

BIPOLE III TRANSMISSION PROJECT

BIPOLE III BIRD-WIRE COLLISION MONITORING 2019

Prepared for

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By

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SUMMARY

Bird-wire collision mortality monitoring occurred at 29 sites along the Bipole III transmission line in the fall of 2019. Each survey site was visited twice from August 26 to September 7, 2019, with each survey separated by four to 12 days. Evidence of nine bird collisions was observed at seven sites during the surveys. Five collisions were observed at sites fitted with bird-diverters on the transmission line and four collisions were observed at sites without bird-diverters. No collision evidence from Threatened or Endangered species were observed during the surveys. Bird carcasses were planted at survey sites to allow the calculation of searcher bias and scavenger bias in the study. These values were used to estimate the collision mortality rates and compare the values between sites with and without bird-diverters present. The estimated collision mortality during the six-week migration period was 76.86 birds/km at sites with diverters and 83.58 birds/km at sites without diverters. These values are within the range of other collision mortality studies that have occurred within the province and it appears that bird diverters are working to prevent bird-wire collisions.

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1.0 INTRODUCTION

The Bipole III transmission line is a 500 kilovolt, high voltage, direct current transmission line spanning 1,388 km from the Keewatinohk converter station near Gillam, Manitoba, along the west side of the province to the Riel Converter Station near Winnipeg. Construction of the transmission line began in the winter of 2014 and was completed 2018. As part of the Environment Act License requirements, Manitoba Hydro is required to monitor potential impacts of infrastructure on birds. To mitigate some effects on birds, Environmentally Sensitive Sites (ESS's) were identified along the route where there was potential for a high number of bird-wire collisions (Amec Foster Wheeler 2015; Amec Foster Wheeler 2016). At these sites the transmission line was fitted with bird diverters, to reduce bird-wire collision potential. These sites, along with control sites, not fitted with bird-diverters, are scheduled to be monitored over a period of five years. The objectives of the study are to 1) conduct bird-wire collision mortality monitoring at "high-risk" areas, and 2) determine the efficacy of bird diverters and develop adaptive management strategies if bird-wire collisions are higher than anticipated. This survey was the second year of bird-wire collision monitoring. Previous bird-wire collision surveys were conducted in the spring and fall of 2018 (Wood 2019).

2.0 METHODS

Evidence of bird-wire collision mortalities was monitored at 29 sites along the transmission line route (Map 1). Fifteen of the sites were identified as ESS's that were fitted with bird diverters and 14 sites were non-significant sites that were not fitted with bird diverters but were expected to have above average bird activity (Wood 2019). Each site was surveyed twice from August 26 to September 7, 2019, with each survey separated by four to 12 days.

Surveys for bird-wire collisions were conducted at each site by two to five personnel that walked parallel lines spaced 5-10 m apart, for the entire length of the site, below the cleared right-of-way (ROW). The spacing of personnel varied slightly depending on depending on the relative density of vegetation and terrain. Personnel visually inspected the search area for signs of bird collisions (*i.e.*, carcasses and clusters of feathers). Collisions were recorded when the remains found consisted of more than five feathers in a square meter (Barrientos *et al.* 2012). The location of the collision was recorded using a handheld global positioning system (GPS), collision evidence was photographed, and any bird remains found were collected under a federal scientific permit. The remains were later identified to species, where possible, by a qualified biologist. Bird remains were later disposed of according to permit conditions.



Map 1. Location of Survey Sites Along the Bipole III Transmission Line

Table 1. Dates Survey Sites Checked and Site Characteristics

Site	Bird Diverters Present	First Check	Second Check	Site Length (m)	Scavenger Area
Bird 11	Yes	28-Aug-19	03-Sep-19	444	1
Bird 13	Yes	28-Aug-19	04-Sep-19	407	1
Bird 3a	Yes	26-Aug-19	07-Sep-19	500	1
Bird 4	No	26-Aug-19	07-Sep-19	500	1
Bird 5	Yes	26-Aug-19	07-Sep-19	506	1
New Point Road	Yes	27-Aug-19	03-Sep-19	391	1
WPT 18	Yes	28-Aug-19	04-Sep-19	489	1
WPT10_11_12	Yes	27-Aug-19	04-Sep-19	417	1
WPT3	Yes	27-Aug-19	03-Sep-19	562	1
WS4	Yes	27-Aug-19	03-Sep-19	441	1
Bird 26	No	31-Aug-19	06-Sep-19	464	2
Bird 29	No	30-Aug-19	04-Sep-19	478	2
Bird 31	Yes	31-Aug-19	06-Sep-19	468	2
Bird 33/35	Yes	30-Aug-19	04-Sep-19	415	2
Bird 37	No	29-Aug-19	03-Sep-19	477	2
Bird 39	No	29-Aug-19	03-Sep-19	439	2
Bird 293	No	28-Aug-19	02-Sep-19	500	3
Bird 44	No	29-Aug-19	03-Sep-19	475	3
Bird 53	Yes	29-Aug-19	03-Sep-19	490	3
Bird 53B	Yes	29-Aug-19	03-Sep-19	503	3
Bird 79	Yes	27-Aug-19	01-Sep-19	500	3
Bird 83	No	30-Aug-19	03-Sep-19	506	3
WS62	Yes	28-Aug-19	02-Sep-19	473	3
WS69	Yes	28-Aug-19	02-Sep-19	391	3
Bird 129	No	30-Aug-19	05-Sep-19	466	4
Bird 130	Yes	31-Aug-19	05-Sep-19	512	4
Bird 140a	Yes	01-Sep-19	05-Sep-19	458	4
Bird 142	No	31-Aug-19	05-Sep-19	487	4
Bird 142a	No	31-Aug-19	05-Sep-19	468	4

Searcher efficiency and scavenger removal biases were estimated by placing bird carcasses within search area in locations unknown to the searchers (California Energy Commission 2003; APLIC 2012). The proportion of carcasses found by the searchers was recorded. Planted birds were also used to estimate the scavenger removal bias. Search periods were separated by four to 12 days to allow time for potential scavengers to locate planted bird carcasses. Bird carcasses were sourced from wildlife rehabilitation centres and Oak Hammock Marsh Interpretive Centre, and common quail (*Coturnix coturnix*) were purchased from a commercial supplier and used to conduct scavenger/searcher trials. Common quail were selected because of their moderate size and cryptic plumage.

Searcher efficiency was calculated for all searchers, not individuals, to find evidence of bird collision mortality occurring within the search area. Planted birds removed by scavengers prior to the search were not included in calculating searcher bias.

Searcher efficiency was calculated as:

$$\text{Searcher Efficiency} = \frac{\text{Number of planted birds found}}{\text{Number of planted birds planted} - \text{Number of birds scavenged}}$$

Survey sites were placed in to four groups, based on their geographical location (Wood 2019). For each group a linear regression of remaining carcasses over time was used to determine carcass persistence.

Carcass persistence was calculated as:

$$\text{Carcass Persistence} = \frac{\text{Estimated time for 100\% carcass removal}}{2}$$

Habitat bias effects were also calculated to account for unsearchable portions of the formal search areas. Unsearchable areas were delineated in the field with a handheld GPS and its size was subtracted from the formal search area.

Habitat bias was calculated as:

$$\text{Habitat Bias} = \frac{\text{Actual area searched}}{\text{Formal search area}}$$

To account for the variation in survey site length, site length bias was calculated. This calculation standardized each site to 500 m.

$$\text{Site Length Bias} = \frac{\text{Actual site length (m)}}{500 \text{ m}}$$

Crippling loss bias was not calculated in this study due to the extensive effort required to obtain this estimate. A value of 20% was used as an estimation in this study, based on previous studies (Wood 2019; Rioux *et al.* 2013; Brown and Drewien 1995).

Searcher efficiency, carcass persistence, habitat bias, site length bias, and crippling loss bias were used to calculate the estimated collision mortality at all surveyed sites.

Estimated daily mortality was calculated as:

$$\text{Estimated Daily Mortality} = \frac{\text{Number of carcasses found}}{\text{Searcher Efficiency} * \text{Carcass Persistence} * \text{Habitat Bias} * \text{Site Length Bias} * \text{Crippling Loss Bias}}$$

To estimate seasonal collision mortality, weekly collision mortality estimates were multiplied by a factor of six weeks (42 days).

3.0 RESULTS

Evidence of nine bird-wire collisions was found at seven sites in 2019 (Table 2; Map 2). The evidence of two collisions found at site WS62 may have been from a single bird as the feathers found in two separate locations were relatively close to one another (approximately 5 m apart) and from the same species. As it was not possible to distinguish if this was a single collision or not, a conservative approach was used, and it was classified as two separate collisions. An additional, incidental mortality at Bird 29 was also found approximately 120 m away from one of the search areas and was not included calculations.

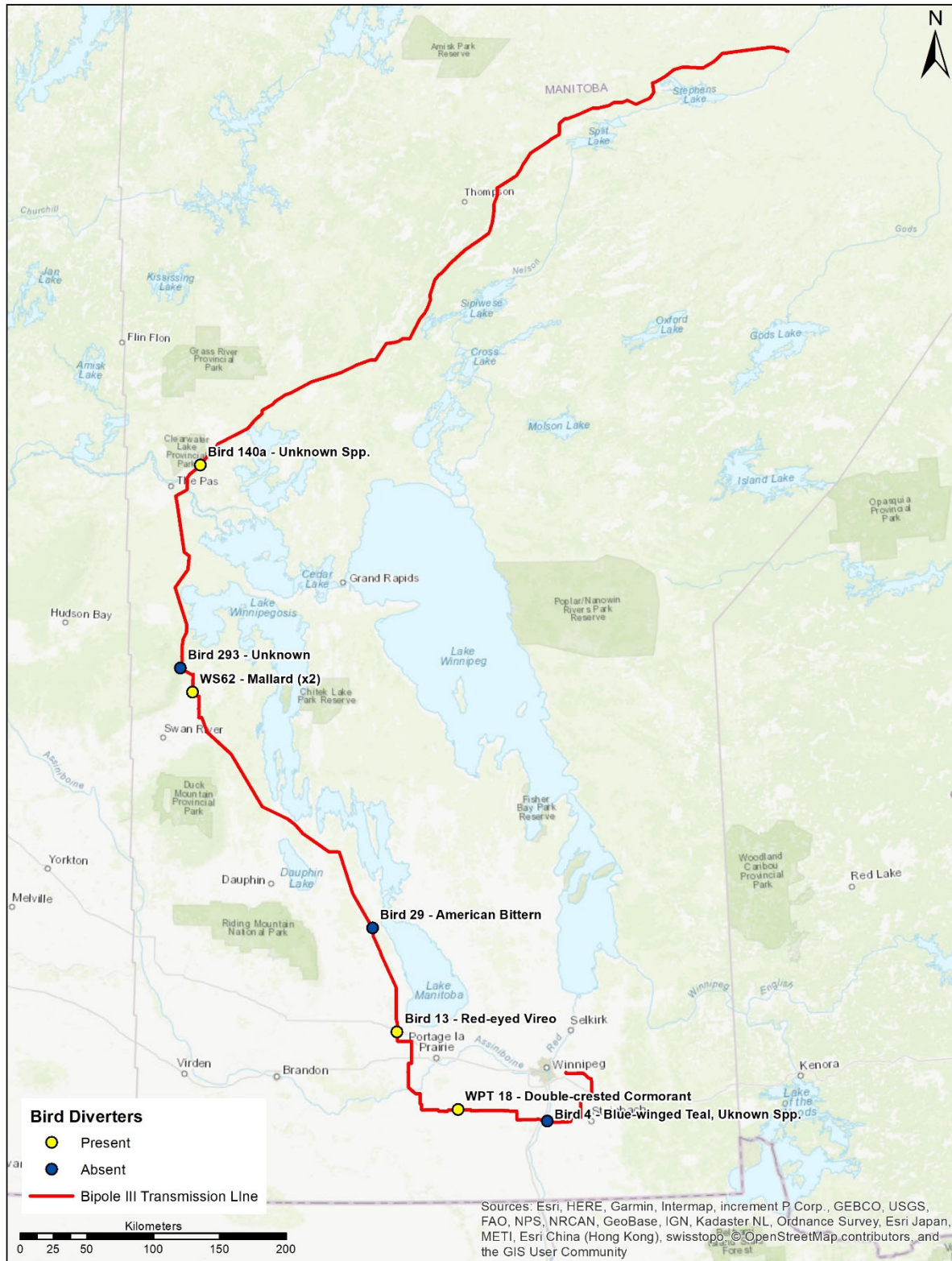
Five bird mortalities were found at four sites that had bird diverters present and four mortalities were found at three sites where bird diverters were absent (Table 2; Map 2).

Species identification was not possible for three collisions, two due to an advanced state of decomposition (skeletal remains), and one due to a lack of distinguishing characteristics (five feathers). No evidence of from Threatened or Endangered species were found during the survey and no injured birds were found during the survey.

Table 2. Collision Mortality Evidence Found at Bipole III Survey Sites in 2019

Site	Bird Diverters Present	Date Found	UTM Coordinate	Evidence Found	Species
Bird 13	Yes	04-Sep-19	14 U 521444 5555936	Carcass	Red-eyed Vireo
Bird 140a	Yes	01-Sep-19	14 U 373567 5980922	Skeletal remains	Unknown
WS62	Yes	02-Sep-19	14 U 367766 5810848	Feathers	Mallard
WS62	Yes	02-Sep-19	14 U 367764 5810844	Feathers	Mallard
WPT 18	Yes	28-Aug-19	14 U 567175 5497735	Carcass	Double-crested Cormorant
Bird 293	No	02-Sep-19	14 U 358538 5828778	Skeletal remains	Unknown
Bird 4	No	26-Aug-19	14 U 634287 5489083	Carcass	Blue-winged Teal
Bird 4	No	07-Sep-19	14 U 634378 5489084	Five white feathers	Unknown
*Bird 29	No	04-Sep-19	14 U 503137 5633860	Partial carcass	American Bittern

* Found approximately 120 m from survey site and not included in estimated mortality calculations



Map 2. Bird Collision Mortality Evidence Found at Bipole III Survey Sites in 2019

Searcher efficiency was relatively low in 2019 (17%), compared to previous years. Carcass persistence ranged from 3 days at the northern survey sites to 7.3 days at the southern sites (Table 3).

Estimated daily collision mortality ranged from 0 to 17.32 birds/km/day. The average estimated collision mortality was 1.89 birds/km/day at all sites, 1.83 birds/km/day at sites with diverters, and 1.99 birds/km/day at sites without diverters. Estimated collision mortality during the six-week migration period was 79.38 birds/km at all sites, 76.86 birds/km at sites with diverters, and 83.58 birds/km at sites without diverters.

Table 3. Bird Collision Mortality Findings and Estimates from 2019

Site	Bird Diverters Present?	Scavenger Area	First Check	Second Check	Collisions	Habitat Bias	Carcass Persistence	Site Length (m)	Site Length Bias	Estimated Collision Mortality (Birds/km/Day)
Bird 11	Yes	1	28-Aug-19	03-Sep-19	0	1.00	7.3	444	0.89	0.00
Bird 13	Yes	1	28-Aug-19	04-Sep-19	1	1.00	7.3	407	0.81	4.95
Bird 3a	Yes	1	26-Aug-19	07-Sep-19	0	1.00	7.3	500	1.00	0.00
Bird 4	No	1	26-Aug-19	07-Sep-19	2	1.00	7.3	500	1.00	8.05
Bird 5	Yes	1	26-Aug-19	07-Sep-19	0	1.00	7.3	506	1.01	0.00
New Point Road	Yes	1	27-Aug-19	03-Sep-19	0	1.00	7.3	391	0.78	0.00
WPT 18	Yes	1	28-Aug-19	04-Sep-19	0	0.65	7.3	489	0.98	0.00
WPT10_11_12	Yes	1	27-Aug-19	04-Sep-19	0	1.00	7.3	417	0.83	0.00
WPT3	Yes	1	27-Aug-19	03-Sep-19	0	0.65	7.3	562	1.12	0.00
WS4	Yes	1	27-Aug-19	03-Sep-19	0	1.00	7.3	441	0.88	0.00
Bird 26	No	2	31-Aug-19	06-Sep-19	0	1.00	5.4	464	0.93	0.00
Bird 29	No	2	30-Aug-19	04-Sep-19	1	1.00	5.4	478	0.96	5.70
Bird 31	Yes	2	31-Aug-19	06-Sep-19	0	1.00	5.4	468	0.94	0.00
Bird 33/35	Yes	2	30-Aug-19	04-Sep-19	0	1.00	5.4	415	0.83	0.00
Bird 37	No	2	29-Aug-19	03-Sep-19	0	1.00	5.4	477	0.95	0.00
Bird 39	No	2	29-Aug-19	03-Sep-19	0	0.89	5.4	439	0.88	0.00
Bird 293	No	3	28-Aug-19	02-Sep-19	1	1.00	3.6	500	1.00	8.19
Bird 44	No	3	29-Aug-19	03-Sep-19	0	1.00	3.6	475	0.95	0.00
Bird 53	Yes	3	29-Aug-19	03-Sep-19	0	1.00	3.6	490	0.98	0.00
Bird 53B	Yes	3	29-Aug-19	03-Sep-19	0	1.00	3.6	503	1.01	0.00
Bird 79	Yes	3	27-Aug-19	01-Sep-19	0	1.00	3.6	500	1.00	0.00
Bird 83	No	3	30-Aug-19	03-Sep-19	0	1.00	3.6	506	1.01	0.00
WS62	Yes	3	28-Aug-19	02-Sep-19	2	1.00	3.6	473	0.95	17.32
WS69	Yes	3	28-Aug-19	02-Sep-19	0	1.00	3.6	391	0.78	0.00
Bird 129	No	4	30-Aug-19	05-Sep-19	0	1.00	3.0	466	0.93	0.00

Site	Bird Diverters Present?	Scavenger Area	First Check	Second Check	Collisions	Habitat Bias	Carcass Persistence	Site Length (m)	Site Length Bias	Estimated Collision Mortality (Birds/km/Day)
Bird 130	Yes	4	31-Aug-19	05-Sep-19	0	1.00	3.0	512	1.02	0.00
Bird 140a	Yes	4	01-Sep-19	05-Sep-19	1	1.00	3.0	458	0.92	10.67
Bird 142	No	4	31-Aug-19	05-Sep-19	0	1.00	3.0	487	0.97	0.00
Bird 142a	No	4	31-Aug-19	05-Sep-19	0	1.00	3.0	468	0.94	0.00

4.0 DISCUSSION

Bird mortalities were relatively even between sites with bird diverters and sites without bird diverters. This was consistent with the bird collision mortality surveys conducted in 2018 (Wood 2019). While bird passage surveys were not conducted in 2019, in 2018 it was observed that survey sites fitted with bird diverters experienced higher numbers of birds passing across the site compared to survey sites without bird diverters (Wood 2019). Assuming bird passage is still higher at these sites in 2019, then this suggests that bird diverters are working properly and preventing bird collisions.

Estimated collision mortality in 2019 was generally higher compared to 2018. In 2019, over the six-week migration period an average mortality rate of 79.38 birds/km was estimated, compared to 56.21 birds/km and 35.66 birds/km in the spring and fall of 2018, respectively (Wood 2019). The mortality rate falls between the rates observed among other Manitoba Hydro projects where it ranged from 0 to 56.21 birds/km over a six-week period (WRCS 2018a; WRCS 2018b; WRCS 2018c; WRCS 2017). One site at Wuskwatim had an estimated mortality rate of 469.09 birds/km but was inflated due to a high scavenger rate bias (WRCS 2018c). The daily mortality rate in 2019, 1.89 birds/km/day (ranging from 0 to 17.32 birds/km/day) was also comparable to results published in other studies, suggesting that a typical number of mortalities is occurring along the transmission line. Constantini *et al.* (2017) found a mortality rate ranging from 0.06 to 2.68 birds/km, and Morkill and Anderson (1991) found a mortality rate ranging from 0.02 to 7.14 birds/km.

Searcher efficiency in 2019 (17%) was noticeably lower compared to 2018 (80%) (Wood 2019). In 2019, native bird species and quail, with their cryptic plumage, were used to assess searcher bias. These birds were likely more difficult to find compared to the chickens used in 2018 and likely attributed to fewer birds being located by searchers (Wood 2019). Differences in bird placement and vegetation cover at the time of the survey may also have played a role in the difference of search efficiency in 2019.

Carcass persistence in 2019 (3.0-7.3 days) was slightly greater than the carcass persistence observed in 2018 (2.31-5.16 days) (Wood 2019). However, in 2018 it was observed that bird carcasses persisted longer in the most northern survey sites and declined in the southern survey sites. In 2019, the opposite was observed, with the longest carcass persistence times occurring in the southern survey sites and increasing northward. This is likely attributed to the variable nature of scavenging rates (Rioux *et al.* 2013) and highlights the need for annual scavenging rate estimations.

5.0 CONCLUSIONS

Bird-wire diverters along the Bipole III transmission line appear to be effective at reducing the number of bird-wire collision mortalities. No Threatened or Endangered species were observed in 2019 and mortality rate estimates are within the ranges of studies in other parts of the province and no further mitigative measures are required at this time. Additional bird-wire collision mortality surveys will be conducted in the spring and fall of 2020 as part of operation monitoring.

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Appendix 1

Photos



Photo 1. Red-eyed Vireo Mortality Observed at Site Bird 13



Photo 2. Unknown Species Mortality Observed at Site Bird 140a



Photo 3. Mallard Mortality Evidence Observed at Site WS62



Photo 4. Double-crested Cormorant Mortality Observed at Site WPT 18



Photo 5. Unknown Species Mortality Observed at Site Bird 293



Photo 6. Blue-winged Teal Mortality Observed at Site Bird 4