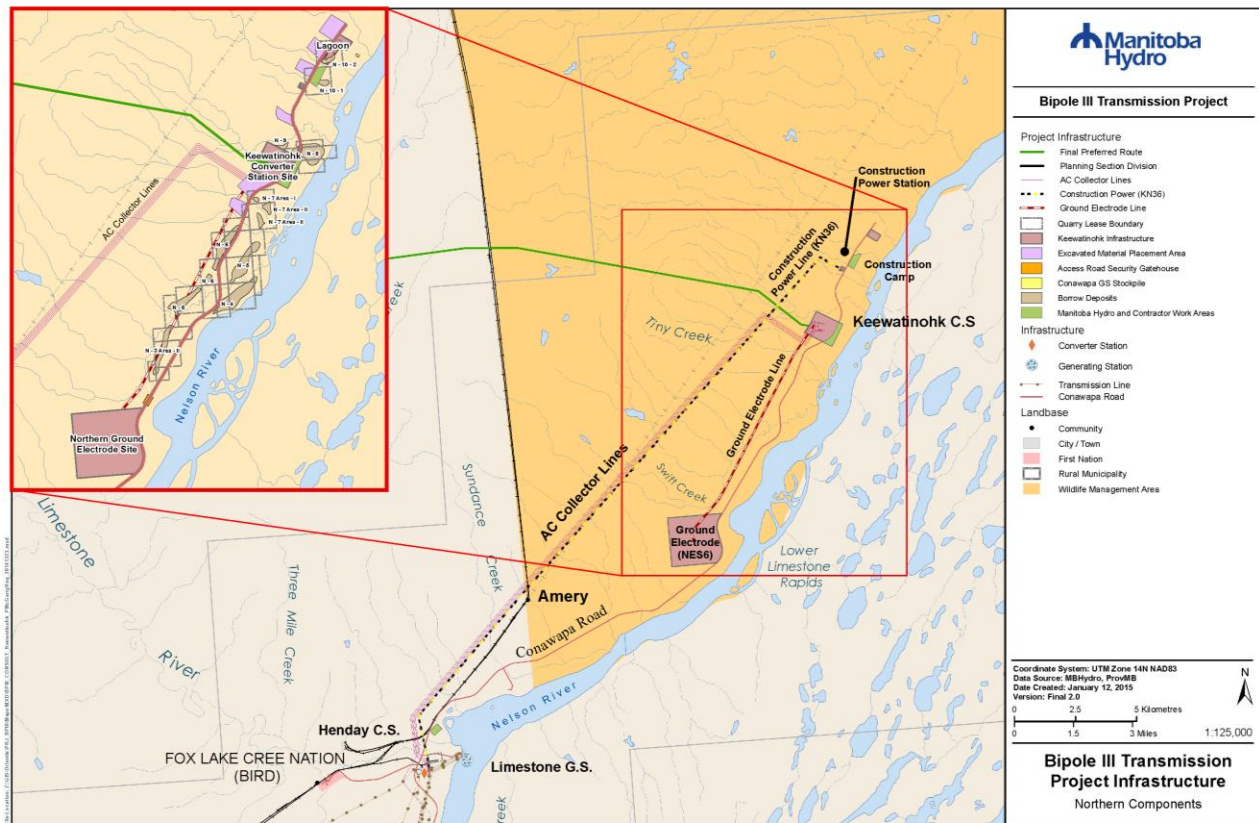


**Photo 5 Installation of concrete piles for the Riel Converter Station**





Map 3-1 Bipole III Project Area and Construction Segments



Map 3-2 Keewatinohk Infrastructure Area Converter Station and Ground Electrode

### 3.3 Transmission line construction

Transmission line clearing advanced significantly during the 2014 – 2015 winter construction season despite some delays. ROW clearing on the 500 kV line has now been completed for segment N2 and is 99% complete for segment N3. Segments N1 and C1 are not far behind at over 90% cleared (Table 3-1 Construction Progress on the 500 kV Transmission Line). Clearing did begin on a 10 km section of S1 in November 2015. Tower foundation and anchor installation began on the three northern segments N1, N2, and N3 with 64% completion for N2, almost half for N3 and 14% for N1. Clearing was completed for the five AC collector lines in the 2014 season and work began on tower footings and foundations with tower assembly and installation scheduled for early 2016. Construction power line KN36 was completed in 2014.



**Photo 6 Transmission Line clearing using rotary blade on an excavator**

Several minor route revisions were investigated and environmental approvals were sought including one revision near the Assiniboine River in segment S1 to reduce potential effects on a small creek valley. The property acquisition process continued in southern segments with over 80% of private land rights obtained as of the end of October 2015.

**Table 3-1 Construction Progress on the 500 kV Transmission Line**

Section	Centerline	Full Width Clearing	Total Area Cleared	All Foundation/ Anchor Installation	Tower Erection	Stringing
N1	98%	90%	92%	14%	0%	0%
N2	100%	100%	100%	64%	0%	0%
N3	99%	99%	99%	48%	0%	0%
N4	99%	49%	67%	0%	0%	0%
C1	83%	55%	65%	0%	0%	0%
C2	100%	92%	95%	0%	0%	0%
S1	0%	0%	0%	0%	0%	0%
S2	0%	0%	0%	0%	0%	0%

## 4 BIOPHYSICAL MONITORING PLAN OVERVIEW

Manitoba Hydro developed a draft Biophysical Monitoring Plan (BMP) as part of its environmental commitment and to meet requirements of the *Environment Act* licence for this Project. Manitoba Hydro has been implementing the draft plan over the past two years. On December 30, 2015, the BMP was formally approved with one exception by Manitoba Sustainable Development.

The scope of the BMP includes physical and biological components of the environment. The purpose of the BMP is to identify the key activities that will be conducted as part of the monitoring and follow-up component of the Environmental Protection Program that will verify potential effects and effectiveness of mitigation.



The objectives of the BMP are to:

- Confirm the nature and magnitude of predicted environmental effects as stated in the EIS;
- Assess the effectiveness of mitigation measures implemented;
- Identify unexpected environmental effects of the Project, if they occur;
- Identify mitigation measures to address unanticipated environmental effects, if required;
- Confirm compliance with regulatory requirements; and
- Provide baseline information to evaluate long-term environmental changes or trends.

Environmental components requiring follow-up monitoring and discussed further in this annual report include:

- Aquatics;
- Groundwater;
- Mammals;
- Soils and Terrain;
- Terrestrial Ecosystems and Vegetation;
- Reptiles;
- Birds;
- Access; and
- Heritage



**Photo 7 An American White Pelican is a colonial water bird found in the project area**

### **Adaptive management**

A key component of monitoring and collection of environmental data is the ongoing review of the information as it is collected. Issues can be identified and acted on through an adaptive management framework. Plans are developed in response to unexpected environmental effects or ineffective mitigation. Actions prevent further damage and ensure ongoing activities are mitigated. Manitoba Hydro's adaptive management is a responsive process that involves effective analysis, planning and timely implementation.

## 2015 Biophysical Monitoring Highlights

Key monitoring highlights during this reporting period described in further detail in this document include:

- Wolf predations continues to be the greatest source of mortality for collared caribou.
- Wolf distribution not extensively overlapping caribou winter range in the Wabowden area.
- Data suggests clearing in the Wabowden area did not increase ROW avoidance for Boreal Woodland Caribou (BWC).
- BWC population sizes by range determined using non-invasive genetic screening (NGS).
- Moose population estimates and models show declining population trends in three areas of interest prior to construction.
- No evidence of expansion of white-tailed deer range.
- High success rate was achieved in protecting known vegetation species of concern on rights-of-way cleared in 2015 similar to 2014 results.
- Pre-construction site surveys for Species of Conservation Concern (SOCC) in Assiniboine River Valley identified 17 species with over 200 occurrences recorded and protected.
- One threatened plant species discovered on the ROW south of the Assiniboine River.
- 326 stream crossings were surveyed in 2015. 84% were in full compliance of all environmental protection measures.
- Re-inspection of nine stream crossings verified restoration.
- Survey crews did not observe any prairie skink, garter snakes, or hibernacula at any of the tower locations surveyed.
- A total of 157 bird species were recorded during the 2015 bird monitoring program of which 76 species are considered species of conservation concern.
- Environmentally Sensitive Sites requiring bird diverters increased from 56 sites in 2014 to 72 following spring and summer surveys.



## **5 IMPLEMENTATION OF MONITORING AND FOLLOW-UP ACTIVITIES**

Environmental monitoring has been implemented for the Bipole III Transmission Project to verify the accuracy of the environmental assessment and the effectiveness of mitigation measures in protecting the environment. Manitoba Hydro has hired full-time staff for the implementation of the Biophysical Monitoring Plan, funded participation of community environmental monitors, and retained qualified specialists in appropriate disciplines. Manitoba Hydro's Environmental Protection Information Management System (EPIMS) also plays a major role in managing the BMP implementation, coordination of field work, data collection and communications amongst the monitoring team.

### **5.1 Environmental inspection staff**

Reporting to a Senior Manitoba Hydro Environmental Assessment Officer, multiple on-site Construction Environmental Inspectors are trained and working in all active areas during project construction. In addition, Manitoba Hydro's Licensing and Environmental Assessment Department provides advice and guidance to the on-site Environmental Inspectors and Site Environmental Officers for potential non-compliance situations, and environmental incidents or emergencies.

### **5.2 Community liaisons and environmental monitors**

In addition to providing employment and business opportunities through the Project, Manitoba Hydro is committed to engaging local community-based environmental expertise during the construction of the Bipole III Transmission Project. Manitoba Hydro is funding qualified and interested individuals from Indigenous communities to work as Environmental Monitors and Community Liaisons. The Environmental Monitors assist in undertaking daily inspections with Environmental Inspectors during construction of the Project and collect monitoring information in support of Manitoba Hydro's biophysical and socio-economic effects monitoring programs. As of March 2015, Manitoba Hydro had seven Environmental Monitor positions filled.

To facilitate communication with in-vicinity Indigenous communities, Manitoba Hydro has also funded Community Liaison positions. These positions allow the communities to have one of their own members on-site to observe construction and then report back to their community on work progress and environmental protection. The Community Liaisons also contribute to the monitoring of some socio-economic metrics for the Project. Manitoba Hydro uses this transparent approach to ensure the community is well informed and can participate in monitoring with innovative approaches and remedies to protect the environment and people. As of March 2015, Manitoba Hydro had 12 Community Liaisons positions filled.

Many of the community members employed as Community Liaisons and Environmental Monitors are trappers and/or resource users and bring knowledge of the local landscape. Manitoba Hydro staff heard from some of the Environmental Monitors and Community Liaisons that they enjoy going out in the field to help with wildlife monitoring and are appreciative of the opportunity. Manitoba Hydro also received tremendous value from these staff.

A few examples of work conducted by some of the Community Liaisons and Environmental Monitors through construction to date include:

- Reviewing sensitive Caribou areas with Natural Resource Office officials;
- Observations of construction activities (i.e., clearing, tower and anchor installations);
- Wildlife observations;
- Participation in tailboards;
- Conducted wildlife ground transect surveys;
- Participated in heritage resources investigations;

- Flagging sensitive sites (including heritage and cultural sites of importance); and
- Review buffer zones.

### 5.3 Data management

As the Project's BMP requires and generates large amounts of data, an on-line system was developed to manage, store and facilitate the transfer of Environmental Protection Program information amongst the Project team. The Environmental Protection Information Management System (EPIMS) facilitates the transfer of knowledge and data recorded on a daily basis during construction activities from Environmental Inspectors and community Environmental Monitors to specialists that are responsible for monitoring project effects on a real time basis. As well, monitoring results and adaptive mitigation measures will be communicated back to construction staff and contractors for implementation.

### 5.4 Specialist technical data reports

Detailed monitoring data collected in support of the Bipole III Biophysical Annual Monitoring and Mitigation Report is compiled from supporting technical reports prepared by discipline specialists. Technical biophysical monitoring reports were prepared for the 2015 construction season for Aquatics, Birds, Mammals, Vegetation, Reptiles, and Heritage.

## 6 ENVIRONMENTAL COMPONENT MONITORING



**Photo 8 Aerial monitoring surveys for Moose in the Project area**

Multiple environmental components were identified for follow-up in the EIS and technical reports as well as the Clean Environmental Commission Report, *The Environment Act* licence and through Indigenous engagement activities. For each environmental component, one or more environmental indicators were selected to focus monitoring and follow up efforts as indicated in the BMP.

The environmental components to be monitored over the life of the monitoring program are listed in

Table 6-1 Monitoring Activities in 2014 by Environmental Component. The column on the far right of the table specifies the monitoring activities that were undertaken to October 31, 2015. These components are being monitored due to their environmental, social, regulatory and cultural importance.

In recognition of the potential impact of the Project on Indigenous people, monitoring components were included to the monitoring plan including: plant communities of importance to Indigenous people, access management, and furbearer and trap line monitoring. This will enhance understanding of the effects transmission facilities can have on blueberries, medicinal plants, access for resource use, furbearer behaviour and trapper success.

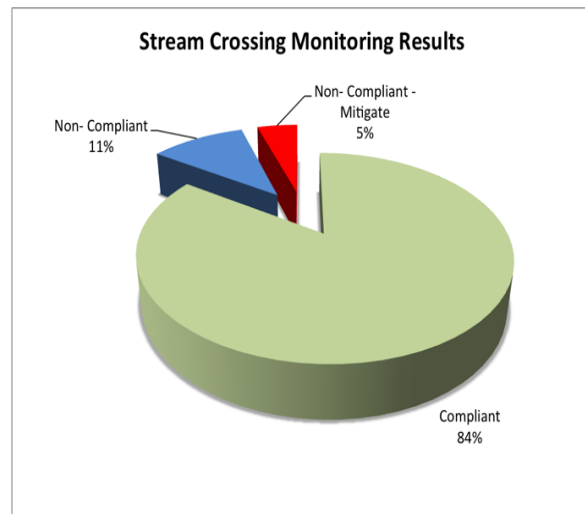
## 6.1 AQUATICS

One of the main risks to existing fish habitat from transmission line construction is damage to stream banks and riparian vegetation leading to loss of cover and in-stream sediment delivery. In recognition of this, mitigation measures were prescribed to protect streams and habitat. The monitoring program for this component is focused on evaluating the effectiveness of mitigation at stream crossings and prescribing any remedial actions.

### 6.1.1 Stream crossings

During this annual reporting period, stream crossing sites were evaluated using Manitoba Hydro's Daily Inspection Reports and site visits in the summer of 2015 to assess the adherence to prescribed mitigation.

Monitoring activity was greatly expanded for stream crossings in 2015 as clearing and construction work accelerated from the start-up winter in 2013 - 2014. Aerial surveys were conducted on 326 crossings in June 2015 allowing some re-vegetation to occur after the winter construction period. Ground surveys were conducted on a subset of stream crossings that had higher valued fish habitat or a non-compliance issue identified during the aerial reconnaissance. Nine of the inspections included follow-up visits based on 2014 monitoring report results for the northern AC collector lines in the Keewatinohk area. The ground surveys consisted of evaluating the stream crossing sites against the list of prescribed mitigation to determine level of compliance as well as recording observations of the conditions of sites. Riparian buffers, vehicle crossings, tower and anchor locations, and rutting and erosion were some of the parameters evaluated. Construction at most stream crossings was compliant with prescribed mitigation. Of the 37 sites that were non-compliant follow-up remediation is recommended at 16 sites or 5% of the 326 sites surveyed (Figure 6-1 Stream Crossing Monitoring Results).



**Figure 6-1 Stream Crossing Monitoring Results**

The most frequent non-compliance measure related to exposed soils along the stream banks or within the buffer zones (13 sites). Slash used in temporary stream crossing construction or felled trees across the channel potentially inhibiting flow (seven sites) and excessive clearing of the riparian buffer (nine sites) were the other two common measures not in compliance. Remediation measures included erosion control measures at seven of the 13 sites, removal of the slash/trees from four sites, and active re-vegetation of two sites. Follow-up visits at an additional three sites were conducted to evaluate bank stability.

**Table 6-1 Monitoring Activities in 2014 by Environmental Component**

Component	Environmental Indicator	Monitoring Status in 2014
Aquatics	Fish habitat	Survey of 326 stream crossings
	Water quality	Keewatinohk area turbidity monitoring
Groundwater	Water level and quality	No results in 2015
Mammals	Caribou	Satellite tracking program for range size and habitat use, and zone of influence analysis
		Caribou range population sizes estimated from Non-invasive Genetic Screening.
		Calf survival and recruitment survey
		Collared caribou mortality surveys
		Winter track surveys and remote IR camera surveillance
	Moose	Moose population model development for three areas of interest in the Boreal Plain Eco-region
		Aerial distribution surveys in four ranges
		Winter track surveys and remote IR camera surveillance
	Deer	Winter track surveys and remote IR camera surveillance
	Elk	Winter track surveys and remote IR camera surveillance
	Grey wolf	Aerial distribution surveys in four caribou ranges
		Winter track surveys and remote IR camera surveillance
	Black bear	Remote IR camera surveillance
		Keewatinohk on-site monitoring
	Furbearers	Establishment of baseline data on fur harvest and trapper participation
		Keewatinohk on-site monitoring
Soils and Terrain	Permafrost	No monitoring activities conducted this reporting period
	Soil productivity	No monitoring activities conducted this reporting period; only applicable to transmission line segments N4, C1, C2, S1 and S2
Terrestrial Ecosystems and Vegetation	Species of conservation concern	16 sites re-visited to determine species survival
		Pre-construction survey of un-cleared ROW in the Assiniboine River valley.
	Plants/communities important to Indigenous people	Continued monitoring of ten sampling sites at the Cowan blueberry resource area.
	Terrestrial vegetation	15 sites re-visited along cleared ROW for differences in species composition and abundance
	Wetlands	7 Patterned fen wetland sites were surveyed including repeat visits to 3 sites from 2014
	Invasive and non-invasive species	38 sites surveyed including 17 sites from 2014.
	Native grassland/prairie	9 sites evaluated and inventoried to provide baseline for future monitoring.

Component	Environmental Indicator	Monitoring Status in 2014
Reptiles	Northern prairie skink habitat	Surveys at tower sites in segment S1
	Red-sided garter snake dens	Pedestrian surveys conducted at tower locations overlapping potential habitat in segment C1
Birds	Bird wire collision	Environmentally Sensitive Sites (ESS) were evaluated for collision potential.
	Bird species of conservation concern	Surveys of bird species of conservation concern
	Sharp-tailed grouse Leks	Aerial and ground surveys
	Active bird nests	Pre-construction survey for stick nests
		Environmental Monitor observations
	Birds of prey	Funding of PhD study on Peregrine Falcons
Access	Humans	Access cameras deployed on access points along cleared ROW
Heritage		Heritage site surveys

As a result of recommendations in the 2014 monitoring report nine sites were re-visited on the Construction Power Line in 2015, where excessive vegetation clearing, rutting or bank damage had left areas of exposed soil. Erosion was not observed and natural re-vegetation was occurring at all sites surveyed in 2015. In 2014 an area of sediment deposition was observed in the creek at CLCP-Aqua-113. The re-inspection showed that no new sedimentation was occurring and the previous accumulation was no longer apparent. The follow-up inspection of crossings on the Construction Power Line that occurred during clearing and foundation work in 2013/14 required no further remediation and the potential impact on fish habitat was minimal. The monitoring results so far are indicating that at a large majority of crossings, most mitigation is being implemented but more importantly the negative environmental effects have been minimal for sites where non-compliance issues were identified. Rehabilitation work and follow-up monitoring has provided assurance that Bipole III construction is meeting environmental and regulatory objectives. MSD has conducted inspection of the ROWs and found them to be in compliance with the work permit and Environment Act licence conditions.



**Photo 9 Erosion Control Blanket installed at Mitishito River crossing.**

### 6.1.2 Water quality

Construction can disturb soils and leave it exposed to erosion and movement through site drainage and runoff. The requirement for water quality monitoring was targeted at several specific sites to ensure appropriate erosion and sedimentation mitigation measures were in place and effective at preventing sediments from entering local fish bearing streams in the Keewatinohk construction area.

Erosion and sediment control measures installed at the Keewatinohk converter station in 2014 were monitored for effectiveness in 2015. Installed measures included rock lining of collector drains, use of rock berms, and natural contouring of landscape as well as silt fencing, coconut fibre mats and permanent geo-textiles. In addition to





**Photo 10 Damaged erosion control blanket on Keewatinohk Converter Station perimeter.**

inspections a turbidity monitoring program was implemented in 2015 to determine how effective the measures were at keeping sediment out of site drainage. A total of ten stations were monitored after five significant rainfall events. Turbidity measurements showed rainfall impacts to waterways and ditches were minimal for small precipitation events. Several larger events on June 14 and August 29, 2015 caused some site damage and sediment runoff which was reflected in the water quality readings. Widespread erosion was observed on the parking lots, dirt roads, and unprotected ditches. It was also noted that erosion and sediment control measures require maintenance and replacement to create permanent solutions. Overall, the monitoring program has shown that for most precipitation events little sediment is moving through the drainage systems as evidenced by relatively low

turbidity readings, however for sudden intense storms additional measures need to be implemented to reduce potential water quality impacts.

## **6.2 MAMMALS**

Potential effects of the Project on mammals were a major focus of the biophysical assessment especially for moose and boreal woodland caribou, a threatened species. Both species are currently in low numbers in vicinity of some of the Bipole III route. Additional study and monitoring is being conducted to assess if adequate mitigation is in place to minimize effects of the Project on mammals.

The overall objectives of the mammals monitoring program are to expand baseline knowledge, ensure compliance with regulatory requirements and EIS commitments, monitor and measure mammal responses to ROW creation and operation, and assess success of mitigation measures.

In addition a Moose and Woodland Caribou Sensitive Range Delineation and Mitigation Plan has been developed and approved by MSD in accordance with Clause 20 of the *The Environment Act* licence for the Project. Specific mitigation measures have been developed within these sensitive ranges. These plans include measures such as modified ROW clearing, maintaining natural cover in wildlife corridors, and controlling ROW access within the sensitive ranges.

### **6.2.1 Moose**

Data review continued for moose monitoring in 2015 with focus on three main areas in the boreal plain ecozone at Tom Lamb WMA, Moose Meadows, and Pine River. An aerial survey was planned for the porcupine hills area to establish a reference population but low snow depth cancelled the survey. The focus of 2014 – 2015 work was to develop discrete population models for each population of interest using historic census and other data to use as baseline and evaluate change to the populations as new survey data becomes available in future years.

The 2012 aerial survey in Tom Lamb WMA produced an estimated population of 317 moose (+/- 32%). Results showed that there are a disproportional number of males to females and low calf recruitment rates indicating a downward trend in population growth rate. This information was collected in collaboration with Manitoba Sustainable Development, who may use it to adjust moose management in this region.

Moose Meadows is a low lying area considered to be a sensitive winter foraging refuge for moose moving off of the east slopes of the Porcupine Hills, as well as a spring moose calving area. Moose Meadows represents a small portion of GHA 14 and tends to fluctuate in numbers depending on snow conditions in the Porcupine Hills. There is no specific population monitoring for this area as it is included in area survey for GHA 14. As a population monitoring unit, moose in GHA 14/14A have experienced a significant decline beginning in the early-1990s from approximately 3,300 animals to the current level of about 150 moose.



**Photo 11 Moose spotted during wildlife monitoring program**

Pine River (GHA 14A/19A) represents a sensitive local moose population that potentially interacts with the Bipole III ROW. Moose population demographic data is limited for this population, but based on modelling of available survey data, it appears the population significantly declined from a high of 1,047 moose in 1991/92 to 213 in 2001/02, and has remained at a low level. The winter population was assessed to be about 100 moose (0.032 moose/km<sup>2</sup>) in January 2014.

Future population monitoring will serve as part of the evaluation of potential transmission line effects on moose. A moose collaring program has not occurred, and efforts to finalize the moose monitoring plan are ongoing. To date, Manitoba Hydro has not needed to make any project related adjustment due to moose related concerns. It is important to note that moose populations declines were experienced prior to the development of this Project. Manitoba Sustainable Development continues to be the authority responsible for moose management, and is leading the effort to recover moose populations in western Manitoba.

## **6.2.2 Boreal woodland caribou**

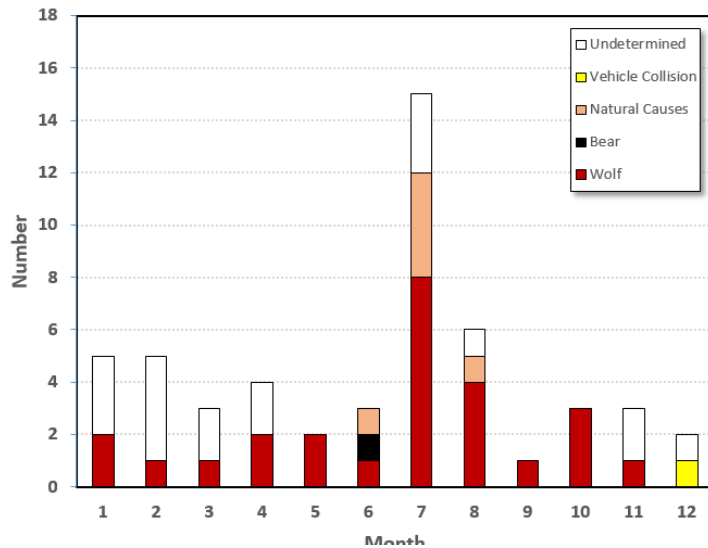


**Photo 12 Boreal Woodland Caribou captured, collared and released.**

Boreal Woodland Caribou (BWC) is a threatened and a highly valued environmental component of the landscape. During 2014 – 2015 extensive baseline data collected since 2009 was reviewed to establish a survey design for on-going tracking of BWC. The objectives of further study and satellite tracking includes determining movement and habitat use, as well as return to preferred site (philopatry), and the zone of influence of the Bipole III project. The data obtained from the satellite collars placed on adult female caribou also provides information on population abundance and structure. The studies require that a minimum of 20 collars need to be active in the four caribou ranges being monitored. Maintenance of collar numbers involves on-going live capture of animals and collar placement which was done in 2015.

The Bipole III transmission line intersects three BWC ranges The Bog (P-Bog), Naosap-Reed (N-Reed), and Wabowden along with the fourth range (Charron Lake) is used for comparison to the potentially affected herds in the other three ranges. The satellite surveillance in 2015 confirmed range size and site fidelities for all ranges with the Charron Lake range having a much larger area and higher population than the other three ranges. Animals exhibited a strong affinity to return to previous calving sites and tend to spread out more as part of their predator avoidance strategy against wolves and black bears. Results also showed that the collared animals return to general

wintering areas but not precise locations like they do for calving sites in May.



**Figure 6-2 Boreal Woodland Caribou Mortality by Source (2010-2015)**

The tracking data also showed that caribou behaviour in general was not significantly different between three ranges in the Bipole III area versus the Charron Lake area indicating similar pre-disturbance conditions which will be important for future data analysis and comparing post construction conditions.

The satellite collars also provided data on the response of BWC to construction and clearing of the ROW in the “Zone of Influence” (ZOI). This was only possible at Wabowden in 2015 as clearing had not touched the other two caribou ranges in the project area. In that area the ROW parallels an existing rail line expanding the overall right-of-way already present. Results suggest caribou spend less time in proximity to the ROW in the 1 – 2 km range both in the pre-construction and construction phases. The data so far does not suggest that the ZOI has

increased in size in response to construction activities. More monitoring data will be required to verify whether there is a response to the transmission line construction.

Non invasive genetic sampling is a mark and recapture technique to estimate populations size and growth trends. Caribou fecal pellets are collected during the winter and genetic screening is the mark or identifier for the individual caribou. Repeated sampling and data analysis estimates the population for a particular caribou range. The Non-Invasive genetic screening (NGS) methods estimated the populations for the four herds being monitored. The smallest population was the P-Bog range at 149 animals and the largest was the Charron Lake range at 1,550 animals. Although this method can be used for determining population trend additional data will be required. However, calf recruitment estimates (Calves /100 females) suggest a stable to increasing population in the Charron Lake range, stable populations in the P-Bog and Wabowden range, and a decreasing population in the N-Reed range. Recent forest fires in the N-Reed core winter range may be a contributing factor for the suspected declining population trend.

Mortality investigations of collared boreal caribou continued in 2015 when a mortality signal from an active satellite collar is received. As shown in Figure 6-2, almost 80% of recovered collars indicated death by predation. Wolves were the most frequent predator to take down a collared caribou accounting for three quarters of all mortalities. There was only one confirmed kill by black bear indicating the limited impact this species has on caribou predation and population. It was also noted that it is highly unlikely these kills were influenced by the presence of the transmission line ROW. The closest collar recovered was almost 4 km from the line and the majority were over 15 km away.

Predation is the limiting factor for BWC populations and they have selected habitat and devised predator avoidance strategies that separate them from other ungulates and their predators. Changes to winter range location and size of winter range can be an indicator of impacts on the predator-prey relationship that could be related to new projects by creating new access or improved hunting advantage for predators. Predation risk was evaluated from collected data in 2015 by comparing the locations and density of wolves to caribou and moose. The survey data suggests that predation risk to boreal woodland caribou was significantly greater than for moose within the N-Reed and Charron Lake caribou survey blocks. In the Wabowden range area, moose were at greater predation risk than caribou with respect to distance to wolves.

Caribou and wolf relationships will be monitored in future years to evaluate project related effects or need for adaptive management. Surveys, data collection and analysis are all important activities for meeting the commitments of the BMP. This work is being done to monitor and measure distinct populations and evaluate the impact of the transmission line on BWC habitat, movement, and life cycles.

To date, Manitoba Hydro has not need to be make any project related adjustment due to caribou related concerns. Manitoba Sustainable Development continues to be the authority responsible for BWC management, and is leading the effort to maintain BWC populations across Manitoba.

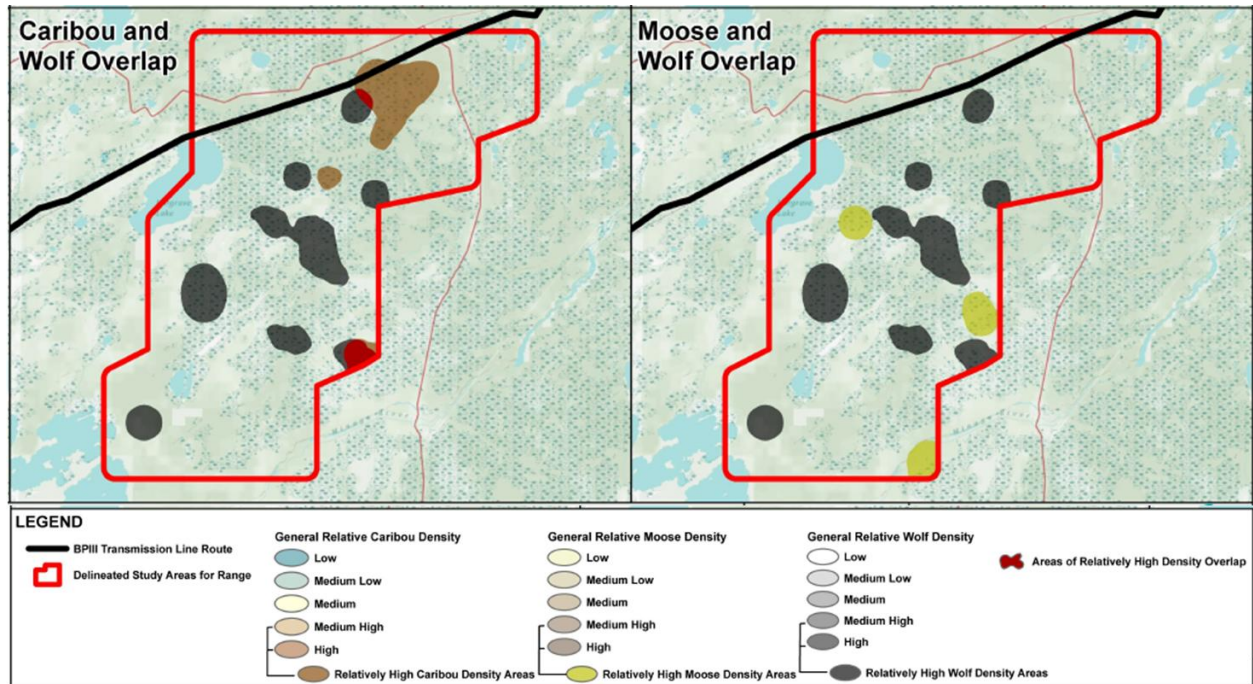


Figure 6-3 Caribou and Moose overlap with wolf densities in Wabowden area



### 6.2.3 White-tailed deer and elk

In terms of addressing the monitoring requirements to answer questions about the impacts and effectiveness of mitigation, multispecies surveys and field IR cameras (camera traps) are used to monitor occurrence and expansion of white-tailed deer range into new areas. Range expansion could bring disease and predators with them that could affect moose and BWC and increase their mortality rates. In the aerial 2014 – 2015 transect surveys in construction segments N2 and N3 no deer were recorded. Similarly in winter ground track surveys conducted in construction segments N2 and N3 no elk were recorded.

Thirty-seven remote IR cameras were also deployed in N2 and N3 in March 2015 along the ROW and within 1.5 km of the ROW. Preliminary review of some images from the cameras did not identify any white-tailed deer or elk suggesting that their range has not expanded to date. Further analysis of all camera data is required to confirm. As elk monitoring is only considered in more southerly segments no new data was collected relative to elk in 2015.

### 6.2.4 Grey wolf



Monitoring in relation to this species centered on any change in predator–prey relationships as a result of the Bipole III ROW. Survey data was used to compare densities of wolves in proximity to moose and caribou concentrations. As reported earlier, wolf overlap created higher risk for caribou than moose in two ranges. In spite of this, the predation risk did not seem related to the ROW as most mortalities occurred greater than 15 km from the ROW. In the Wabowden range, wolf tended to be closer to moose occurrence in the area than wintering woodland caribou nearer to Ponton. Wolf occurrence, density and habitat use will continued to be monitored for potential interactions with moose and BWC.

**Photo 13 Wolves captured on deployed trail cameras.**

### 6.2.5 Black bear



The BMP requires monitoring on black bear to evaluate the predator prey relationship and the potential for the transmission line ROW to improve bear access to BWC in calving areas. A combination of BWC mortality investigations collar recoveries and remote IR cameras are used in monitoring activities. Only one caribou mortality due to bears was recorded of the 10 collar recoveries made in 2015 for the N-Reed range of caribou. This was the only incidence of bear predation in all of the 52 collars recovered in 2015 for a very low incidence of BWC predation by black bear. Four observations were made of black bear in one remote camera placed off the ROW and no observations from on ROW

**Photo 14 Black bear live-trapped and released.**



cameras, although the data is preliminary. Full review of all camera data for 2015 has not been completed. During construction in segment C1 a black bear den was discovered.

#### **6.2.6 Fur-bearers**

Monitoring work on fur-bearers began in 2015 with an assessment of pre-construction data on fur harvest levels in relation to the Bipole III transmission line. Beaver, marten, fisher, and wolverine, are valued species for trappers and resource harvesters. The intent of the monitoring program is to determine if there are any effects on distribution of these animals from Bipole III due to noise disturbance, habitat change, or depletion in number from the new access a ROW will create for other harvesters and predators. A baseline on fur production and number of harvesters has been established up to 2012 for the project area and will be updated with new data. Comparisons will be made to this pre-construction data once several years of post-construction data are obtained and assessed, which will provide an indication of any alteration in species distribution and abundance.

Winter ground surveys conducted in 2015 in construction segments N2 and N3 detected most of the expected furbearing species including marten/fisher, wolf, fox, otter and mink, as well as ungulate species including moose and caribou. One wolverine was recorded on N3. Statistical analysis cannot be undertaken on temporal trends in species relative abundance or local occurrence until more data is acquired during the 2015/16 winter field season.

#### **6.2.7 Wildlife interactions and mortalities**

An occupied black bear den was encountered during the clearing construction in segment C1 in February 2015. Four bears (an adult female and three cubs) were observed leaving a den that was disturbed by a mulching machine. The machine operator immediately stopped operations and withdrew from the location. The right of way road near to the den site was immediately closed to vehicle access in order to minimize any potential for further disturbance. Upon inspection it was found the den located in a snow covered willow was found to be intact and unaltered by mulching operations. The bears returned to the den by the late afternoon of the same day.

At the Keewatinohk Converter Station black bear – human interactions in the work areas during the spring summer can be dangerous. To reduce the occurrence of bears in the Project footprint, additional measures were implemented with respect to food and waste handling which reduces wildlife attraction.

Site specific bear awareness training was also provided to project personnel. Live bear traps were deployed when other measures were not effective. One bear was live trapped and relocated away from the Keewatinohk Converter Station Lodge (Photo 3-1) and five other animals were removed from the Sundance Camp – a temporary work area located approximately 20 kilometers south of the Keewatinohk security gate.

During the off season, Manitoba Hydro deployed live traps to capture and relocate additional problem wildlife. Two foxes and one marten were successfully relocated away from the Keewatinohk Project site.

At the Riel Converter Station, numerous migratory birds were regularly observed including Canada goose, Killdeer, numerous gulls (Franklin, Bonaparte, ring-billed, herring), blackbirds (red-winged, grackle, Brewers, cowbird), barn swallow, and savannah sparrow. Additionally red-tailed hawk, osprey, and bald eagles were sporadically observed around site with one incidence of a Common Nighthawk being observed outside the construction area in the parking lot. An osprey pair tried, without success, to nest on a distribution line, but the wind seemed to preclude nest development.

A simple deterrent program was put in place for avian management on-site. Mitigation measures included setting out nine prowler owls, a coyote decoy, some silver sparkling tape, plus walking and vehicular patrols of the construction site to deter birds from nesting. The prowler owl and coyote decoys with location rotation and patrols were effective in deterring birds from nesting once in place.

### 6.3 TERRESTRIAL ECOSYSTEMS AND VEGETATION

Protection and re-establishment of vegetation in cleared areas continued to be monitored and evaluated in 2015. The monitoring activity included surveys for forested areas, wetlands, native prairie, invasive and non-native species and rare plants or species of conservation concern (SOCC). As of 2014 over one hundred line surveys were conducted in the Project area. Surveys and results are summarized in Table 6-2 Terrestrial Ecosystem and Vegetation 2015 Monitoring Summary.

**Table 6-2 Terrestrial Ecosystem and Vegetation 2015 Monitoring Summary**

Component	2015 Activity	Results
Native Grassland/ Prairie	<ul style="list-style-type: none"> <li>9 sites surveyed pre-construction in S1</li> </ul>	One site found suitable to establish as project monitoring site
Species of Conservation Concern	<ul style="list-style-type: none"> <li>9 surveys in Assiniboine River area in segment S1</li> <li>16 sites re-visited from 2012 and 2013 surveys</li> </ul>	<p>36 species of conservation concern identified One threatened species found</p> <p>All but one species was found again in the follow-up surveys. Indicates high success rate of plant survival after clearing.</p>
Wetlands	<ul style="list-style-type: none"> <li>7 sites with Patterned Fens visited. 3 of them for follow-up from previous surveys</li> </ul>	<p>Species richness, diversity and evenness were not significantly different between on and off ROW sites indicating limited effects of clearing.</p> <p>Generally low disturbance effects on wetlands. 15.2 hectare had moderate level of disturbance.</p>
Invasive and Non native	<ul style="list-style-type: none"> <li>38 sites (76 surveys) were investigated with paired comparisons on and off the ROW</li> </ul>	<p>One or more invasive or non-native species was recorded in 36 out 76 surveys.</p> <p>In follow-up surveys, only three sites were recommended for vegetation management to control invasives.</p>
Plant Communities Important to Indigenous People	<ul style="list-style-type: none"> <li>10 sites were visited</li> <li>8 surveys</li> </ul>	Two blueberry plant species were identified in the eight surveys. Area coverage by blueberry was quite low in the surveys.
Terrestrial Vegetation	<ul style="list-style-type: none"> <li>15 sites re-visited.</li> <li>9 new sites added</li> </ul>	<p>Up to 30% increase in cover over one year on cleared ROW.</p> <p>No change in species diversity between 2014 and 2015.</p>
Site Rehabilitation	<ul style="list-style-type: none"> <li>General aerial survey</li> <li>Re-visit to two river crossing sites</li> </ul>	The Mitishito River and the Hunting River crossings were inspected. It was found that previously installed erosion control measures were effective.

#### 6.3.1 Native Grassland/Prairie

Native grassland/prairie is a rare vegetation community type requiring conservation and protection and was designated an Environmentally Sensitive Sites (ESS). Nine sites were visited in 2015 and assessed for their potential to establish a monitoring site prior to clearing in the S1 construction segment where this unique habitat type occurs. A single suitable site was found of dry upland prairie and baseline measurements were made of species composition, richness and diversity. Four rare to uncommon species were also identified at the selected site. Future monitoring will evaluate the potential effects and effectiveness of mitigation on this ESS.

### 6.3.2 Species of conservation concern

Pre-construction site surveys continued in 2015 with a focus on the Assiniboine River valley where the route passes through mature deciduous forest. Frequent observations of SOCC were made along the nine surveys, mostly under the canopies of the mature forests. Seventeen SOCC were recorded in this area ranging from very rare to uncommon in occurrence. Over 200 observations were made and recorded of these species. The abundance and variety of SOCC species in this area make it one of the richest rare plant sites along the Bipole III transmission line route.



**Photo 15 - Hairy sweet cecily a threatened species found in Assiniboine River Forest.**

Part of the survey included a route modification on the north side of the Assiniboine River to avoid a steep creek valley and mature black ash and oak forest. The new route turned out to be a much better choice in terms of the presence of SOCC species as only seven were recorded.

A total of thirty SOCC (ranking S1S2 through S3S4) were recorded during surveys and sampling in 2015. In one case, Silky prairie clover, a species listed as threatened, was found on the ROW south of the Assiniboine River. This location was designated as an ESS, and a construction buffer was applied around the plant. Construction crews will be required to exercise caution when working around this site.

Sixteen sites were re-visited to monitor species survival from previously surveys in 2012 and 2014 along the northern AC Collector Lines, Construction Power Line, Ground Electrode Line, and along the main Bipole III transmission line ROW. Species of conservation concern monitored within the ROWs were observed again in 2015, except for northern slender ladies'-tresses (*Spiranthes lacera*) at a site in C1 segment. This species is ranked uncommon to widespread (S3S4) and not considered an issue as a result of ROW clearing. Conditions actually improved for white beakrush an S3 ranked species, which was observed by the hundreds on the AC Collector Line ROW. Mitigation measures for the protection of species of conservation concern that include establishing a 5 m buffer zone around plants seems to be quite effective at retaining the occurrences of these rare and valued species.

Only newly cleared sites that were previously known to support species of concern are monitored for mitigation. Manitoba Hydro applies mitigation to sites that support very rare (S1) to rare (S2) species of conservation concern. As a result, no new sites within the ROW were monitored for mitigation compliance in 2015.

### 6.3.3 Plant species important to indigenous people

The Cowan resource area, a highly valued site for natural blueberry production, was surveyed for potential changes after the area was cleared in the winter of 2014 – 2015. Ten sites were visited to sample vegetation in the Cowan Blueberry Resource Area in segment C1. Eight surveys were conducted in the



**Photo 16 Cleared ROW after 1 year**

cleared areas of the zone. Two species of blueberry plants were observed during the surveys: velvetleaf blueberry and low sweet blueberry - but at only two of the eight sites surveyed, with total blueberry cover averaging 1.5% within the surveyed sites. Species occurrence of the two blueberry species seemed to change between years as one site recorded an increase in occurrence and the other a decrease. Low sweet blueberry also did not recur in two plots where it was noted in 2014. Future monitoring will help determine the effects of clearing and recovery of blueberry in the resource area.

### 6.3.4 Terrestrial vegetation

This monitoring component was to determine the changes in species composition and abundance from the clearing of approximately 3,300 ha of upland forest for the Bipole III Transmission Project. Following up on the monitoring begun in 2014, 15 sites were re-visited and an additional nine sites added for on-going monitoring. As expected on and off ROW sites differed significantly for number of species and percent cover. In comparison to 2014 data at the same locations, some sites showed an increase in cover greater than 30% over one growing season. There was generally no change in species diversity from 2014 to 2015 for the on ROW sites.

The predicted effects of the Project on terrestrial vegetation remain true in terms of loss of native forest vegetation and temporary reduction in vegetative cover. Mitigation measures seem to be effective in reducing impacts and allowing for timely regeneration of vegetation on cleared ROWs. Tree and shrub roots were much less exposed from clearing than some areas cleared in 2014 due to a recommendation from the 2014 monitoring report, and greater depth of frost in the ground when clearing was conducted. It was also noted that only the ROW was cleared and trees were felled into the ROW as per forest clearing prescriptions.

### 6.3.5 Wetlands

Patterned fens, a wetland type, were designated as ESSs in the Bipole III environmental assessment due to their uniqueness and sensitivity to disturbance. They occupy approximately 535 ha of area along the right-of-way. Seven sites were visited in 2015 including repeat visits to three sites monitored in 2014. There was no significant difference in species diversity measures on the ROW versus off the ROW although there was a trend towards great plant cover and species richness off the ROW. This was due to the removal of sparse tree and shrub cover, and a decrease in moss cover on the ROW. Similar to 2014 results, clearing had minimal effect on species diversity, evenness, or richness indicating the limited effects of clearing. In comparison to 2014 sites, the 2015 sites had slightly less plant cover on the ROW potentially related to greater snow depth providing protection in the previous year.



**Photo 17 Some ground disturbance in wetland area**

Generally the wetlands sites showed low disturbance and the overall effect was largely seen as a change in appearance from the clearing work. There were, however, wetland sites that exhibited moderate disturbance from shearblading tree removal. Natural re-vegetation is expected to occur at these wetland sites and will be monitored over successive years.



### 6.3.6 Invasive and non-native species

Monitoring continued in 2015 to determine the effect of clearing on the presence and potential spread of non-native and invasive species. The removal of native vegetation on the ROW and exposed soil from clearing activities provide an opportunity for these species to establish and proliferate. Thirty-eight sites were visited in 2015 for a total of 76 surveys. One or more invasive or non-native species were recorded in 36 surveys throughout the Project area, 63% of on ROW surveys and 57% of off ROW surveys. A total of 20 invasive and non-native species were recorded in the sites surveyed with a higher presence of species and percent cover for off ROW sites, showing some of the effects of clearing. Winter clearing and equipment cleaning between sites has helped reduce the incidence and spread of these species.

Seventeen sites were re-visited in 2015 to see re-vegetation results between successive years. Six non-native species recurred but results generally only showed slight to no increase in percent cover. One exception was the rapid expansion of sweet clover on a site on N3 where percent cover increased to 63% from 2% in one year. In all, three sites were identified for vegetation management to reduce the spread of invasive species. Although invasive species were present at several sites, the majority of sites surveyed in 2015 did not show a spread of invasive and non-native species.

In 2015 a comparison was made of the effect of different clearing techniques on the presence of invasive and non-native species. Most right-of-way sections are cleared using a shear blade which cuts the vegetation close to ground level. Some sections use mulching as an alternative to vegetation removal and disposal of tree debris. Only slight differences occurred in average total species percent cover, which was slightly higher for shear blading than mulching. No significant differences were noted for total species cover, species richness, diversity or evenness. This helped to demonstrate that either clearing method can be used with similar results on vegetation recovery.



**Photo 18 White clover spread on cleared ROW**

### 6.3.7 Rehabilitation

Aerial inspection surveys were conducted in 2015 in all cleared areas to identify sites in need of rehabilitation and to evaluate sites previously repaired. Several water crossings were inspected to monitor erosion control measures implemented in 2014. At the Hunting and Mitishito Rivers fibre blankets had been installed along the exposed river banks to prevent further erosion and sediment entry into the water. The erosion control blankets appeared to be functioning properly with no sediment plumes visible in the river. At Hunting River only the equipment access trail was treated. The two river crossing sites will be included in the monitoring program for 2016 to ensure vegetation re-establishment and effective erosion control.



No additional sites requiring rehabilitation were observed during the aerial inspections and no other sites were identified by construction or environmental inspectors. The Keewatinohk Construction Camp lagoon, Conawapa Road ditch immediately adjacent to the lagoon and the ditches surrounding the Keewatinohk Converter Station, will be re-vegetated using native seed.

## 6.4 REPTILES



**Photo 19 Cover board placement for observing prairie skink.**

Surveys were conducted on tower sites in 2015 to determine presence of northern prairie skink, Manitoba's only lizard species. Skinks are an endangered species occupying unique sand prairie habitats. Surveys were conducted at tower sites situated in potential skink habitat in construction segment S1 in 2015. Cover boards were used to attract skink and determine if they are present in the area. The northern prairie skink was not detected at tower sites during the course of field investigations and cover board surveys.

The presence of over-wintering denning habitat (hibernacula) for red-sided garter snake was considered at risk if in proximity to transmission line towers or near the ROW. Habitat modeling identified several tower locations where there was overlap with potential hibernacula areas. Six tower locations in segment C1 were surveyed in

May when snake activity would be high in denning sites. No suitable hibernacula habitat or garter snake individuals were observed at any of the tower survey locations leading to the conclusion that they are not present and no further mitigation is required.

## 6.5 BIRDS

2015 represents the first year of monitoring post-clearing for birds when potential effects can begin to be verified and mitigation measures evaluated in terms of habitat alteration and disturbance. Manitoba Hydro has committed to monitoring disturbance/avoidance impacts of the Project on bird abundance, density, richness and habitat use. In addition the potential for bird-wire collisions was further evaluated and additional sites recommended for installation of bird diverters. Mortality surveys of bird-wire strikes will commence once transmission line conductors are installed beginning in 2016. No further surveys were done for colonial nesting birds in 2015 as no bird colonies were found in proximity to the right-of-way during 2014 surveys.

During 2015 aerial and ground surveys no lekking sites were confirmed. Individual birds were observed and several ground locations were examined more closely but no lekking behavior was identified. No further results are available as yet to report on birds of prey as it is a long term research study.

A total of 157 bird species were recorded during the 2014 and 2015 baseline monitoring program, of which 76 species are considered Species of Conservation Concern birds (10 SARA or MESEA listed species and 66 Bird Conservation Region priority species).

### 6.5.1 Bird-wire collisions

The Bipole III environmental assessment identified 144 sites where there was potential for bird-wire collisions based on desktop assessment from multiple data sources. Bird habitat qualifying as ESS included presence of bird colonies, raptor nesting habitat, and waterbird nesting or migration stopover habitat in vicinity of the ROW. Initially in 2014 spring and fall surveys, 56 sites were considered high risk for bird collisions and the installation of bird diverters recommended. It was recognized at that time that a further spring waterbird survey would be required to refine or expand the number of sites. An additional 16 sites were added in 2015 for a total of 72 sites recommended for bird diverters on the transmission line route based on various criteria (Figure 6-4 ES Sites for potential bird strikes). Installation will coincide with conductor stringing.

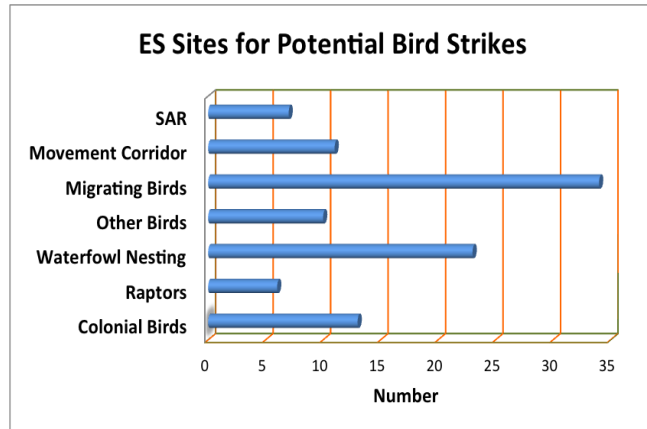


Figure 6-4 ES Sites for potential bird strikes

### 6.5.2 Species of conservation concern

Point count surveys were used again in 2015 to monitor species of conservation concern as well as collect data on changes in overall bird species abundance, density and richness. Permanent monitoring point count stations were established along transects throughout the transmission line route and were stationed in areas identified in the Bipole III EIS as supporting species of conservation concern. Three point count surveys were conducted: morning songbird surveys; morning and evening marsh bird surveys; and night time crepuscular bird surveys.

The six most widely occurring SOCC birds recorded across impact and control stations in 2015 included Alder Flycatcher, Black-billed Cuckoo, Clay-coloured Sparrow, Common Yellowthroat, Least Flycatcher and White-throated Sparrow. These species showed similar occurrence in 2014, with the exception of Black-billed Cuckoo which showed a large increase in occurrence at impact sites and even more so at control sites in 2015 most likely due to increased nest success and productivity following the tent caterpillar outbreak in 2014. Statistical analysis was performed on the species data to determine if there were any differences in numbers between years as well as any differences between impact and control sites (Table 3). Interestingly two species showed greater occurrence at control sites (Alder flycatcher, white-throated sparrow) and two species greater occurrence at impact sites (clay-coloured sparrow, least flycatcher) while two species showed no significant difference (Common yellowthroat, black-billed cuckoo). Overall, the clearing of vegetation did not appear to have an effect on species abundance and density adjacent to the ROW.

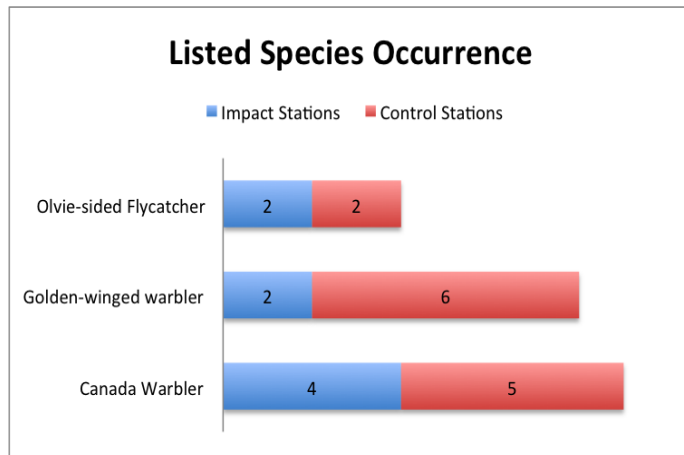
**Table 6-3 Trends in Species of Conservation Concern**

Species	Abundance change between 2014 and 2015 (trend)	Greater Occurrence (Trend)	Overall	Conclusion
Alder Flycatcher	↑	Control Stations	No significant interaction between treatment and year.	Vegetation did not affect species abundance adjacent to cleared areas.
Black Billed Cuckoo	↑	Neutral	No significant interaction between treatment and year.	Vegetation did not affect species abundance adjacent to cleared areas.
Clay-coloured Sparrow	↓	Control Stations	Significant interaction between treatment and year.	Vegetation did not affect species abundance adjacent to cleared areas. May be additional factors contributing to decreased abundance in control sites.
Common Yellowthroat	—	Neutral	No significant interaction between treatment and year.	Vegetation did not affect species abundance adjacent to cleared areas.
Least Flycatcher	↓	Impact Stations	No significant interaction between treatment and year.	Vegetation did not affect species abundance adjacent to cleared areas.
White-throated Sparrow	—	Control Stations	No significant interaction between treatment and year.	Vegetation did not affect species abundance adjacent to cleared areas.

Based on the analysis of habitat preferences, species abundance and density followed similar trends for both SOCC and non-SOCC species. The abundance of edge/shrub/successional SOCC species significantly increased at impacts sites adjacent to the ROW clearing; however, the analysis suggests the increase in abundance is not likely due to vegetation clearing for the Project, but instead potentially due to annual variation in the abundance of edge/shrub/ successional birds within the monitoring areas. The abundance of edge/shrub/successional non-SOCC species significantly increased at impacts sites adjacent to the ROW clearing suggest the vegetation clearing increased available habitat for non-SOCC birds likely due to increased habitat for grassland/open country birds, in particular much larger numbers of Sandhill Cranes within the ROW in 2015.

Species richness was also not significantly affected by clearing for the ROW for the majority of guilds and SOCC/non-SOCC species; however, analysis suggests the vegetation clearing increased the richness of edge/shrub/successional SOCC birds likely due to an increase in edge related habitats. Yearly and treatment variations in species diversity were observed for some guilds, mainly for non-SOCC species, but were not related to vegetation clearing within the ROW.

The overall marsh bird abundance decreased between 2014 and 2015 for all target species, except Yellow Rails. Yellow Rail showed no significant change between 2014 and 2015; however, a number of Yellow Rails occurred in areas not previously detected in 2015. The general decline in marsh birds across all impact and control stations may be due to lower water levels in 2015. Water levels in wetland habitats were noticeably high in 2014 due to high amounts of snow melt and spring flooding in 2014. Habitat adjacent to the survey stations may have become less favourable for Sora, American Bittern, and Virginia Rail, whereas lower water levels in some areas may have become more favourable habitat for Yellow Rails. Marsh birds are very sensitive to water levels and may adjust breeding areas to accommodate for changes. Nonetheless, the clearing of vegetation appeared to have no effect on the abundance of marsh birds adjacent to the ROW.



**Figure 6-5 Listed species occurrence**

Three SARA and/or MESEA listed species, Canada Warbler, Golden-winged Warblers and Olive-sided Flycatcher were not frequently recorded at point count stations. Counts of Canada warbler and Olive sided flycatcher increased in 2015 across all sites, while golden-winged warbler decreased (Figure 6-5 Listed species occurrence). Due to the low numbers of these three SARA and/or MESEA listed species recorded at both impact and control stations, statistical comparisons could not be completed.

Night surveys were conducted during 2015 as well to capture Eastern Whip-poor-wills and Common Nighthawk which are species of conservation concern. Nighthawks were not recorded at any survey stations. There was no

significant change in abundance of Whip-poor-wills between 2014 and 2015 although the trend suggests there were increases in numbers at both impact and control sites. As such initial results suggest no effects on whip-poor-will abundance adjacent to cleared areas.

Overall analysis revealed that the total combined SOCC birds showed no significant interaction effect between treatment and year indicating that vegetation clearing did not affect the abundance of the combined SOCC birds adjacent to cleared areas. However, the trend suggests that their abundance increased at impact sites compared to control sites. The abundance of the SOCC birds showed no significant difference between 2014 and 2015.

### 6.5.3 Active bird nests

To protect bird nests and young any clearing during breeding season must identify and buffer nesting sites. Fourteen active nests, two probable nests, one brood of newly fledged Clay-coloured Sparrows, and one brood of fledged Long-eared Owls were observed during the active nest surveys conducted in segment N4 in late June and early July. Buffers were established around nests and no Project activities were conducted within these buffers until late August.

## 6.6 ACCESS

Part of the BMP is to monitor the use of new ROWs for use by humans and predators. Trail cams were deployed in several areas along the Bipole III corridor in N2 to monitor use. Between camera deployment in June 2014 and the first data download in August 2014, only one occurrence was documented of an all-terrain vehicle at the first access point off Cormorant Road. The 2014 results continue to be analysed and will contribute to multi-year data that is necessary to determine the potential effect of new access.

## 6.7 HERITAGE

The 2015 monitoring program included heritage field investigation, monitoring and post-clearing assessment in all eight segments. Fieldwork was focused on previously identified heritage Environmentally Sensitive Site (ESS) locations along the transmission line corridor which contain high potential for the presence of heritage resources. In addition, known registered archaeological sites were also revisited and tested. Cultural and heritage locations that were identified during community workshops were also included as heritage ESS locations

and were assessed as part of the fieldwork program.



**Photo 20 Portage trail at Burntwood River identified from community knowledge**

Archaeological assessment and monitoring program methods included a mix of aerial examination, pedestrian survey and shovel testing. Locational information was collected using handheld GPS units. Shovel tests were recorded on detailed shovel test forms. Other environmental and relevant information was recorded in field notebooks and site photos taken. Data collected through the assessment process will be catalogued and entered into Manitoba Hydro's Data Inventory Heritage Resource Tracking (DIHRT) database which organizes and stores archaeological and heritage resource information.



**Photo 21 Cornerstone of building foundation at Gruber**

A total of 103 heritage ESS were identified for archaeological investigation. More than 360 shovel tests were excavated. The majority of these sites were appropriately evaluated and were cleared for construction. Three new archaeological sites were recorded as part of the monitoring program and were added to the Provincial Archaeological Site Inventory. There are still ESS locations that will require monitoring in 2016 as it was not possible to assess them in 2015, primarily due to clearing and access issues.

Key results of the 2015 monitoring program included the identification of a multi-component archaeological site on the east bank of the Red River, in segment S2. Hundreds of artefacts have been recovered and catalogued from the site. The artefacts suggest a

human occupation of the area dating back to the Middle Woodland period (*ca.* 1,000 – 2,000 years ago). However, there is archaeological evidence of 6,000± years of First Nation (Sioux, Assiniboine, Cree, and Ojibway) settlement and land use along the Red River. Pedestrian surveys and trench excavation were carried out at the site including four shovel tests at a nearby tower location which did not reveal any new artefacts. Protection of the site was completed in November 2015 allowing construction activities to proceed.

Two other archaeological sites were also recorded in segment C1. The "Gruber Townsite" is a late 19<sup>th</sup> early 20<sup>th</sup> century stone building foundation, while the second site was an abandoned building documented and registered as "Waynynen Homestead". A summary of results by transmission line construction segment is provided in Table 6-4 Heritage Surveys. There are no further heritage concerns in segments N1, N2, N3 or C2.



Table 6-4 Heritage Surveys

Construction Segment	Survey work	Key Findings	Conclusions/ Recommendations
N1	<ul style="list-style-type: none"> <li>14 ES heritage sites surveyed</li> <li>88 shovel tests</li> </ul>	Negative results for all sites Burntwood and Odei River crossings did not reveal cultural or heritage resources	There are no further heritage concerns with N1.
N2	<ul style="list-style-type: none"> <li>2 ES heritage sites surveyed</li> <li>12 shovel tests</li> </ul>	Halfway River and ATK identified site did not reveal cultural or heritage resources A prayer tree was identified and protected by an Environmental Monitor	There are no further heritage concerns with N2.
N3	<ul style="list-style-type: none"> <li>1 ES heritage sites surveyed</li> <li>8 shovel tests</li> </ul>	Rall's Island ESS investigated for but no heritage resources found	There are no further heritage concerns with N3.
N4	<ul style="list-style-type: none"> <li>24 ES heritage sites surveyed</li> <li>81 shovel tests</li> </ul>	Two important river crossings Bell and Steeprock rivers showed no results from testing All sites negative for artifacts from shovel testing	There are 7 sites remaining in N4 for investigation in 2016 including the Swan, Red Deer and Bell River crossings
C1	<ul style="list-style-type: none"> <li>13 ES heritage sites surveyed</li> <li>26 shovel tests</li> </ul>	Two new sites investigated. Stone foundation and an abandoned building recorded All sites negative for artifacts from shovel testing	A 5m buffer is recommended to be placed around the early stone foundation site. There are 13 additional sites to investigate in 2016.
C2	<ul style="list-style-type: none"> <li>3 ES heritage sites surveyed</li> <li>2 shovel tests</li> </ul>	Small wide creeks and wetlands not conducive to testing or likely source of heritage materials	There are no further heritage concerns with C2.
S1	<ul style="list-style-type: none"> <li>13 ES heritage sites surveyed</li> <li>6 Registered sites surveyed</li> <li>212 shovel tests</li> </ul>	Route change in S1 resulted in avoidance of 2 ES Heritage Sites Six provincial registered sites investigated on ROW All sites negative for artifacts from shovel testing	A post-clearing assessment of the north Assiniboine River section S1-Hert-105 should be undertaken in 2016 to ensure heritage resources were not disturbed in this area with strong connection to SLFN.
S2	<ul style="list-style-type: none"> <li>13 ES heritage sites surveyed</li> <li>Heritage Resource investigation of one site including shovel and trench testing</li> </ul>	Discovery of multiple artifacts at an ES Heritage site east of the Red River. These findings verified the existence of a multi-component site dating from the Middle Woodland (ca. 1,000 – 2,000 years ago). Registered as Provincial Archeological Site	Mitigation is considered complete at the new registered site. Recommended that site be monitored during any ground disturbing activities.

The Project Culture and Heritage Resource Plan (CHRP) was created in part to deal with unknown heritage resources that may be encountered on the landscape during ROW clearing operations. In construction segment C2 workers noticed some unusual stone piles and stopped work and immediately notified the site supervisor. The Project archaeologist was called to the site to identify the discovery and protect it if necessary. After careful examination of the site and surrounding area the Project archaeologist concluded the rock piles were created as a result of recent agricultural activity and not related to traditional land use.

## 7 COMPLIANCE MONITORING

Compliance monitoring is observation or testing conducted to verify whether a practice or procedure meets the applicable requirements prescribed by legislation, licence conditions, permits, and/or environmental protection plans. Manitoba Hydro's Bipole III Transmission Project mitigation measures are aligned with both provincial and federal regulatory requirements.

The Compliance Program involves the use of dedicated Environmental Inspectors and Site Environmental Officers to observe and verify the implementation of the environmental protection plans. Information generated from these programs will be used within an adaptive management approach to improve

both mitigation measure effectiveness and monitoring program design.



**Photo 22 Stone pile discovered on segment C2**

### Compliance Monitoring Summary 2015

- The Keewatinohk Converter Station and Riel Converter Station have qualified Site Environmental Officers conducted compliance monitoring to ensure mitigation measures outlined in the Construction Environmental Protection Plans, licences, permits and approvals were followed during construction.
- The Riel Construction Department and Site were audited in October 2015 by a third party auditor as part of Manitoba Hydro's re-registration of ISO 14001.
- One environmental stop work order in transmission line segment N4 was issued by Manitoba Hydro due to incorrect clearing practices and lack of supervision. MSD was notified and corrective action taken by the contractor
- One environmental improvement order in transmission line segment N2 was issued by Manitoba Hydro due to unauthorized by-passes and lack of supervision. MSD was notified and corrective action taken by the contractor
- Throughout the winter construction season, the local Natural Resource Officers conducted periodic inspections of transmission line segments. Inspection reports indicated there were no major issues and work was in compliance with applicable approvals and permits.

## 7.1 Site restoration

As areas are no longer required during construction, restoration can begin to return the sites to near natural conditions. Some restoration work was started on several borrow pits in the Keewatinohk project area. Restoration planning and design was also conducted based a survey in 2014 of sites that were no longer needed for construction. Those areas identified were the slopes of the wastewater treatment lagoon, where organic material was spread and native grass seed sown.

At two aggregate borrow sites (N6 and N8) the restoration work consisted of re-sloping the side walls of the excavation to an overall grade of 4:1. Stockpiled soil was then replaced on the re-graded slopes to promote establishment and growth of native vegetation. The surface soils were roughed in with minimal smoothing resulting in shallow pockets that will trap both seed and water.

Site restoration will be ongoing in all areas of the Bipole III Transmission Project as construction advances and temporary use areas can then be returned to near natural conditions.

Other areas in the Bipole III Transmission Project, namely the converter station project sites, will require decommissioning and remediation of petroleum storage facilities of various sizes. The N8 Petroleum and Storage Area at Keewatinohk was decommissioned in June 2015, with a full site remediation plan submitted and approved by the Contaminated Sites Program, Environmental Approvals Branch of Manitoba Sustainable Development. Soil samples were taken from points around the excavation and sent to an accredited laboratory for analysis. The timeline for this project was June 8 to 15, 2015. Photo 15-3 shows the site completely remediated and backfilled.



**Photo 23 Spreading of stockpiled soils over borrow pit slopes.**



**Photo 24 Excavation of Petroleum Fuel Storage Area at Keewatinohk**



**Photo 25 Completed Excavation of Petroleum Fuel Storage Area at Keewatinohk**

## 7.2 Waste management & hazardous materials

The handling, transportation and storage of hazardous materials and wastes present considerable environmental risk unless proper facilities and protocols are in place for safe operation. Siting away from watercourses and environmentally sensitive areas is the first consideration followed by well designed storage and spill containment systems (Photo 16-1). Training of all personnel is the key to ultimately preventing releases and contamination.



**Photo 26 A spill containment system for the safe storage of gasoline**

To properly manage all hazardous materials, Manitoba Hydro requires contractors to have spill response and prevention plans that outline procedures, notification, and training. All contractors are made aware that releases, regardless of quantity, are to be reported to Manitoba Hydro for further action or regulatory reporting.

To ensure hazardous materials including fuels, oils and greases are being handled properly and to detect any leaks or releases from equipment, consistent monitoring is conducted. All active work areas, petroleum and hazardous material storage sites, camp facilities, and heavy equipment are inspected.

One release was the result of equipment failure, one was the result of human error, and the other resulted from systemic fuel handling issues over period of time.

There were three externally reportable releases of hazardous materials from January 1 to December 31, 2015 at the Keewatinohk Converter Station project site.

**Table 7-1 Summary of Environmental Releases**

<b>Environmental Releases</b>	<b>Manitoba Hydro</b>	<b>Contractors</b>	<b>Totals</b>
<b>Keewatinohk (January 1<sup>st</sup> 2014 – December 31<sup>st</sup> 2015)</b>			
Reportable	0	3	3
Non-reportable	7	84	91
<b>Riel Station (January 1<sup>st</sup> 2014 – December 31<sup>st</sup> 2015)</b>			
Reportable	0	0	0
Non-reportable	12	10	22
<b>Transmission Lines (April 1<sup>st</sup> 2014 – March 31<sup>st</sup> 2015)</b>			
Reportable	0	1	1
Non-reportable	7	128	135

A release of 100 litres of hydraulic oil at the concrete batch plant was a result of equipment failure. The release of 50 litres of propylene glycol at the converter station work area was a result of human error during transfer operations. The final release was 20 litres of diesel fuel, not externally reportable for quantity, but for duration. A series of small releases over time lead to significant subsurface contamination that required a clean-up.

The Riel Converter Station site had no externally reportable and only 22 non-reportable releases. Work during this time was limited to the 230 kV expansion and regular operations. For transmission line construction, there was only one externally reportable that occurred in 2015. The reportable spill was a result of a D8 Cat that rolled off the deck of a transport truck while traveling north through a bypass. The D8 was righted on its tracks by an excavator and cable but during this process the fuel tank was compromised resulting in the diesel fuel being released. None of the environmental releases impacted any waterways and all were cleaned up and remediated as required.



## 8 FUTURE MONITORING

Clearing activities are anticipated to continue in the southern area of the Project. Tower construction and installation along with conductor stringing will advance in all areas over the last two winters. The following monitoring activities are planned to occur during 2016 and winter 2016/2017.

### Mammals

For boreal woodland caribou, genetic capture-mark-recapture surveys will continue to be used for population estimates and calculation of growth of the four ranges currently being monitored. Winter calf recruitment surveys using telemetry for locations will continue in 2016 as well as caribou-moose-wolf distribution studies.

*P. Tenuis* is a parasite carried by white-tailed deer and when transferred to moose and caribou can cause high mortality rates. Potential white-tailed deer range expansion as a result of the creation of the ROW may lead to increased infection rates for other ungulates. Pellet sampling will begin on white-tailed deer to detect the presence of the parasite in the northern extent of their range.

Multi-species aerial transect surveys will be completed annually post-construction to record mammal locations via tracks and animal sightings. Integrated remote IR camera trap and winter ground transect surveys will be used to assess local distribution and abundance of mammals as well as frequency of human access within 5 km of the ROW.

### Terrestrial & vegetation

Activities will continue in 2016 in accordance with the BMP both for pre and post construction surveys. Follow-up surveys for invasive and non-native species on recently cleared ROWs will continue as well as monitoring the effectiveness of vegetation management on several problem sites. The Assiniboine River area will also be surveyed again to monitor the effects of clearing on species of conservation concern. The newly established monitoring plot for native prairie will be re-visited to evaluate potential clearing effects. With completion of clearing in C1, the Cowan blueberry resource use area will be re-surveyed and monitored for species and percent cover change.

### Birds

Data will continue to be collected on the impact of the transmission project on species of conservation concern from disturbance/avoidance and overall effects on bird populations.

### Reptiles

Further monitoring for the presence of prairie skink will be conducted in sand prairie habitats that were not available to access in 2015. No further monitoring for red-sided garter snake denning sites (hibernaculum) will be required based on the 2015 results.

### Aquatics

Follow-up monitoring will be conducted on the stream crossing sites recommended for remediation in 2015. Additional surveys will be conducted post construction on the main Bipole III transmission line route as clearing and construction move further south in 2016. Compliance with prescribed mitigation and evaluation of effectiveness of remedial work will be the on-going focus of aquatics monitoring.

### Heritage

Heritage mitigation requirements have been met for N1, N2, N3 and C2 construction segments, including the documentation and registration of all archeological sites. N4 will require survey of seven sites not cleared during 2014 – 2015 and thirteen sites to be examined on segment C1. As clearing continues in the south, segments S1 and S2 will continue to be surveyed, including a multi-component archaeological site on the east bank of the Red River, south of Ste. Agathe, MB.

## 9 SUMMARY

Monitoring activities conducted in 2015 combined with results from 2014 have provided a solid base for determining potential effects of construction and effectiveness of mitigation. Extensive effort was put into monitoring activity with hundreds of surveys done for vegetation, birds, mammals, reptiles and aquatic habitat. Key results of the 2015 program are summarized below.

## Mammals

Mammals monitoring further characterized caribou and moose ranges in 2015 and explored the predator-prey relationships that affect both species. Wolves remain the most frequent cause of mortality for caribou based on GPS collar recoveries. There was one incidence of a black bear kill recorded but considered a relatively rare occurrence for caribou.

The population sizes of the four caribou ranges being monitored was estimated using the Non-invasive Genetic Survey method with the reference herd at Charron Lake being the largest. Satellite data of collared adult caribou showed that the zone of influence of construction disturbance on the ROW did not increase in the Wabowden area. Although, the number of caribou crossing the ROW was less than expected when compared to predicted numbers. Ongoing data collection and analysis will help explain caribou crossing rates with respect to the ROW.

Data for moose populations was obtained and analysed in three areas to be monitored for potential Project effects. For largely unknown reasons moose populations are shown to be generally declining in the Tom Lamb WMA, Moose Meadows and Pine River areas. Preliminary data from track surveys and remote IR cameras has not shown any expansion of white-tailed deer range. Trapping and fur harvest data was analysed to create the baseline dataset that will be used to evaluate any potential changes in fur-bearer numbers or distribution.

## Terrestrial and vegetation

Over a hundred line surveys were conducted for the vegetation monitoring program, which identified successful protection of species of conservation concern, and the limited effects of the cleared ROW on wetlands species richness and diversity.

Invasive plant species were more abundant and frequent on the ROW than off the ROW as was expected. Surveys in the Cowan area highlighted the presence of blueberries on and off the ROW. The data will contribute to monitoring any effects on growth and abundance of blueberries on the ROW once cleared in that area.

## Birds

Surveys conducted for birds collected solid baseline data for monitoring potential disturbance and avoidance effects as a result of the Project. Surveys for locations of potential bird–wire strikes reduced the number of sites to 56 where likelihood of collisions was highest and requiring the installation of bird diverters on transmission line sky-wires. The work also verified that Bipole III is not in close proximity to any bird nesting colonies where bird strike potential is highest.

## Reptiles

Surveys for red-sided garter snakes and prairie skink in potential habitat areas provided no observations of these animals on the ROW.

## Aquatics

Stream crossing surveys increased significantly in 2015 with 326 crossings inspected in aerial surveys. Ground surveys followed on a subset of crossings to examine condition and compliance with specified mitigation measures. Only 5% of all stream crossing inspected required further rehabilitation measures that will be the focus of work in 2016.

## Heritage

Results of the 2015 monitoring program included assessments of most segments of the line. Two archaeological sites were also documented and registered in segment C1. Manitoba Hydro its and contractors have taken all appropriate heritage mitigation measures and will continue this work in 2016.

## Closing

As construction of the Bipole III Transmission Project continues, large amounts of monitoring data are being generated and analysed. In many instances environmental effects predications are being confirmed to be accurate and mitigation effective. Where there have been unanticipated effects, quick response and adaptive management have minimized environmental effect and promoted site rehabilitation. Effective on-going monitoring and response will continue to protect the environment and provide data and knowledge for continual improvement.