



Keeyask Transmission Project **Environmental Effects Monitoring Plan** Annual Report



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Winnipeg, Manitoba
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Keeyask Transmission Project 2018/19

Environmental Effects Monitoring Report

Prepared by Manitoba Hydro

Transmission Planning & Design Division
Licensing & Environmental Assessment

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Prepared for:

Environmental Approvals Branch

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Abbreviations

AC	Alternating Current
EA	Environmental Assessment
EEMP	Environmental Effects Monitoring Plan
EPIMS	Environmental Protection Information Management System
EPP	Environmental Protection Program
GPS	Geographic Positioning System
GOT	Generation Outlet Transmission Line
KHLP	Keeyask Hydroelectric Limited Partnership
KTP	Keeyask Transmission Project
km	kilometre
kV	kilovolt
m	metres
SD	Sustainable Development
ROW	Right-of-way
UAV	Unmanned Aerial Vehicle

1 INTRODUCTION

The objective of this report is to present information and data on the Keeyask Transmission Project Environmental Effects Monitoring Plan in compliance with clause 16 of the Project *Environment Act* licence (No. 3106). Manitoba Hydro presents this information to inform interested parties on progress made on construction, monitoring and implementation of mitigation measures to minimize environmental effects.

This is the Project's fourth annual monitoring report and describes progress from April 1, 2018 through March 31, 2019. Map 1 outlines the Keeyask Transmission Project area. Anyone interested in further information about this report or the Project is invited to contact Manitoba Hydro at:

Licensing and Environmental Assessment
360 Portage Avenue (5)
Winnipeg MB R3C 0G8
1-877-343-1631 or 204-360-7888

2 PROJECT OVERVIEW

The Keeyask Transmission Project (the Project) involves the construction, operation and decommissioning of 22 km of new 138 kV ac construction power transmission line, a new 138 kV ac to 12.47 kV ac construction power station to be located north of the Keeyask generation station, upgrades to the existing Radisson converter station, a new Keeyask switching station to be located south of the Nelson River, 4 km of four 138 kV ac unit transmission lines that will transmit power from the Keeyask generation station to the Keeyask switching station, and three 38 km 138 kV ac generation outlet transmission lines that will transmit power from the new Keeyask switching station to the existing Radisson converter station. The Keeyask Transmission Project is owned and operated by Manitoba Hydro.

3 PROJECT STATUS

Construction for the Keeyask Transmission Project is occurring in parallel to construction of the Keeyask Generation Station. The Keeyask Transmission Project provides power for the construction of the generation station and will allow for the integration of generation power

into the Manitoba Hydro transmission system when the generation station is operational. The Keeyask Transmission Project and all its components are currently on schedule. The projected in-service date for the Project is anticipated for 2020.

3.1 Radisson Converter Station Upgrades

Upgrades to the existing Radisson converter station are required to accommodate the Keeyask Transmission Project. Equipment replacement and station upgrades are currently underway. Work at Radisson Converter Station has been ongoing, with the replacement of 4 breakers and the construction of the new Bay 1, the installation of associated equipment, and structures for the termination of the new transmission lines. Construction will continue through 2020.

3.2 Keeyask Switching Station

The Keeyask switching station will accept power from the generating station via four unit transmission lines and transfer that power to three generation outlet transmission lines. The switching station is nearly fully constructed with protection work, testing and ongoing commissioning planned through 2019.

3.3 Keeyask Construction Power

The Keeyask Construction Power Project, which consists of two transmission lines and a construction power station, provides the Keeyask construction site with a permanent, reliable source of power during construction. The construction power station and lines are in-service.

3.4 Transmission Line Construction

The unit transmission lines will transmit power from the seven generators located at the Keeyask generating station to the new Keeyask switching station. The four unit transmission lines will be located in a single corridor. Construction is significantly complete with remaining work to resume in 2019/20.

Three generation output transmission (GOT) lines will transmit power from the Keeyask switching station to the existing Radisson converter station. Construction is now complete.

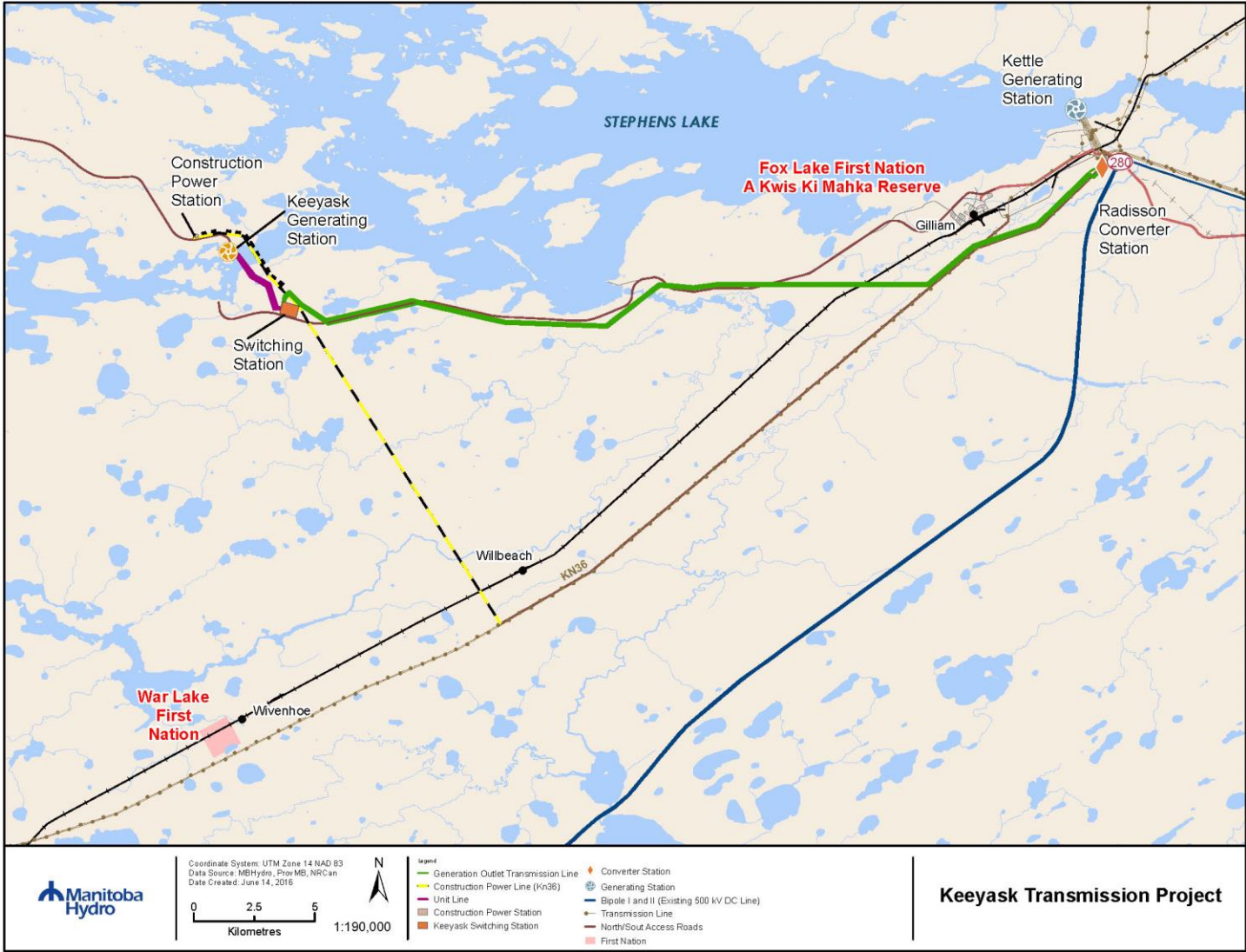
2018/19 Environmental Effects Monitoring Highlights

Key monitoring highlights during this reporting period include:

- Of the 46 water crossing sites assessed, none showed non-compliance with prescribed mitigation measures. Sites identified in 2015 and 2016 as being non-compliant with the prescribed mitigation showed signs of successful natural revegetation.
- Summer resident caribou continue to calve in the peatland complexes and islands around the Project area.
- Despite Project construction, an influx of migratory caribou moved through the Keeyask region this winter. 3,684 caribou were counted during aerial surveys.
- Ecosystem diversity surveys found that overall impacts on the 63 priority habitat patches situated along the Project ROW were minor and were consistent with those predicted in the environmental assessment.
- Vegetation surveys identified very minimal observations of invasive plant species. Individual plants or small patches of invasive plants were observed at 26 sites or 0.001% of the surveyed area).
- Passive data recorders were deployed to assess breeding success of bird species of conservation concern including common nighthawk, rusty blackbird and olive-sided flycatcher. Multi-year data and analysis will help determine Project effects.
- Similar numbers of gulls and terns used habitat in Gull Rapids and successfully nested in 2018 compared to previous years (2015–2017). Project construction did not appear to disturb nesting colonial waterbirds.
- Survey personnel from Tataskweyak, War Lake, York Factory and Fox Lake Cree Nations were vital in conducting many field activities.



Photo 1: Keeyask Transmission Project is located south of Gillam, MB. Construction of the GOT lines is now complete.



Map 1: Keeyask Transmission Project Area

4 ENVIRONMENTAL EFFECTS MONITORING PLAN OVERVIEW

Part of Manitoba Hydro's commitment to environmental protection includes the development of a comprehensive Environmental Protection Program (EPP) for the Keeyask Transmission Project. One aspect of this program is monitoring and follow up for biophysical environmental components identified in the Keeyask Transmission Project Environmental Assessment and associated technical reports. The Environmental Effects Monitoring Plan (EEMP) submitted to Manitoba Sustainable Development outlines the various monitoring activities that will occur during the different phases of the Project.

The scope of this plan includes physical and biological components of the environment. The purpose of the EEMP 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 EEMP are to:

- Confirm the nature and magnitude of predicted environmental effects as stated in the environmental assessment
- 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
- Provide baseline information to evaluate long-term changes or trends

Environmental components requiring follow-up monitoring are discussed further in this annual Environmental Effects Monitoring Report include:

- Aquatics
- Terrestrial Ecosystems and Vegetation
- Mammals
- Birds
- Heritage

4.1 Adaptive Management

Adaptive management is a planned and systematic process used to continuously improve environmental management

practices by learning about their outcomes. Manitoba Hydro has accumulated knowledge and lessons learned from previous monitoring programs. The successes of those programs have been useful in implementing the EEMP for this Project.

An adaptive management framework is being used to deal with unexpected outcomes or events. Program documents, processes, procedures and mitigation measures are continuously evaluated by inspection, monitoring and communication programs. Data is reviewed as collected to determine if any of the environmental thresholds specified in the EEMP have been exceeded due to shortfalls in impact prediction, ineffective mitigation measures or inadequate monitoring approaches. Actions are developed in response to these contingencies.

5 IMPLEMENTATION OF MONITORING AND FOLLOW-UP ACTIVITIES

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

5.1 Environmental Inspection Staff

Reporting to a Manitoba Hydro Environmental Specialist, an on-site Construction Environmental Inspector continued environmental oversight for the 2018/19 transmission line construction season. In addition, Manitoba Hydro's Licensing and Environmental Assessment Department provides advice and guidance to these on-site environmental inspectors.

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

Keeyask 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 inspections with environmental inspectors during construction and collect monitoring information in support of Manitoba Hydro's environmental effects monitoring programs. The community liaisons observe the construction and environmental protection program activities and report back to community leadership as well as inform the Manitoba Hydro construction supervisor of any concerns the communities may have with those activities.

5.3 Data Management

As the Project's EEMP requires and generates large amounts of data, the EPIMS was developed to manage, store and facilitate the transfer of Environmental Protection Program data and information amongst the Project team. The EPIMS will facilitate the transfer of knowledge and experiences encountered 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 mitigation measure adaptations will be communicated back to construction staff and contractors.



Photo 2: Keeyask Transmission Project Right of Way



Photo 3: Tower assembly on the Keeyask Transmission Project.

Table 1: 2018/19 Monitoring Activities by Environmental Component

Component	Environmental Indicator	2018/19 Monitoring Status
Aquatics	Fish habitat	Post-construction stream crossing surveys at 46 sites
Mammals	Moose	Moose population survey conducted and reported in 2017/18. No surveys were conducted in 2018/19
	Caribou	A sensory disturbance and winter aerial survey conducted – Additional reporting in KHLP - Keeyask Generation Project - Terrestrial Effects Monitoring Report
Terrestrial Ecosystems and Vegetation	Priority plants	Priority plant surveys are completed
	Ecosystem diversity	Ecosystem diversity survey conducted along the Project ROW
	Invasive plants	Invasive plant survey conducted along the Project ROW
Birds	Bird wire collision mortality	All bird-wire collision surveys are completed
	Bird species of conservation concern	Passive audio recorders deployed during bird breeding season to detect common nighthawk, rusty blackbird and olive-sided flycatcher. Additional reporting in KHLP - Keeyask Generation Project Terrestrial Effects Monitoring Report
	Colonial bird nesting sites	Aerial survey of colonial nest sites conducted– Additional reporting in KHLP - Keeyask Generation Project Terrestrial Effects Monitoring Report
Heritage	Heritage sites	All heritage surveys are completed

6 ENVIRONMENTAL COMPONENT MONITORING

Multiple environmental components were identified for follow-up monitoring in the environmental assessment, technical reports, and Environment Act licence. For each environmental component, one or more environmental indicators were selected to focus monitoring and follow-up efforts as indicated in the EEMP (Table 1).

7 AQUATICS

The potential effect of the Project on aquatics was a component of the environmental assessment. 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.

7.1 Stream Crossings

A stream crossing survey was conducted along Project components where construction was carried out in 2018. The survey was conducted on June 25th, 2018.

Confirm the nature and magnitude of predicted environmental effects as stated in the EA:

As predicted in the EA, Project effects on stream crossings were minor and have recovered. Of the 46 watercourse sites assessed in 2018, all were

compliant with prescribed mitigation and have recovered from construction effects.

Assess the effectiveness of mitigation measures implemented:

The implementation of mitigation recommendations outlined in the construction Environmental Protection Plan was effective. Sites identified in 2015 and 2016 as being non-compliant with the prescribed mitigation showed signs of successful natural revegetation. Small shrubs and forbs were observed growing along the stream banks and no active sedimentation of the stream has been noted since being identified in 2015. Due to the naturally occurring re-vegetation and the marginal value of the stream to fish, no further remediation is recommended (Photo 4).

Identify mitigation measures to address unanticipated environmental effects, if required:

Due to the natural revegetation of disturbed sites, no further remediation is required.

Provide baseline information to evaluate long-term changes or trends:

Survey information has contributed to understanding of recovery timelines for affected stream crossings.



Photo 4: Vegetative regrowth along a tributary of the Butnau River.

8 MAMMALS

The potential effect of the Project on moose (*Alces alces*) and caribou (*Rangifer tarandus*) was the focus of the environmental assessment for mammals. Both species occur in vicinity of the Keeyask Transmission Project. Survey support was provided by members of the Keeyask Cree Nations, including Tataskweyak, War Lake, York Factory and Fox Lake Cree Nations.

8.1 Caribou

Manitoba Hydro is working cooperatively with the Keeyask Hydroelectric Limited Partnership (KHLPP) to jointly study Project effects on caribou.

In 2018, a sensory disturbance survey was conducted in the spring and summer, and a caribou winter abundance estimate was conducted in mid winter.

Confirm the nature and magnitude of predicted environmental effects as stated in the EA:

Caribou occupied 54% of the islands in lakes surveyed in 2018, 9% of which were also occupied by calves. During the pre-construction period (2010 to 2014), the percentage of islands on which caribou and their calves were detected declined. The trend continued in 2015 and then reversed in 2017, when caribou and calves were detected on a greater percentage of islands than in 2015. The declining trend resumed in 2018. As predicted in the EA, many Project-affected islands were unoccupied by caribou in 2018. However, there was also less caribou activity on unaffected islands than in

previous survey years.

A total of 3,684 caribou in 280 clusters were observed during the winter survey. Using the computer program DISTANCE, caribou density in the survey area was estimated to be 0.63 animals/km², or a total of 6,665 caribou. Most caribou were seen in the southern portion of the survey area, mainly between Gillam and Atkinson (Fox) Lake, and south of York Landing. Track densities were high throughout the survey area, except for the northeast portion, indicating extensive use of the Keeyask region.

This years influx of caribou into the Keeyask region shows that their movements are variable and difficult to predict. It has been well established that caribou may avoid construction activities and roads, such as the transmission line and South Access Road. However, numerous observations of caribou and tracks were made in and near the construction site, suggesting minimal influence.

Assess the effectiveness of mitigation measures implemented:

Mitigation efforts, including construction timing windows appear to be effective.

Identify unexpected environmental effects of the Project, if they occur:

No unexpected environmental effects have been observed.

Identify mitigation measures to address unanticipated environmental effects, if required:

To date, none required.

Confirm compliance with regulatory requirement:

Compliance with regulatory requirements continues.

Provide baseline information to evaluate long-term changes or trends:

Survey information will contribute to evaluating long-term changes or trends in caribou population changes, calving locations, and habitat use in response to the transmission project.

A detailed report on the findings of the caribou population and sensory disturbance survey can be found in the 2018 KHLPP Keeyask Generation Project Terrestrial Effects Monitoring Report.



Photo 5: Caribou on an island in Stephens Lake in 2018.



Photo 7: Moose observed on island in Stephens Lake during caribou sensory disturbance survey in 2018.



Photo 6: Caribou observed during the aerial survey in February 2019.

8.2 Moose

Manitoba Hydro is working cooperatively with the Keeyask Hydroelectric Limited Partnership (KHLP) to jointly study Project effects on moose. Moose population survey conducted and reported in 2017/18. No surveys were conducted in 2018/19.

A detailed report on the findings of the moose population and survey can be found in the 2017/18 KHLP Keeyask Generation Project Terrestrial Effects Monitoring Report.

8.3 Wildlife Mortalities

Project environmental inspectors did not identify any wildlife mortalities or road-killed wildlife related to the Project.

9 TERRESTRIAL ECOSYSTEMS AND VEGETATION

The potential effect of the Project on terrestrial ecosystems and vegetation was a component of the environmental assessment.

9.1 Invasive Plants

In 2018, an invasive plant survey was conducted on August 22nd, 24th and 29th. Surveys consisted of 17 transects totalling 11 km in length, repeating the surveys done in 2017.

Confirm the nature and magnitude of predicted environmental effects as stated in the EA:

As predicted in the EA, Project construction had minimal effect on the spread invasive species. During these surveys, 15.3 m² of non-native plant cover was recorded as a few individual plants or small patches of plants at 26 sites. Most of the non-native plant cover was observed close to either a Keeyask Generation Project south access road ditch or the Radisson Converter Station. Seven non-native plant species recorded during the surveys, which was five more than 2017. Of these species, perennial sow-thistle and white sweet clover

were of moderate invasive concern while three were of minor invasive concern.

Assess the effectiveness of mitigation measures implemented:

Mitigation actions prescribed in the Construction Environmental Protection Plan, to limit the exposure of mineral soils by clearing equipment were successfully implemented. The extremely low cover of non-native plants in the surveyed areas (0.001% of the area) was likely due to a combination of factors including the low proportion of the ROW area with exposed mineral substrates, the relatively short time since clearing, limitations on potential sources of seeds, and increasing native vegetation cover.

Identify unexpected environmental effects of the Project, if they occur:

No unexpected environmental effects have been observed.

Identify mitigation measures to address unanticipated environmental effects, if required:

To date, none required. Control recommendations were not developed for the sites with plants of invasive concern for several reasons. At two of the three perennial sow-thistle sites, the plants were immediately removed by vegetation surveyors due to their degree of invasive concern and the small number of plants present. Control recommendations were not developed for the remaining sites, primarily for two reasons. The likelihood that control efforts would be successful was limited by the close proximity of the same non-native plants in either the south access road ditch or the Radisson converter station. Also, ongoing expansion of native plant cover was expected to eventually crowd out or even eliminate non-native plants at some of the sites.

Confirm compliance with regulatory requirements:

Compliance with regulatory requirements continues.

Provide baseline information to evaluate long-term changes or trends:

Survey information will contribute to evaluating long-term changes or trends in invasive plant species in the Project area.



Photo 8: A patch of perennial sow-thistle growing in the GOT ROW near the South Access Road.



Photo 9: Regenerating native vegetation in the transmission ROW.

9.2 Ecosystem Diversity

In 2018, an ecosystem diversity survey was conducted on July 6th, 7th to 9th. 63 priority habitat patches were surveyed by air and 23 of these that were within walking distance of a road were ground surveyed.

Confirm the nature and magnitude of predicted environmental effects as stated in the EA:

Surveys found that overall impacts on the 63 priority habitat patches situated along the Project ROW were minor and were consistent with those predicted in the EA Report. Ground surveys found 14 additional minor effects outside of the cleared ROW at 12 priority habitat patches. All of these effects were localized, small in area and did not extend more than a few meters into the habitat patch.

Assess the effectiveness of mitigation measures

implemented:

Monitoring results indicated that mitigation measures were implemented correctly during Project construction.

Identify unexpected environmental effects of the Project, if they occur:

No unexpected environmental effects have been observed.

Identify mitigation measures to address unanticipated environmental effects, if required:

No follow up mitigation is required based on the survey findings.

Confirm compliance with regulatory requirements;

Compliance with regulatory requirements continues.

Provide baseline information to evaluate long-term changes or trends:

Survey information will contribute to evaluating long-term changes or trends in habitat patches and ecosystem diversity.



Photo 10: Leaning trees adjacent to ROW in priority habitat patch.

Surveys for priority plants were completed in 2016/17.

10 BIRDS

The potential effect of the Project on bird wire collisions, species of conservation concern, and colonial bird nesting islands was a component of the environmental assessment.

10.1 Bird-Wire Collision

The bird-wire collision survey was completed in 2017/18.



Photo 11: Survey personnel searching for evidence of bird-wire collisions under the Keeyask generation outlet transmission lines.

10.2 Species of Conservation Concern

Manitoba Hydro is working cooperatively with the Keeyask Hydroelectric Limited Partnership (KHLP) to jointly study Project effects on bird species of conservation concern.

Habitat affects surveys for common nighthawk continued in 2018, to evaluate Project-related changes in the distribution and abundance of suitable breeding habitat. Programmable four-microphone audio recorders were placed at 62 locations in major subtypes of common nighthawk nesting habitat in the Stephens, Gull, and Split lakes region during the breeding season. Recorders were programmed to record for 10 minutes at 30-minute intervals from dusk until dawn to record common nighthawk breeding activity in the form of calls and the booming sound made by territorial males as air rushes through their feathers. Audio recordings are being analyzed and results are pending.

Sensory disturbance surveys for olive-sided flycatcher and rusty blackbird also continued in 2018, to monitor the effects of sensory disturbance on the distribution and relative abundance of these species at risk. Territories for breeding pairs were mapped and programmable four-microphone audio recorders were placed within, at varying distances from the nearest source of disturbance- the north or south access roads, construction power or generation

outlet transmission lines, or Provincial Road 280. Recorders were programmed to record six times each hour during the early morning hours of the spring breeding season to record olive-sided flycatcher or rusty blackbird songs. The direction and distance of each bird to the fixed location of the recorder will be estimated and the positions of the bird in its territory will be mapped. The result of audio recording analysis has been delayed, but results are expected for the next reporting period. Survey support was provided by members of the Keeyask Cree Nations, including Tataskweyak, War Lake, York Factory and Fox Lake Cree Nations.



Photo 12: A passive audio recorder is used to monitor bird species of conservation concern.

10.3 Colonial Nesting Sites

In 2018, colonial nesting site surveys in the Project area were conducted through spring and summer.

Confirm the nature and magnitude of predicted environmental effects as stated in the EA:

Similar numbers of gulls and terns used habitat in Gull Rapids and successfully nested in 2018 compared to previous years (2015-2017). Project construction did not appear to disturb nesting colonial waterbirds.

Assess the effectiveness of mitigation measures implemented:

Mitigation efforts, including bird-wire diverters, appear to be effective. The results of the surveys suggest that Project construction is not negatively affecting colonial waterbirds. The consistent number and locations of colonies of colonial waterbirds observed in the Gull

Rapids area suggests that Project construction is not discouraging the use of nearby traditional nesting islands.

Identify unexpected environmental effects of the Project, if they occur:

No unexpected environmental effects have been observed.

Identify mitigation measures to address unanticipated environmental effects, if required:

To date, none required.

Confirm compliance with regulatory requirements:

Compliance with regulatory requirements continues.

Provide baseline information to evaluate long-term changes or trends.

Survey information will contribute to evaluating long-term changes or trends in colonial waterbird populations and activity near the Project area.

A complete report on colonial nesting bird surveys can be found in the 2018 KHLP Keeyask Generation Project Terrestrial Effects Monitoring Report.



Photo 13: An unmanned aerial vehicle used to monitor islands in Gull Rapids.

11 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 Keeyask Transmission Project mitigation measures are aligned with both provincial and federal

regulatory requirements.

The compliance program involves the use of a dedicated environmental inspector 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.

In 2018/19 all Project components of the Keeyask Transmission Project were in compliance with applicable requirements. No regulatory citations or warnings were issued. There were a number of minor hazardous material releases, but only one meeting the threshold requiring a report to the Province. All spills have been addressed and cleaned up from the season. Project tours were regularly conducted with the regional Conservation Officer.

12 FUTURE MONITORING

The following monitoring activities are planned for 2019/20. Detailed descriptions of all monitoring activities can be found in the Keeyask Transmission Project Environmental Effects

Monitoring Plan.

Aquatics

Post construction surveys will continue in 2019/20 in accordance with the EEMP. This includes stream crossing surveys at outlet transmission lines and unit lines.

Terrestrial & Vegetation

Post construction surveys will continue in 2019/20 in accordance with the EEMP.

Mammals

Post construction surveys will continue in 2019/20 in accordance with the EEMP. This includes a sensory disturbance survey for caribou. This includes surveys for invasive plants and priority plants.

Birds

Post construction surveys will continue in 2019/20 in accordance with the EEMP. This includes breeding bird surveys for species of conservation concern.

Heritage

All heritage related surveys have been completed.