BIPOLE III TRANSMISSION PROJECT

BIRD SPECIES OF CONSERVATION CONCERN MONITORING 2020

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By

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SUMMARY

The Bipole III Transmission Project (the Project) is a 500-kilovolt high voltage, direct current transmission line spanning 1,388 km from the Keewatinohk converter station near Gillam in northern Manitoba to the Riel converter station near Winnipeg. Construction for the Project began in the winter of 2014 and was completed in the summer of 2018.

Bird species of conservation concern monitoring began in spring 2014, just prior to the beginning of Project construction, and continued in 2015, during clearing and tower construction. Post-construction surveys were conducted in 2017 and 2020. The post-construction monitoring period was defined by the completion of all right-of-way vegetation clearing and tower construction. Songbird, marsh bird, and crepuscular bird surveys were conducted in the spring of each monitoring year, when breeding birds were generally most vocal, with methods adapted from scientifically recognized studies for breeding birds. All bird species of conservation concern and non-species of conservation concern were counted at impact (disturbed by vegetation clearing for the Project) and control (similar but undisturbed) sites to test the hypothesis that the Project does not affect the abundance, density, and richness of bird species of conservation concern. Summary statistics were prepared for the most common bird species and for four bird guilds (edge/shrub/successional, forest, grassland/open country, and wetland/open water). Distribution, abundance, density, and species richness indicators were compared at impact and control sites before and after Project construction with non-parametric longitudinal analysis of variance (ANOVA). Where a significant interaction was observed, non-parametric ANOVA-type post-hoc tests with Bonferroni-corrected p-values were performed. All results were considered significant at the $\alpha = 0.05$ level.

While the density and abundance of bird species of conservation concern varied before, during, and after Project construction, there did not appear to be adverse Project effects on any species or guilds during the second post-construction monitoring year. There was an increase in the abundance, density, and species richness of edge/shrub/successional birds at impact sites and a simultaneous decrease at control sites, suggesting that regenerating vegetation on the transmission line right-of-way provided suitable habitat for these species and may have attracted them to it. No adverse Project effects on forest, grassland/open country, or wetland/open water birds were apparent; there was no change in the abundance, density, or species richness of forest or grassland/open country birds and an increase in the abundance and species richness of wetland/open water birds was observed but was not likely Project-related. There appeared to be a general decline in marsh bird abundance in the study area that was not Project-related, but more likely due to drought conditions, a potential decline in eastern whip-poor-will abundance near the ROW, and a potential increase in common nighthawk abundance near the ROW.

No adverse Project effects on bird non-species of conservation concern species or guilds were detected during the second post-construction monitoring year. Abundance, density, and species richness increased or remained the same at impact and control sites. The abundance, density, and species richness of all but forest birds were greater at impact than control sites before and after Project construction. The increase or similarity in metrics at both site types after construction suggests that changes were observed throughout the study area and were likely not Project-related.

In terms of hypothesis testing, positive Project effects on the abundance, density, and richness of edge/shrub/successional bird species of conservation concern and no effects on forest, grassland/open country, or wetland/open water bird species of conservation concern were observed. These observations are consistent with similar studies in North America.

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1.0 INTRODUCTION

The Bipole III Transmission Project (the Project) is a 500-kilovolt high voltage, direct current transmission line spanning 1,388 km from the Keewatinohk converter station near Gillam in northern Manitoba to the Riel converter station near Winnipeg. Clearing for the Project began in the winter of 2014. The Project came into service in the summer of 2018. As part of *The Environment Act* licence conditions, Manitoba Hydro is required to monitor potential effects of Project infrastructure on bird species of conservation concern (SCCs), which are those listed by the federal *Species at Risk Act* (SARA), *The Endangered Species and Ecosystems Act* of Manitoba (ESEA), or those listed by Environment and Climate Change Canada as priority species in Bird Conservation Region (BCR) 6 or 11 (Boreal Taiga Plains and Prairie Potholes ecoregions, respectively; Environment Canada 2013a, 2013b).

As described in the *Bipole III Transmission Project Biophysical Monitoring Plan*, the objectives of bird SCC monitoring included:

- Comparing their location within or near the Project footprint before, during, and after construction, and
- Comparing their annual site fidelity and abundance to nearby control sites.

SCC bird monitoring began in spring 2014, just prior to the beginning of Project construction, and continued in 2015, during clearing and tower construction. Post-construction surveys began in 2017, when the transmission line right-of-way had been cleared but before the line was strung, and concluded in 2020, after Project construction.

2.0 METHODS

A Before-After-Control-Impact (BACI) study was conducted to evaluate Project effects on bird SCCs (AMEC Foster Wheeler Americas Limited [AMEC] 2015a, 2015b, 2017). Surveys were conducted at point count locations along the transmission line route in areas identified in the *Bipole III Transmission Project Environmental Impact Statement* as potentially suitable habitat for bird SCCs (impact sites) and in unaffected reference areas (control sites). All bird SCCs and non-SCCs were recorded to monitor changes in species distribution, abundance, density, and richness before, during, and after Project construction. Three survey periods were identified (AMEC 2015a):

- Pre-construction (2014)
- Pre-tower and conductor construction- vegetation clearing on the transmission line right-of-way (2015); and
- Post-tower and conductor construction- wire-stringing and operation (2017, 2020).

Three types of point count surveys were conducted to target species that are active at different times of the day and that are typically difficult to detect:

- Morning songbird surveys;
- Morning and evening marsh bird surveys; and
- Night-time crepuscular bird surveys.

2.1 SONGBIRD SURVEYS

Songbird surveys that were conducted in 2014, 2015, and 2017 were replicated in 2020; see AMEC (2015a) for a description of the study design. Methods were adapted from scientifically recognized studies for monitoring breeding birds (e.g., the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas 2010] and the North American Breeding Bird Survey [U.S. Geological Survey 2018]). Surveys were conducted June 8–12 and June 22–26, 2020, during the breeding bird season when species are generally most vocal. A total of 216 of the point count sites surveyed in previous years were revisited in 2020, at 106 impact sites and 110 control sites (Table 1; Appendix A, Map Series 100). Surveys were conducted between approximately 5:00 a.m. and 10:30 a.m. At each site, an observer skilled in the identification of birds by sight and sound recorded all species detected at 0–50 m, 50–100 m, and >100 m intervals during a 10-minute period. The location of each bird was mapped on field data sheets to ensure none were double counted. All but nine sites were surveyed twice; four impact and five control sites were surveyed once in 2020 due to poor weather conditions or logistical issues. Where possible, point count sites were surveyed in reverse order during the second visit.

Table 1: Number of sites surveyed during songbird surveys 2014–2017 and 2020

Year	Period	Impact	Control	Total
2014	Pre-construction	106	110	216
2015	Construction	91	110	201
2017	Post-construction	106	110	216
2020	Post-construction	106	110	216

2.2 MARSH BIRD SURVEYS

Marsh bird surveys were conducted from June 8–12 and June 20–23, 2020 at point count sites initially surveyed in 2014, 2015, and 2017 (AMEC 2015a, 2015b, 2017). A total of 70 of the point count locations surveyed in previous years were revisited in 2020, at 36 impact sites and 34 control sites (Table 2; Appendix A, Map Series 200). All sites but one were surveyed twice. Surveys were conducted from 5:00 a.m. until 9:30 a.m. and from 10:00 p.m. until 1:00 a.m. At each site, an observer recorded all species detected at 0–100 m, 100–200 m, and >200 m intervals during a six-minute period. The location of each bird was mapped on field data sheets to ensure none were double counted. Target species were American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), pied-billed grebe (*Podilymbus podiceps*), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), and yellow rail (*Coturnicops noveboracensis*).

Table 2: Number of sites surveyed during marsh bird surveys 2014–2017 and 2020

Year	Period	Impact	Control	Total
2014	Pre-construction	35	44	79
2015	Construction	37	36	73
2017	Post-construction	37	37	74
2020	Post-construction	36	34	70

2.3 CREPUSCULAR BIRD SURVEYS

Crepuscular bird surveys that were conducted in 2014, 2015, and 2017 were repeated from June 7–9, 2020; see AMEC (2017) for a description of the study design. Twenty-three of the 24 impact sites and all 24 control sites (Appendix A, Map Series 300) surveyed in previous years were surveyed once in 2020. Surveys were conducted from 9:00 p.m. to midnight when common nighthawk (*Chordeiles minor*) and eastern whip-poor-will (*Antrostomus vociferus*), the target species, are most active. At each site, an observer recorded all species detected at 0–200 m, 200–400 m, and >400 m intervals during a six-minute period. The location of each bird was mapped on field data sheets to ensure none were double counted.

2.4 DATA ANALYSIS

Four metrics established by AMEC (2017) were calculated to assess Project effects on bird SCCs and non-SCCs:

- Species distribution;
- Species abundance;
- Species density; and
- Species richness.

As outlined in AMEC (2017), the maximum number of individuals of each species at point count sites was determined by counting the greatest number of each species recorded during either the first or second round of surveys each year as the maximum number of individuals regardless of their distance from the centre of the site. For instance, if two birds of the same species were recorded during the first survey and three birds of that species were recorded during the second survey, the maximum number of that species at that site was three. Species were also divided into four guilds (edge/shrub/successional, forest, grassland/open country, and wetland/open water), based on their general habitat requirements, for the analysis.

Summary statistics were prepared as described by AMEC (2017). In addition to data collected in 2020, raw data from 2014 and 2017 were used to calculate species and guild distribution, abundance, density, and richness at sites where species and guilds were observed. Except for distribution, where all sites were included, sites at which a species was not observed over the three-year pre-and post-construction survey period were omitted from the analysis to account for potential differences in habitat at point count sites (i.e., sites where no individuals of a species were ever detected were assumed to be unsuitable habitat). Data from 2015 were not available and summary statistics from AMEC (2017) were reported for that survey year.

As described by AMEC (2017), species distribution is a measure of the proportion of point count stations at which SCC and non-SCC species were observed. It was determined by measuring the percent occurrence of each species, which was calculated by dividing the number of sites at which a species was observed at an unlimited distance by the total number of sites surveyed, including those where species were not observed.

Species abundance is an indication of the number of each species in the study area (AMEC 2017). Mean species abundance was calculated for SCCs and non-SCCs by dividing the sum of the maximum number of individuals recorded by the number of stations where the species was recorded at least once over an unlimited distance during the three-year survey period.

Species density is a measure of the number of individuals of a species per unit area (AMEC 2017). Mean density of SCCs and non-SCCs was calculated at each point count site as the maximum number of each species observed within a 100 m radius of the centre divided by the total area of the site (3.14 ha), then divided by the total number of stations where the species was observed at least once over the three-year survey period. Species density was only measured for songbird surveys because marsh and crepuscular birds were considered at an unlimited distance.

As described by AMEC (2017), species richness is a measure of the total number of species from each guild detected at each point count site. Mean species richness was calculated by dividing the number of species from each of four guilds at each site by the total number of sites where the species was recorded at least once over an unlimited distance during the three-year survey period.

Predicted Project effects on bird SCCs included displacement and/or reduced nesting success due to habitat alteration or noise disturbance. As described by AMEC (2015a, 2015b, 2017), monitoring studies were conducted to test the hypothesis that the Bipole III transmission line adversely affects the abundance, density, and richness of SCCs nearby. The null and alternative hypotheses state (AMEC 2017):

- H^0 (null): The Bipole III transmission line does not affect the abundance, density, and richness of bird SCCs.
- H^1 (alternative): The Bipole III transmission line affects the abundance, density, and richness of bird SCCs.

Statistical analyses were conducted with R (The R Project for Statistical Computing 2021). As indicated by AMEC (2017) the study was a design with repeated measures (the same sites surveyed each year) and one categorical predictor (impact vs. control). Repeated measures analysis of variance (ANOVA) was employed with data from before (2014) and after (2017, 2020) Project construction. Assumptions of normality (normal distribution) were tested with the Kolmogorov-Smirnov test and the Shapiro-Wilk test, and by visually assessing quantile-quantile (Q-Q) plots and histograms. When data were determined to be non-normal, they were square root or log transformed. If data were still non-normal, a non-parametric longitudinal ANOVA was performed and the results were reported. For consistency with previous survey years, parametric ANOVA results were also included for all species and guilds. Where a significant effect was observed, Tukey HSD post-hoc multiple comparisons or non-parametric ANOVA-type post-hoc tests with Bonferroni-corrected p-values were performed to analyze differences between pre-construction (2014) and post-construction (2020) years. Where non-parametric ANOVA results were included for species or guilds, only non-parametric post-hoc test results were reported, if applicable. Results were considered significant at the $\alpha = 0.05$ level.

3.0 RESULTS

In all, 181 bird species were identified in the study area from 2014 to 2020 during songbird, marsh bird, and crepuscular bird surveys (Appendix B, Table B-1; all scientific names are included within). Of these, 159 were observed in 2020. A total of 15 SARA- or ESEA-listed species was observed (Appendix A, Map Series 400). The results of assumption testing and data transformation are provided in Appendix C.

3.1 SONGBIRD SURVEYS

A total of 149 bird species were recorded during songbird surveys from 2014–2017 and 2020 (Appendix B, Table B-2), several of which (e.g., bald eagle, ruffed grouse) are not considered songbirds and were not the target of the surveys. Nine species (American woodcock, bank swallow, black tern, marbled godwit, red crossbill, sharp-shinned hawk, sharp-tailed grouse, vesper sparrow, and willow flycatcher) were first observed in 2020. Sixty-eight were SCCs, including ten SARA- and/or ESEA-listed species.

3.1.1 Species of Conservation Concern

Distribution

The six most common bird SCCs observed over the four-year survey period were alder flycatcher, clay-colored sparrow, common yellowthroat, least flycatcher, mourning warbler, and white-throated sparrow (Table 3). All but two were from the edge/shrub/successional guild; mourning warbler and white-throated sparrow were classified as forest birds (AMEC 2017); however, mourning warblers are also common in disturbed or shrubby areas and clearings (e.g., Pitocchelli 1993). All SCCs but white-throated sparrow were observed at a greater percentage of impact stations than control stations all or most (common yellowthroat) survey years.

Table 3: Most common bird species of conservation concern detected during songbird surveys, 2014–2017 and 2020

Species	Year	Impact			Control		
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence
Alder flycatcher[1]	2014	31	22	20.8	22	18	16.4
	2015	41	29	31.9	36	29	26.4
	2017	67	42	39.6	35	25	22.7
	2020	91	66	62.3	46	28	25.5
Clay-colored sparrow[1, 2]	2014	88	47	44.3	75	42	38.2
	2015	79	43	47.3	52	36	32.7
	2017	74	55	51.9	52	35	31.8
	2020	99	56	52.8	33	26	23.6

Species	Year	Impact			Control		
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence
Common yellowthroat[1, 2]	2014	83	51	48.1	86	55	50.0
	2017	64	44	48.4	68	42	38.2
	2015	128	71	67.0	62	40	36.4
	2020	114	68	64.2	70	43	39.1
Least flycatcher[1, 2]	2014	120	60	56.6	68	38	34.5
	2015	86	45	49.5	38	24	21.8
	2017	106	57	53.8	28	19	17.3
	2020	105	56	52.8	42	29	26.4
Mourning warbler[1]	2014	19	17	16.0	20	17	15.5
	2015	27	18	19.8	27	20	18.2
	2017	32	28	26.4	23	16	14.5
	2020	45	32	30.2	36	29	26.4
White-throated sparrow[1]	2014	116	64	60.4	210	96	87.3
	2015	111	58	63.7	197	88	80.0
	2017	145	72	67.9	150	82	74.5
	2020	130	68	64.2	169	89	80.9

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species

Nine SARA- or MESA-listed songbird SCCs were observed over the four-year survey period (Table 4). Canada warbler, golden-winged warbler, and olive-sided flycatcher were detected each survey year. The number and distribution of golden-winged warblers and olive-sided flycatchers increased during (2015) and after (2017, 2020) Project construction at impact sites and varied at control sites over the same period.

Table 4: Summary of SARA- or ESEA-listed species detected during songbird surveys, 2014–2017 and 2020

Species	Year	Impact			Control		
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence
Bank swallow[1, 3]	2014	0	0	0	0	0	0
	2015	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0
Bobolink[1, 2, 3]	2014	10	5	4.7	0	0	0
	2015	3	3	3.3	0	0	0
	2017	0	0	0	0	0	0
	2020	3	3	2.8	0	0	0

Species	Year	Impact			Control		
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence
Canada warbler[1, 3]	2014	1	1	0.9	3	3	2.7
	2015	5	5	5.5	5	4	3.6
	2017	1	1	0.9	5	3	2.7
	2020	3	2	1.9	11	9	8.2
Chimney swift[1, 2, 3]	2014	0	0	0	0	0	0
	2015	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9
	2020	0	0	0	0	0	0
Eastern wood-pewee[3]	2014	7	6	5.7	6	6	5.5
	2015	0	0	0	0	0	0
	2017	3	2	1.9	4	4	3.6
	2020	1	1	0.9	7	7	6.4
Golden-winged warbler[1, 2, 3]	2014	7	7	6.6	9	6	5.5
	2015	2	2	2.2	6	6	5.5
	2017	11	8	7.5	6	4	3.6
	2020	10	8	7.5	5	5	4.5
Olive-sided flycatcher[1, 2, 3]	2014	0	0	0	1	1	0.9
	2015	2	2	2.2	2	2	1.8
	2017	3	3	2.8	3	2	1.8
	2020	4	4	3.8	0	0	0
Red-headed woodpecker[1, 2, 3]	2014	0	0	0	0	0	0
	2015	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9
	2020	0	0	0	0	0	0
Rusty blackbird[1, 2, 3]	2014	0	0	0	0	0	0
	2015	2	2	2.2	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species 3. SARA- and/or ESEA-listed species.

Abundance

Alder flycatcher abundance was lower at impact than control sites before (2014) and during (2015) Project construction and was greater at impact than control sites after construction (2017, 2020; Table 5). Abundance increased at impact sites and fluctuated at control sites over the four-year survey period. There were no significant differences in alder flycatcher abundance at impact vs. control sites over the three-year pre- and post-construction survey period (Table 6). Abundance increased significantly over the same period (18.957, p <0.001). There was no significant interaction effect between treatment and year. Post-hoc analysis showed a significant increase in abundance at impact sites between 2014 and

2020 (p <0.001) and no significant difference at control sites (p = 0.080), suggesting a positive Project effect on alder flycatcher abundance near the transmission line right-of-way (ROW).

Clay-colored sparrow abundance was lower at impact than control sites before construction (2014) and during the first year of post-construction monitoring (2017; Table 5). Abundance was greater at impact than control sites during construction (2015) and the second year of post-construction monitoring (2020). There was no significant difference in clay-colored sparrow abundance at impact vs. control sites over the three-year pre- and post-construction survey period (Table 6). There was a significant difference in abundance among years (6.605, p = 0.001) and a significant interaction effect between treatment and year (13.017, p <0.001). Post-hoc analysis indicated that there was no significant difference in abundance between 2014 and 2020 at impact sites (p = 0.940) and that abundance at control sites was significantly lower in 2020 than in 2014 (p <0.001). There were no apparent adverse Project effects on clay-colored sparrow abundance near the ROW.

Common yellowthroat abundance was lower at impact than control sites before (2014) and during (2015) Project construction but was greater at impact sites post-construction (2017, 2020; Table 5). There were no significant differences in common yellowthroat abundance at impact vs. control sites or among survey years over the three-year pre- and post-construction period (Table 6). There was a significant interaction effect between treatment and year (11.367, p <0.001). Post-hoc analysis indicated that abundance at impact sites was significantly greater in 2020 than in 2014 (p = 0.031), while there was no difference in abundance at control sites over the same period (0.163), suggesting a positive Project effect on common yellowthroat abundance near the ROW.

The abundance of least flycatchers was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 5). Abundance declined at impact and control sites over the same period. Over the three-year pre- and post-construction period, least flycatcher abundance was significantly greater at impact than control sites (9.401, p = 0.002) and there was a significant difference among survey years (13.113, p <0.001; Table 6). There was a significant interaction effect between treatment and year (4.848, p = 0.008). Post-hoc analysis indicated that there was no significant difference in abundance at impact sites between 2014 and 2020 (p = 0.409), but abundance decreased significantly at control sites (p = 0.012), suggesting that there have been no adverse Project effects on least flycatcher abundance near the ROW.

Mourning warbler abundance was lower at impact than control sites before (2014) and during (2015) Project construction and was greater at impact than control sites after construction (2017, 2020; Table 5). At both site types, abundance was greater after construction than before. There was no significant difference in mourning warbler abundance at impact vs. control sites over the three-year pre- and post-construction period and no significant interaction effect between treatment and year (Table 6). Abundance differed significantly over the three-year period (8.646, p <0.001). Post-hoc analysis indicated that abundance was significantly greater in 2020 than in 2014 at impact sites (p = 0.002) and that there was no significant difference in abundance at control sites (p = 0.056), suggesting a positive Project effect on mourning warbler abundance near the ROW.

The abundance of white-throated sparrows was lower at impact than control sites before (2014) and during (2015) Project construction, and during the second post-construction monitoring year (2020; Table 5). Abundance was greater at impact than control sites in 2017, the first year of post-construction monitoring. At impact sites, white-throated sparrow abundance was greater after construction than before or during. At control sites, abundance was greater before and during construction than after. There was no significant difference in white-throated sparrow abundance at impact vs. control sites over

the three-year pre- and post-construction period, or among survey years (Table 6). There was a significant interaction effect between treatment and year (9.760, p <0.001). Post-hoc analysis indicated that there was no significant difference in abundance at impact sites between 2014 and 2020 (p = 0.828) and that abundance was significantly lower in 2020 than in 2014 (p = 0.024) at control sites, suggesting that there have been no adverse Project effects on white-throated sparrow abundance near the ROW.

Table 5: Summary of most common bird species of conservation concern abundance, 2014–2017 and 2020

Species	Type	2014 Mean Abundance ± SE (n)	2015 Mean Abundance ± SE (n)	2017 Mean Abundance ± SE (n)	2020 Mean Abundance ± SE (n)
Alder flycatcher[1]	Impact	0.39 ± 0.08 (79)	0.82 ± 0.12 (50)	0.85 ± 0.11 (79)	1.15 ± 0.09 (79)
	Control	0.49 ± 0.10 (45)	0.90 ± 0.12 (40)	0.78 ± 0.13 (45)	1.02 ± 0.16 (45)
Clay-colored sparrow[1, 2]	Impact	1.21 ± 0.15 (73)	1.39 ± 0.15 (57)	1.01 ± 0.10 (73)	1.36 ± 0.15 (73)
	Control	1.53 ± 0.13 (49)	1.02 ± 0.12 (51)	1.06 ± 0.12 (49)	0.67 ± 0.10 (49)
Common yellowthroat[1, 2]	Impact	0.91 ± 0.10 (91)	0.86 ± 0.10 (74)	1.41 ± 0.12 (91)	1.25 ± 0.11 (91)
	Control	1.32 ± 0.12 (65)	1.01 ± 0.13 (67)	0.95 ± 0.12 (65)	1.08 ± 0.13 (65)
Least flycatcher[1, 2]	Impact	1.56 ± 0.13 (77)	1.39 ± 0.15 (62)	1.38 ± 0.13 (77)	1.36 ± 0.14 (77)
	Control	1.45 ± 0.15 (47)	0.90 ± 0.17 (42)	0.60 ± 0.12 (47)	0.89 ± 0.13 (47)
Mourning warbler[1]	Impact	0.39 ± 0.08 (49)	0.71 ± 0.16 (38)	0.65 ± 0.09 (49)	0.92 ± 0.12 (49)
	Control	0.45 ± 0.09 (44)	0.75 ± 0.13 (36)	0.52 ± 0.12 (44)	0.82 ± 0.10 (44)
White-throated sparrow[1]	Impact	1.36 ± 0.12 (85)	1.46 ± 0.13 (76)	1.71 ± 0.13 (85)	1.53 ± 0.12 (85)
	Control	1.98 ± 0.13 (106)	1.88 ± 0.14 (105)	1.42 ± 0.11 (106)	1.59 ± 0.11 (106)

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species

Table 6: Parametric and non-parametric ANOVA of most common bird species of conservation concern abundance before (2014) and after (2017, 2020) Project construction

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
Alder flycatcher[1]	Treatment	1	0.137	0.712	0.172	0.678
	Year	**2**	**25.630**	**<0.001**	**18.957**	**<0.001**
	Treatment * Year	2	1.277	0.281	1.875	0.153
Clay-colored sparrow[1,2]	Treatment	1	0.287	0.593	0.015	0.902
	Year	**2**	**3.461**	**0.033**	**6.605**	**0.001**
	Treatment * Year	**2**	**12.133**	**<0.001**	**13.017**	**<0.001**
Common yellowthroat[1, 2]	Treatment	1	0.267	0.606	0.412	0.521
	Year	2	0.808	0.447	0.073	0.928
	Treatment * Year	**2**	**11.476**	**<0.001**	**11.367**	**<0.001**

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
Least flycatcher[1, 2]	**Treatment**	**1**	**9.058**	**0.003**	**9.401**	**0.002**
	Year	**2**	**9.128**	**<0.001**	**13.113**	**<0.001**
	Treatment * Year	**2**	**5.131**	**<0.001**	**4.848**	**0.008**
Mourning warbler[1]	Treatment	1	0.577	0.449	0.577	0.448
	Year	**2**	**9.175**	**<0.001**	**8.646**	**<0.001**
	Treatment * Year	2	0.647	0.525	0.804	0.442
White-throated	Treatment	1	0.962	0.328	0.453	0.501
sparrow[1]	Year	2	1.672	0.189	0.257	0.765
	Treatment * Year	**2**	**11.068**	**<0.001**	**9.760**	**<0.001**

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species

Bold font indicates statstical signficance.

The abundance of SCC edge/shrub/successional birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 7). At impact sites, abundance increased over the four-year survey period. At control sites, abundance was lower after construction than before or during. Abundance was significantly greater at impact than control sites (41.239, p <0.001) over the three-year pre- and post-construction period, and there was a significant interaction effect between treatment and year (27.400, p <0.001; Table 8). Post-hoc analysis indicated that abundance was significantly greater in 2020 than in 2014 at impact sites (p = 0.001) and was significantly lower in 2020 than in 2014 at control sites (p <0.001), suggesting a positive Project effect on SCC edge/shrub/successional bird abundance near the ROW.

The abundance of SCC forest birds was similar at control and impact sites over the four-year survey period (Table 7). At impact sites, abundance was greater after construction (2017, 2020) than before (2014) or during (2015). Abundance fluctuated at control sites over the same period. Abundance differed significantly over the three-year pre- and post-construction period (11.401, p <0.001) and there was a significant interaction effect between treatment and year (3.802, p = 0.022; Table 8). Post-hoc analysis indicated that there was no significant difference in abundance at impact sites between 2014 and 2020 (p = 0.073) and that abundance was significantly greater in 2020 than in 2014 at control sites (p = 0.001), suggesting that there have been no adverse Project effects on SCC forest bird abundance near the ROW.

The abundance of SCC grassland/open country birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 7). Abundance fluctuated at impact sites over the four-year survey period and decreased at control sites. Abundance was significantly greater at impact than control sites (8.467, p = 0.004) over the three-year pre- and post-construction period (Table 8). There were no significant differences in abundance and there was no significant interaction effect between treatment and year. There were no apparent adverse Project effects on SCCC grassland/open country bird abundance near the ROW.

The abundance of SCC wetland/open water birds was greater at impact than control sites in 2014, 2015, and 2017 (Table 7). Abundance increased at impact and control sites over the four-year survey period. There was a significant difference in abundance at impact vs. control sites (4.300, p = 0.038) and before (2014) and after (2017, 2020) Project construction (7.061, p = 0.001; Table 8). Post-hoc analysis

indicated that abundance increased significantly between 2014 and 2020 (p = 0.003) at impact sites and that there was no difference in abundance at control sites (p = 0.218), suggesting a positive Project effect on SCC wetland/open water bird abundance near the ROW.

Table 7: Summary of bird species of conservation concern abundance by guild, 2014–2017 and 2020

Guild	Type	2014 Mean Abundance ± SE (n)	2015 Mean Abundance ± SE (n)	2017 Mean Abundance ± SE (n)	2020 Mean Abundance ± SE (n)
Edge/shrub/ successional	Impact	5.08 ± 0.28 (106)	5.41 ± 0.29 (91)	6.37 ± 0.33 (106)	6.12 ± 0.28 (106)
	Control	4.79 ± 0.30 (110)	4.24 ± 0.31 (110)	3.44 ± 0.28 (110)	3.65 ± 0.24 (110)
Forest	Impact	1.18 ± 0.13 (96)	1.24 ± 0.15 (79)	1.53 ± 0.18 (96)	1.52 ± 0.13 (96)
	Control	1.16 ± 0.10 (109)	1.36 ± 0.14 (99)	1.15 ± 0.12 (109)	1.94 ± 0.18 (109)
Grassland/open country	Impact	0.93 ± 0.20 (42)	1.20 ± 0.17 (44)	0.98 ± 0.16 (42)	1.19 ± 0.18 (42)
	Control	0.75 ± 0.48 (4)	0.73 ± 0.30 (11)	0.50 ± 0.29 (4)	0.25 ± 0.25 (4)
Wetland/open water	Impact	0.80 ± 0.15 (71)	1.06 ± 0.34 (31)	1.76 ± 0.43 (71)	3.03 ± 0.79 (71)
	Control	0.45 ± 0.14 (40)	0.52 ± 0.19 (21)	1.28 ± 0.41 (40)	3.45 ± 1.42 (40)

Table 8: Parametric and non-parametric ANOVA of bird species of conservation concern guild abundance before (2014) and after (2017, 2020) Project construction

Guild			Parametric		Non-parametric	
	Effect	DF	F	*p*	Statistic	*p*
Edge/shrub/successional	**Treatment**	**1**	**35.300**	**<0.001**	**41.239**	**<0.001**
	Year	2	0.500	0.607	0.551	0.576
	Treatment * Year	**2**	**28.700**	**<0.001**	**27.400**	**<0.001**
Forest	Treatment	1	0	0.995	0.017	0.896
	Year	**2**	**13.980**	**<0.001**	**11.401**	**<0.001**
	Treatment * Year	**2**	**4.930**	**0.008**	**3.802**	**0.022**
Grassland/open country	**Treatment**	**1**	1.334	0.254	**8.476**	**0.004**
	Year	2	0.642	0.529	0.034	0.929
	Treatment * Year	2	0.653	0.523	0.760	0.431
Wetland/open water	**Treatment**	**1**	1.707	0.194	**4.300**	**0.038**
	Year	**2**	**10.25**	**<0.001**	**7.061**	**0.001**
	Treatment * Year	2	0.030	0.970	0.166	0.833

Bold font indicates statstical signficance.

Density

Alder flycatcher density was somewhat lower at impact than control sites in 2014, 2015, and 2017 and was somewhat greater at impact than control sites in 2020 (Table 9). Density was greater after Project construction (2017, 2020) than before (2014). There were no significant differences in alder flycatcher

density at impact vs. control sites over the three-year pre- and post-construction period (Table 10). There was a significant difference in density among survey years (16.220, p <0.001) but no significant interaction effect between treatment and year. Post-hoc analysis showed a significant increase in density at impact sites between 2014 and 2020 (p <0.001) and no significant difference at control sites (p = 0.157), suggesting a positive Project effect on alder flycatcher density near the transmission line ROW.

Clay-colored sparrow density was somewhat lower at impact than control sites before Project construction (2014) and was somewhat greater at impact than control sites during (2015) and after (2017, 2020; Table 9). There was no significant difference in clay-colored sparrow density at impact vs. control sites over the three-year pre-and post-construction period (Table 10). There was a significant difference in density (8.925, p <0.001) and a significant interaction effect between treatment and year (11.946, p <0.001). Post-hoc analysis indicated that there was no significant difference in density at impact sites between 2014 and 2020 (p = 0.617) and that density was significantly lower at control sites in 2020 than in 2014 (p <0.001), suggesting that there have been no adverse Project effects on clay-colored sparrow density near the ROW.

Common yellowthroat density was somewhat lower at impact than control sites before (2014) and during (2015) Project construction but was somewhat greater at impact sites after (2017, 2020; Table 9). There were no significant differences in common yellowthroat density at impact vs. control sites or among survey years over the three-year pre- and post-construction period (Table 10). There was a significant interaction effect between treatment and year (8.413, p <0.001). Post-hoc analysis indicated that there was no significant difference in density at impact (p = 0.113) or control (p = 0.177) sites between 2014 and 2020, suggesting that there have been no adverse Project effects on common yellowthroat density near the ROW.

The density of least flycatchers was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 9). Over the three-year pre- and post-construction period, there was a significant difference in density at impact vs. control sites (6.995, p = 0.008) and among survey years (13.367, p <0.001; Table 10). There was a significant interaction effect between treatment and year (4.6618, p = 0.010). Post-hoc analysis indicated that there was no significant difference in density at impact sites between 2014 and 2020 (p = 0.453) and that density decreased significantly at control sites (p = 0.027), suggesting that there have been no adverse Project effects on least flycatcher density near the ROW.

Mourning warbler density was similar at impact and control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 9), with no significant difference over the three-year pre-and post-construction period (Table 10). At impact and control sites, density was greater after construction than before (Table 9). There was no significant difference in mourning warbler density at impact vs. control sites over the three-year pre- and post-construction period and no significant interaction effect between treatment and year (Table 10). Density differed significantly among survey years (8.374, p <0.001). Post-hoc analysis indicated that density was significantly greater in 2020 than in 2014 (p = 0.009) at impact sites and that there was no significant difference in density at control sites (p = 0.102), suggesting a positive Project effect on mourning warbler density near the ROW.

The density of white-throated sparrows was lower at impact than control sites before (2014) and during (2015) Project construction, was greater at impact than control sites in 2017, and was similar at both site types in 2020 (Table 9). At impact sites, white-throated sparrow density was greater after construction than before. At control sites, density was greater before construction than after. There was no significant difference in white-throated sparrow density at impact vs. control sites over the three-

year pre- and post-construction period (Table 10). There was a significant difference among survey years (18.904, p <0.001) and a significant interaction effect between treatment and year (8.921, p <0.001). Post-hoc analysis indicated that there was no significant difference in density at impact (p = 0.154) or control (p = 1.00) sites between 2014 and 2020, suggesting that there have been no adverse Project effects on white-throated sparrow density near the ROW.

Table 9: Summary of most common bird species of conservation concern density, 2014–2017 and 2020

Species	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
Alder flycatcher[1]	Impact	0.13 ± 0.03 (73)	0.90 ± 0.13 (42)	0.22 ± 0.04 (73)	0.38 ± 0.03 (73)
	Control	0.17 ± 0.04 (38)	1.00 ± 0.11 (36)	0.26 ± 0.05 (38)	0.34 ± 0.06 (38)
Clay-colored sparrow[1, 2]	Impact	0.39 ± 0.05 (67)	1.38 ± 0.15 (53)	0.28 ± 0.03 (67)	0.46 ± 0.05 (67)
	Control	0.49 ± 0.04 (48)	1.04 ± 0.12 (49)	0.27 ± 0.04 (48)	0.22 ± 0.03 (48)
Common yellowthroat[1, 2]	Impact	0.29 ± 0.03 (89)	0.79 ± 0.10 (73)	0.40 ± 0.04 (89)	0.39 ± 0.03 (89)
	Control	0.45 ± 0.04 (59)	1.00 ± 0.13 (61)	0.30 ± 0.04 (59)	0.36 ± 0.04 (59)
Least flycatcher[1, 2]	Impact	0.49 ± 0.04 (76)	1.31 ± 0.15 (62)	0.42 ± 0.04 (76)	0.43 ± 0.05 (76)
	Control	0.47 ± 0.05 (45)	0.93 ± 0.18 (41)	0.18 ± 0.04 (45)	0.30 ± 0.04 (45)
Mourning warbler[1]	Impact	0.13 ± 0.03 (46)	0.68 ± 0.14 (37)	0.16 ± 0.03 (46)	0.29 ± 0.04 (46)
	Control	0.15 ± 0.03 (42)	0.69 ± 0.12 (36)	0.16 ± 0.04 (42)	0.26 ± 0.03 (42)
White-throated sparrow[1]	Impact	0.40 ± 0.04 (76)	1.39 ± 0.13 (64)	0.41 ± 0.05 (76)	0.52 ± 0.04 (76)
	Control	0.60 ± 0.05 (100)	1.52 ± 0.13 (99)	0.25 ± 0.04 (100)	0.52 ± 0.04 (100)

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species

Table 10: Parametric and non-parametric ANOVA of most common bird species of conservation concern density before (2014) and after (2017, 2020) Project construction

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
Alder flycatcher[1]	Treatment	1	0.184	0.669	0.203	0.622
	Year	**2**	**23.110**	**<0.001**	**16.220**	**<0.001**
	Treatment * Year	2	1.244	0.290	2.278	0.102
Clay-colored sparrow[1, 2]	Treatment	1	0.761	0.385	0.247	0.619
	Year	**2**	**7.579**	**<0.001**	**8.925**	**<0.001**
	Treatment * Year	**2**	**10.801**	**<0.001**	**11.946**	**<0.001**
Common yellowthroat[1,2]	Treatment	1	0.114	0.736	0.085	0.770
	Year	2	0.369	0.692	0.964	0.380
	Treatment * Year	**2**	**7.916**	**<0.001**	**8.413**	**<0.001**

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
Least flycatcher[1, 2]	**Treatment**	**1**	**6.740**	**0.011**	**6.995**	**0.008**
	Year	**2**	**9.394**	**<0.001**	**13.367**	**<0.001**
	Treatment * Year	**2**	**4.632**	**0.011**	**4.661**	**0.010**
Mourning warbler[1]	Treatment	1	0.027	0.869	0.015	0.904
	Year	**2**	**8.580**	**<0.001**	**8.374**	**<0.001**
	Treatment * Year	2	0.209	0.811	0.156	0.849
White-throated sparrow[1]	Treatment	1	0	0.986	0.034	0.854
	Year	**2**	**21.483**	**<0.001**	**18.904**	**<0.001**
	Treatment * Year	**2**	**9.735**	**<0.001**	**8.921**	**<0.001**

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species

Bold font indicates statstical signficance.

The density of SCC edge/shrub/successional birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 11). At impact sites, density was greater after construction than before. At control sites, density was lower after construction than before. Density was significantly greater at impact than control sites (36.627, p <0.001) over the three-year pre- and post-construction period, differed significantly among survey years (24.646, P <0.001), and there was a significant interaction effect between treatment and year (22.092, p <0.001; Table 12). Post-hoc analysis indicated that density was significantly greater at impact sites in 2020 than in 2014 (p <0.001) and was significantly lower at control sites in 2020 than in 2014 (p = 0.002), suggesting a positive Project effect on SCC edge/shrub/successional bird density near the ROW.

The density of SCC forest birds was similar at control and impact sites over the four-year survey period (Table 11). Density was greater after construction (2017, 2020) than before (2014) at impact sites. Density fluctuated at control sites over the same period. Density differed significantly over the three-year pre- and post-construction period (14.095, p <0.001) and there was a significant interaction effect between treatment and year (5.949, p = 0.003; Table 12). Post-hoc analysis indicated that there was no significant difference in density at impact sites between 2014 and 2020 (p = 0.644) and that density was significantly greater in 2020 than in 2014 at control sites (p <0.001), suggesting that there have been no adverse Project effects on SCC forest bird density near the ROW.

The density of SCC grassland/open country birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 11). Density was similar at impact sites before and after construction. Density was significantly greater at impact than control sites (12.287, p <0.001) over the three-year pre-and post-construction period (Table 12). There were no significant differences in density and there was no significant interaction effect between treatment and year. There were no apparent adverse Project effects on SCC grassland/open country bird density.

The density of SCC wetland/open water birds was greater at impact than control sites in 2014, 2015, and 2020 (Table 11). Density fluctuated at impact and control sites over the four-year survey period. There were no significant differences in density at impact vs. control sites or among survey years over the three-year pre- and post-construction period (Table 12). There was also no interaction effect between treatment and year. There were no apparent adverse Project effects on SCC wetland/open water bird density.

Table 11: Summary of bird species of conservation concern density by guild, 2014–2017 and 2020

Guild	Type	2014 Mean Abundance ± SE (n)	2015 Mean Abundance ± SE (n)	2017 Mean Abundance ± SE (n)	2020 Mean Abundance ± SE (n)
Edge/shrub/ successional	Impact	1.46 ± 0.09 (105)	4.51 ± 0.25 (91)	1.49 ± 0.10 (105)	1.82 ± 0.09 (105)
	Control	1.38 ± 0.09 (110)	3.50 ± 0.28 (108)	0.72 ± 0.08 (110)	1.08 ± 0.07 (110)
Forest	Impact	0.34 ± 0.04 (88)	1.17 ± 0.15 (72)	0.39 ± 0.06 (88)	0.42 ± 0.04 (88)
	Control	0.34 ± 0.03 (106)	1.27 ± 0.13 (94)	0.29 ± 0.04 (106)	0.59 ± 0.05 (106)
Grassland/open country	Impact	0.32 ± 0.07 (36)	1.03 ± 0.18 (40)	0.33 ± 0.06 (36)	0.32 ± 0.07 (36)
	Control	0.21 ± 0.21 (3)	0.75 ± 0.41 (8)	0.21 ± 0.11 (3)	0 (3)
Wetland/open water	Impact	0.30 ± 0.06 (51)	0.96 ± 0.36 (23)	0.39 ± 0.09 (51)	0.69 ± 0.20 (51)
	Control	0.22 ± 0.08 (20)	0.90 ± 0.35 (10)	0.41 ± 0.17 (20)	0.35 ± 0.17 (20)

Table 12: Parametric and non-parametric ANOVA of bird species of conservation concern guild density before (2014) and after (2017, 2020) Project construction

Guild			Parametric		Non-parametric	
	Effect	DF	F	*p*	W	*p*
Edge/shrub/successional	**Treatment**	**1**	**33.660**	**<0.001**	**36.627**	**<0.001**
	Year	**2**	**28.800**	**<0.001**	**24.646**	**<0.001**
	Treatment * Year	**2**	**22.240**	**<0.001**	**22.092**	**<0.001**
Forest	Treatment	1	0.442	0.507	0.356	0.551
	Year	**2**	**17.290**	**<0.001**	**14.095**	**<0.001**
	Treatment * Year	**2**	**6.831**	**0.001**	**5.949**	**0.003**
Grassland/open country	**Treatment**	**1**	1.285	0.264	**12.287**	**<0.001**
	Year	2	0.132	0.876	0.722	0.404
	Treatment * Year	2	0.487	0.616	0.565	0.462
Wetland/open water	Treatment	1	0.924	0.340	2.087	0.149
	Year	2	1.663	0.193	0.288	0.742
	Treatment * Year	2	0.531	0.589	0.272	0.754

Bold font indicates statstical signficance.

Species Richness

The richness of SCC edge/shrub/successional bird species was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 13). At impact sites, species richness was greater after construction than before or during. At control sites, species richness was lower after construction than before or during. Species richness was significantly greater at impact than control sites (50.106, p <0.001) over the three-year pre- and post-construction period (Table 14). There was a significant interaction effect between treatment and year (22.226, p <0.001). Post-hoc analysis indicated that species richness was significantly greater at impact sites in 2020 than in 2014

(p <0.001) and was significantly lower in 2020 than in 2014 at control sites (p = 0.033), suggesting that there have been no adverse Project effects on SCC edge/shrub/successional bird species richness near the ROW.

The richness of SCC forest bird species was similar at control and impact sites over the four-year survey period (Table 13). At impact sites, species richness was greater after construction (2017, 2020) than before (2014) or during (2015). Species richness fluctuated at control sites over the same period. Species richness differed significantly among years over the three-year pre- and post-construction period (11.279, p <0.001) and there was a significant interaction effect between treatment and year (3.157, p = 0.043; Table 14). Post-hoc analysis indicated that there was no significant difference in species richness at impact sites between 2014 and 2020 (p = 0.187) and that species richness was significantly greater in 2020 than in 2014 at control sites (p <0.001), suggesting that there have been no adverse Project effects on SCC forest bird species richness near the ROW.

The richness of SCC grassland/open country bird species was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 13). Species richness was similar at impact sites before and after construction. Species richness was significantly greater at impact than control sites (8.595, p = 0.003) over the three-year pre-and post-construction period (Table 14). There were no significant differences in species richness among survey years over the three-year pre- and post-construction period and there was no significant interaction effect between treatment and year. There were no apparent adverse Project effects on SCC grassland/open country bird species richness.

The richness of SCC wetland/open water bird species was greater at impact than control sites in 2014, 2015, 2017, and 2020 (Table 13). Species richness was greater after construction than before or during at both site types over the four-year survey period. Species richness was significantly greater at impact than control sites (4.802, p = 0.028) and increased significantly over the three-year pre-and post-construction period (5.231, p = 0.006; Table 14). Post-hoc analysis indicated that species richness was significantly greater in 2020 than in 2014 (p = 0.014) at impact sites and that there was no significant difference in species richness at control sites (p = 0.394) over the same period. There was no significant interaction effect between treatment and year. There were no apparent adverse Project effects on SCC wetland/open water bird species richness.

Table 13: Summary of bird species of conservation concern richness by guild, 2014–2017 and 2020

Guild	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
Edge/shrub/ successional	Impact	3.14 ± 0.15 (106)	3.42 ± 0.17 (91)	3.86 ± 0.16 (106)	3.80 ± 0.13 (106)
	Control	2.76 ± 0.15 (110)	2.60 ± 0.16 (110)	2.24 ± 0.15 (110)	2.32 ± 0.13 (110)
Forest	Impact	1.02 ± 0.10 (96)	1.03 ± 0.11 (79)	1.20 ± 0.10 (96)	1.26 ± 0.09 (96)
	Control	0.97 ± 0.08 (109)	1.12 ± 0.10 (99)	0.97 ± 0.09 (109)	1.53 ± 0.11 (109)

Guild	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
Grassland/open country	Impact	0.64 ± 0.12 (42)	0.93 ± 0.11 (44)	0.74 ± 0.11 (42)	1.00 ± 0.12 (42)
	Control	0.50 ± 0.29 (4)	0.55 ± 0.21 (11)	0.50 ± 0.29 (4)	0.25 ± 0.25 (4)
Wetland/open water	Impact	0.56 ± 0.10 (71)	0.74 ± 0.19 (31)	0.93 ± 0.16 (71)	0.92 ± 0.11 (71)
	Control	0.37 ± 0.09 (40)	0.48 ± 0.16 (21)	0.61 ± 0.10 (40)	0.68 ± 0.12 (40)

Table 14: Parametric and non-parametric ANOVA of bird species of conservation concern richness by guild before (2014) and after (2017, 2020) Project construction

Guild			Parametric		Non-parametric	
	Effect	DF	F	*p*	Statistic	*p*
Edge/shrub/successional	**Treatment**	**1**	**45.09**	**<0.001**	**50.106**	**<0.001**
	Year	2	0.503	0.605	1.000	0.368
	Treatment * Year	**2**	**21.869**	**<0.001**	**22.226**	**<0.001**
Forest	Treatment	1	0.003	0.956	0.034	0.854
	Year	**2**	**13.627**	**<0.001**	**11.279**	**<0.001**
	Treatment * Year	**2**	**3.866**	**0.022**	**3.157**	**0.043**
Grassland/open country	Treatment	1	2.096	0.155	**8.595**	**0.003**
	Year	2	2.575	0.082	0.031	0.918
	Treatment * Year	2	1.009	0.369	0.831	0.393
Wetland/open water	**Treatment**	1	**4.272**	**0.041**	**4.802**	**0.028**
	Year	2	**5.675**	**<0.001**	**5.231**	**0.006**
	Treatment * Year	2	0.413	0.867	0.113	0.886

Bold font indicates statstical signficance.

Summary of Effects on Species of Conservation Concern

The abundance of bird SCCs tended to be greater after construction than before at impact sites, or there was no change (Table 15). At control sites, abundance tended to be lower after construction than before, or there was no change. There was generally no difference in bird SCC abundance at impact vs. control sites except for least flycatcher, which was more abundant at impact than control sites. Bird SCC density followed similar trends, with increases or no change at impact sites and decreases or no change at control sites.

Table 15: Summary of statistically significant effects on bird species of conservation concern before (2014) and after (2017, 2020) Project construction

	Abundance			Density		
Species	**Impact**	**Control**	**Impact vs. Control**	**Impact**	**Control**	**Impact vs. Control**
Alder flycatcher[1]	↑	–	–	↑	–	–
Clay-colored sparrow[1, 2]	–	↓	–	–	↓	–
Common yellowthroat[1, 2]	↑	–	–	–	–	–
Least flycatcher[1, 2]	–	↓	I > C	–	↓	I > C
Mourning warbler[1]	↑	–	–	↑	–	–
White-throated sparrow[1]	–	↓	–	–	–	–

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority

The abundance of SCC guilds tended to be greater after construction than before at impact sites, or there was no change (Table 16). At control sites, abundance decreased for edge/shrub/successional species, increased for forest species, and was unchanged for grassland/open country and wetland species. Abundance was generally greater at impact than control sites. There were similar trends in SCC guild density and species richness.

Table 16: Summary of statistically significant effects on bird species of conservation concern guilds before (2014) and after (2017, 2020) Project construction

	Abundance			Density			Richness		
Species	**Impact**	**Control**	**Impact vs. Control**	**Impact**	**Control**	**Impact vs. Control**	**Impact**	**Control**	**Impact vs. Control**
Edge/shrub/successional	↑	↓	I > C	↑	↓	I > C	↑	↓	I > C
Forest	–	↑	–	–	↑	–	–	↑	–
Grassland/open country	–	–	I > C	–	–	I > C	–	–	I > C
Wetland/open water	↑	–	I > C	–	–	–	↑	–	I > C

3.1.2 Non-species of Conservation Concern

Distribution

The six most common bird non-SCCs were American redstart, chestnut-sided warbler, ovenbird, red-eyed vireo, Tennessee warbler, and veery (Table 17). American redstart, chestnut-sided warbler, and Tennessee warbler are from the edge/shrub/successional guild and ovenbird, red-eyed vireo, and veery are forest birds. American redstart, ovenbird, and Tennessee warbler were observed at a smaller percentage of impact than control sites each survey year.

Table 17: Most common bird non-species of conservation concern detected during songbird surveys, 2014–2017 and 2020

Species	Year	Impact			Control		
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence
American redstart	2014	72	45	42.5	99	50	45.5
	2015	35	19	20.9	79	48	43.6
	2017	50	32	30.2	94	51	46.4
	2020	77	51	48.1	113	60	54.5
Chestnut-sided warbler	2014	62	45	42.5	53	34	30.9
	2015	44	31	34.1	79	55	50.0
	2017	61	42	39.6	50	35	31.8
	2020	66	57	53.8	77	50	45.5
Ovenbird	2014	84	47	44.3	127	67	60.9
	2015	70	42	46.2	110	70	63.6
	2017	86	57	53.8	112	68	61.8
	2020	81	56	52.8	125	73	66.4
Red-eyed vireo	2014	161	89	84.0	142	84	76.4
	2015	138	71	78.0	159	86	78.2
	2017	207	86	81.1	177	90	81.8
	2020	198	90	84.9	227	96	87.3
Tennessee warbler	2014	46	35	33.0	70	47	42.7
	2015	35	24	26.4	71	51	46.4
	2017	10	9	8.5	17	15	13.6
	2020	6	6	5.7	10	10	9.1
Veery	2014	54	37	34.9	61	38	34.5
	2015	47	32	35.2	60	44	40.0
	2017	43	31	29.2	52	38	34.5
	2020	87	54	50.9	84	54	49.1

Abundance

The abundance of American redstarts was lower at impact than control sites over the four-year survey period (Table 18). Abundance was greatest at impact and control sites in 2020, the second year of construction monitoring. There was a significant difference in American restart abundance at impact vs. control sites (9.899, $p = 0.002$) and among survey years (5.942, $p = 0.003$) over the three-year pre- and post-construction period (Table 19). There was no significant interaction effect between treatment and year. Post-hoc analyses indicated that there was no significant difference in abundance between 2014 and 2020 at impact ($p = 1.000$) or control ($p = 1.000$) sites. There were no apparent adverse Project effects on American redstart abundance near the transmission line ROW.

Chestnut-sided warbler abundance was somewhat greater at impact than control sites before (2014) Project construction and during the first post-construction monitoring year (2017; Table 18). Abundance was lower at impact than control sites during construction (2015) and during the second post-construction monitoring year (2020). Over the three-year pre- and post-construction period, there was no significant difference in chestnut-sided warbler abundance at impact vs. control sites and there was no significant interaction effect between treatment and year (Table 19). Abundance differed significantly over the three-year period (5.033, $p = 0.007$). Post-hoc analysis indicated that there was no significant difference in abundance at impact ($p = 1.000$) or control ($p = 1.000$) sites between 2014 and 2020, suggesting that there were no adverse Project effects on chestnut-sided warbler abundance near the ROW.

Ovenbird abundance was somewhat lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 18) but the difference was not significant over the three-year pre- and post-construction period (Table 19). There was no significant difference in the abundance of ovenbirds among survey years and there was no significant interaction effect between treatment and year, suggesting that there were no adverse Project effects on ovenbird abundance near the ROW.

The abundance of red-eyed vireos was greater at impact than control sites before (2014) and during (2015) Project construction, and during the first year of post-construction monitoring (2017; Table 18). Abundance was greater at impact and control sites after construction than before or during. There was no significant difference in red-eyed vireo abundance at impact vs. control sites over the three-year pre- and post-construction monitoring period (Table 19). There was a significant difference in abundance among survey years (14.764, $p < 0.001$) but no significant interaction effect between treatment and year. Post-hoc analysis showed that abundance was significantly greater in 2020 than in 2014 at impact ($p = 0.029$) and control ($p < 0.001$) sites, suggesting that there have been no adverse Project effects on red-eyed vireo abundance near the ROW.

The abundance of Tennessee warblers was somewhat lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 18). Abundance declined at impact and control sites over the same period. There was no significant difference in Tennessee warbler abundance at impact vs. control sites over the three-year pre- and post-construction period (Table 19). There was no significant interaction effect between treatment and year. Abundance differed significantly among survey years (93.044, $p < 0.001$); post-hoc analysis indicated that abundance was significantly lower in 2020 than in 2014 at both impact ($p < 0.001$) and control ($p < 0.001$) sites, suggesting that the decline was throughout the study area.

Veery abundance was somewhat lower at impact than control sites before (2014) and during (2015) Project construction, and during the first post-construction monitoring year (2017; Table 18). Abundance was somewhat greater at impact than control sites in 2020, the second year of post-construction monitoring. There was no significant difference in veery abundance at impact vs. control sites over the three-year pre- and post-construction period and there was no significant interaction effect between treatment and year (Table 19). The difference in abundance was significant among survey years (21.144, $p < 0.001$). Post-hoc analysis showed that abundance was significantly greater in 2020 than in 2014 at impact ($p = 0.002$) and control ($p = 0.002$) sites, suggesting that there have been no adverse Project effects on veery abundance near the ROW.

Table 18: Summary of most common bird non-species of conservation concern abundance, 2014–2017 and 2020

Species	Type	2014 Mean Abundance ± SE (n)	2015 Mean Abundance ± SE (n)	2017 Mean Abundance ± SE (n)	2020 Mean Abundance ± SE (n)
American redstart	Impact	0.99 ± 0.13 (73)	0.73 ± 0.15 (48)	0.68 ± 0.12 (73)	1.05 ± 0.13 (73)
	Control	1.30 ± 0.15 (76)	1.07 ± 0.13 (74)	1.24 ± 0.13 (76)	1.49 ± 0.15 (76)
Chestnut-sided warbler	Impact	0.77 ± 0.09 (81)	0.71 ± 0.11 (62)	0.75 ± 0.10 (81)	0.81 ± 0.07 (81)
	Control	0.74 ± 0.11 (72)	1.07 ± 0.10 (74)	0.69 ± 0.10 (72)	1.07 ± 0.11 (72)
Ovenbird	Impact	1.12 ± 0.13 (75)	1.21 ± 0.13 (58)	1.15 ± 0.10 (75)	1.08 ± 0.10 (75)
	Control	1.43 ± 0.13 (89)	1.29 ± 0.10 (85)	1.26 ± 0.11 (89)	1.40 ± 0.12 (89)
Red-eyed vireo	Impact	1.55 ± 0.09 (104)	1.62 ± 0.11 (85)	1.99 ± 0.14 (104)	1.90 ± 0.11 (104)
	Control	1.34 ± 0.09 (106)	1.53 ± 0.10 (104)	1.67 ± 0.11 (106)	2.14 ± 0.14 (106)
Tennessee warbler	Impact	1.15 ± 0.10 (40)	0.85 ± 0.15 (41)	0.25 ± 0.08 (40)	0.15 ± 0.06 (40)
	Control	1.32 ± 0.10 (53)	1.15 ± 0.10 (62)	0.32 ± 0.08 (53)	0.19 ± 0.05 (53)
Veery	Impact	0.86 ± 0.11 (63)	0.94 ± 0.14 (50)	0.68 ± 0.11 (63)	1.38 ± 0.11 (63)
	Control	0.91 ± 0.14 (67)	1.00 ± 0.12 (60)	0.78 ± 0.10 (67)	1.25 ± 0.11 (67)

Table 19: Parametric and non-parametric ANOVA of most common bird non-species of conservation concern abundance before (2014) and after (2017, 2020) Project construction

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
American redstart	**Treatment**	**1**	**8.706**	**0.004**	**9.899**	**0.002**
	Year	**2**	**6.133**	**0.025**	**5.942**	**0.003**
	Treatment * Year	2	1.275	0.281	1.728	0.179
Chestnut-sided warbler	Treatment	1	0.490	0.485	0.054	0.817
	Year	2	2.765	0.065	**5.033**	**0.007**
	Treatment * Year	2	1.588	0.206	0.884	0.413
Ovenbird	Treatment	1	3.819	0.052	3.636	0.057
	Year	2	0.202	0.817	0.098	0.900
	Treatment * Year	2	1.020	0.362	1.099	0.332
Red-eyed vireo	Treatment	1	0.609	0.436	1.190	0.275
	Year	**2**	**12.674**	**<0.001**	**14.764**	**<0.001**
	Treatment * Year	2	2.569	0.078	2.025	0.132

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
Tennessee warbler	Treatment	1	2.654	0.107	2.594	0.107
	Year	**2**	**94.830**	**<0.001**	**93.044**	**<0.001**
	Treatment * Year	2	0.105	0.901	0.072	0.917
Veery	Treatment	1	0.001	0.980	0.017	0.896
	Year	**2**	**20.308**	**<0.001**	**21.144**	**<0.001**
	Treatment * Year	2	0.716	0.490	0.791	0.452

Bold font indicates statstical signficance.

The abundance of non-SCC edge/shrub/successional birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 20). Abundance increased at impact sites and fluctuated at control sites over the same period. Abundance was significantly greater at impact than control sites over the three-year pre-and post-construction period (28.448, p <0.001) and differed significantly among survey years (20.269, p <0.001; Table 21). There was a significant interaction effect between treatment and year (7.658, p <0.001). Post-hoc analysis indicated that abundance was significantly greater in 2020 than in 2014 at impact (p <0.001) and control (p <0.001) sites, suggesting that there have been no adverse Project effects on non-SCC edge/shrub/successional bird abundance near the ROW.

The abundance of non-SCC forest birds was lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 20). Abundance increased at impact sites and fluctuated at control sites over the same period. Abundance was significantly lower at impact than control sites (20.877, p <0.001) and differed significantly among years (18.407, p <0.001) over the three-year pre-and post-construction period (Table 21). There was a significant interaction effect between treatment and year (8.335, p <0.001). Post-hoc analysis showed that abundance increased significantly at impact (p <0.001) and control (p <0.001) sites between 2014 and 2020, suggesting that there have been no adverse Project effects on non-SCC forest bird abundance near the ROW.

The abundance of SCC grassland/open country birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 20); the difference was significant over the three-year pre-and post-construction period (10.373, p = 0.001; Table 21). Abundance differed significantly among survey years (3.641, p = 0.030) but there was no significant interaction effect between treatment and year. Post-hoc analysis indicated that abundance was significantly greater in 2020 than in 2014 at impact sites (p <0.001) and control sites (p = 0.013), suggesting that there have been no adverse Project effects on non-SCC forest bird abundance near the ROW.

The abundance of SCC wetland/open water birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 20); the difference was significant over the three-year pre- and post-construction period (9.519, p = 0.002; Table 21). There was no significant difference in abundance among survey years. There was a significant interaction effect between treatment and year (3.577, p = 0.033). Post-hoc analysis showed that there was no significant difference

in abundance between 2014 and 2020 at impact (p = 1.000) or control (p = 1.000) sites. There have been no apparent adverse Project effects on non-SCC wetland/open water bird abundance near the ROW.

Table 20: Summary of bird non-species of conservation concern abundance by guild, 2014–2017 and 2020

Guild	Type	2014 Mean Abundance ± SE (n)	2015 Mean Abundance ± SE (n)	2017 Mean Abundance ± SE (n)	2020 Mean Abundance ± SE (n)
Edge/Shrub/ Successional	Impact	4.52 ± 0.27 (106)	5.38 ± 0.29 (91)	5.71 ± 0.34 (106)	6.85 ± 0.37 (106)
	Control	3.82 ± 0.27 (108)	4.14 ± 0.24 (108)	3.30 ± 0.23 (108)	4.50 ± 0.33 (108)
Forest	Impact	5.95 ± 0.32 (106)	6.24 ± 0.31 (91)	7.40 ± 0.34 (106)	7.68 ± 0.28 (106)
	Control	8.06 ± 0.30 (110)	7.30 ± 0.25 (110)	7.61 ± 0.37 (110)	9.89 ± 0.41 (110)
Grassland/open country	Impact	0.28 ± 0.09 (47)	1.20 ± 0.17 (45)	1.40 ± 0.19 (47)	0.85 ± 0.16 (47)
	Control	0.13 ± 0.06 (31)	0.59 ± 0.14 (29)	0.68 ± 0.13 (31)	0.52 ± 0.10 (31)
Wetland/open water	Impact	1.40 ± 0.23 (60)	2.02 ± 0.33 (60)	2.45 ± 0.50 (31)	2.08 ± 0.47 (60)
	Control	0.74 ± 0.15 (39)	1.12 ± 0.24 (39)	0.54 ± 0.14 (30)	1.46 ± 0.40 (39)

Table 21: Parametric and non-parametric ANOVA of non-bird species of conservation concern guild abundance before (2014) and after (2017, 2020) Project construction

Guild			Parametric		Non-parametric	
	Effect	DF	F	p	Statistic	p
Edge/shrub/successional	**Treatment**	**1**	**28.960**	**<0.001**	**28.448**	**<0.001**
	Year	**2**	**20.780**	**<0.001**	**20.269**	**<0.001**
	Treatment * Year	**2**	**10.370**	**<0.001**	**7.658**	**<0.001**
Forest	**Treatment**	**1**	**21.440**	**<0.001**	**20.877**	**<0.001**
	Year	**2**	**20.627**	**<0.001**	**18.407**	**<0.001**
	Treatment * Year	**2**	**7.548**	**<0.001**	**8.335**	**<0.001**
Grassland/open country	**Treatment**	**1**	**10.430**	**0.002**	**10.373**	**0.001**
	Year	**2**	**23.230**	**<0.001**	**3.641**	**0.030**
	Treatment * Year	2	1.630	0.199	0.993	0.365
Wetland/open water	**Treatment**	**1**	**7.232**	**0.008**	**9.519**	**0.002**
	Year	2	2.730	0.068	2.314	0.105
	Treatment * Year	**2**	**4.344**	**0.014**	**3.577**	**0.033**

Bold font indicates statstical signficance.

Density

The density of American redstarts was lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 22). The difference was significant over the three-year pre- and post-construction period (11.473, p <0.001) and density differed significantly among years

(6.628, p = 0.001; Table 23). There was no significant interaction effect between treatment and year. Post-hoc analysis indicated that there was no significant difference in density at impact (p = 1.000) and control (p = 1.000) sites between 2014 and 2020, suggesting that there were no adverse Project effects on American redstart density near the transmission line ROW.

Chestnut-sided warbler density was similar at impact and control sites before (2014) and after (2017, 2020) Project construction (Table 22). Over the three-year pre- and post-construction period, there was no significant difference in chestnut-sided warbler density at impact vs. control sites and there was no significant interaction effect between treatment and year (Table 23). Density differed significantly among survey years (5.179, p = 0.006). Post-hoc analysis indicated that there was no significant difference in density at impact (p = 1.000) or control (p = 0.052) sites between 2014 and 2020, suggesting that there were no adverse Project effects on chestnut-sided warbler density near the ROW.

Ovenbird density was somewhat lower at impact than control sites before (2014), during (2015), and after (2020) Project construction (Table 22). Density was somewhat greater at impact than control sites in 2017, the first year of post-construction monitoring. There was no significant difference in density at impact vs. control sites during the three-year pre- and post-construction period (Table 23). Density differed significantly among survey years (16.021, p <0.001) and there was a significant interaction effect between treatment and year (6.946, p = 0.001). Post-hoc analysis showed that there was no significant difference in density at impact (p = 1.000) or control (p = 1.000) sites between 2014 and 2020, suggesting that there have been no adverse Project effects on ovenbird density near the ROW.

The density of red-eyed vireos was somewhat greater at impact than control sites before Project construction (2014) and during the first year of post-construction monitoring (2017; Table 22). Density was greater at impact and control sites after construction than before. There was no significant difference in red-eyed vireo density at impact vs. control sites over the three-year pre- and post-construction monitoring period (Table 23). Density differed significantly among survey years (11.645, p <0.001) and there was a significant interaction effect between treatment and year (3.778, p = 0.023). Post-hoc analysis showed that there was no significant difference in density at impact sites (p = 0.181) between 2014 and 2020 and that density increased at control sites (p <0.001) over the same period, suggesting that there have been no adverse Project effects on red-eyed vireo density near the ROW.

The density of Tennessee warblers was somewhat lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 22). Density declined at impact and control sites over the same period. There was no significant difference in Tennessee warbler density at impact vs. control sites over the three-year pre- and post-construction period (Table 23). There was no significant interaction effect between treatment and year. Density differed significantly among survey years (107.129, p <0.001); post-hoc analysis indicated that density was significantly lower in 2020 than in 2014 at both impact (p <0.001) and control (p <0.001) sites, suggesting that the decline was throughout the study area.

Veery density was somewhat lower at impact than control sites before (2014) and during (2015) Project construction and was somewhat greater at impact than control sites after (2017, 2020; Table 22). There was no significant difference in density at impact vs. control sites and no significant interaction effect between treatment and year over the three-year pre-and post-construction period (Table 23). Density differed significantly among survey years (34.289, p <0.001). Post-hoc analysis showed that density was

significantly greater in 2020 than in 2014 at impact (p = 0.002) and control (p = 0.012) sites, suggesting that there have been no adverse Project effects on veery density near the ROW.

Table 22: Summary of most common bird non-species of conservation concern density, 2014–2017 and 2020

Species	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
American redstart	Impact	0.32 a 0.04 (72)	0.73 ± 0.15 (48)	0.21 a 0.04 (72)	0.34 a 0.04 (72)
	Control	0.42 a 0.05 (74)	1.07 ± 0.13 (73)	0.40 a 0.04 (74)	0.48 a 0.05 (74)
Chestnut-sided warbler	Impact	0.25 a 0.03 (79)	0.73 ± 0.11 (60)	0.23 a 0.03 (79)	0.25 a 0.02 (79)
	Control	0.24 a 0.04 (71)	1.07 ± 0.10 (74)	0.22 a 0.03 (71)	0.35 a 0.03 (71)
Ovenbird	Impact	0.36 a 0.05 (65)	1.14 ± 0.13 (50)	0.31 a 0.04 (65)	0.37 a 0.03 (65)
	Control	0.46 a 0.04 (82)	1.24 ± 0.10 (79)	0.20 a 0.03 (82)	0.46 a 0.04 (82)
Red-eyed vireo	Impact	0.48 a 0.03 (102)	1.45 ± 0.10 (83)	0.58 a 0.05 (102)	0.58 a 0.04 (102)
	Control	0.41 a 0.03 (102)	1.56 ± 0.09 (95)	0.43 a 0.04 (102)	0.67 a 0.05 (102)
Tennessee warbler	Impact	0.38 a 0.03 (38)	0.87 ± 0.16 (38)	0.05 a 0.02 (38)	0.05 a 0.02 (38)
	Control	0.42 a 0.03 (52)	1.15 ± 0.10 (60)	0.09 a 0.02 (52)	0.06 a 0.02 (52)
Veery	Impact	0.27 a 0.04 (57)	0.83 ± 0.14 (41)	0.15 a 0.03 (57)	0.44 a 0.04 (57)
	Control	0.30 a 0.05 (60)	0.85 ± 0.12 (53)	0.14 a 0.03 (60)	0.41 a 0.04 (60)

Table 23: Parametric and non-parametric ANOVA of most common bird non-species of conservation concern density before (2014) and after (2017, 2020) Project construction

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
American redstart	**Treatment**	**1**	**9.695**	**0.002**	**11.473**	**<0.001**
	Year	**2**	**6.323**	**0.002**	**6.628**	**0.001**
	Treatment * Year	2	1.641	0.196	2.595	0.076
Chestnut-sided warbler	Treatment	1	0.855	0.357	0.482	0.488
	Year	**2**	**3.521**	**0.031**	**5.179**	**0.006**
	Treatment * Year	2	1.699	0.185	1.243	0.288
Ovenbird	Treatment	1	0.318	0.574	0.168	0.682
	Year	**2**	**17.980**	**<0.001**	**16.021**	**<0.001**
	Treatment * Year	**2**	**6.500**	**0.002**	**6.946**	**0.001**
Red-eyed vireo	Treatment	1	1.422	0.235	1.632	0.201
	Year	**2**	**12.631**	**<0.001**	**11.645**	**<0.001**
	Treatment * Year	**2**	**5.684**	**0.005**	**3.778**	**0.023**

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
Tennessee warbler	Treatment	1	3.553	0.063	3.149	0.076
	Year	**2**	**106.075**	**<0.001**	**107.129**	**<0.001**
	Treatment * Year	2	0.184	0.832	0.518	0.839
Veery	Treatment	1	0.029	0.865	0.132	0.716
	Year	**2**	**32.454**	**<0.001**	**34.289**	**<0.001**
	Treatment * Year	2	0.137	0.872	0.020	0.980

Bold font indicates statstical signficance.

The density of non-SCC edge/shrub/successional birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 24). The difference was significant over the three-year pre-and post-construction period (24.597, p <0.001) and there was a significant difference in density among survey years (20.642, p <0.001; Table 25). There was a significant interaction effect between treatment and year (7.812, p <0.001). Post-hoc analysis indicated that density was significantly greater in 2020 than in 2014 at impact (p <0.001) and control (p <0.001) sites, suggesting that there have been no adverse Project effects on non-SCC edge/shrub/successional bird density near the ROW.

The density of non-SCC forest birds was lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 24). Density fluctuated at both site types over the same period. Density was significantly lower at impact than control sites (26.858, p <0.001) and differed significantly among survey years (53.374, p <0.001) over the three-year pre-and post-construction period (Table 25). There was a significant interaction effect between treatment and year (10.471, p <0.001). Post-hoc analysis showed that there was no significant difference in density at impact sites between 2014 and 2020 (p = 0.073) and that density at control sites increased significantly over the same period, suggesting that there have been no adverse Project effects on forest birds near the ROW.

The density of non-SCC grassland/open country birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 24); the difference was significant over the three-year pre- and post-construction monitoring period (10.328, p = 0.001; Table 25). Density differed significantly (3.641, p = 0.030) among years over the three-year period but there was no significant interaction effect between treatment and year. Post-hoc analysis indicated that there was no significant difference in density at impact (p = 1.000) or control (p = 0.231) sites between 2014 and 2020, suggesting that there have been no apparent adverse Project effects on non-SCC grassland/open country bird density near the ROW.

The density of non-SCC wetland/open water birds was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 24); the difference was significant over the three-year pre- and post-construction period (10.656, p = 0.001; Table 25). There was no significant difference in density among years and there was no significant interaction effect between treatment and year. There have been no apparent Project effects on non-SCC wetland/open water bird density near the ROW.

Table 24: Summary of bird non-species of conservation concern density by guild, 2014–2017 and 2020

Guild	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
Edge/shrub/ successional	Impact	1.38 ± 0.09 (106)	4.95 ± 0.27 (91)	1.61 ± 0.11 (106)	2.06 ± 0.11 (106)
	Control	1.19 ± 0.09 (108)	4.04 ± 0.23 (108)	0.93 ± 0.07 (108)	1.34 ± 0.10 (108)
Forest	Impact	1.61 ± 0.09 (106)	4.62 ± 0.30 (91)	1.57 ± 0.09 (106)	2.13 ± 0.09 (106)
	Control	2.29 ± 0.09 (110)	6.41 ± 0.25 (110)	1.64 ± 0.10 (110)	2.93 ± 0.13 (110)
Grassland/open country	Impact	0.22 ± 0.06 (19)	1.27 ± 0.23 (15)	0.28 ± 0.10 (19)	0.34 ± 0.08 (19)
	Control	0.05 ± 0.05 (7)	0.67 ± 0.57 (3)	0.05 ± 0.05 (7)	0.27 ± 0.08 (7)
Wetland/open water	Impact	0.49 ± 0.08 (51)	1.98 ± 0.36 (45)	0.74 ± 0.18 (51)	0.61 ± 0.14 (51)
	Control	0.28 ± 0.06 (30)	1.14 ± 0.22 (28)	0.17 ± 0.05 (30)	0.30 ± 0.08 (3)

Table 25: Parametric and non-parametric ANOVA of bird non-species of conservation concern guild density before (2014) and after (2017, 2020) Project construction

Guild			Parametric		Non-parametric	
	Effect	DF	F	*p*	Statistic	*p*
Edge/shrub/successional	**Treatment**	**1**	**25.350**	**<0.001**	**24.597**	**<0.001**
	Year	**2**	**23.631**	**<0.001**	**20.642**	**<0.001**
	Treatment * Year	**2**	**9.782**	**<0.001**	**7.812**	**<0.001**
Forest	**Treatment**	**1**	**24.420**	**<0.001**	**26.858**	**<0.001**
	Year	**2**	**62.976**	**<0.001**	**58.374**	**<0.001**
	Treatment * Year	**2**	**9.516**	**<0.001**	**10.471**	**<0.001**
Grassland/open country	**Treatment**	**1**	3.193	0.087	**10.328**	**0.001**
	Year	**2**	1.862	0.166	**3.641**	**0.030**
	Treatment * Year	2	0.561	0.574	0.993	0.365
Wetland/open water	**Treatment**	**1**	**6.349**	**0.014**	**10.656**	**0.001**
	Year	2	0.226	0.798	0.943	0.386
	Treatment * Year	2	2.179	0.117	1.900	0.425

Bold font indicates statstical signficance.

Species Richness

The richness of non-SCC edge/shrub/successional bird species was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 26). Species richness increased at impact sites and fluctuated at control sites over the same period. Species richness was significantly greater at impact than control sites over the three-year pre-and post-construction period (40.419, p <0.001) and differed significantly among survey years (36.225, p <0.001; Table 27). There was also a significant interaction effect between treatment and year (5.482, p <0.001). Post-hoc analysis

indicated that species richness was significantly greater in 2020 than in 2014 at impact (p <0.001) and control (p = 0.002) sites, suggesting that there have been no adverse Project effects on non-SCC edge/shrub/successional bird species richness.

The richness of non-SCC forest bird species was lower at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 26). Species richness increased at impact sites over the same period. Species richness was significantly lower at impact than control sites (29.206, p <0.001) and differed significantly among years (19.657, p <0.001) over the three-year pre-and post-construction period (Table 27). There was a significant interaction effect between treatment and year (5.192, p <0.001). Post-hoc analysis showed that species richness was significantly greater at impact (p <0.001) and control (p <0.001) sites in 2020 than in 2014, suggesting that there have been no adverse Project effects on non-SCC forest bird species richness near the ROW.

The richness of non-SCC grassland/open country bird species was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 26), with a significant difference over the three-year pre- and post-construction period (9.639, p <0.001; Table 27). Species richness differed significantly among years (18.059, p <0.001), but there was no significant interaction effect between treatment and year. Post-hoc analysis indicated that species richness was significantly greater in 2020 than in 2014 at impact (p <0.001) and control (p = 0.014) sites, suggesting that there have been no adverse Project effects on non-SCC grassland/open country bird species richness near the ROW.

The richness of non-SCC wetland/open water bird species was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 26); the difference was significant over the three-year pre- and post-construction period (9.103, p = 0.003; Table 27). Species richness differed significantly among years (4.768, p = 0.012) but there was no significant interaction effect between treatment and year. Post-hoc analysis showed that there was no significant difference in species richness at impact (p = 1.000) or control (p = 0.547) sites between 2014 and 2020, suggesting that there have been no Project effects on non-SCC wetland/open water bird species richness near the ROW.

Table 26: Summary of bird non-species of conservation concern richness by guild, 2014–2017 and 2020

Guild	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
Edge/shrub/ successional	Impact	3.28 a 0.18 (106)	3.68 ± 0.17 (91)	3.97 a 0.21 (106)	5.12 a 0.23 (106)
	Control	2.63 a 0.16 (108)	3.06 ± 0.16 (108)	2.42 a 0.15 (108)	3.32 a 0.21 (108)
Forest	Impact	4.25 a 0.20 (106)	4.45 ± 0.22 (91)	5.03 a 0.22 (106)	5.30 a 0.18 (106)
	Control	5.49 a 0.20 (110)	5.19 ± 0.17 (110)	5.44 a 0.23 (110)	6.75 a 0.19 (110)
Grassland/open country	Impact	0.19 a 0.06 (47)	0.73 ± 0.09 (45)	0.89 a 0.11 (47)	0.66 a 0.10 (47)
	Control	0.13 a 0.06 (31)	0.41 ± 0.09 (29)	0.55 a 0.09 (31)	0.48 a 0.09 (31)
Wetland/open water	Impact	0.90 a 0.11 (60)	1.09 ± 0.14 (53)	0.78 a 0.09 (60)	0.93 a 0.11 (60)
	Control	0.54 a 0.09 (39)	0.70 ± 0.12 (33)	0.38 a 0.09 (39)	0.79 a 0.10 (39)

Table 27: Parametric and non-parametric ANOVA of bird non-species of conservation concern guild species richness before (2014) and after (2017, 2020) Project construction

Guild			Parametric		Non-parametric	
	Effect	DF	F	*p*	Statistic	*p*
Edge/shrub/successional	**Treatment**	**1**	**39.030in**	**<0.001**	**40.419**	**<0.001**
	Year	**2**	**34.067**	**<0.001**	**36.225**	**<0.001**
	Treatment * Year	**2**	**7.677**	**<0.001**	**5.482**	**<0.001**
Forest	**Treatment**	**1**	**29.710**	**<0.001**	**29.206**	**<0.001**
	Year	**2**	**20.589**	**<0.001**	**19.657**	**<0.001**
	Treatment * Year	**2**	**3.994**	**0.019**	**5.192**	**<0.001**
Grassland/open country	**Treatment**	**1**	**7.198**	**<0.001**	**9.639**	**<0.001**
	Year	**2**	**20.745**	**<0.001**	**18.059**	**<0.001**
	Treatment * Year	2	1.089	0.339	0.467	0.593
Wetland/open water	**Treatment**	**1**	**8.264**	**0.005**	**9.103**	**0.003**
	Year	**2**	**4.260**	**0.016**	**4.768**	**0.012**
	Treatment * Year	2	1.264	0.285	1.844	0.163

Bold font indicates statstical signficance.

Summary of Effects on Non-Species of Conservation Concern

The abundance of three bird non-SCCs was unchanged from the pre- to post-construction period (Table 28). The abundance of two species increased and the abundance of Tennessee warblers decreased at impact and control sites. There was generally no difference in bird SCC abundance at impact vs. control sites except for American redstart, which was more abundant at control than impact sites. Bird non-SCC density followed similar trends.

Table 28: Summary of statistically significant effects on bird non-species of conservation concern before (2014) and after (2017, 2020) Project construction

	Abundance			Density		
Species	**Impact**	**Control**	**Impact vs. Control**	**Impact**	**Control**	**Impact vs. Control**
American redstart	–	–	C > I	–	–	C > I
Chestnut-sided warbler	–	–	–	–	–	–
Ovenbird	–	–	–	–	–	–
Red-eyed vireo	↑	↑	–	–	↑	–
Tennessee warbler	↓	↓	–	↓	↓	–
Veery	↑	↑	–	↑	↑	–

The abundance of non-SCC bird guilds tended to be greater after construction than before at impact sites, or there was no change (Table 29). The exception was forest birds, which were more abundant at

control than impact sites. Most guilds were more abundant after construction (2020) than before (2014) except for wetland/open water birds, for which there was no change. There were similar trends in non-SCC guild density and species richness, with no change in density for grassland/open country birds between 2014 and 2020.

Table 29: Summary of effects on bird non-species of conservation concern guilds before (2014) and after (2017, 2020) Project construction

Species	Abundance			Density			Richness		
	Impact	Control	Impact vs. Control	Impact	Control	Impact vs. Control	Impact	Control	Impact vs. Control
Edge/shrub/successional	↑	↑	I > C	↑	↑	I > C	↑	↑	I > C
Forest	↑	↑	C > I	–	↑	C > I	↑	↑	C > I
Grassland/open country	↑	↑	I > C	–	–	I > C	↑	↑	I > C
Wetland/open water	–	–	I > C	–	–	I > C	–	–	I > C

3.1.3 Other Species of Interest

Brown-headed Cowbird

Brown-headed cowbirds were most common in the southern study area but were recorded at some of the northernmost sites. The distribution of brown-headed cowbirds increased at impact sites over the four-year survey period and was greatest in 2020, the second year of construction monitoring (Table 30). An 18% change was observed from 2014 to 2020, or an increase of 3–7% between consecutive survey years. Distribution varied at control sites over the same period; brown-headed cowbirds were detected at the smallest percentage of sites in 2014, before Project construction, and at the greatest percentage of sites in 2015, during construction, with a 24% change between the two survey years.

Table 30: Brown-headed cowbirds recorded during songbird surveys 2014–2017 and 2020

Year	Impact			Control			Percent of All Stations Observed
	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
2014	33	22	20.8	30	20	18.2	19.4
2015	33	20	22.0	38	29	26.4	24.4
2017	26	25	23.6	26	22	20.0	21.8
2020	39	26	24.5	34	24	21.8	23.1

3.2 MARSH BIRD SURVEYS

American bittern, sora, Virginia rail, and yellow rail were the most common target species detected during marsh bird surveys (Table 31). Fewer target marsh birds (also including American coot, least bittern, and pied-billed grebe) were detected in 2020 than in previous survey years, possibly because playback surveys were conducted for these species from 2014 to 2017 and not in 2020.

Table 31: Summary of target species detected during marsh bird surveys, 2014–2017 and 2020

Species	Year	Impact			Control		
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence
American bittern[1, 2]	2014	10	8	0.23	24	20	0.45
	2015	4	5	0.14	11	7	0.19
	2017	4	4	0.11	28	19	0.51
	2020	1	1	<0.01	0	0	0
American coot	2014	0	0	0	2	2	0.05
	2015	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Least bittern[2, 3]	2014	0	0	0	0	0	0
	2015	2	2	0.05	2	2	0.06
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Pied-billed grebe[1, 2]	2014	0	0	0	3	3	0.07
	2015	2	2	0.05	2	2	0.06
	2017	2	2	0.05	3	3	0.08
	2020	0	0	0	0	0	0
Sora[1, 2]	2014	127	35	1.00	121	41	0.93
	2015	69	28	0.76	64	25	0.69
	2017	65	31	0.84	62	29	0.78
	2020	11	11	0.30	5	5	0.15
Virginia rail[1, 2]	2014	24	14	0.40	32	22	0.50
	2015	10	7	0.19	19	14	0.39
	2017	18	12	0.32	24	14	0.38
	2020	2	1	<0.01	3	1	0.03
Yellow rail[1, 2, 3]	2014	8	6	0.17	6	4	0.09
	2015	17	9	0.24	9	5	0.14
	2017	12	9	0.24	6	7	0.19
	2020	2	2	0.10	1	1	0.03

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species 3. SARA and/or ESEA listed species.

American bittern abundance was greater at control than impact sites before (2014) and during (2015) Project construction and in the first year of post-construction monitoring (2017; Table 32). No American bitterns were detected at control sites in 2020, the second year of post-construction monitoring. Abundance decreased at impact sites and fluctuated at control sites over the four-year monitoring period. Abundance was significantly greater at control than impact sites (4.260, $p = 0.039$) over the survey period (Table 33). Abundance differed significantly among survey years (12.429, $p < 0.001$) but there was no significant interaction effect between treatment and year. Post-hoc analysis indicated that abundance was significantly greater in 2014 than in 2020 at impact ($p < 0.001$) and control ($p < 0.001$) sites, which is likely at least partly attributable to the difference in survey methods in 2020.

Sora abundance was greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 32). Abundance decreased at impact and control sites over the four-year monitoring period. Sora abundance was significantly greater at impact than control sites (9.764, $p = 0.002$) and differed significantly among survey years (84.176, $p < 0.001$; Table 33). There was no significant interaction effect between treatment and year. Post-hoc analysis showed that abundance was significantly greater in 2014 than in 2020 at impact ($p < 0.001$) and control ($p < 0.001$) sites, which is likely at least partly attributable to the difference in survey methods in 2020.

The abundance of Virginia rails was similar at impact and control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 32). Abundance at impact and control sites fluctuated over the four-year survey period and differed significantly among years (16.515, $p < 0.001$; Table 33). There was no significant interaction effect between treatment and year. Post-hoc analysis indicated that abundance was significantly greater in 2014 than in 2020 at impact ($p < 0.001$) and control ($p < 0.001$) sites, which is likely at least partly attributable to the difference in survey methods in 2020.

Yellow rail abundance was somewhat greater at impact than control sites before (2014), during (2015), and after (2017, 2020) Project construction (Table 32). Abundance fluctuated at impact and control sites over the four-year survey period and differed significantly among years (4.469, $p = 0.005$; Table 33). Post-hoc analysis indicated that there was no significant difference in abundance at impact ($p = 1.000$) and control ($p = 0.629$) sites between 2014 and 2020. There were no significant differences in abundance at impact vs. control sites and there was no significant interaction between treatment and year. While an overall decrease in marsh bird abundance may have been observed in the study area (AMEC 2017), there was no change in yellow rail abundance.

Table 32: Summary of most common bird non-species of conservation concern density, 2014–2017 and 2020

Species	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
American bittern[1, 2]	Impact	0.71 ± 0.19 (14)	0.29 ± 0.13 (14)	0.29 ± 0.13 (14)	0.07 ± 0.07 (14)
	Control	0.87 ± 0.13 (31)	0.35 ± 0.13 (31)	0.90 ± 0.19 (31)	0 (31)
Sora[1, 2]	Impact	3.43 ± 0.29 (37)	1.86 ± 0.24 (37)	1.76 ± 0.19 (37)	0.30 ± 0.08 (37)
	Control	2.69 ± 0.24 (45)	1.42 ± 0.26 (45)	1.38 ± 0.24 (45)	0.11 ± 0.05 (45)

Species	Type	2014 Mean Density ± SE (n)	2015 Mean Density ± SE (n)	2017 Mean Density ± SE (n)	2020 Mean Density ± SE (n)
Virginia rail[1, 2]	Impact	1.09 ± 0.22 (22)	0.45 ± 0.17 (22)	0.82 ± 0.21 (22)	0.09 ± 0.09 (22)
	Control	1.03 ± 0.16 (31)	0.61 ± 0.16 (31)	0.77 ± 0.20 (31)	0.10 ± 0.10 (31)
Yellow rail[1, 2, 3]	Impact	1.60 ± 0.40 (5)	1.89 ± 0.42 (9)	1.33 ± 0.33 (9)	1.00 ± 0 (2)
	Control	1.50 ± 0.29 (4)	1.50 ± 0.50 (6)	1.00 ± 0 (6)	1.00 ± (1)

Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species 3. SARA- and/or ESEA-listed species

Table 33: Parametric and non-parametric ANOVA of most common bird non-species of conservation concern density before (2014), during (2015), and after (2017, 2020) Project construction

			Parametric		Non-parametric	
Species	**Effect**	**DF**	**F**	***p***	**Statistic**	***p***
American bittern[1, 2]	**Treatment**	**1**	2.610	0.114	**4.260**	**0.039**
	Year	**3**	**18.178**	**<0.001**	**12.429**	**<0.001**
	Treatment * Year	3	2.035	0.112	1.691	0.179
Sora[1, 2]	**Treatment**	**1**	**7.003**	**0.010**	**9.764**	**0.002**
	Year	**3**	**73.723**	**<0.001**	**84.176**	**<0.001**
	Treatment * Year	3	0.459	0.711	0.625	0.587
Virginia rail[1, 2]	Treatment	1	0.035	0.852	0.034	0.817
	Year	**3**	**15.726**	**<0.001**	**16.515**	**<0.001**
	Treatment * Year	3	0.262	0.852	0.344	0.748
Yellow rail[1, 2, 3]	Treatment	1	0.017	0.898	0.011	0.916
	Year	**3**	**4.596**	**0.006**	**4.469**	**0.005**
	Treatment * Year	3	0.172	0.915	0.197	0.879

Bold font indicates statstical signficance.

3.3 CREPUSCULAR BIRD SURVEYS

A total of 16 impact sites and 14 control sites were surveyed all four years. Eastern whip-poor-wills were detected at 15 impact and 12 control sites over the same period. Eastern whip-poor-wills were detected at a similar percentage of impact and control sites before (2014) and during (2015) Project construction and were found at a greater percentage of impact than control sites after construction (2017, 2020; Table 34). Abundance increased at impact sites from 2014 to 2017 and then declined in 2020, the second year of post-construction monitoring. At control sites, abundance was greatest in 2015 and lowest in 2017.

Table 34: Summary of eastern whip-poor-will detected during crepuscular bird surveys, 2014–2017 and 2020

	Impact (n = 15)				Control (n = 12)			
Metric	**2014**	**2015**	**2017**	**2020**	**2014**	**2015**	**2017**	**2020**
Max. birds observed	17	21	25	11	17	22	9	9
No. stations observed	10	12	13	7	11	10	8	5
Percent occurrence	66.7	80.0	86.7	46.7	91.7	83.3	66.7	41.7
Mean abundance ± SE	1.70 ± 0.17	1.75 ± 0.27	1.92 ± 0.29	1.57 ± 0.20	1.55 ± 0.20	2.20 ± 0.30	1.13 ± 0.10	1.80 ± 0.13

Common nighthawks were only detected in 2017 and 2020. Two individuals were detected in 2017, at an impact and a control site (Table 35). Common nighthawks were detected at a greater proportion of impact than control sites in 2020, but mean density was similar at each site type.

Table 35: Summary of common nighthawk detected during crepuscular bird surveys, 2014–2017 and 2020

	Impact (n = 6)				Control (n = 4)			
Metric	**2014**	**2015**	**2017**	**2020**	**2014**	**2015**	**2017**	**2020**
Max. birds observed	0	0	1	8	0	0	1	4
No. stations observed	0	0	1	6	0	0	1	3
Percent occurrence	0	0	16.7	100.0	0	0	25.0	75.0
Mean abundance ± SE	0	0	1.00	1.33 ± 0.21	0	0	1.00	1.33 ± 0.29

4.0 DISCUSSION

4.1 SONGBIRDS

4.1.1 Species of Conservation Concern

For five of the six most common bird SCCs (alder flycatcher, clay-colored sparrow, common yellowthroat, mourning warbler, and white-throated sparrow) there was no difference in abundance or density at impact vs. control sites over the three-year pre- and post-construction survey period. The exception was least flycatcher, which was more abundant and more dense at impact than control sites. The abundance and density of three of the most common SCCs increased at impact sites and remained the same at control sites between 2014 and 2020, suggesting that the alteration of habitat on the ROW created suitable conditions for these species. Alder flycatcher, common yellowthroat, and mourning warbler abundances were all greater during the second year of post-construction monitoring than before construction began. The former two species are edge/shrub/successional birds and the latter is a forest bird. Alder flycatchers nest in shrubby roadside areas, forest edges, regenerating forests, and in wet areas dominate by willow and alder (Parker 2019), while common yellowthroats are attracted to ditches and other wet, disturbed areas (Taylor 2018a). Mourning warblers inhabit mature forests but are also common in regenerating areas that have been cleared of mature trees (Pitocchlli 1993) such as ROWs (Shettler 2018). These species were likely more abundant at impact sites after construction because they were attracted to the regenerating vegetation on the ROW. The similarity of these species' abundances at control sites in 2014 and 2020 suggests that there were no substantial changes in their populations over the monitoring period.

There was no difference in the abundance or density of clay-colored sparrow, least flycatcher, and white-throated sparrow at impact vs. control sites over the three-year pre-and post-construction monitoring period. The abundance and density of these species remained the same at impact sites before (2014) and after (2020) Project construction and decreased or remained the same at control sites. These species select shrubby habitat edges (Raitt and Artuso 2018), regenerating vegetation (Methuen 2018), or forests and edges (Artuso 2018), all of which were found on the ROW after construction and may have attracted individuals to it. That there was no increase in abundance at impact sites and a decrease in abundance at control sites could indicate a small decline in their numbers throughout the study area, but they did not appear to be adversely affected by the Project.

There was an increase in the abundance, density, and species richness of SCC edge/shrub/successional birds at impact sites and a simultaneous decrease at control sites during the second year of post-construction monitoring, suggesting that regenerating vegetation on the ROW provided suitable habitat for these species (e.g., King et al. 2009; Askins et al. 2012), including golden-winged warbler and olive-sided flycatcher, and may have attracted them to it. No adverse Project effects on forest, grassland/open country, and wetland/open water birds were apparent; there was no change in the abundance, density, or species richness of forest or grassland/open country birds and an increase in the abundance and species richness of wetland/open water birds. As little or no clearing on the ROW would likely have been required in grassland or wetland habitats, no change in the abundance of the species

inhabiting them would be expected. The increased abundance of wetland birds at impact sites was likely due to the large number of Canada geese recorded in 2020 (n = 165), where none were recorded in 2014. There was no difference in wetland/open water bird density (where individuals recorded within 100 m of the observer were included in the analysis) at impact or control sites over the same period, suggesting that loud, easily detected species such as Canada goose were recorded passing through in the distance. There was no difference in the abundance or density of non-SCC wetland/open water birds at impact sites before and after construction, suggesting that the increased abundance of SCC wetland/open water birds near the ROW was not habitat-related. Clearing in forest habitat did not appear to have benefited forest birds but also did not adversely affect them, as their abundance, density, and species richness was similar at impact and control sites and no change in these metrics was observed at impact sites after construction compared to before.

4.1.2 Non-species of Conservation Concern

Few Project effects on five of the six most common bird non-SCCs (American redstart, chestnut-sided warbler, ovenbird, red-eyed vireo, and veery) were observed. All are edge/shrub/successional or forest species. For American redstart, chestnut-sided warbler, and ovenbird there was no change in abundance or density at impact or control sites from 2014 to 2020. Red-eyed vireo and veery abundance increased at both impact and control sites, suggesting that the change was not Project-related. No adverse Project effects were observed.

The abundance and density of Tennessee warbler, an edge/shrub/successional species, declined steadily and substantially at impact and control sites during the monitoring period. There was no difference in abundance or density at impact vs. control sites, suggesting that the decline was not Project-related. The increased abundance of some edge/shrub/successional SCC species and the similar abundances of other SCC and non-SCC species likely indicate that the change was not due to habitat alteration. Tennessee warbler abundance is linked to spruce budworm outbreaks and can vary considerably from year to year (Taylor 2018b). The decline in Tennessee warbler abundance over the survey period was most likely related to a reduced availability of spruce budworm in the study area over the monitoring period.

No adverse Project effects on non-SCC bird guilds were observed. Abundance, density, and species richness increased or remained the same at impact and control sites between 2014 and 2020. The abundance, density, and species richness of all but forest birds were greater at impact than control sites over the three-year pre- and post-construction survey period. The increase or similarity in metrics at both site types after construction suggests that changes were observed throughout the study area and were likely not Project-related.

4.1.3 Other Species of Interest

Brown-headed Cowbird

Brown-headed cowbirds were most common in the southern study area but were recorded at some northernmost sites, consistent with observations for the Manitoba Breeding Bird Atlas (Sealy 2018). As nest parasites, females lay their eggs in other species' nests, lowering the productivity of the host bird

by removing or breaking its eggs and decreasing its nestlings' survival by crowding or outcompeting them in the nest (e.g., Lorenzana and Sealy 1999). Nest parasitism can be a threat to species at risk such as golden-winged warbler (Environment and Climate Change Canada 2016). The transmission line may provide brown-headed cowbird habitat because the species is attracted to fragmented landscapes (e.g., Barnagaud et al. 2015) and a small increase in the distribution of cowbirds was observed between consecutive survey years. However, an increase in the distribution of brown-headed cowbirds was also observed at control sites over the four-year survey period, suggesting that there was a small increase in the brown-headed cowbird population throughout the study area.

4.2 MARSH BIRDS

The abundances of the four most common marsh birds (American bittern, sora, Virginia rail, and yellow rail) appeared to decline throughout the study area from the pre- to post-construction period. The abundance of all four species was lower during the second year of post-construction monitoring (2020) than before construction began (2014). The lower abundances in 2020 can likely be attributed at least in part to the difference in survey methods in 2020. However, there was also a decline in abundance at both impact and control sites between 2014 and 2017, and fewer marsh birds were also observed at impact and control sites in 2020 than in previous survey years during songbird surveys. The Canadian Drought Monitor (Environment and Climate Change Canada 2021) shows average precipitation in the study area in 2014, with abnormally dry or drought conditions in 2015 and 2017 throughout. Abnormally dry conditions were also observed in portion of the study area in 2020 (Environment and Climate Change Canada 2021), suggesting an overall decrease in marsh bird abundance in the study area that is likely habitat-related (e.g., Weller and Spatcher 1965; Stewart and Kantrud 1974; Markham 1982; Priestly 2002) and not a result of the Project.

4.3 CREPUSCULAR BIRDS

Relatively few crepuscular birds were detected in the study area over the four-year monitoring period. Eastern whip-poor-will abundance increased at impact sites from 2014 to 2017 but was lowest in 2020, the second year of post-construction monitoring. Eastern whip-poor-wills were as active at sites on the Lake Winnipeg East System Improvement Project ROW as at sites in suitable habitat nearby, and the cleared ROW appeared to create habitat at some locations (Wildlife Resource Consulting Services MB Inc. 2016). An increase in eastern whip-poor-will distribution and abundance was anticipated at impact sites after Project construction, as the species is common in open habitats and regenerating forest edges (Committee on the Status of Endangered Wildlife in Canada 2009). As eastern-whip-poor-will abundance fluctuated at control sites over the survey period and was relatively high in 2020, it is unclear if the decline at impact sites was Project-related.

Common nighthawks were only detected in 2017 and 2020, after Project construction, and were more widely distributed and more abundant at impact than control sites both years. While common nighthawks are relatively rare in the study area, it is unclear why none were detected before and during construction. Habitat for common nighthawks, which consists mainly of open areas for foraging and nesting (Committee on the Status of Endangered Wildlife in Canada 2018), may have been created by the transmission line ROW.

5.0 CONCLUSIONS

While the density and abundance of SCC and non-SCC birds varied before, during, and after Project construction, no adverse Project effects on species or guilds were detected during the second post-construction monitoring year, which is consistent with results from other studies of songbirds on transmission lines in North America (Niemi and Hanowski 1984; Yahner et al. 2002; King et al. 2009; Wildlife Resource Consulting Services MB Inc. 2016, 2020). Clearing and habitat regeneration on the ROW appeared to create suitable habitat for edge/shrub/successional birds, resulting in a greater abundance of several species nearby. There was generally no change in the abundance of forest, grassland/open country, and wetland/open water species near the ROW, or a simultaneous increase at control sites was observed. There appeared to be a general decline in marsh bird abundance in the study area that was not Project-related and a potential decline in eastern whip-poor-will abundance near the ROW. In terms of hypothesis testing, positive Project effects on the abundance, density, and richness of edge/shrub/successional bird SCCs and no effects on forest, grassland/open country, or wetland/open water bird SCCs were observed.

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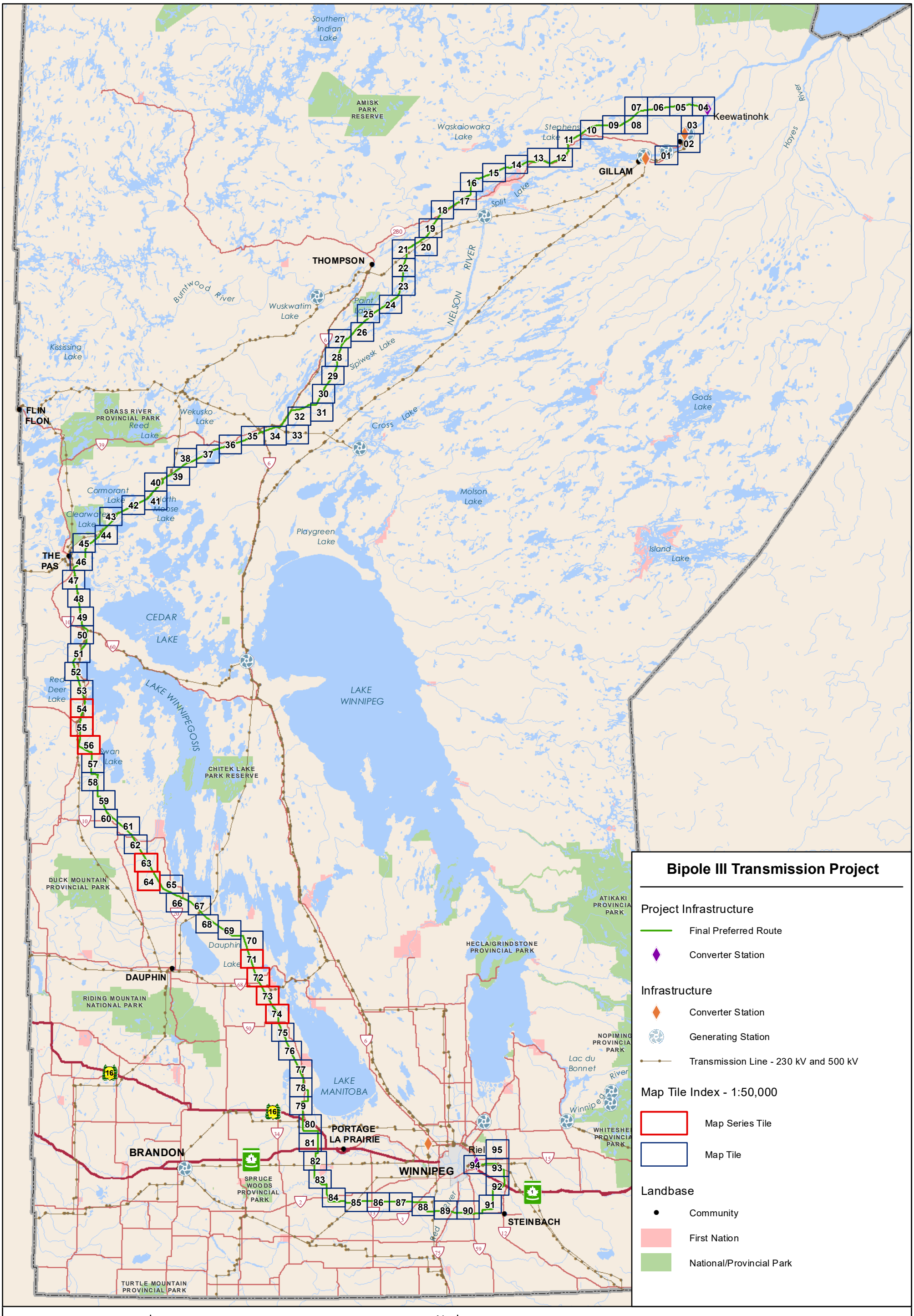
Appendix A
Maps



Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station

Infrastructure

- Converter Station
- Generating Station
- Transmission Line - 230 kV and 500 kV

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- Map Series Tile
- Map Tile

Landbase

- Community
- First Nation
- National/Provincial Park

Manitoba Hydro

Coordinate System: UTM Zone 14N NAD83
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Date Created: June 10, 2021

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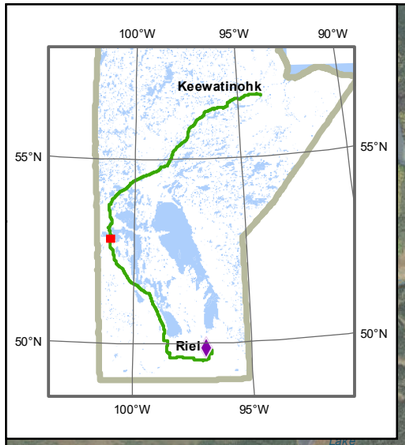

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Songbird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
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Songbird Survey Stations

2020

Map 100-54

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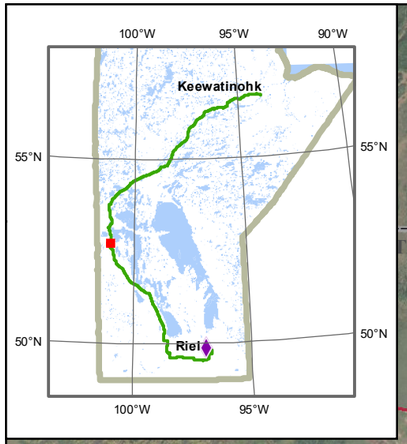

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure
- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure
- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey
- Songbird Survey Location

Landbase
- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

Map 100-55

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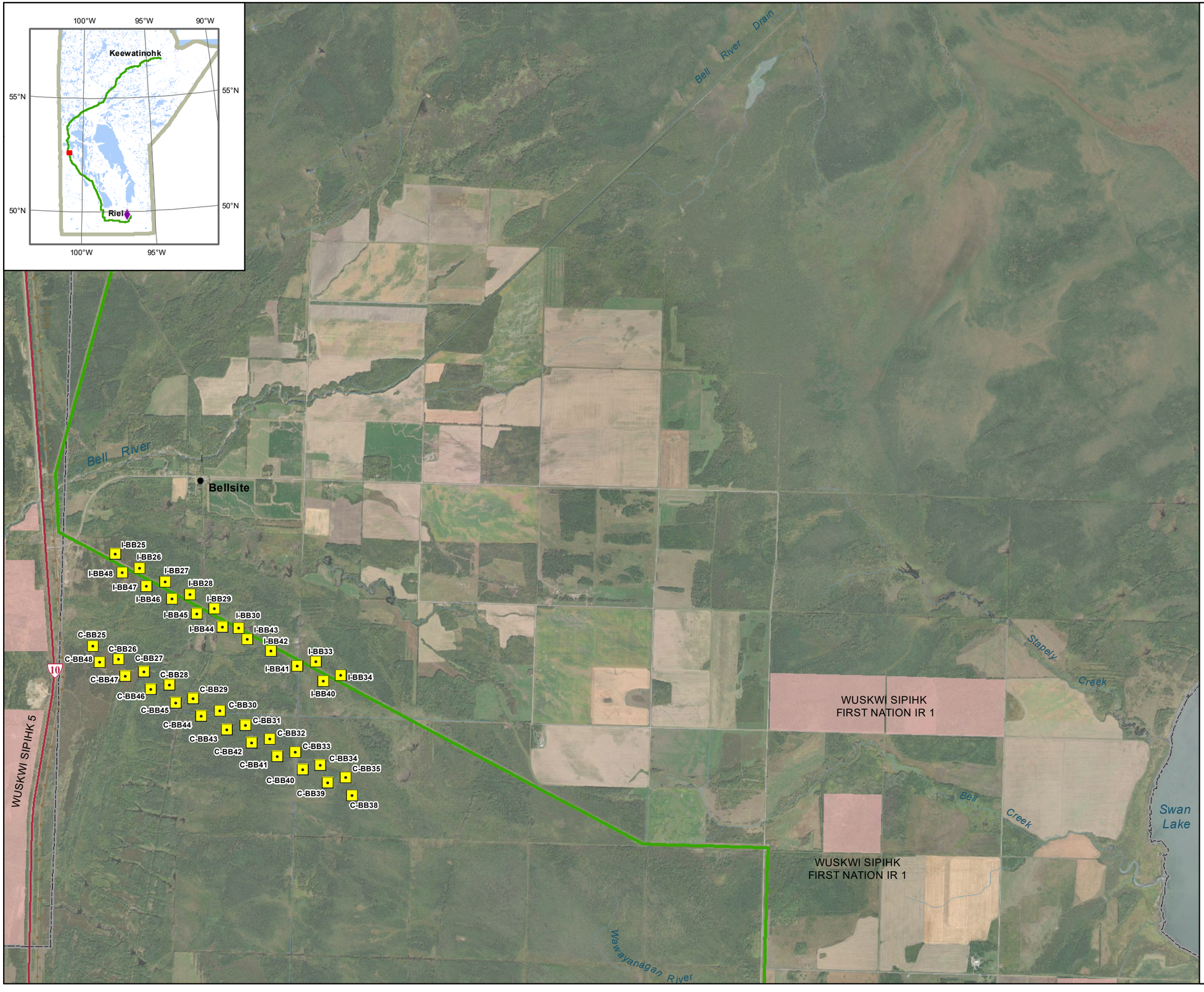

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Songbird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

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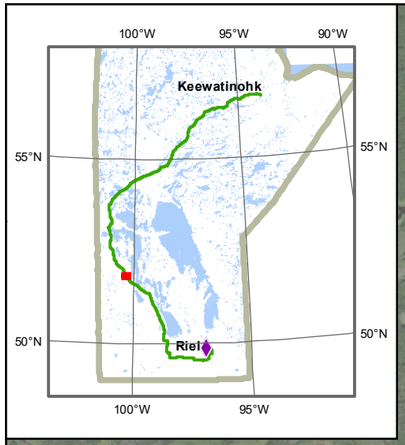

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Songbird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

Map 100-63

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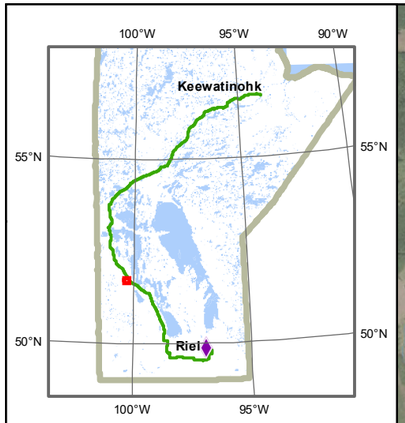

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RM OF MOUNTAIN SOUTH
RM of Mountain
Municipality
of Ethelbert
RM OF ETHELBERT
RM OF MOSSEY RIVER
RM of Mountain
Mossey River
Municipality
Municipality
of Ethelbert
Mossey River
Municipality
Wellburns River
Garland River

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure
- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure
- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey
- Songbird Survey Location

Landbase
- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

Map 100-64

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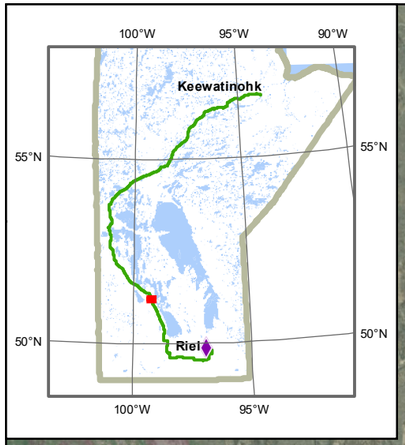

RM OF ALONSA

481

Tamarack Lake

Moore Dale

Lonely Lake

C-BB61
C-BB60
C-BB62
C-BB59
C-BB63
C-BB58
C-BB64
C-BB57

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
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- Ground Electrode Site
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- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Songbird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

Map 100-71

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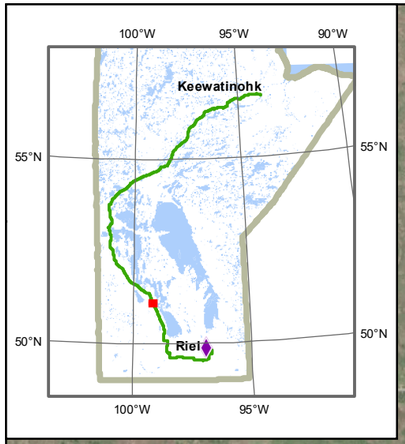

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I-BB70 I-BB51
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I-BB72 I-BB49

Lonely Lake

RM OF ALONSA

EBB AND FLOW FIRST NATION

Eddystone

Shergrove

Ebb and Flow

68 235 278

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure
- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
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- Construction Power Site
- Construction Camp Site

Infrastructure
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- Generating Station
- Electrical Station

2020 Bird Survey
- Songbird Survey Location

Landbase
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- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

Map 100-72

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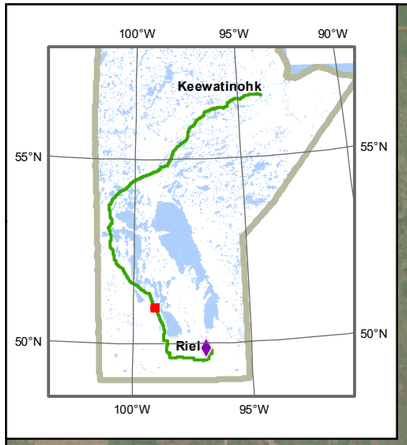

EBB AND FLOW FIRST NATION

RM OF ALONSA

Ebb and Flow Lake

Comeau

RM of

Bacon Ridge

278

Pedro Lake

C-BB113
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Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

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2020 Bird Survey

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Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Songbird Survey Stations

2020

Map 100-73

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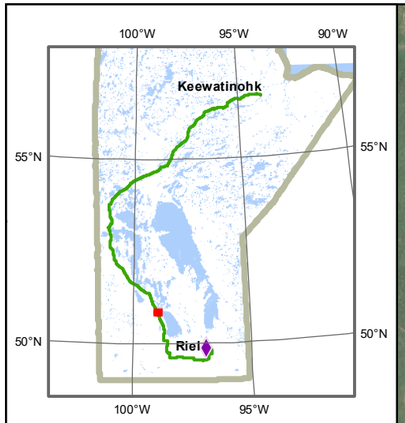

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

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- Ground Electrode Site
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- Construction Power Site
- Construction Camp Site

Infrastructure

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- Electrical Station

2020 Bird Survey

- Songbird Survey Location

Landbase

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- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

N

0 0.5 1 Kilometres
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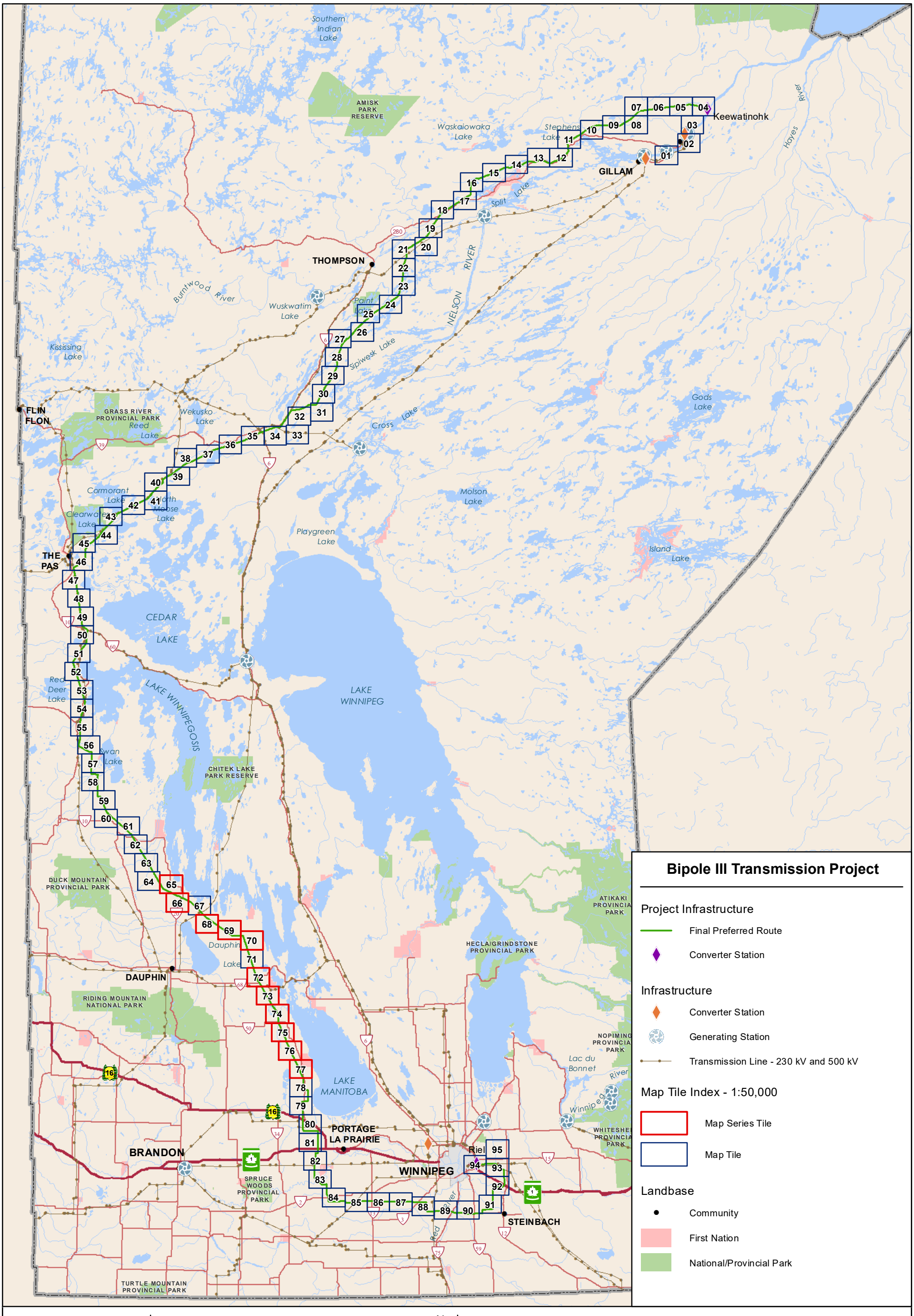
Songbird Survey Stations

2020

Map 100-74

File Location: I:\CLIENTS\MANITOBA_HYDRO\1191510\2\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries100_SongbirdSurveys2020_50k_B_20210610_PAGES.mxd



Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station

Infrastructure

- Converter Station
- Generating Station
- Transmission Line - 230 kV and 500 kV

Map Tile Index - 1:50,000

- Map Series Tile
- Map Tile

Landbase

- Community
- First Nation
- National/Provincial Park

Manitoba Hydro

Coordinate System: UTM Zone 14N NAD83
Data Source: MB Hydro, ProvMB, NRCAN
Date Created: June 10, 2021

0 25 50 Kilometres
0 25 50 Miles

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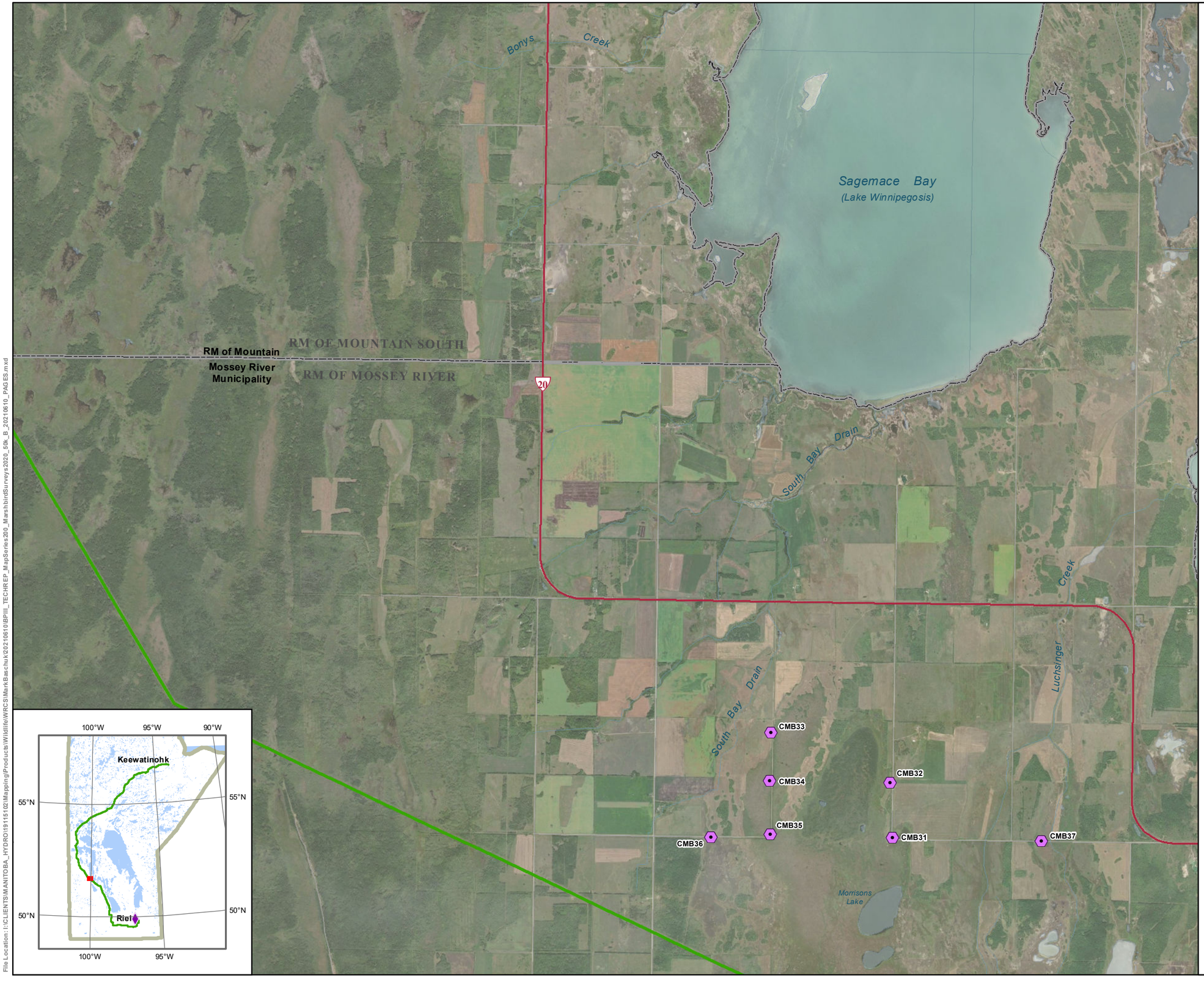
Index of Map Series 200

Marsh Bird Surveys
2020

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610BPIII_TECHREP_MapSeries200_MarshbirdSurveys2020_2_5m_B_20210610_INDEX.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure
- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure
- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey
- Marsh Bird Survey Location

Landbase
- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Marsh Bird Survey Stations
2020

Map 200-65

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure
- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure
- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey
- Marsh Bird Survey Location

Landbase
- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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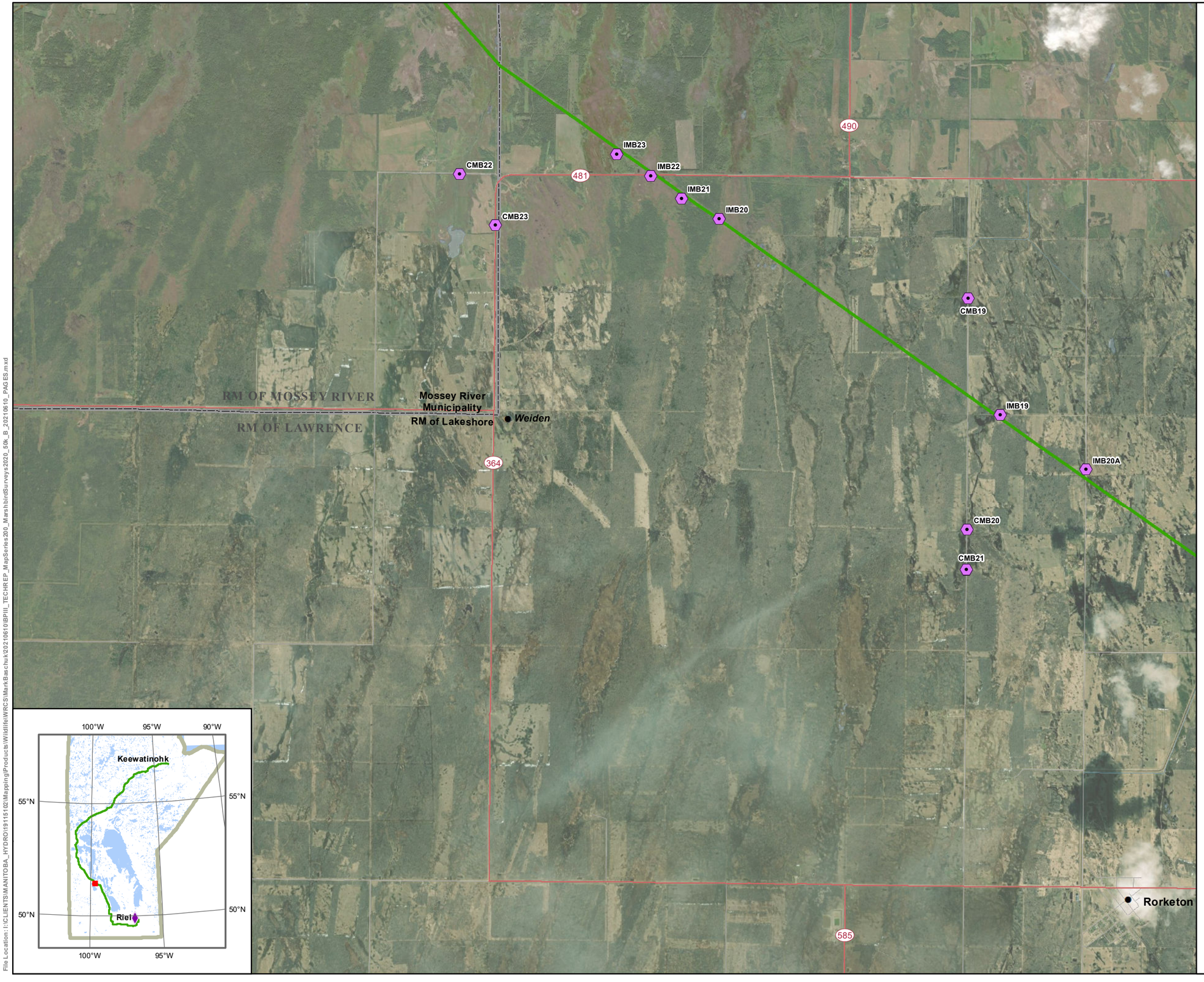
Marsh Bird Survey Stations
2020

Map 200-66

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

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2020 Bird Survey

- Marsh Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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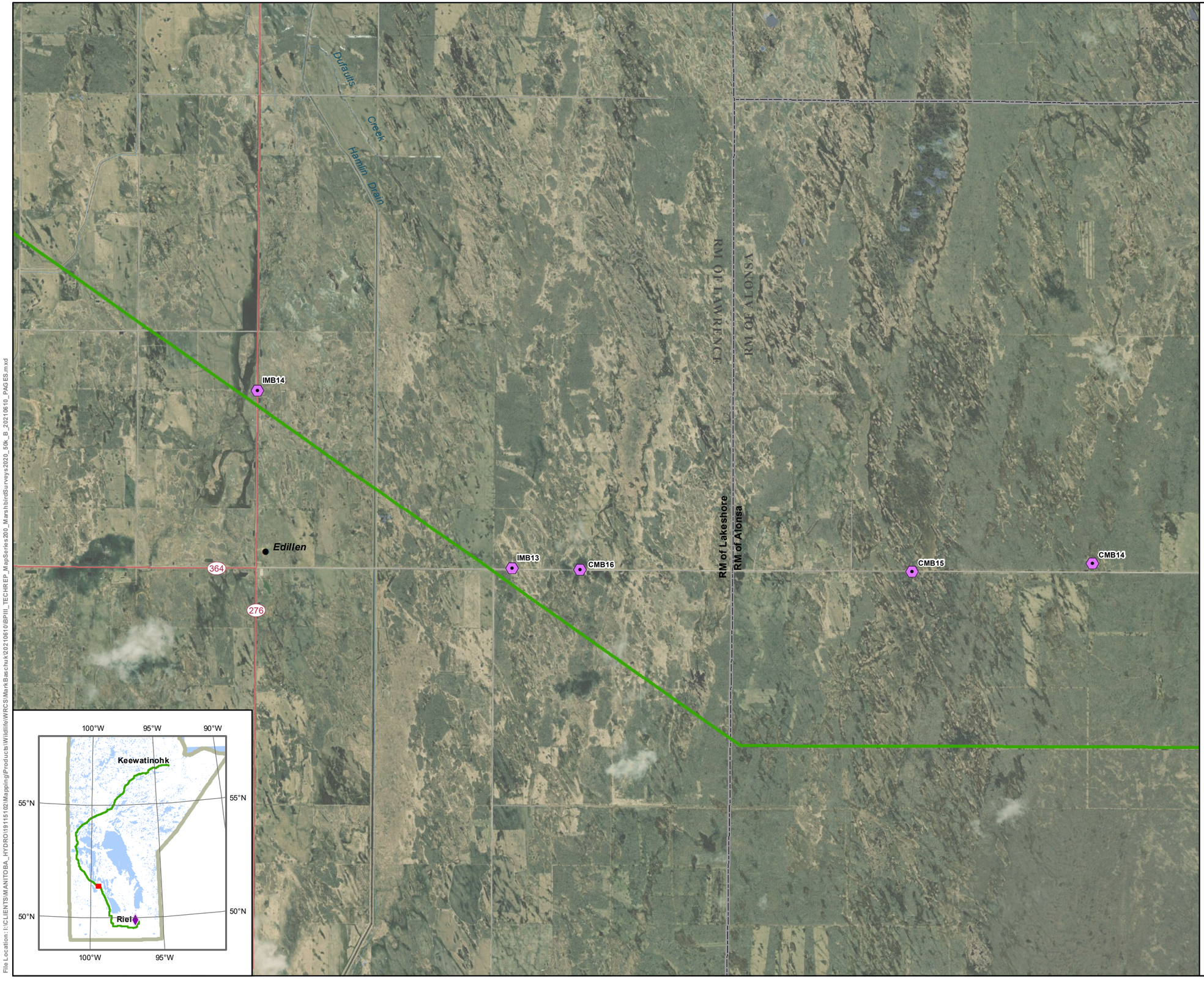
Marsh Bird Survey Stations

2020

Map 200-68

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

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- Converter Station
- Generating Station
- Electrical Station

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Landbase

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- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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Marsh Bird Survey Stations

2020

Map 200-69

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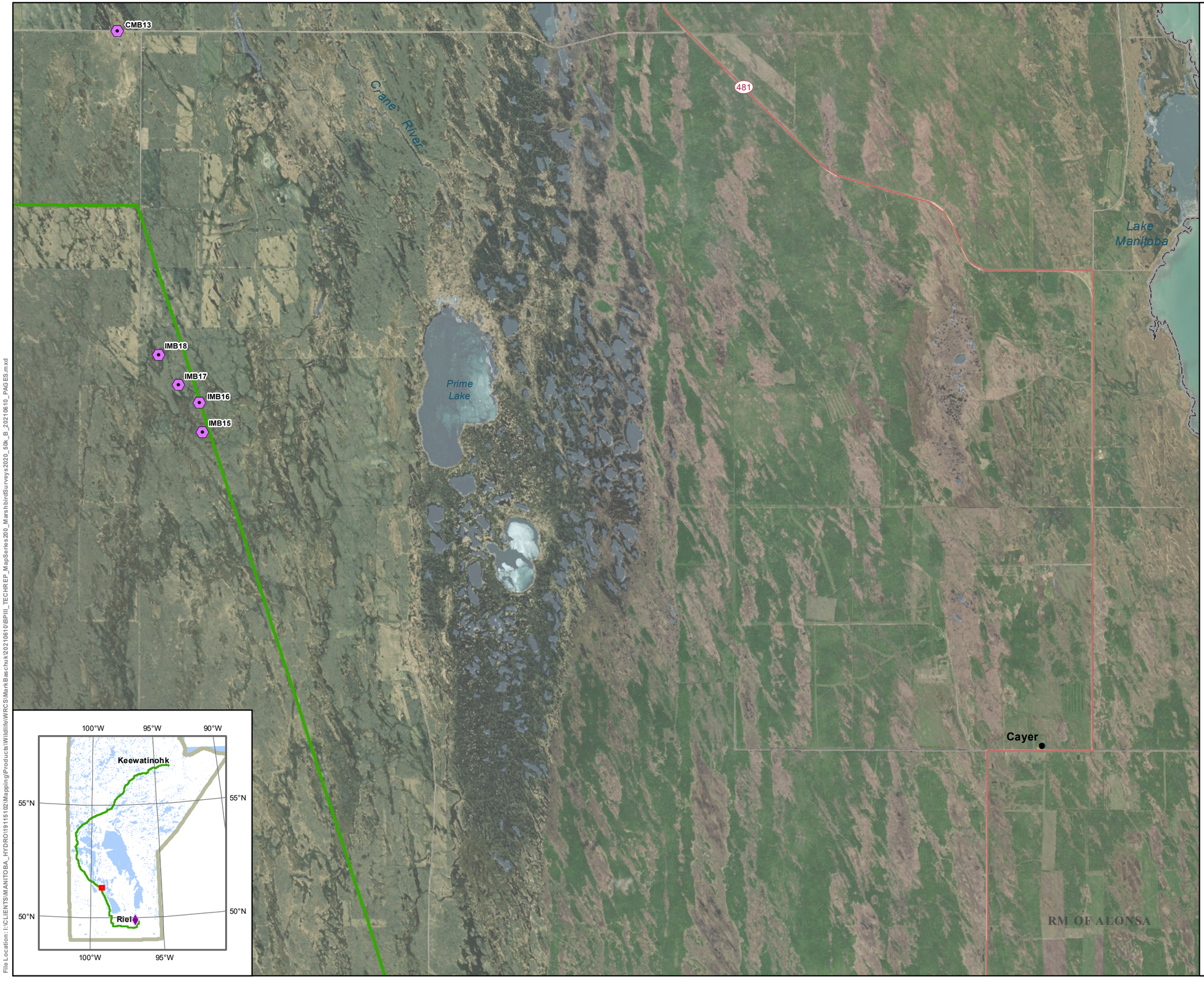

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

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- Electrical Station

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Landbase

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- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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0 0.5 1 Kilometres
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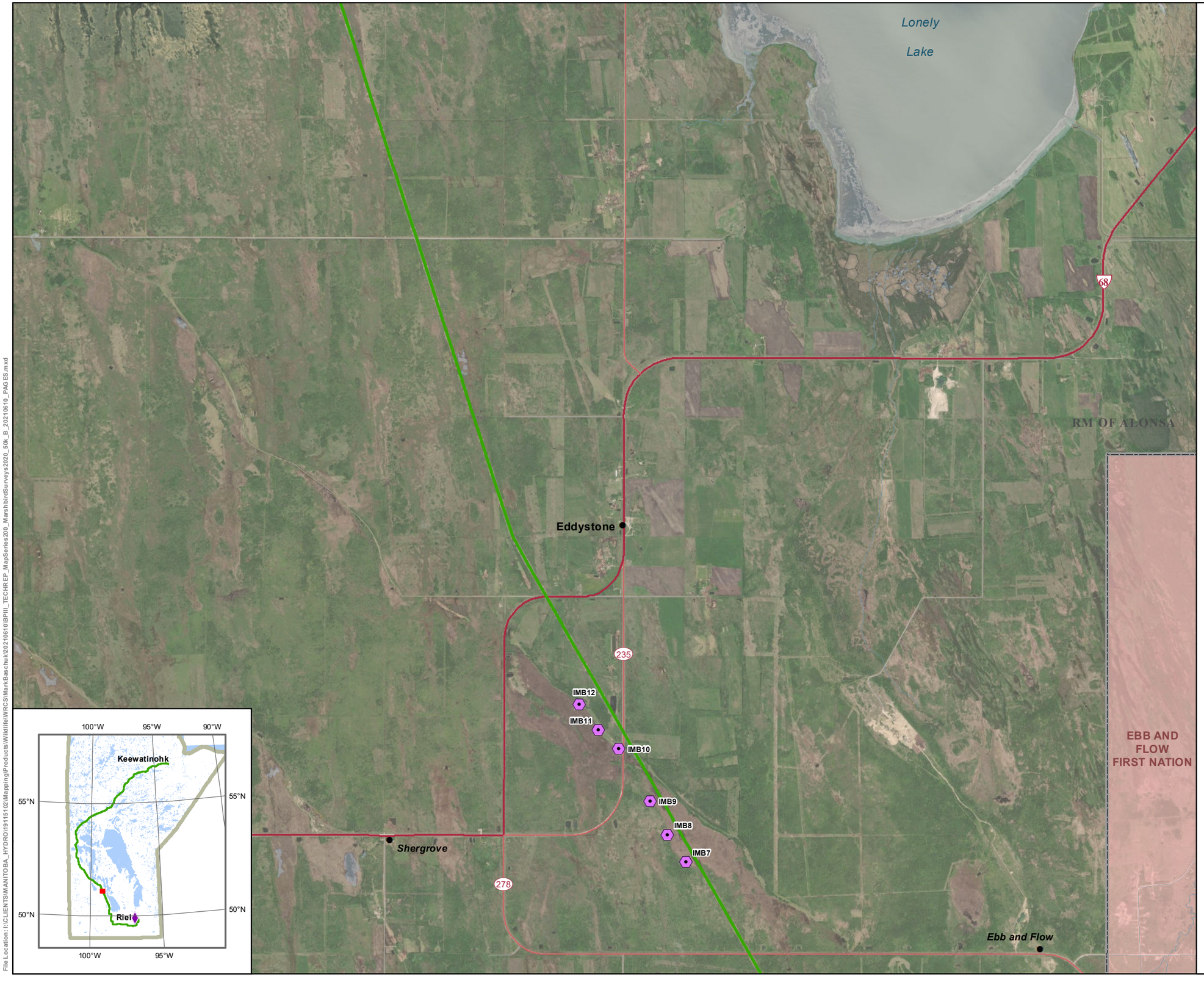
Marsh Bird Survey Stations

2020

Map 200-70

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Marsh Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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0 0.5 1 Miles

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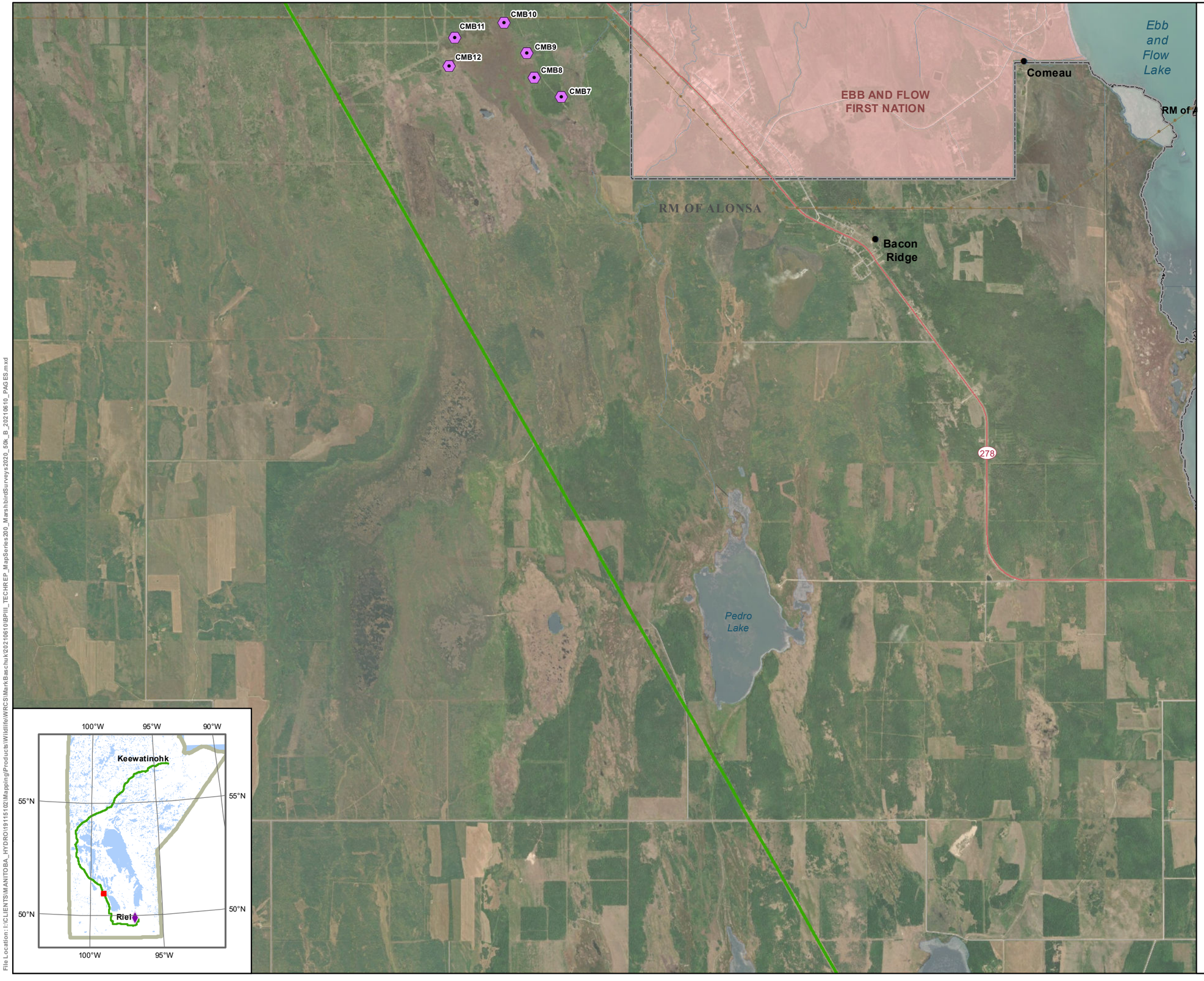
Marsh Bird Survey Stations

2020

Map 200-72

File Location: I:\CLIENTS\MANITOBA_HYDRO\1915102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
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- Electrical Station

2020 Bird Survey

- Marsh Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

N

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0 0.5 1 Miles

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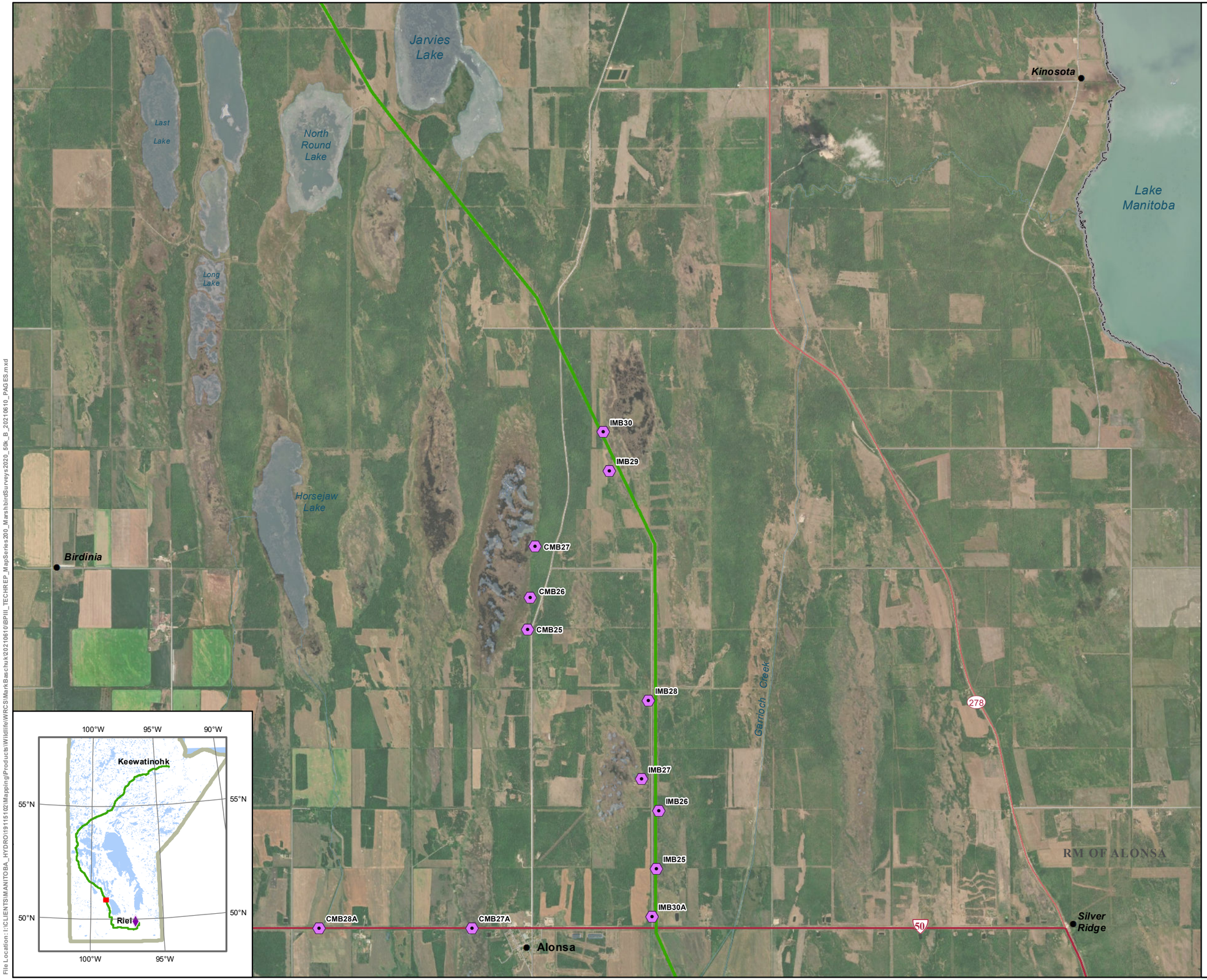
Marsh Bird Survey Stations

2020

Map 200-73

File Location: I:\CLIENTS\MANITOBA_HYDRO\1915102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Marsh Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

N

0 0.5 1 Kilometres
0 0.5 1 Miles

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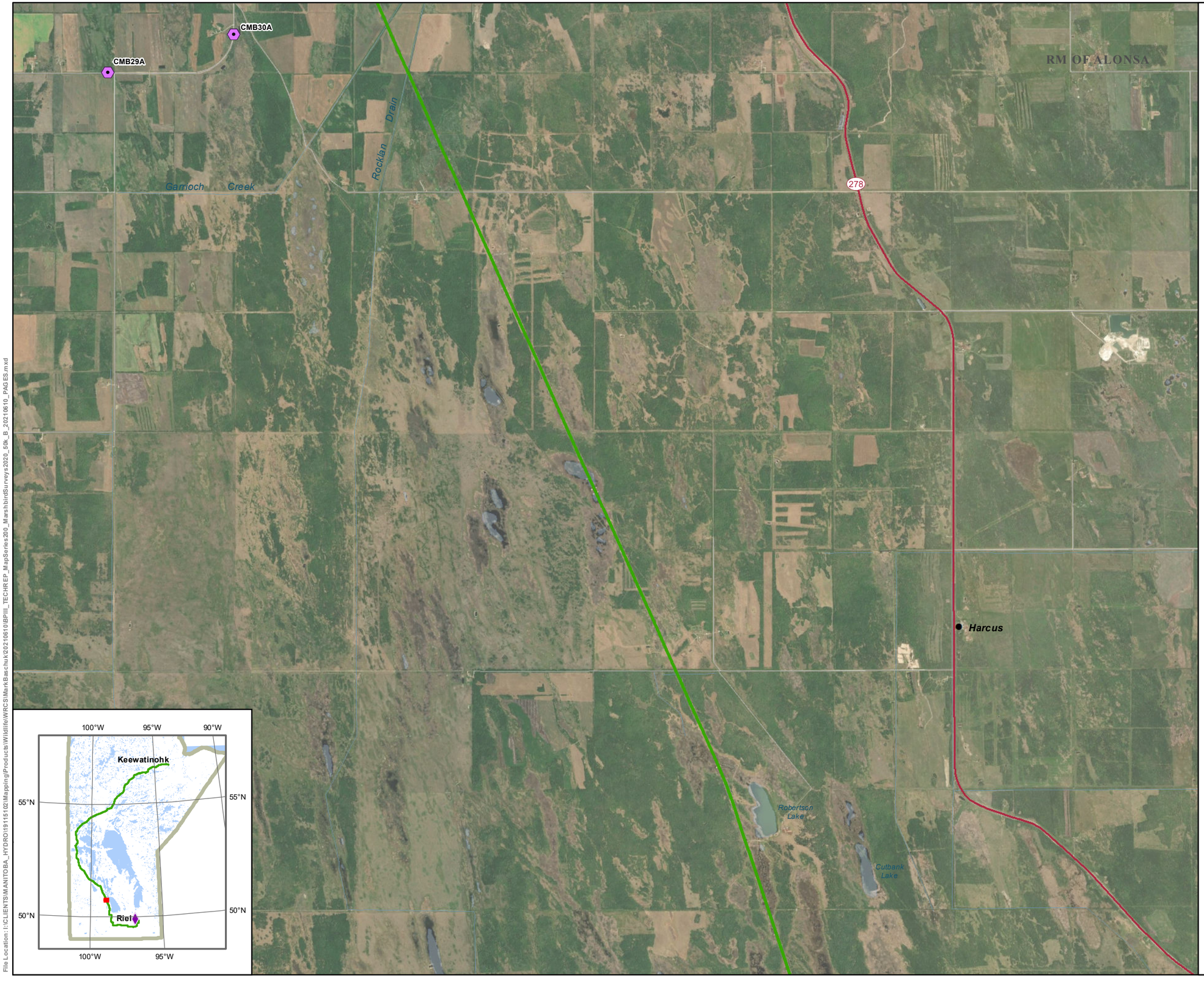
Marsh Bird Survey Stations

2020

Map 200-74

File Location: i:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610BPIII_TECHREP_MapSeries20_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Marsh Bird Survey Location

Landbase

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- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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0 0.5 1 Kilometres
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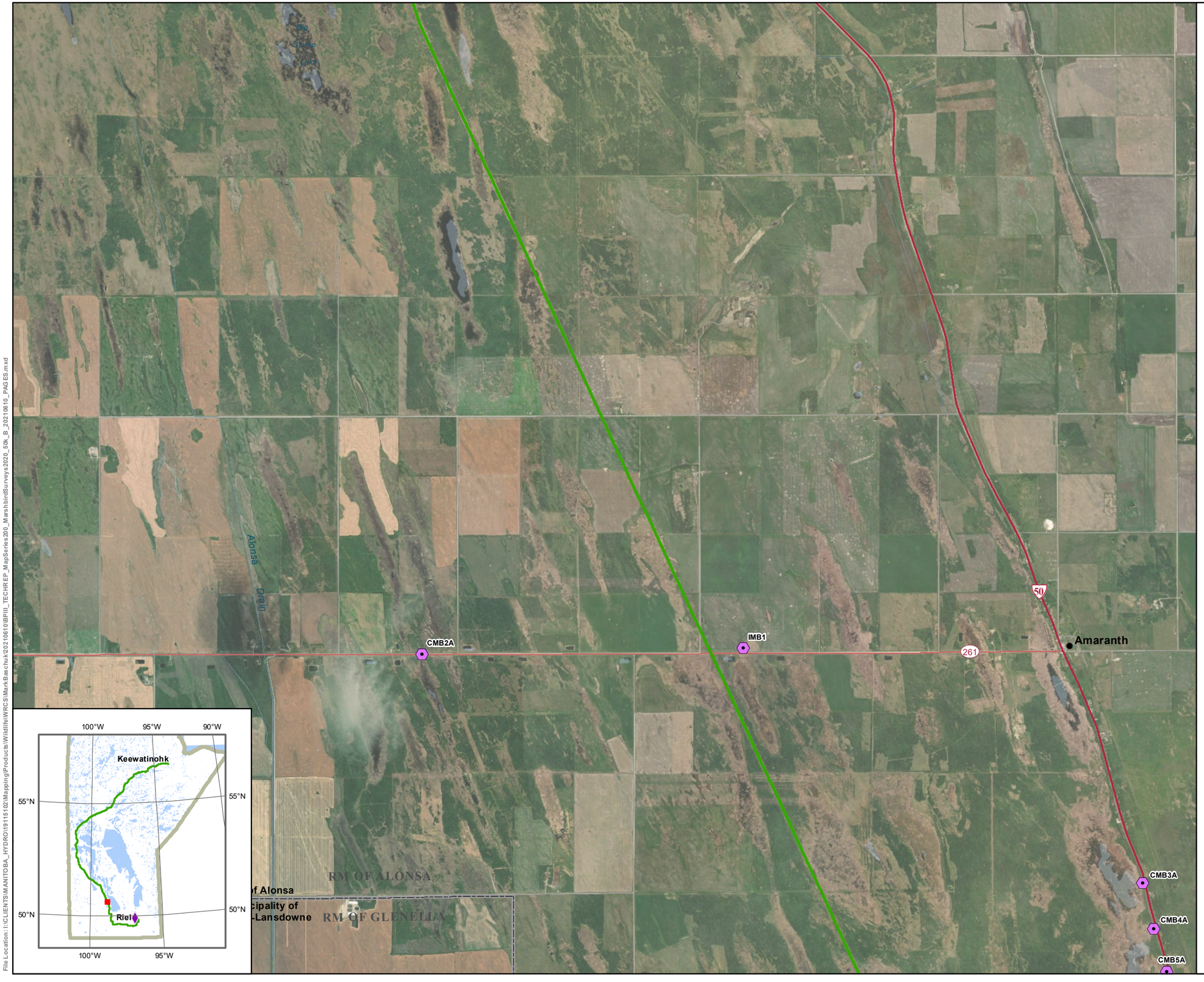
Marsh Bird Survey Stations

2020

Map 200-75

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Marsh Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

N

0 0.5 1 Kilometres
0 0.5 1 Miles

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Marsh Bird Survey Stations

2020

Map 200-76

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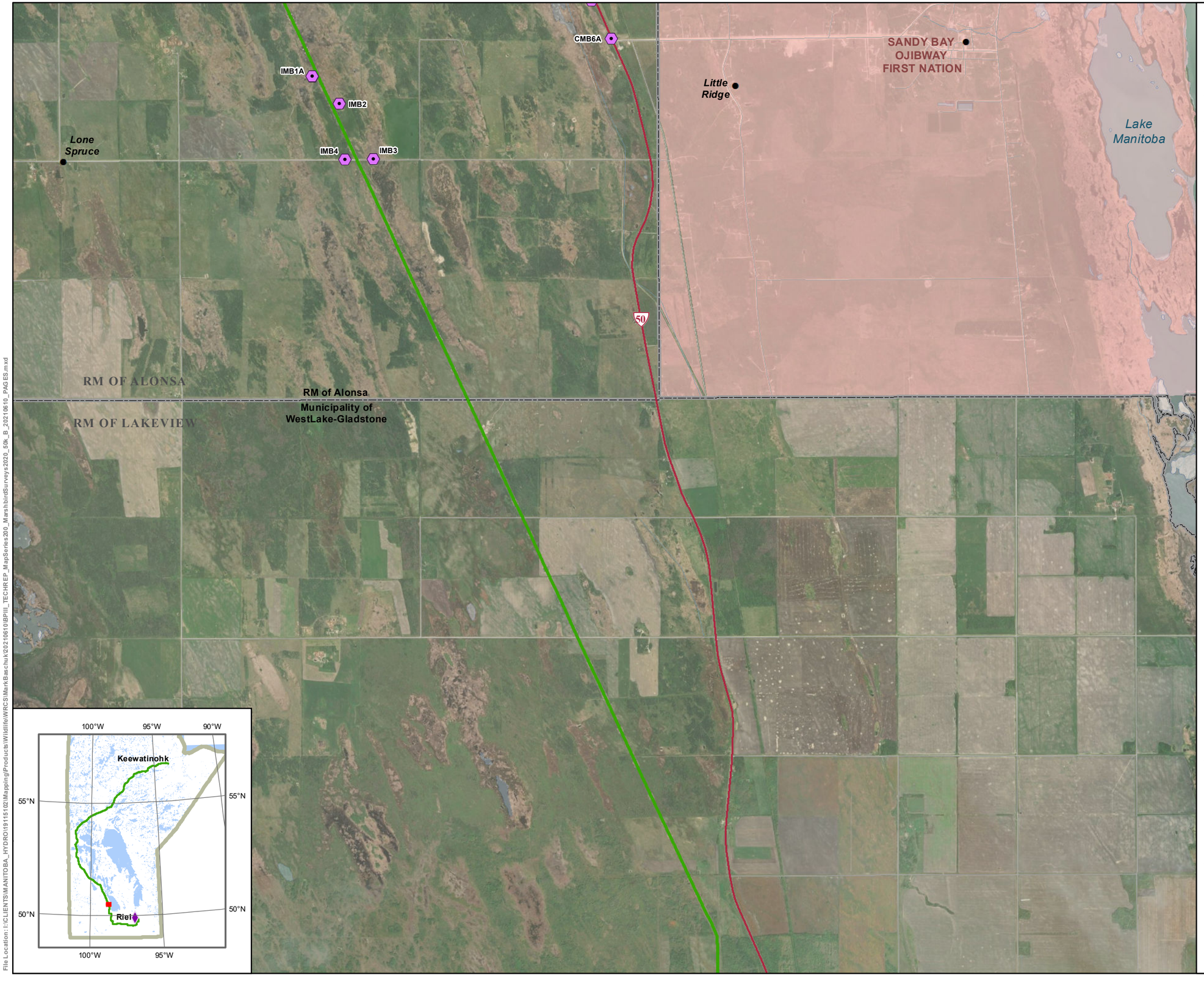

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure
- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure
- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey
- Marsh Bird Survey Location

Landbase
- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

N

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0 0.5 1 Miles

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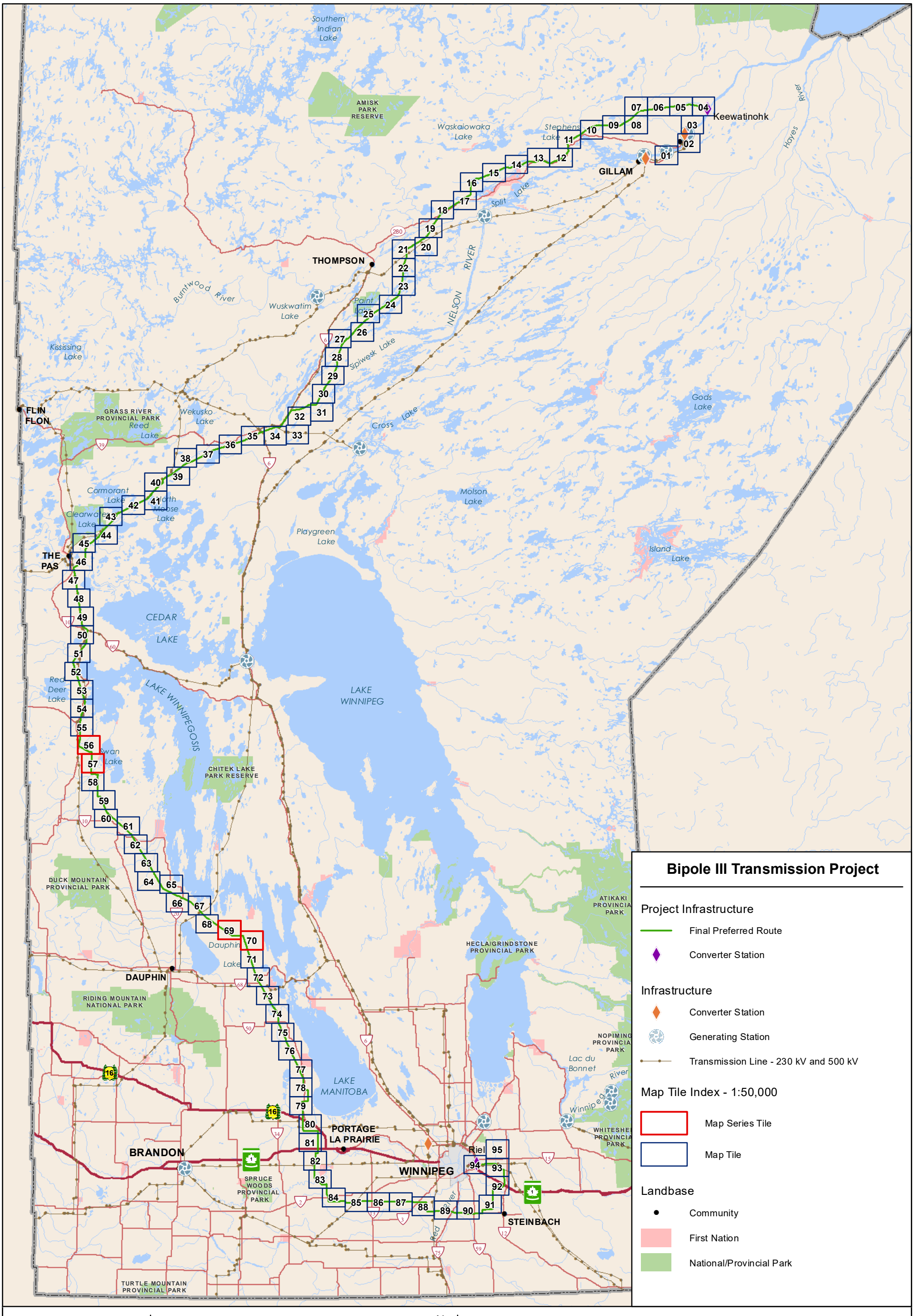
Marsh Bird Survey Stations
2020

Map 200-77

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries\200_MarshbirdSurveys2020_50k_B_20210610_PAGES.mxd



Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station

Infrastructure

- Converter Station
- Generating Station
- Transmission Line - 230 kV and 500 kV

Map Tile Index - 1:50,000

- Map Series Tile
- Map Tile

Landbase

- Community
- First Nation
- National/Provincial Park

Manitoba Hydro

Coordinate System: UTM Zone 14N NAD83
Data Source: MB Hydro, ProvMB, NRCAN
Date Created: June 10, 2021

0 25 50 Kilometres
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Crepuscular Bird Surveys 2020

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610BPIII_TECHREP_MapSeries300_CrepuscularBirdSurveys2020_2_5m_B_20210610_INDEX.mxd

RM OF MOUNTAIN NORTH

Bell River Drain

Bell River

Bellsite

10

WUSKWI SIPIHK FIRST NATION IR 1

Stapely Creek

Bell Creek

Swan Lake

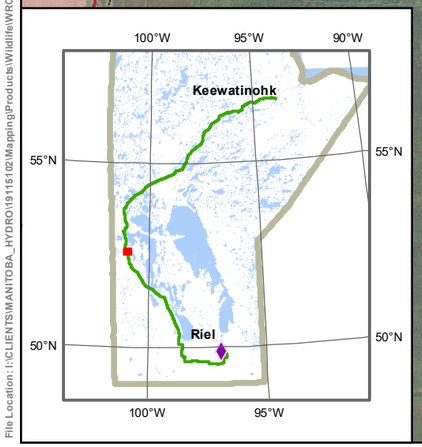
ICB13

ICB14

ICB15

ICB16

Wawayanagan River



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Crepuscular Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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0 0.5 1 Miles

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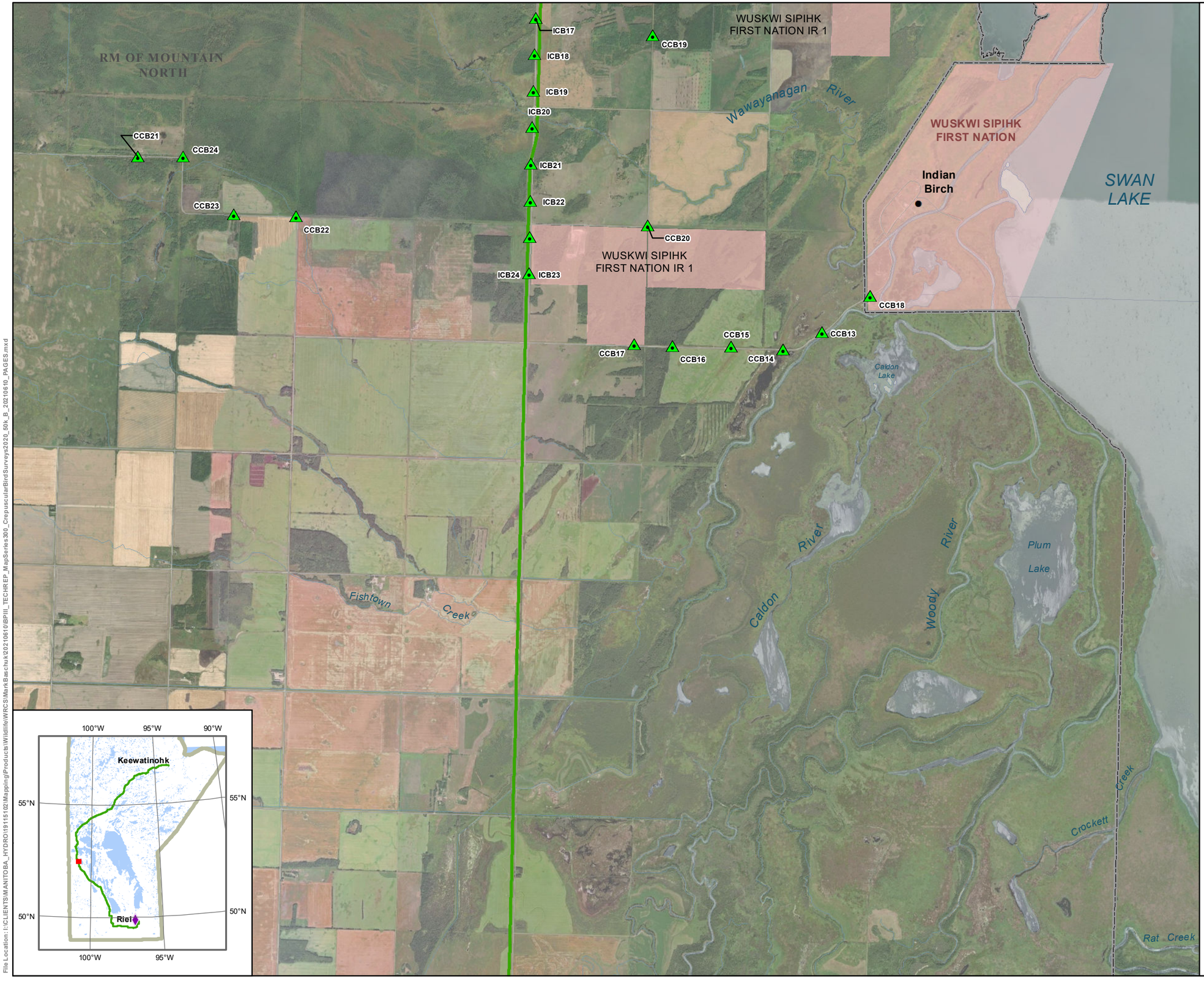
Crepuscular Bird Survey Stations

2020

Map 300-56

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries300_CrepuscularBirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Crepuscular Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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0 0.5 1 Miles

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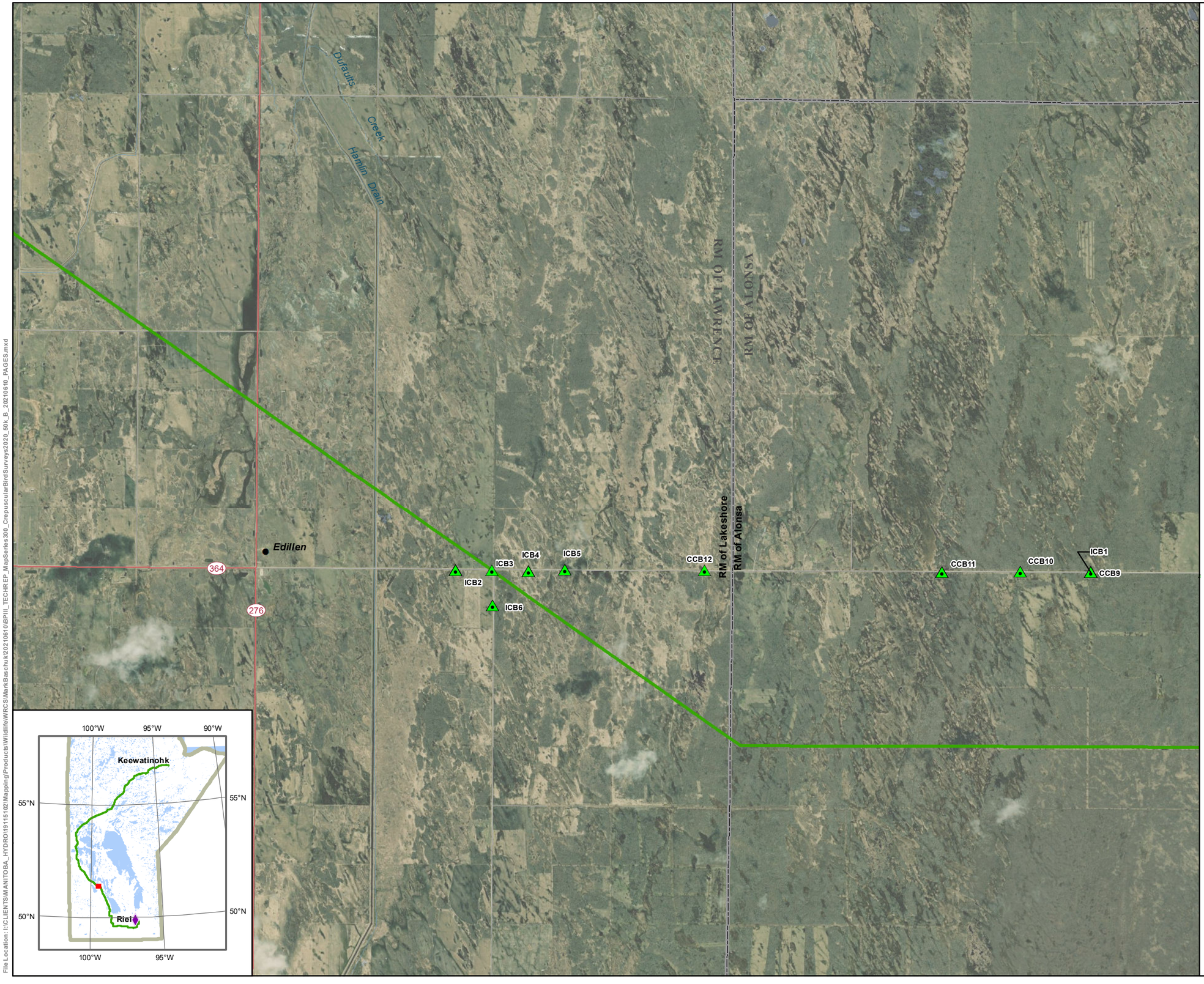
Crepuscular Bird Survey Stations

2020

Map 300-57

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries300_CrepuscularBirdSurveys2020_50k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

2020 Bird Survey

- Crepuscular Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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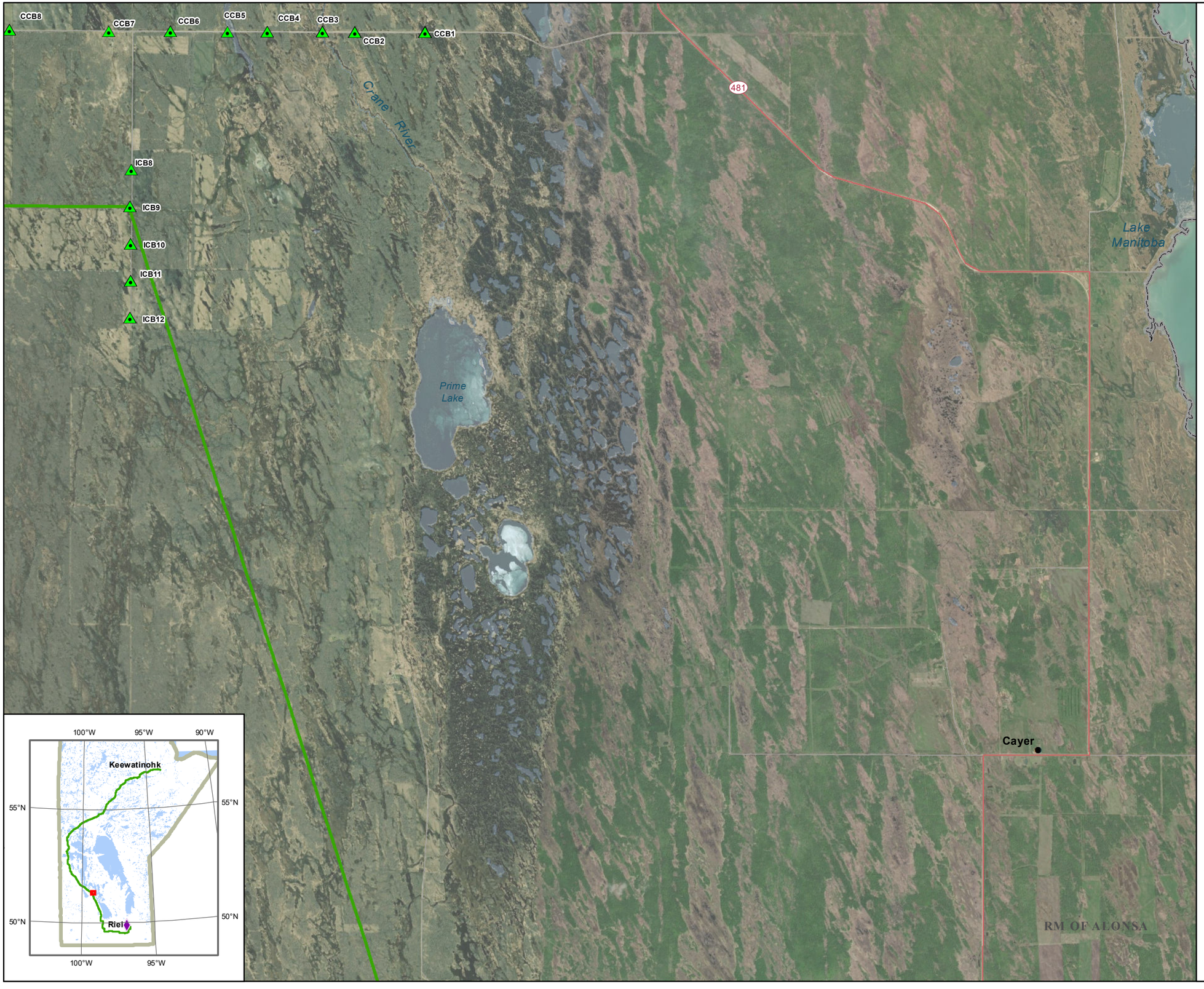
Crepuscular Bird Survey Stations

2020

Map 300-69

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries300_CrepuscularBirdSurveys2020_60k_B_20210610_PAGES.mxd



Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
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- Electrical Station

2020 Bird Survey

- Crepuscular Bird Survey Location

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 10, 2021

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0 0.5 1 Miles

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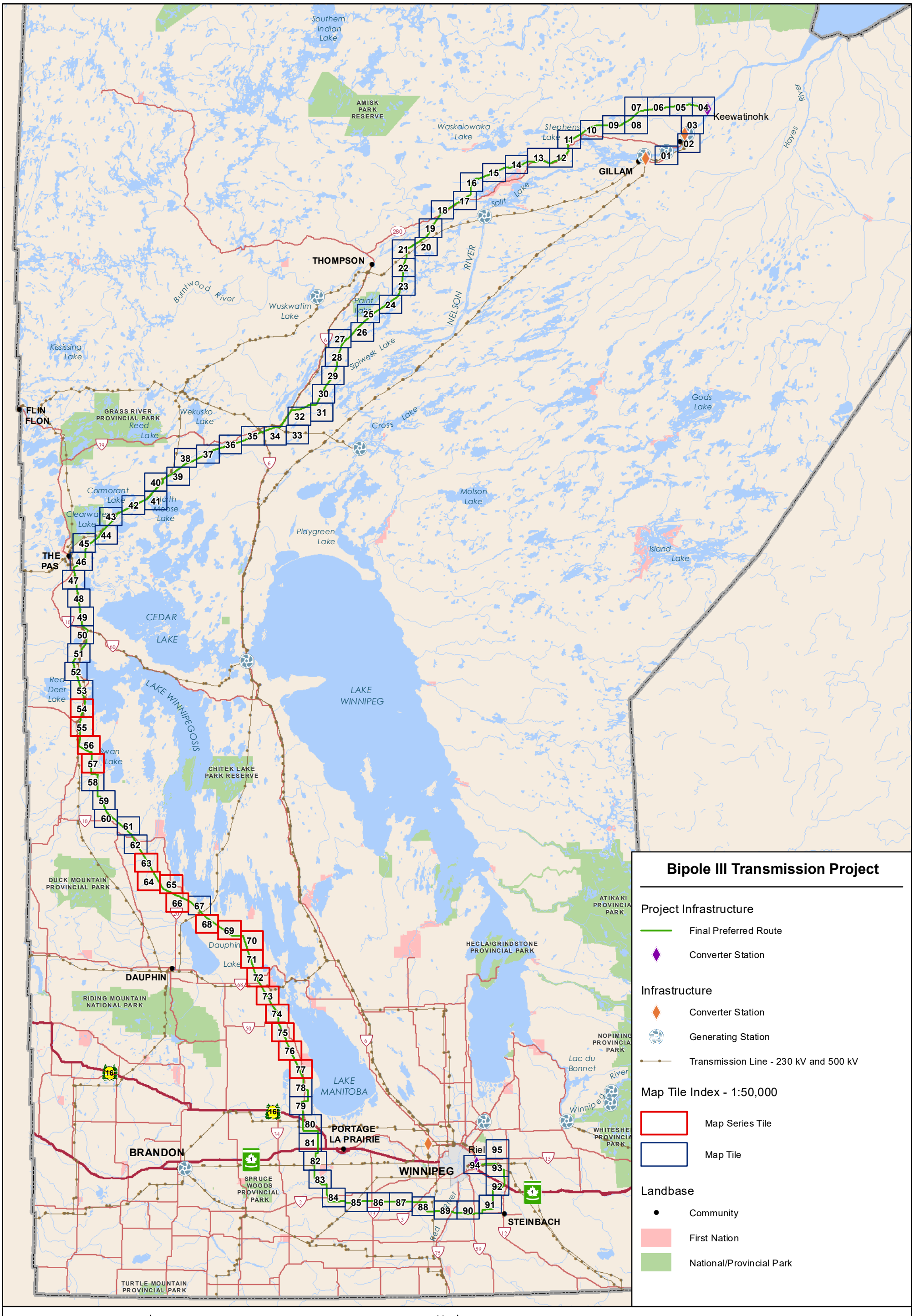
Crepuscular Bird Survey Stations

2020

Map 300-70

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610\BPIII_TECHREP_MapSeries300_CrepuscularBirdSurveys2020_50k_B_20210610_PAGES.mxd



Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station

Infrastructure

- Converter Station
- Generating Station
- Transmission Line - 230 kV and 500 kV

Map Tile Index - 1:50,000

- Map Series Tile
- Map Tile

Landbase

- Community
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MB Hydro, ProvMB, NRCAN
Date Created: June 10, 2021

0 25 50 Kilometres
0 25 50 Miles

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1:2,500,000

Index of Map Series 400

Species at Risk Observations

File Location: I:\CLIENTS\MANITOBA_HYDRO\19115102\Mapping\Products\Wildlife\WRCS\MarkBaschuk\20210610BPIII_TECHREP_MapSeries400_SpeciesAtRisk_2_5m_B_20210610_INDEX.mxd

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Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

Species At Risk Observations

- 2014 Observation
- 2015 Observation
- 2017 Observation
- 2020 Observation

BANS - Bank Swallow
BARS - Barn Swallow
BOBO - Bobolink
CAWA - Canada Warbler
CHSW - Chimney Swift
CONI - Common Nighthawk
EWPW - Eastern Whip-poor-will
EAPW - Eastern Wood-pewee
GWWA - Golden-winged Warbler
LEBI - Least Bittern
OSFL - Olive-sided Flycatcher
RHWO - Red-headed Woodpecker
RUBL - Rusty Blackbird
SEOW - Short-eared Owl
YERA - Yellow Rail

Landbase

- Community
- City / Town
- Rural Municipality
- First Nation
- National/Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 15, 2021

N

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0 0.5 1 Miles

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Species at Risk Observations

Map 400-54

Redacted

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
- Ground Electrode Line
- Ground Electrode Site
- Construction Power (KN36)
- Construction Power Site
- Construction Camp Site

Infrastructure

- Converter Station
- Generating Station
- Electrical Station

Species At Risk Observations

- 2014 Observation
- 2015 Observation
- 2017 Observation
- 2020 Observation

BANS - Bank Swallow
BARS - Barn Swallow
BOBO - Bobolink
CAWA - Canada Warbler
CHSW - Chimney Swift
CONI - Common Nighthawk
EWPW - Eastern Whip-poor-will
EAPW - Eastern Wood-pewee
GWWA - Golden-winged Warbler
LEBI - Least Bittern
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RUBL - Rusty Blackbird
SEOW - Short-eared Owl
YERA - Yellow Rail

Landbase

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Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: June 15, 2021

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Species at Risk Observations

Map 400-55

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Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

- Final Preferred Route
- Converter Station Site
- AC Collector Line
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Infrastructure

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Species at Risk Observations

Map 400-56

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-57

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-63

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-64

Redacted

Manitoba Hydro

Bipole III Transmission Project

Project Infrastructure

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Species at Risk Observations

Map 400-65

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-66

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-68

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-69

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-70

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Manitoba Hydro

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Species at Risk Observations

Map 400-71

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Manitoba Hydro

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Species at Risk Observations

Map 400-72

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Manitoba Hydro

Bipole III Transmission Project

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Species at Risk Observations

Map 400-73

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Manitoba Hydro

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Species at Risk Observations

Map 400-74

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Manitoba Hydro

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Species at Risk Observations

Map 400-75

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Manitoba Hydro

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Species at Risk Observations

Map 400-76

Redacted

Manitoba Hydro

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Species at Risk Observations

Map 400-77

Appendix B
Tables

Table B-1: Compiled bird species list from the 2020 and 2014–2017 bird species of conservation concern monitoring program

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Alder flycatcher	*Empidonax alnorum*	✓	✓	✓				✓		Edge/Shrub/Successional
American avocet	*Recurvirostra americana*				✓				✓	Wetland/Open Water
American bittern	*Botaurus lentiginosus*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
American coot	*Fulica americana*	✓	✓	✓	✓					Wetland/Open Water
American crow	*Corvus brachyrhynchos*	✓	✓	✓						Forest
American goldfinch	*Spinus tristis*	✓	✓	✓						Edge/Shrub/Successional
American kestrel	*Falco sparverius*	✓	✓		✓			✓		Edge/Shrub/Successional
American redstart	*Setophaga ruticilla*	✓	✓	✓						Edge/Shrub/Successional
American robin	*Turdus migratorius*	✓	✓	✓						Edge/Shrub/Successional
American three-toed woodpecker	*Picoides dorsalis*	✓	✓					✓		Forest
American white pelican	*Pelecanus erythrorhynchos*	✓	✓		✓			✓	✓	Wetland/Open Water
American wigeon	*Mareca americana*	✓	✓		✓			✓	✓	Wetland/Open Water
American woodcock	*Scolopax minor*	✓	✓	✓						Wetland/Open Water
Bald eagle	*Haliaeetus leucocephalus*	✓	✓	✓	✓					Forest
Baltimore oriole	*Icterus galbula*	✓	✓	✓				✓		Edge/Shrub/Successional
Bank swallow	*Riparia riparia*	✓	✓			THR		✓		Edge/Shrub/Successional
Barn swallow	*Hirundo rustica*	✓		✓		THR		✓		Edge/Shrub/Successional
Bay-breasted warbler	*Setophaga castanea*	✓	✓					✓		Forest
Belted kingfisher	*Megaceryle alcyon*	✓	✓							Wetland/Open Water
Black tern	*Chlidonias niger*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
Black-and-white warbler	*Mniotilta varia*	✓	✓	✓						Forest
Black-backed woodpecker	*Picoides arcticus*	✓	✓					✓		Forest
Black-billed cuckoo	*Coccyzus erythropthalmus*	✓	✓					✓	✓	Edge/Shrub/Successional

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Black-billed magpie	*Pica hudsonia*	✓	✓	✓	✓			✓	✓	Edge/Shrub/Successional
Blackburnian warbler	*Setophaga fusca*	✓	✓					✓		Forest
Black-capped chickadee	*Poecile atricapillus*	✓	✓							Forest
Blackpoll warbler	*Setophaga striata*	✓	✓					✓		Forest
Black-throated green warbler	*Setophaga virens*	✓	✓					✓		Forest
Blue jay	*Cyanocitta cristata*	✓	✓	✓						Forest
Blue-headed vireo	*Vireo solitarius*	✓	✓							Forest
Blue-winged teal	*Spatula discors*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
Bobolink	*Dolichonyx oryzivorus*	✓	✓	✓		THR		✓	✓	Grassland/Open Country
Bonaparte's gull	*Chroicocephalus philadelphia*				✓			✓	✓	Wetland/Open Water
Boreal chickadee	*Poecile hudsonicus*	✓	✓					✓		Forest
Boreal owl	*Aegolius funereus*		✓					✓		Forest
Brewer’s blackbird	*Euphagus cyanocephalus*	✓	✓	✓						Edge/Shrub/Successional
Broad-winged hawk	*Buteo platypterus*	✓	✓					✓		Forest
Brown creeper	*Certhia americana*	✓	✓					✓		Forest
Brown thrasher	*Toxostoma rufum*	✓	✓						✓	Edge/Shrub/Successional
Brown-headed cowbird	*Molothrus ater*	✓	✓							Edge/Shrub/Successional
Bufflehead	*Bucephala albeola*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
California gull	*Larus californicus*		✓	✓				✓		Wetland/Open Water
Canada goose	*Branta canadensis*	✓	✓	✓	✓				✓	Wetland/Open Water
Canada jay	*Perisoreus canadensis*	✓	✓							Forest
Canada warbler	*Cardellina canadensis*	✓	✓			THR	THR	✓		Forest
Cape May warbler	*Setophaga tigrina*	✓	✓					✓		Forest
Canvasback	*Aythya valisineria*				✓				✓	Wetland/Open Water
Cedar waxwing	*Bombycilla cedrorum*	✓	✓	✓						Edge/Shrub/Successional

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Chestnut-sided warbler	*Setophaga pensylvanica*	✓	✓							Edge/Shrub/Successional
Chimney swift	*Chaetura pelagica*	✓	✓			THR	THR	✓	✓	Edge/Shrub/Successional
Chipping sparrow	*Spizella passerina*	✓	✓	✓						Edge/Shrub/Successional
Clay-colored sparrow	*Spizella pallida*	✓	✓	✓				✓	✓	Edge/Shrub/Successional
Common goldeneye	*Bucephala clangula*	✓	✓		✓			✓		Wetland/Open Water
Common grackle	*Quiscalus quiscula*	✓	✓	✓						Edge/Shrub/Successional
Common loon	*Gavia immer*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
Common merganser	*Mergus merganser*				✓					Wetland/Open Water
Common nighthawk	*Chordeiles minor*	✓		✓		THR	THR	✓	✓	Grassland/Open Country
Common raven	*Corvus corax*	✓	✓	✓	✓					Forest
Common tern	*Sterna hirundo*				✓			✓	✓	Wetland/Open Water
Common yellowthroat	*Geothlypis trichas*	✓	✓	✓				✓	✓	Edge/Shrub/Successional
Connecticut warbler	*Oporornis agilis*	✓	✓					✓		Forest
Dark-eyed junco	*Junco hyemalis*	✓	✓	✓						Forest
Double-crested cormorant	*Phalacrocorax auritus*				✓					Wetland/Open Water
Downy woodpecker	*Picoides pubescens*	✓	✓							Forest
Eared grebe	*Podiceps nigricollis*				✓			✓	✓	Wetland/Open Water
Eastern bluebird	*Sialia sialis*	✓	✓							Grassland/Open Country
Eastern kingbird	*Tyrannus tyrannus*	✓	✓	✓						Edge/Shrub/Successional
Eastern towhee	*Pipilo erythrophthalmus*	✓	✓	✓						Edge/Shrub/Successional
Eastern whip-poor-will	*Antrostomus vociferus*	✓		✓		THR	THR	✓	✓	Forest
Eastern wood-pewee	*Contopus virens*	✓	✓			SC				Forest
European starling	*Sturnus vulgaris*	✓	✓	✓						Forest
Evening grosbeak	*Coccothraustes vespertinus*	✓	✓							Forest
Franklin's gull	*Leucophaeus pipixcan*	✓	✓	✓	✓				✓	Wetland/Open Water
Gadwall	*Anas strepera*				✓			✓	✓	Wetland/Open Water

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Golden-crowned kinglet	*Regulus satrapa*	✓	✓							Forest
Golden-winged warbler	*Vermivora chrysoptera*	✓	✓			THR	THR	✓	✓	Edge/Shrub/Successional
Grasshopper sparrow	*Ammodramus savannarum*	✓	✓						✓	Edge/Shrub/Successional
Gray catbird	*Dumetella carolinensis*	✓	✓	✓						Edge/Shrub/Successional
Great blue heron	*Ardea herodias*	✓	✓	✓	✓				✓	Wetland/Open Water
Great crested flycatcher	*Myiarchus crinitus*	✓	✓							Forest
Great gray owl	*Strix nebulosa*	✓	✓		✓			✓		Forest
Great horned owl	*Bubo virginianus*			✓	✓					Forest
Greater white-fronted goose	*Anser albifrons*				✓					Wetland/Open Water
Greater yellowlegs	*Tringa melanoleuca*	✓	✓		✓			✓		Wetland/Open Water
Green-winged teal	*Anas crecca*	✓	✓		✓			✓	✓	Wetland/Open Water
Hairy woodpecker	*Picoides villosus*	✓	✓	✓						Forest
Hermit thrush	*Catharus guttatus*	✓	✓	✓						Forest
Herring gull	*Larus argentatus*	✓	✓	✓				✓		Wetland/Open Water
Hooded merganser	*Lophodytes cucullatus*	✓	✓	✓	✓					Wetland/Open Water
House wren	*Troglodytes aedon*	✓	✓	✓						Edge/Shrub/Successional
Indigo bunting	*Passerina cyanea*	✓	✓							Edge/Shrub/Successional
Killdeer	*Charadrius vociferus*	✓	✓	✓	✓			✓	✓	Grassland/Open Country
Least bittern	*Ixobrychus exilis*	✓		✓		THR	END		✓	Wetland/Open Water
Least flycatcher	*Empidonax minimus*	✓	✓	✓				✓	✓	Edge/Shrub/Successional
LeConte's sparrow	*Ammospiza leconteii*	✓	✓	✓				✓	✓	Grassland/Open Country
Lesser scaup	*Anthya affinis*	✓		✓	✓			✓	✓	Wetland/Open Water
Lesser yellowlegs	*Tringa flavipes*	✓	✓					✓		Wetland/Open Water
Lincoln's sparrow	*Melospiza lincolnii*	✓	✓							Edge/Shrub/Successional
Long-eared owl	*Asio otus*			✓					✓	Forest

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Magnolia warbler	*Setophaga magnolia*	✓	✓							Forest
Mallard	*Anas platyrhynchos*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
Marbled godwit	*Limosa fedoa*	✓	✓	✓	✓			✓	✓	Grassland/Open Country
Marsh wren	*Cistothorus palustris*	✓	✓	✓						Wetland/Open Water
Merlin	*Falco columbarius*	✓		✓				✓		Forest
Mourning dove	*Zenaida macroura*	✓	✓	✓						Edge/Shrub/Successional
Mourning warbler	*Geothlypis philadelphia*	✓	✓					✓		Forest
Nashville warbler	*Oreothlypis ruficapilla*	✓	✓							Forest
Nelson's sparrow	*Ammodramus nelsoni*	✓	✓	✓				✓	✓	Grassland/Open Country
Northern flicker	*Colaptes auratus*	✓	✓	✓				✓	✓	Forest
Northern goshawk	*Accipiter gentilis*	✓	✓					✓		Forest
Northern harrier	*Circus hudsonius*	✓	✓	✓	✓			✓	✓	Grassland/Open Country
Northern pintail	*Anas acuta*				✓			✓	✓	Wetland/Open Water
Northern shoveler	*Anas clypeata*	✓		✓	✓			✓	✓	Wetland/Open Water
Northern waterthrush	*Parkesia noveboracensis*	✓	✓							Forest
Olive-sided flycatcher	*Contopus cooperi*	✓	✓			THR	THR	✓	✓	Edge/Shrub/Successional
Orange-crowned warbler	*Oreothlypis celata*	✓	✓							Edge/Shrub/Successional
Osprey	*Pandion haliaetus*				✓					Wetland/Open Water
Ovenbird	*Seiurus aurocapilla*	✓	✓	✓						Forest
Palm warbler	*Setophaga palmarum*	✓	✓							Edge/Shrub/Successional
Philadelphia vireo	*Vireo philadelphicus*	✓	✓							Forest
Pied-billed grebe	*Podilymbus podiceps*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
Pileated woodpecker	*Dryocopus pileatus*	✓	✓	✓				✓		Forest
Pine grosbeak	*Pinicola enucleator*	✓	✓							Forest
Pine siskin	*Spinus pinus*	✓	✓							Forest
Purple finch	*Haemorhous purpureus*	✓	✓							Forest
Red crossbill	*Loxia curvirostra*	✓	✓							Forest

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Red-breasted nuthatch	*Sitta canadensis*	✓	✓							Forest
Red-eyed vireo	*Vireo olivaceus*	✓	✓	✓						Forest
Redhead	*Aythya americana*	✓		✓	✓			✓	✓	Wetland/Open Water
Red-headed woodpecker	*Melanerpes erythrocephalus*	✓	✓	✓		THR	THR	✓	✓	Forest
Red-necked grebe	*Podiceps grisegena*				✓			✓	✓	Wetland/Open Water
Red-tailed hawk	*Buteo jamaicensis*	✓	✓	✓	✓					Forest
Red-winged blackbird	*Agelaius phoeniceus*	✓	✓	✓						Wetland/Open Water
Ring-billed gull	*Larus delawarensis*	✓	✓	✓	✓					Wetland/Open Water
Ring-necked duck	*Aythya collaris*				✓			✓	✓	Wetland/Open Water
Rose-breasted grosbeak	*Pheucticus ludovicianus*	✓	✓							Forest
Rough-legged hawk	*Buteo lagopus*				✓					Grassland/Open Country
Ruby-crowned kinglet	*Regulus calendula*	✓	✓							Forest
Ruby-throated hummingbird	*Archilochus colubris*	✓	✓	✓						Forest
Ruddy duck	*Oxyura jamaicensis*				✓				✓	Wetland/Open Water
Ruffed grouse	*Bonasa umbellus*	✓	✓	✓						Forest
Rusty blackbird	*Euphagus carolinus*	✓	✓			SC		✓	✓	Wetland/Open Water
Sandhill crane	*Antigone canadensis*	✓	✓	✓	✓					Grassland/Open Country
Savannah sparrow	*Passerculus sandwichensis*	✓	✓	✓						Grassland/Open Country
Sedge wren	*Cistothorus platensis*	✓	✓	✓				✓	✓	Wetland/Open Water
Sharp-shinned hawk	*Accipiter striatus*	✓	✓		✓					Forest
Sharp-tailed grouse	*Tympanuchus phasianellus*	✓	✓	✓	✓			✓	✓	Grassland/Open Country
Short-eared owl	*Asio flammeus*	✓	✓			SC	THR	✓	✓	
Solitary sandpiper	*Tringa solitaria*	✓	✓		✓			✓		Wetland/Open Water
Song sparrow	*Melospiza melodia*	✓	✓	✓						Edge/Shrub/Successional
Sora	*Porzana carolina*	✓	✓	✓	✓			✓	✓	Wetland/Open Water

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Spotted sandpiper	*Actitis macularius*	✓	✓		✓				✓	Wetland/Open Water
Swainson's thrush	*Catharus ustulatus*	✓	✓	✓						Forest
Swamp sparrow	*Melospiza georgiana*	✓	✓	✓						Wetland/Open Water
Tennessee warbler	*Oreothlypis peregrina*	✓	✓							Edge/Shrub/Successional
Tree swallow	*Tachycineta bicolor*	✓	✓	✓						Edge/Shrub/Successional
Trumpeter swan	*Cygnus buccinator*				✓		END	✓	✓	Wetland/Open Water
Tundra swan	*Cygnus colombianus*				✓					Wetland/Open Water
Turkey vulture	*Cathartes aura*	✓	✓		✓					Forest
Veery	*Catharus fuscescens*	✓	✓	✓						Forest
Vesper sparrow	*Pooecetes gramineus*	✓	✓							Forest
Virginia rail	*Rallus limicola*	✓	✓	✓	✓			✓	✓	Wetland/Open Water
Warbling vireo	*Vireo gilvus*	✓	✓							Edge/Shrub/Successional
Western kingbird	*Tyrannus verticalis*	✓		✓						Grassland/Open Country
Western meadowlark	*Sturnella neglecta*	✓	✓	✓					✓	Grassland/Open Country
White-breasted nuthatch	*Sitta carolinensis*	✓	✓							Forest
White-throated sparrow	*Zonotrichia albicollis*	✓	✓	✓				✓		Forest
White-winged crossbill	*Loxia leucoptera*	✓	✓					✓		Forest
Willet	*Tringa semipalmata*				✓				✓	Wetland/Open Water
Willow flycatcher	*Empidonax traillii*	✓	✓						✓	Edge/Shrub/Successional
Wilson's snipe	*Gallinago delicata*	✓	✓	✓				✓	✓	Edge/Shrub/Successional
Wilson's warbler	*Cardellina pusilla*	✓	✓							Forest
Winter wren	*Troglodytes hiemalis*	✓	✓							Forest
Wood duck	*Aix sponsa*	✓	✓		✓					Forest
Yellow rail	*Coturnicops noveboracensis*	✓		✓		SC		✓	✓	Wetland/Open Water
Yellow warbler	*Setophaga petechia*	✓	✓	✓						Edge/Shrub/Successional

Common Name	Scientific Name	Observed in 2020	Songbird Surveys	Marsh/ Crep. Bird Surveys	Aerial Surveys	SARA[1]	ESEA[2]	BCR 6 Priority Species	BCR 11 Priority Species	Guild
Yellow-bellied flycatcher	*Empidonax flaviventris*	✓	✓							Forest
Yellow-bellied sapsucker	*Sphyrapicus varius*	✓	✓	✓				✓		Forest
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	✓		✓	✓					Wetland/Open Water
Yellow-rumped warbler	*Setophaga coronata*	✓	✓	✓						Forest
Yellow-throated vireo	*Vireo flavifrons*	✓	✓							Forest

1. SARA- *Species at Risk Act*
2. ESEA- *The Endangered Species and Ecosystems Act*

Table B-2: Species recorded during songbird surveys 2014–2017 and 2020

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Alder flycatcher[1]	2014	31	22	20.8	22	18	16.4	18.5
	2015	41	29	31.9	36	29	26.4	28.9
	2017	67	42	39.6	35	25	22.7	31.0
	2020	91	66	62.3	46	28	25.5	43.5
American bittern[1, 2]	2014	5	5	4.7	1	1	0.9	2.8
	2015	1	1	1.1	1	1	0.9	1.0
	2017	1	1	0.9	2	2	1.8	1.4
	2020	3	3	2.8	0	0	0	1.4
American coot	2014	0	0	0	0	0	0	0
	2015	1	1	1.1	0	0	0	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
American crow	2014	26	21	19.8	14	9	8.2	13.9
	2015	54	37	40.7	18	16	14.5	26.4
	2017	76	43	40.6	21	14	12.7	26.4
	2020	64	49	46.2	33	26	23.6	34.7
American goldfinch	2014	21	17	16.0	22	19	17.3	16.7
	2015	32	22	24.2	22	19	17.3	20.4
	2017	31	27	25.5	18	16	14.5	19.9
	2020	41	33	31.1	14	14	12.7	21.8
American kestrel[1]	2014	2	2	1.9	0	0	0	0.9
	2015	0	0	0	0	0	0	0
	2017	0	0	0	1	1	1	0.5
	2020	0	0	0	0	0	0	0
American redstart	2014	72	45	42.5	99	50	45.5	44.0
	2015	35	19	20.9	79	48	43.6	33.3
	2017	50	32	30.2	94	51	46.4	38.4
	2020	77	51	48.1	113	60	54.5	51.4
American robin	2014	39	34	32.1	30	26	23.6	27.8
	2015	–	–	–	–	–	–	–
	2017	74	56	52.8	29	28	25.5	38.9
	2020	88	72	67.9	44	40	36.4	51.9
American three-toed woodpecker[1]	2014	0	0	0	1	1	1	0.5
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	2	2	2	1.4
	2020	1	1	0.9	0	0	0	0.5

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
American white pelican[1, 2]	2014	0	0	0	0	0	0	0
	2015	1	1	1.1	0	0	0	0.5
	2017	7	1	0.9	1	1	0.9	0.9
	2020	0	0	0	2	2	1.8	0.9
American wigeon[1, 2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	0	0	0	0
American woodcock	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5
Bald eagle	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	0	0	0	0
Baltimore oriole[1]	2014	17	11	10.4	4	4	3.6	6.9
	2015	8	8	8.8	5	5	4.5	6.5
	2017	28	21	19.8	8	8	7.3	13.4
	2020	19	18	17.0	7	7	6.4	11.6
Bank swallow[1, 3]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5
Bay-breasted warbler[1]	2014	2	2	1.9	1	1	0.9	1.4
	2015	1	1	1.1	2	2	1.8	1.5
	2017	7	6	6	8	8	7.3	6.5
	2020	0	0	0	1	1	0.9	0.5
Belted kingfisher	2014	1	1	0.9	0	0	0	0.5
	2015	2	2	2.2	0	0	0	1.0
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Black tern[1, 2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5
Black-and-white warbler	2014	43	38	35.8	50	41	37.3	36.6
	2015	12	11	12.1	27	25	22.7	17.9
	2017	30	28	26.4	45	37	33.6	30.1
	2020	31	29	27.4	43	37	33.6	30.6
Black-backed woodpecker	2014	1	1	0.9	0	0	0	0.5
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	3	3	2.7	1.4
Black-billed cuckoo[1, 2]	2014	16	15	14.2	7	7	6.4	10.2
	2015	34	33	36.3	46	38	34.5	35.3
	2017	4	4	3.8	1	1	0.9	2.3
	2020	13	12	11.3	1	1	0.9	6.0
Black-billed magpie[1, 2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	11	5	4.7	0	0	0	2.3
	2020	10	7	6.6	4	4	3.6	5.1
Blackburnian warbler[1]	2014	13	12	11.3	19	14	12.7	12.0
	2015	8	8	8.8	14	13	11.8	10.4
	2017	11	11	10.4	27	22	20.0	15.3
	2020	10	9	8.5	38	29	26.4	17.6
Black-capped chickadee	2014	16	10	9.4	15	12	10.9	10.2
	2015	13	12	13.2	22	9	8.2	10.4
	2017	24	18	17.0	28	21	19.1	18.1
	2020	11	11	10.4	12	11	10.0	10.2
Blackpoll warbler[1]	2014	0	0	0	1	1	0.9	0.5
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Black-throated green warbler[1]	2014	3	2	1.9	0	0	0	0.9
	2015	4	2	2.2	5	5	4.5	3.5
	2017	3	3	2.8	9	7	6.4	4.6
	2020	0	0	0	4	4	3.6	1.9

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Blue Jay	2014	11	11	10.4	28	24	21.8	16.2
	2015	23	19	20.9	40	35	31.8	26.9
	2017	22	19	17.9	29	26	23.6	20.8
	2020	15	13	12.3	30	23	20.9	16.7
Blue-headed vireo	2014	5	5	4.7	10	8	7.3	6.0
	2015	6	5	5.5	24	19	17.3	11.9
	2017	10	8	7.5	17	15	13.6	10.6
	2020	2	2	1.9	19	16	14.5	8.3
Blue-winged teal[1, 2]	2014	0	0	0	0	0	0	0
	2015	4	2	2.2	0	0	0	1.0
	2017	1	1	0.9	0	0	0	0.5
	2020	1	1	0.9	0	0	0	0.5
Bobolink[1, 2, 3]	2014	10	5	4.7	0	0	0	2.3
	2015	3	3	3.3	0	0	0	1.5
	2017	0	0	0	0	0	0	0
	2020	3	3	2.8	0	0	0	1.4
Boreal chickadee[1]	2014	0	0	0	6	4	3.6	1.9
	2015	1	1	1.1	6	5	4.5	3.0
	2017	0	0	0	1	1	0.9	0.5
	2020	0	0	0	5	2	1.8	0.9
Boreal owl[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	1	1	0.9	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Brewer's blackbird	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	2	2	1.9	0	0	0	0.9
	2020	5	3	2.8	3	2	1.8	2.3
Broad-winged hawk[1]	2014	4	4	3.8	2	2	1.8	2.8
	2015	3	2	2.2	1	1	0.9	1.5
	2017	1	1	0.9	2	2	1.8	1.4
	2020	1	1	0.9	3	2	1.8	1.4
Brown creeper[1]	2014	9	6	5.7	5	5	4.5	5.1
	2015	0	0	0	2	2	1.8	1.0
	2017	2	2	1.9	4	3	2.7	2.3
	2020	0	0	0	1	1	0.9	0.5

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Brown thrasher[2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9	0.5
	2020	1	1	0.9	0	0	0	0.5
Brown-headed cowbird	2014	33	22	20.8	30	20	18.2	19.4
	2015	33	20	22.0	38	29	26.4	24.4
	2017	26	25	23.6	26	22	20.0	21.8
	2020	39	26	24.5	34	24	21.8	23.1
Bufflehead[1, 2]	2014	6	1	0.9	0	0	0	0.5
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	3	3	2.8	0	0	0	1.4
Canada goose[2]	2014	0	0	0	0	0	0	0
	2015	44	6	6.6	12	3	2.7	4.5
	2017	6	2	1.9	22	4	3.6	2.8
	2020	165	24	22.6	124	15	13.6	18.1
Canada jay	2014	2	2	1.9	10	6	5.5	3.7
	2015	4	4	4.4	10	8	7.3	6.0
	2017	5	5	4.7	15	11	10.0	7.4
	2020	6	3	2.8	11	8	7.3	5.1
Canada warbler[1, 3]	2014	1	1	0.9	3	3	2.7	1.9
	2015	5	5	5.5	5	4	3.6	4.5
	2017	1	1	0.9	5	3	2.7	1.9
	2020	3	2	1.9	11	9	8.2	5.1
Cape May warbler[1]	2014	0	0	0	0	0	0	0
	2015	1	1	11.1	4	4	3.6	2.5
	2017	12	12	11.3	3	3	2.7	6.9
	2020	0	0	0	2	2	1.8	0.9
Cedar waxwing	2014	29	26	24.5	31	27	24.5	24.5
	2015	21	12	13.2	34	26	23.6	18.9
	2017	12	9	8.5	16	12	10.9	9.7
	2020	23	18	17.0	25	22	20.0	18.5
Chestnut-sided warbler	2014	62	45	42.5	53	34	30.9	36.6
	2015	44	31	34.1	79	55	50.0	42.8
	2017	61	42	39.6	50	35	31.8	35.6
	2020	66	57	53.8	77	50	45.5	49.5

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Chimney swift[1, 2, 3]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9	0.5
	2020	0	0	0	0	0	0	0
Chipping sparrow	2014	9	7	6.6	7	7	6.4	6.5
	2015	18	14	15.4	20	17	15.5	15.4
	2017	11	9	8.5	13	10	9.1	8.8
	2020	10	10	9.4	18	16	14.5	12.0
Clay-colored sparrow[1, 2]	2014	88	47	44.3	75	42	38.2	41.2
	2015	79	43	47.3	52	36	32.7	39.3
	2017	74	55	51.9	52	35	31.8	41.7
	2020	99	56	52.8	33	26	23.6	38.0
Common goldeneye[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	9	1	0.9	0	0	0	0.5
	2020	2	2	1.9	0	0	0	0.9
Common grackle	2014	2	2	1.9	1	1	0.9	1.4
	2015	1	1	1.1	4	2	1.8	1.5
	2017	9	5	4.7	0	0	0	2.3
	2020	5	4	3.8	1	1	0.9	2.3
Common loon[1, 2]	2014	1	1	0.9	1	1	0.9	0.9
	2015	3	3	3.3	1	1	0.9	2.0
	2017	5	5	4.7	4	4	3.6	4.2
	2020	4	3	2.8	6	6	5.5	4.2
Common raven	2014	15	13	12.3	8	7	6.4	9.3
	2015	23	21	23.1	10	7	6.4	13.9
	2017	29	24	22.6	18	13	11.8	17.1
	2020	29	20	18.9	20	17	15.5	17.1
Common yellowthroat[1, 2]	2014	83	51	48.1	86	55	50.0	49.1
	2015	64	44	48.4	68	42	38.2	42.8
	2017	128	71	67.0	62	40	36.4	51.4
	2020	114	68	64.2	70	43	39.1	51.4
Connecticut warbler[1]	2014	22	19	17.9	25	20	18.2	18.1
	2015	6	6	6.6	28	21	19.1	13.4
	2017	13	10	9.4	17	16	14.5	12.0
	2020	9	9	8.5	28	25	22.7	15.7

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Dark-eyed junco	2014	7	6	5.7	29	26	23.6	14.8
	2015	3	2	2.2	5	4	3.6	3.0
	2017	5	5	4.7	5	5	4.5	4.6
	2020	0	0	0.0	5	5	4.5	2.3
Downy woodpecker	2014	7	7	6.6	8	7	6.4	6.5
	2015	1	1	1.1	0	0	0	0.5
	2017	5	5	4.7	2	2	1.8	3.2
	2020	0	0	0	1	1	0.9	0.5
Eastern bluebird	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	4	4	3.8	0	0	0	1.9
	2020	2	2	1.9	1	1	0.9	1.4
Eastern kingbird	2014	4	4	3.8	3	2	1.8	2.8
	2015	5	4	4.4	0	0	0	2.0
	2017	9	7	6.6	3	2	1.8	4.2
	2020	7	5	4.7	5	3	2.7	3.7
Eastern towhee	2014	3	3	2.8	12	9	8.2	5.6
	2015	7	6	6.6	11	10	9.1	8.0
	2017	7	7	6.6	4	4	3.6	5.1
	2020	4	4	3.8	5	2	1.8	2.8
Eastern wood-pewee[3]	2014	7	6	5.7	6	6	5.5	5.6
	2015	0	0	0	0	0	0	0
	2017	3	2	1.9	4	4	3.6	2.8
	2020	1	1	0.9	7	7	6.4	3.7
European starling	2014	0	0	0	0	0	0	0
	2015	0	0	0	1	1	0.9	0.5
	2017	0	0	0	0	0	0	0
	2020	4	1	0.9	0	0	0	0.5
Evening grosbeak	2014	1	1	0.9	6	1	0.9	0.9
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Franklin's gull[2]	2014	0	0	0	2	2	1.8	0.9
	2015	1	1	1.1	0	0	0	0.5
	2017	17	7	6.6	1	1	0.9	3.7
	2020	0	0	0	0	0	0	0

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Golden-crowned kinglet	2014	2	2	1.9	13	9	8.2	5.1
	2015	2	2	2.2	11	10	9.1	6.0
	2017	0	0	0	3	3	2.7	1.4
	2020	0	0	0	1	1	0.9	0.5
Golden-winged warbler[1, 2, 3]	2014	7	7	6.6	9	6	5.5	6.0
	2015	2	2	2.2	6	6	5.5	4.0
	2017	11	8	7.5	6	4	3.6	5.6
	2020	10	8	7.5	5	5	4.5	6.0
Grasshopper sparrow[2]	2014	4	2	1.9	0	0	0	0.9
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Gray catbird	2014	11	11	10.4	8	6	5.5	7.9
	2015	22	19	20.9	9	8	7.3	13.4
	2017	25	18	17.0	12	8	7.3	12.0
	2020	34	28	26.4	9	9	8.2	17.1
Great blue heron[2]	2014	1	1	0.9	0	0	0	0.5
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Great crested flycatcher	2014	17	15	14.2	15	14	12.7	13.4
	2015	16	15	16.5	11	11	10.0	12.9
	2017	20	15	14.2	23	22	20.0	17.1
	2020	20	16	15.1	39	32	29.1	22.2
Great gray owl[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	1	1	0.9	0.5
	2017	0	0	0	1	1	0.9	0.5
	2020	0	0	0	0	0	0	0
Greater yellowlegs[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	0	0	0	0
Green-winged teal[1, 2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	2	1	0.9	0.5
	2017	2	2	1.9	0	0	0	0.9
	2020	1	1	0.9	0	0	0	0.5

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Hairy woodpecker	2014	7	6	5.7	8	5	4.5	5.1
	2015	7	6	6.6	5	5	4.5	5.5
	2017	6	6	5.7	4	4	3.6	4.6
	2020	9	9	8.5	2	2	1.8	5.1
Hermit thrush	2014	28	25	23.6	42	30	27.3	25.5
	2015	22	18	19.8	29	24	21.8	20.9
	2017	28	23	21.7	41	31	28.2	25.0
	2020	28	17	16.0	43	33	30.0	23.1
Herring gull[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	2	2	1.9	6	4	3.6	2.8
	2020	0	0	0	0	0	0	0
Hooded merganser	2014	0	0	0	0	0	0	0
	2015	3	1	1.1	0	0	0	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
House wren	2014	12	10	9.4	7	5	4.5	6.9
	2015	12	9	9.9	8	7	6.4	8.0
	2017	20	15	14.2	4	3	2.7	8.3
	2020	30	24	22.6	11	7	6.4	14.4
Indigo bunting	2014	0	0	0	0	0	0	0
	2015	1	1	1.1	1	1	0.9	1.0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Killdeer[1, 2]	2014	3	2	1.9	1	1	0.9	1.4
	2015	20	15	16.5	0	0	0	7.5
	2017	13	10	9.4	0	0	0	4.6
	2020	7	5	4.7	0	0	0	2.3
Least flycatcher[1, 2]	2014	120	60	56.6	68	38	34.5	45.4
	2015	86	45	49.5	38	24	21.8	34.3
	2017	106	57	53.8	28	19	17.3	35.2
	2020	105	56	52.8	42	29	26.4	39.4

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
LeConte's sparrow[1, 2]	2014	17	13	12.3	2	1	0.9	6.5
	2015	6	5	5.5	0	0	0	2.5
	2017	18	14	13.2	2	2	1.8	7.4
	2020	14	11	10.4	0	0	0	5.1
Lesser yellowlegs[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	2	1	0.9	0	0	0	0.5
	2020	0	0	0	0	0	0	0.0
Lincoln's sparrow	2014	1	1	0.9	3	3	2.7	1.9
	2015	6	6	6.6	3	3	2.7	4.5
	2017	8	7	6.6	3	2	1.8	4.2
	2020	8	8	7.5	0	0	0	3.7
Magnolia warbler	2014	11	7	6.6	44	31	28.2	17.6
	2015	2	2	2.2	13	11	10.0	6.5
	2017	18	15	14.2	28	26	23.6	19.0
	2020	17	17	16.0	35	31	28.2	22.2
Mallard[1, 2]	2014	5	3	2.8	2	2	1.8	2.3
	2015	3	3	3.3	0	0	0	1.5
	2017	23	4	3.8	1	1	0.9	2.3
	2020	3	2	1.9	3	3	2.7	2.3
Marbled godwit[1, 2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5
Marsh wren	2014	1	1	0.9	6	4	3.6	2.3
	2015	4	3	3.3	0	0	0	1.5
	2017	5	3	2.8	0	0	0	1.4
	2020	7	6	5.7	0	0	0	2.8
Mourning dove	2014	1	1	0.9	1	1	0.9	0.9
	2015	4	4	4.4	2	2	1.8	3.0
	2017	21	18	17.0	5	4	3.6	10.2
	2020	36	32	30.2	36	30	27.3	28.7
Mourning warbler[1]	2014	19	17	16.0	20	17	15.5	15.7
	2015	27	18	19.8	27	20	18.2	18.9
	2017	32	28	26.4	23	16	14.5	20.4
	2020	45	32	30.2	36	29	26.4	28.2

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Nashville warbler	2014	47	30	28.3	95	60	54.5	41.7
	2015	20	18	19.8	65	44	40.0	30.8
	2017	33	25	23.6	64	43	39.1	31.5
	2020	63	44	41.5	89	65	59.1	50.5
Nelson's sparrow[1, 2]	2014	2	2	1.9	0	0	0	0.9
	2015	1	1	1.1	0	0	0	0.5
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5
Northern flicker[1, 2]	2014	8	8	7.5	9	7	6.4	6.9
	2015	7	7	7.7	8	8	7.3	7.5
	2017	7	7	6.6	3	3	2.7	4.6
	2020	12	11	10.4	5	5	4.5	7.4
Northern goshawk[1]	2014	1	1	0.9	0	0	0	0.5
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	0	0	0	0
Northern harrier[1, 2]	2014	1	1	0.9	0	0	0	0.5
	2015	0	0	0	2	2	1.8	1.0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	0	0	0	0
Northern waterthrush	2014	7	6	5.7	0	0	0	2.8
	2015	7	7	7.7	2	2	1.8	4.5
	2017	7	6	5.7	2	2	1.8	3.7
	2020	8	5	4.7	7	7	6.4	5.6
Olive-sided flycatcher[1, 2, 3]	2014	0	0	0	1	1	0.9	0.5
	2015	2	2	2.2	2	2	1.8	2.0
	2017	3	3	2.8	3	2	1.8	2.3
	2020	4	4	3.8	0	0	0	1.9
Orange-crowned warbler	2014	0	0	0	4	3	2.7	1.4
	2015	2	2	2.2	1	1	0.9	1.5
	2017	0	0	0	0	0	0	0
	2020	3	2	1.9	0	0	0	0.9
Ovenbird	2014	84	47	44.3	127	67	60.9	52.8
	2015	70	42	46.2	110	70	63.6	55.7
	2017	86	57	53.8	112	68	61.8	57.9
	2020	81	56	52.8	125	73	66.4	59.7

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Palm warbler	2014	0	0	0	3	3	2.7	1.4
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	0	0	0	0.5
	2020	0	0	0	3	2	1.8	0.9
Philadelphia vireo	2014	4	4	3.8	1	1	0.9	2.3
	2015	0	0	0	0	0	0	0
	2017	1	1	0.9	5	4	3.6	2.3
	2020	6	6	5.7	6	6	5.5	5.6
Pied-billed grebe[1, 2]	2014	0	0	0	0	0	0	0
	2015	2	2	2.2	2	2	1.8	2.0
	2017	2	2	1.9	0	0	0	0.9
	2020	1	1	0.9	0	0	0	0.5
Pileated woodpecker[1]	2014	3	3	2.8	2	2	1.8	2.3
	2015	5	4	4.4	5	5	4.5	4.5
	2017	6	5	4.7	1	1	0.9	2.8
	2020	31	29	27.4	14	14	12.7	19.9
Pine grosbeak	2014	1	1	0.9	1	1	0.9	0.9
	2015	1	1	1.1	0	0	0	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Pine siskin	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	2	2	1.8	0.9
	2020	2	2	1.9	49	12	10.9	6.5
Purple finch	2014	1	1	0.9	1	1	0.9	0.9
	2015	0	0	0	1	1	0.9	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	1	1	0.9	0.5
Red crossbill	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	5	1	0.9	0.5
Red-breasted nuthatch	2014	9	8	7.5	4	4	3.6	5.6
	2015	12	11	12.1	19	14	12.7	12.4
	2017	3	2	1.9	8	8	7.3	4.6
	2020	18	14	13.2	28	26	23.6	18.5

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Red-eyed vireo	2014	161	89	84.0	142	84	76.4	80.1
	2015	138	71	78.0	159	86	78.2	78.1
	2017	207	86	81.1	177	90	81.8	81.5
	2020	198	90	84.9	227	96	87.3	86.1
Red-headed woodpecker[1, 2, 3]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9	0.5
	2020	0	0	0	0	0	0	0
Red-tailed hawk	2014	1	1	0.9	0	0	0	0.5
	2015	3	3	3.3	0	0	0	1.5
	2017	7	6	5.7	0	0	0	2.8
	2020	6	6	5.7	1	1	0.9	3.2
Red-winged blackbird	2014	44	24	22.6	4	4	3.6	13.0
	2015	57	25	27.5	12	8	7.3	16.4
	2017	103	29	27.4	7	5	4.5	15.7
	2020	51	21	19.8	13	9	8.2	13.9
Ring-billed gull	2014	3	3	2.8	1	1	0.9	1.9
	2015	2	1	1.1	0	0	0	0.5
	2017	0	0	0	0	0	0	0
	2020	34	12	11.3	33	13	11.8	11.6
Rose-breasted grosbeak	2014	35	31	29.2	26	22	20.0	24.5
	2015	36	31	34.1	36	33	30.0	31.8
	2017	28	24	22.6	13	10	9.1	15.7
	2020	43	37	34.9	33	33	30.0	32.4
Ruby-crowned kinglet	2014	4	3	2.8	25	20	18.2	10.6
	2015	11	10	11.0	41	29	26.4	19.4
	2017	10	10	9.4	22	17	15.5	12.5
	2020	7	5	4.7	27	23	20.9	13.0
Ruby-throated hummingbird	2014	0	0	0	1	1	0.9	0.5
	2015	2	2	2.2	0	0	0	1.0
	2017	3	3	2.8	0	0	0	1.4
	2020	2	2	1.9	6	6	5.5	3.7
Ruffed grouse	2014	0	0	0	15	8	7.3	3.7
	2015	2	2	2.2	5	2	1.8	2.0
	2017	20	20	18.9	14	14	12.7	15.7
	2020	33	32	30.2	28	25	22.7	26.4

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Rusty blackbird[1, 2, 3]	2014	0	0	0	0	0	0	0
	2015	2	2	2.2	0	0	0	1.0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Sandhill crane	2014	0	0	0.0	4	4	3.6	1.9
	2015	36	23	25.3	17	12	10.9	17.4
	2017	50	30	28.3	21	17	15.5	21.8
	2020	21	19	17.9	15	14	12.7	15.3
Savannah sparrow	2014	13	9	8.5	0	0	0	4.2
	2015	18	10	11.0	0	0	0	5.0
	2017	12	8	7.5	0	0	0	3.7
	2020	17	10	9.4	0	0	0	4.6
Sedge wren[1, 2]	2014	16	12	11.3	5	4	3.6	7.4
	2015	22	16	17.6	6	4	3.6	10.0
	2017	36	20	18.9	11	5	4.5	11.6
	2020	19	13	12.3	3	2	1.8	6.9
Sharp-shinned hawk	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	1	1	0.9	0.5
Sharp-tailed grouse[1, 2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	1	1	0.9	0	0	0	0.5
Short-eared owl[2, 3]	2014	0	0	0	0	0	0	0
	2015	1	1	1.1	0	0	0	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Solitary sandpiper[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	1	1	0.9	0.5
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Song sparrow	2014	42	29	27.4	6	5	4.5	15.7
	2015	71	47	51.6	15	10	9.1	28.4
	2017	140	76	71.7	22	20	18.2	44.4
	2020	104	69	65.1	23	18	16.4	40.3

Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Sora[1, 2]	2014	19	13	12.3	1	1	0.9	6.5
	2015	21	13	14.3	4	4	3.6	8.5
	2017	16	14	13.2	2	2	1.8	7.4
	2020	5	5	4.7	0	0	0	2.3
Spotted sandpiper[2]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9	0.5
	2020	0	0	0	0	0	0	0
Swainson's thrush	2014	1	1	0.9	10	7	6.4	3.7
	2015	9	7	7.7	19	13	11.8	10.0
	2017	16	12	11.3	26	21	19.1	15.3
	2020	1	1	0.9	21	19	17.3	9.3
Swamp sparrow	2014	36	26	24.5	24	16	14.5	19.4
	2015	30	19	20.9	25	15	13.6	16.9
	2017	33	16	15.1	14	10	9.1	12.0
	2020	38	21	19.8	11	9	8.2	13.9
Tennessee warbler	2014	46	35	33.0	70	47	42.7	38.0
	2015	35	24	26.4	71	51	46.4	37.3
	2017	10	9	8.5	17	15	13.6	11.1
	2020	6	6	5.7	10	10	9.1	7.4
Tree swallow	2014	2	2	1.9	0	0	0	0.9
	2015	2	1	1.1	0	0	0	0.5
	2017	1	1	0.9	2	1	0.9	0.9
	2020	8	6	5.7	2	1	0.9	3.2
Turkey vulture	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Veery	2014	54	37	34.9	61	38	34.5	34.7
	2015	47	32	35.2	60	44	40.0	37.8
	2017	43	31	29.2	52	38	34.5	31.9
	2020	87	54	50.9	84	54	49.1	50.0
Vesper sparrow	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	9	9	8.5	0	0	0	4.2

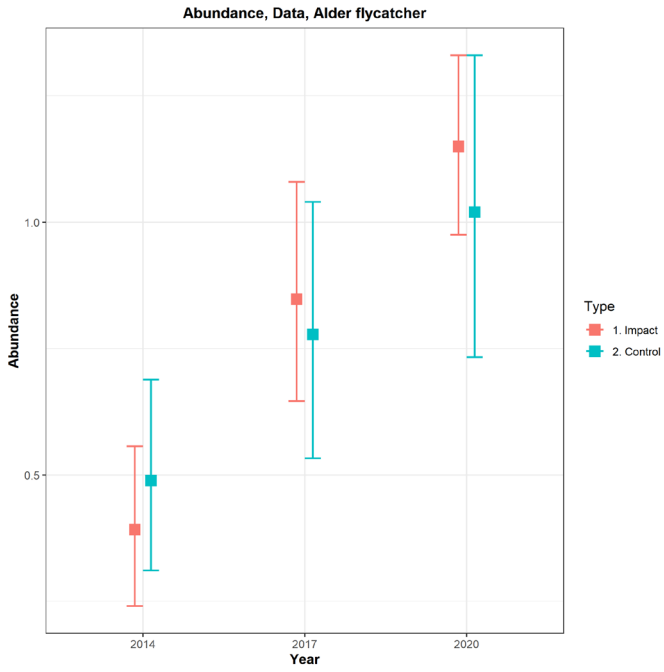
Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Virginia rail[1, 2]	2014	2	2	1.9	0	0	0	0.9
	2015	2	2	2.2	0	0	0	1.0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Warbling vireo	2014	18	14	13.2	6	4	3.6	8.3
	2015	23	15	16.5	2	2	1.8	8.5
	2017	33	20	18.9	4	4	3.6	11.1
	2020	27	23	21.7	4	3	2.7	12.0
Western meadowlark[2]	2014	2	2	1.9	0	0	0	0.9
	2015	0	0	0	0	0	0	0
	2017	9	6	5.7	0	0	0	2.8
	2020	23	20	18.9	1	1	0.9	9.7
White-breasted nuthatch	2014	1	1	0.9	1	1	0.9	0.9
	2015	0	0	0	1	1	0.9	0.5
	2017	5	3	2.8	1	1	0.9	1.9
	2020	0	0	0	2	2	1.8	0.9
White-throated sparrow[1]	2014	116	64	60.4	210	96	87.3	74.1
	2015	111	58	63.7	197	88	80.0	72.6
	2017	145	72	67.9	150	82	74.5	71.3
	2020	130	68	64.2	169	89	80.9	72.7
White-winged crossbill[1]	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	1	1	0.9	0.5
	2020	0	0	0	23	8	7.3	3.7
Willow flycatcher	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	1	1	0.9	0.5
Wilson's snipe[1, 2]	2014	56	51	48.1	44	36	32.7	40.3
	2015	63	45	49.5	16	16	14.5	30.3
	2017	89	66	62.3	30	27	24.5	43.1
	2020	52	38	35.8	24	23	20.9	28.2
Wilson's warbler	2014	0	0	0	3	2	1.8	0.9
	2015	0	0	0	0	0	0	0
	2017	4	3	2.8	3	3	2.7	2.8
	2020	0	0	0	0	0	0	0

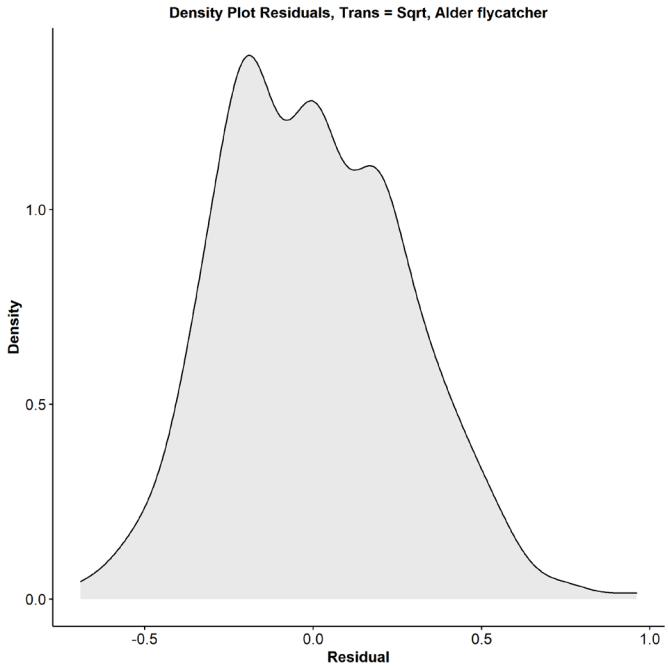
Species	Year	Impact			Control			Percent of All Stations Observed
		Max. Birds Observed	No. of Stations Observed	Percent Occurrence	Max. Birds Observed	No. of Stations Observed	Percent Occurrence	
Winter wren	2014	11	10	9.4	32	26	23.6	16.7
	2015	10	10	11.0	18	16	14.5	12.9
	2017	13	11	10.4	18	14	12.7	11.6
	2020	7	6	5.7	20	18	16.4	11.1
Wood duck	2014	0	0	0	0	0	0	0
	2015	9	2	2.2	0	0	0	1.0
	2017	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0
Yellow warbler	2014	74	42	39.6	18	13	11.8	25.5
	2015	65	37	40.7	17	13	11.8	24.9
	2017	63	40	37.7	34	24	21.8	29.6
	2020	105	62	58.5	48	44	40.0	49.1
Yellow-bellied flycatcher	2014	6	5	4.7	5	5	4.5	4.6
	2015	1	1	1.1	6	6	5.5	3.5
	2017	7	7	6.6	15	12	10.9	8.8
	2020	0	0	0.0	11	11	10.0	5.1
Yellow-bellied sapsucker[1]	2014	20	16	15.1	26	23	20.9	18.1
	2015	30	26	28.6	28	21	19.1	23.4
	2017	46	24	22.6	14	13	11.8	17.1
	2020	33	26	24.5	31	26	23.6	24.1
Yellow-rumped warbler	2014	5	5	4.7	37	26	23.6	14.4
	2015	2	1	1.1	34	23	20.9	11.9
	2017	12	11	10.4	23	20	18.2	14.4
	2020	3	3	2.8	22	18	16.4	9.7
Yellow-throated vireo	2014	0	0	0	0	0	0	0
	2015	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0
	2020	4	3	2.8	1	1	0.9	1.9

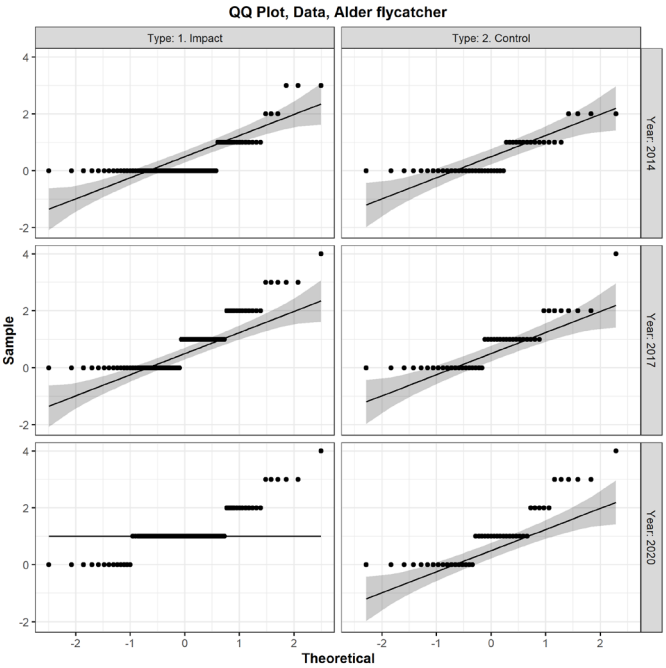
Species of conservation concern: 1. BCR 6 priority species 2. BCR 11 priority species 3. SARA- and/or ESEA-listed species.

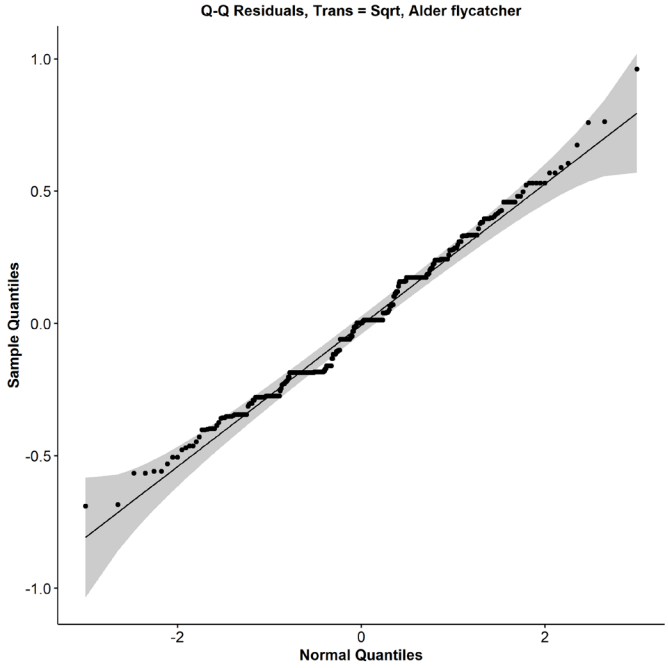
Appendix C
Statistical Tests of Normality

Species of Conservation Concern – Alder Flycatcher Abundance

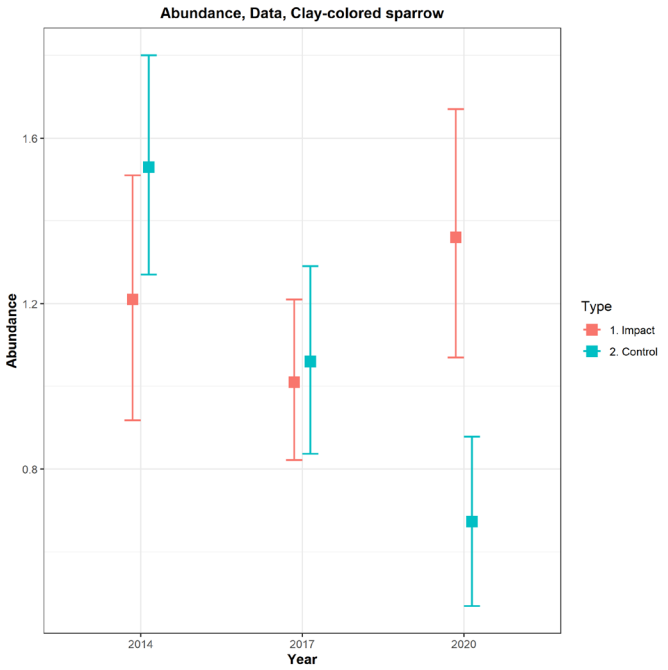


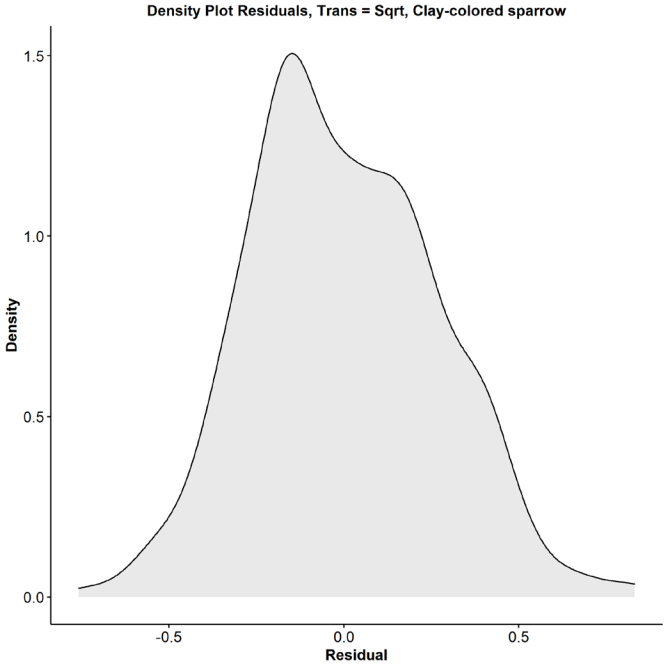


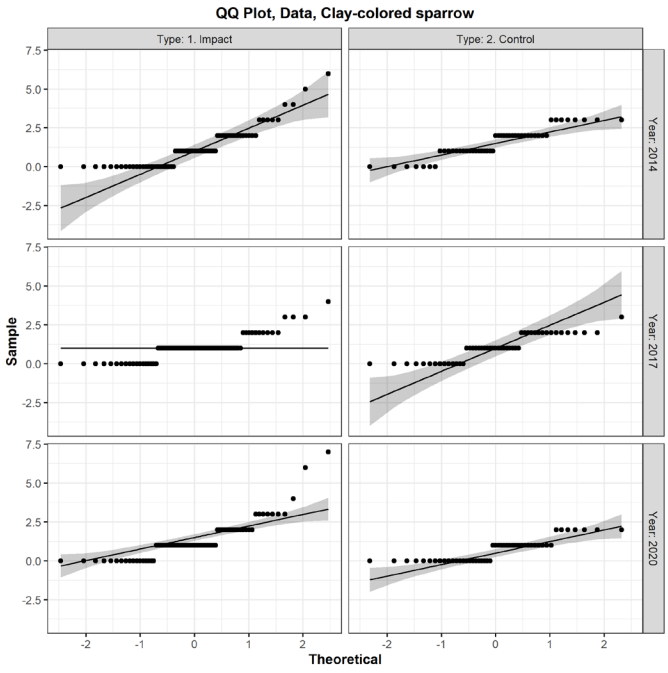


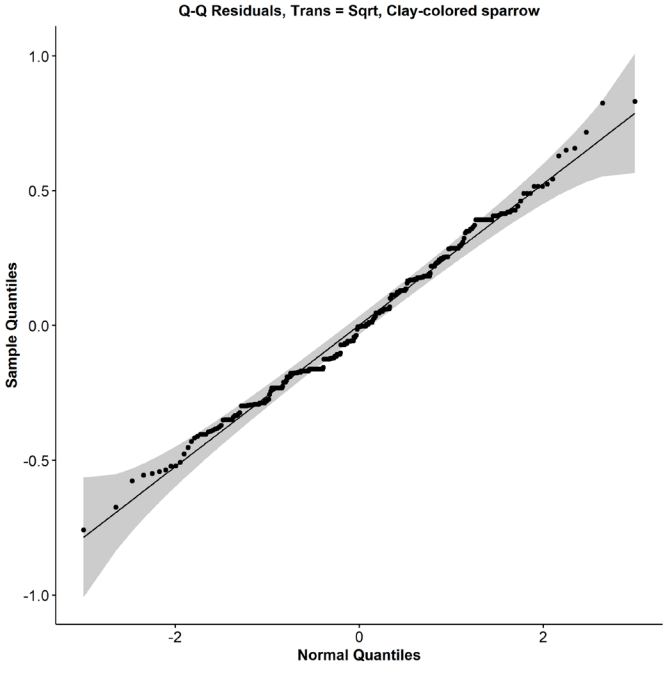


Species of Conservation Concern – Clay-colored Sparrow Abundance

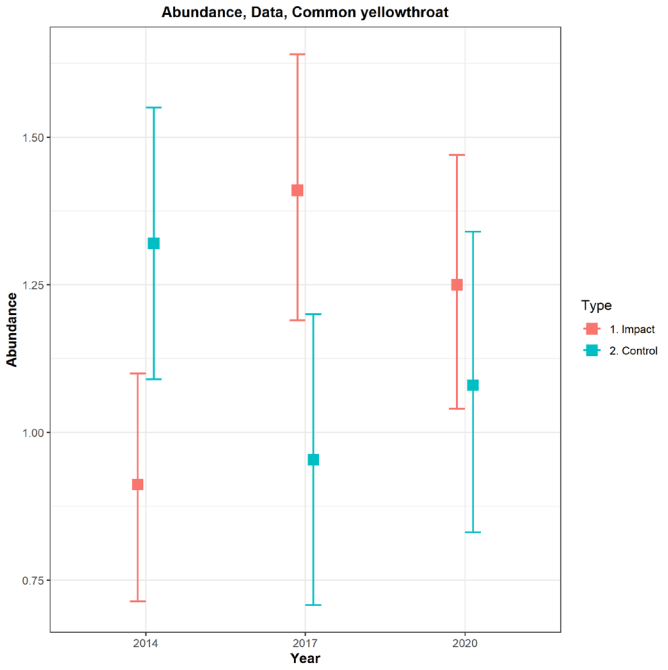


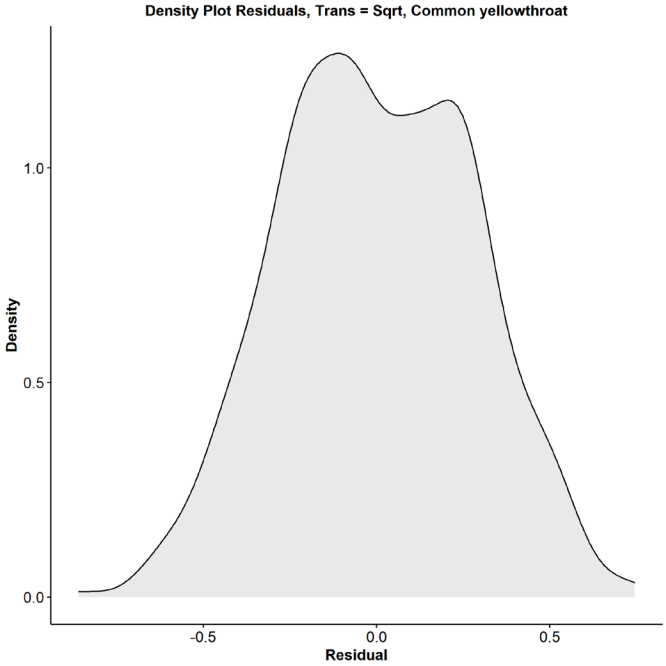


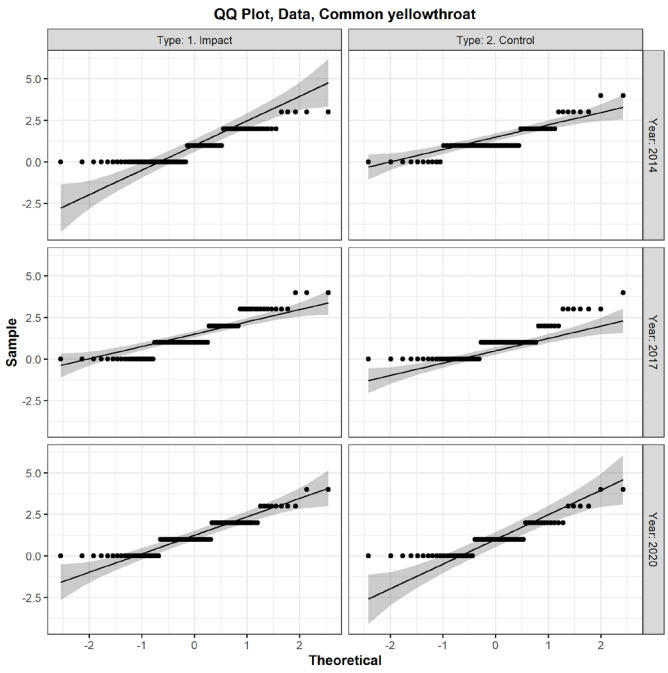


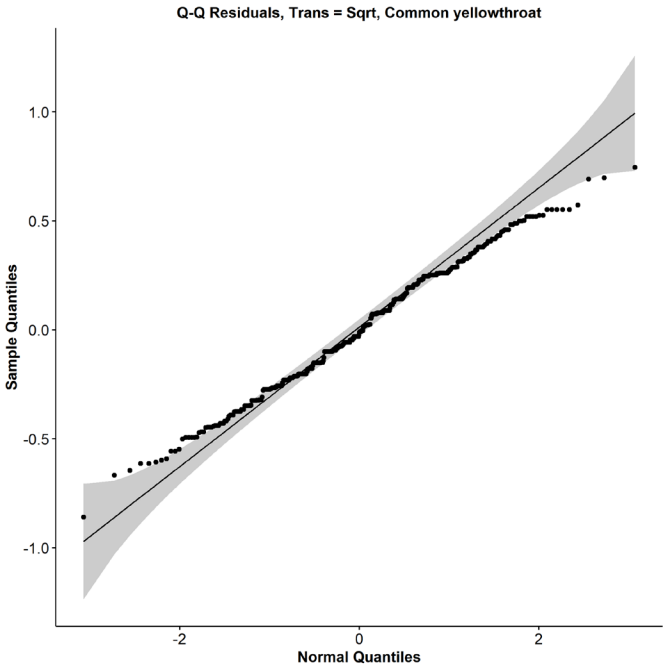


Species of Conservation Concern – Common Yellowthroat Abundance

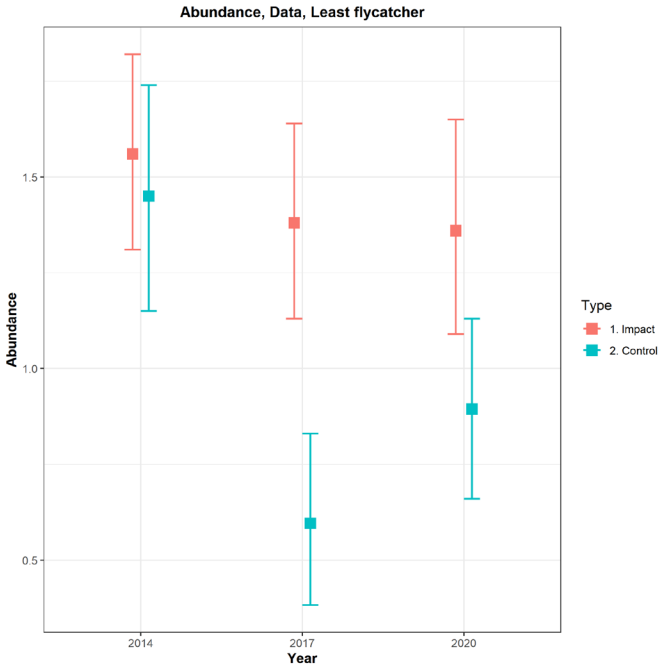


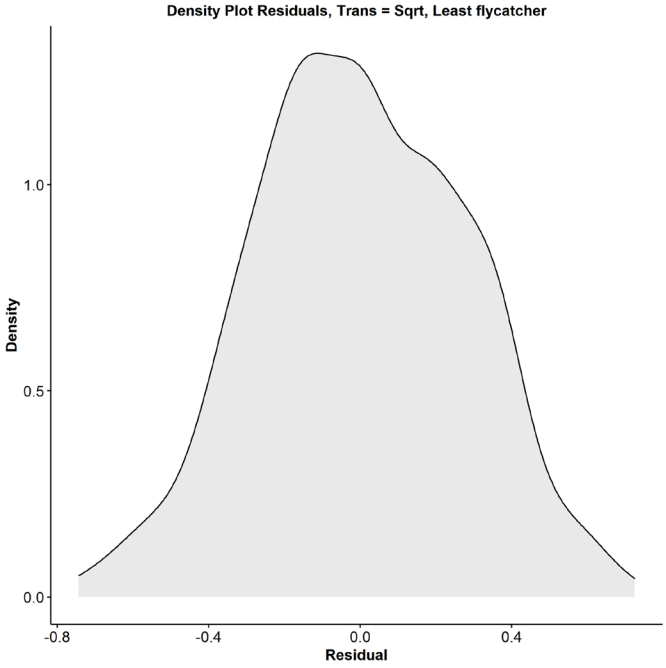


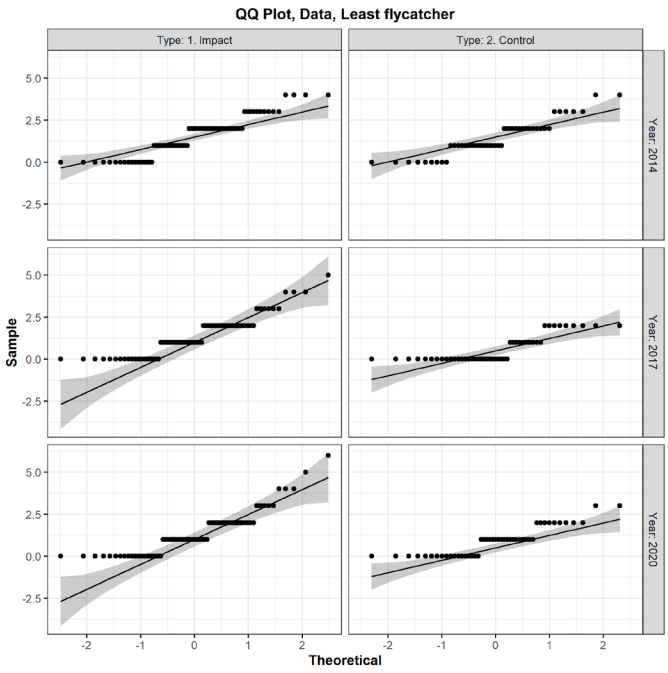


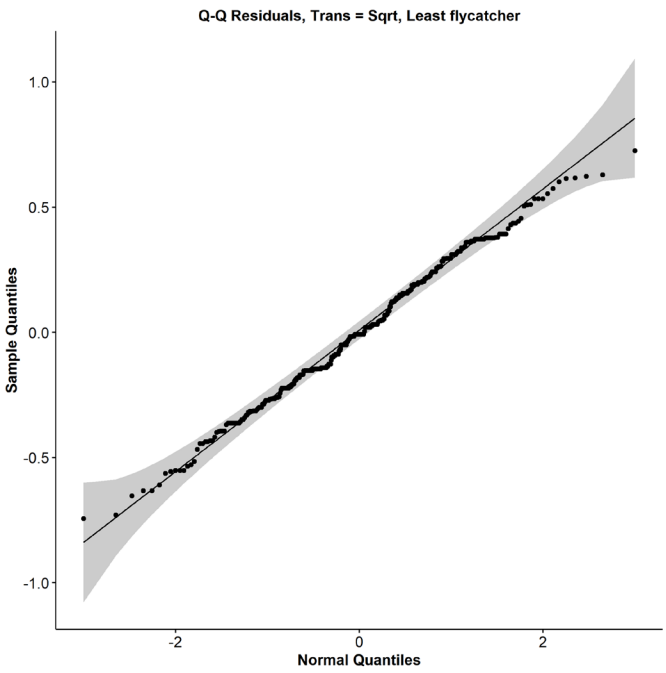


Species of Conservation Concern – Least Flycatcher Abundance

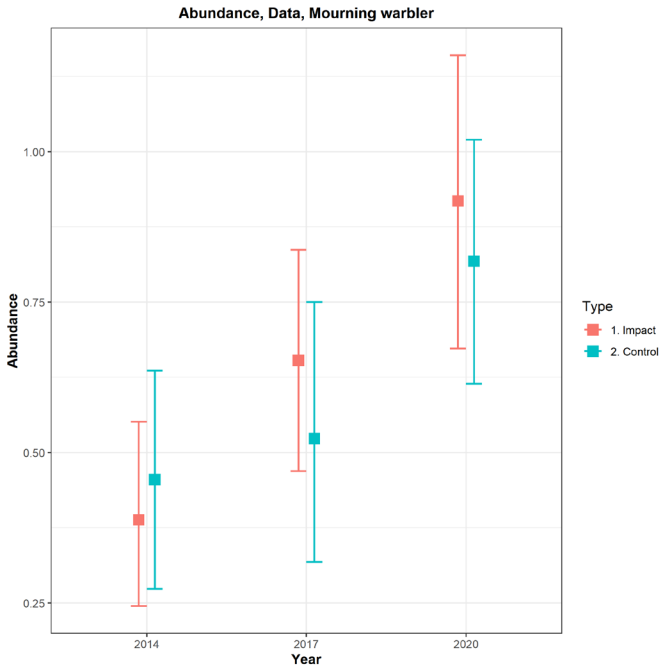


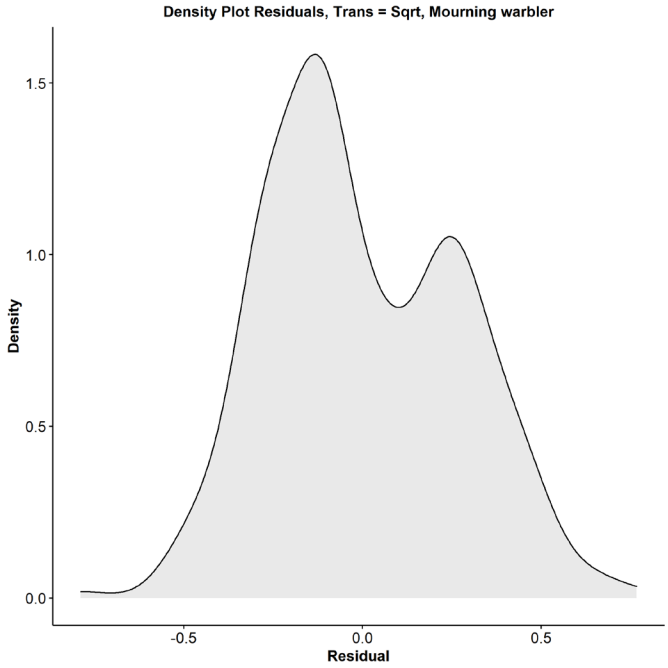


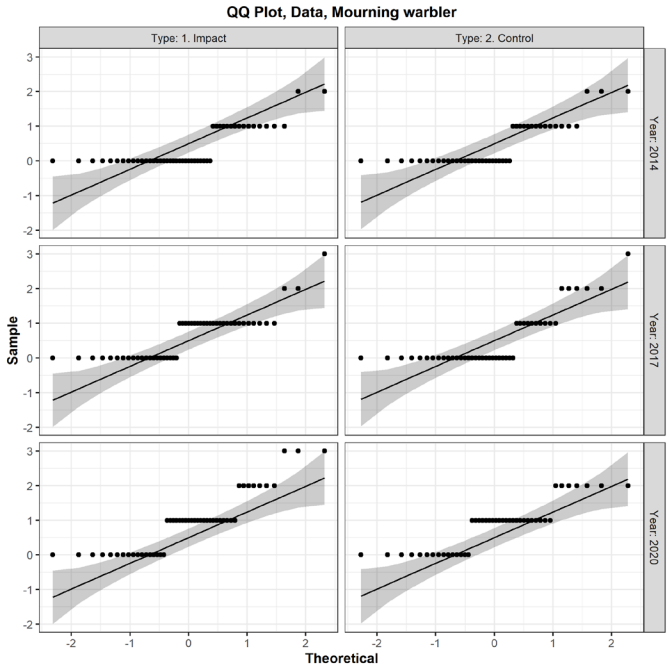


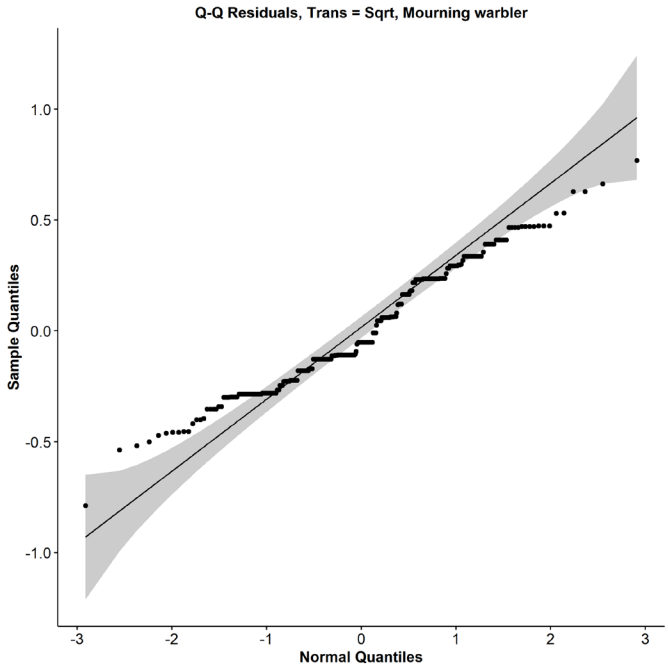


Species of Conservation Concern – Mourning Warbler Abundance

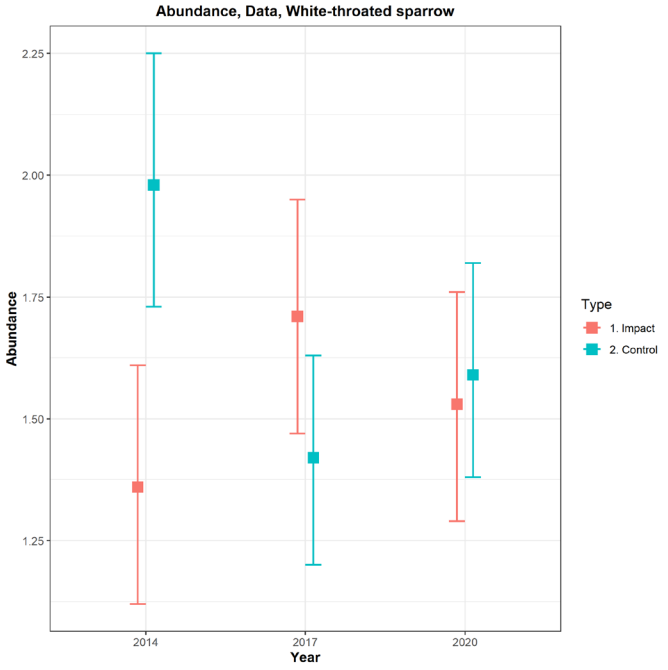


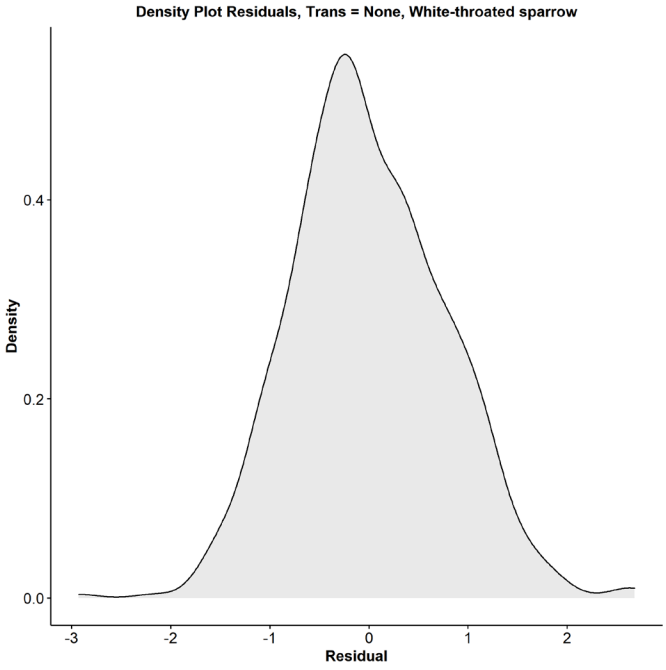


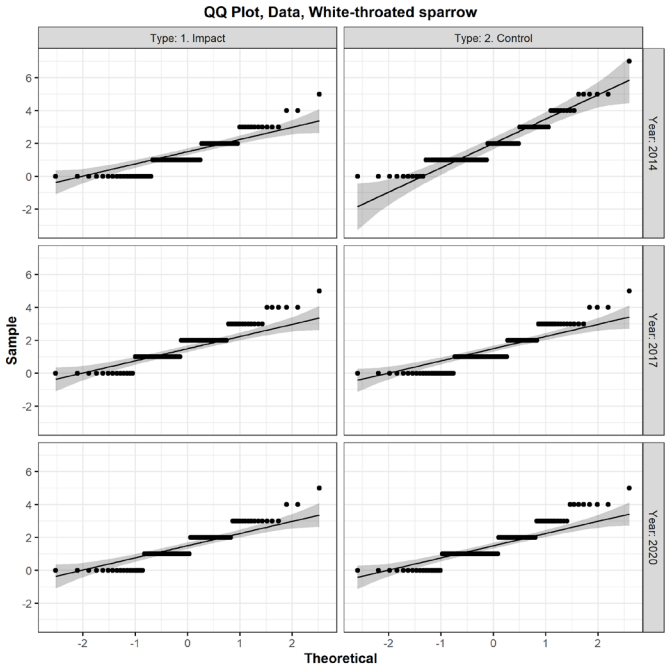


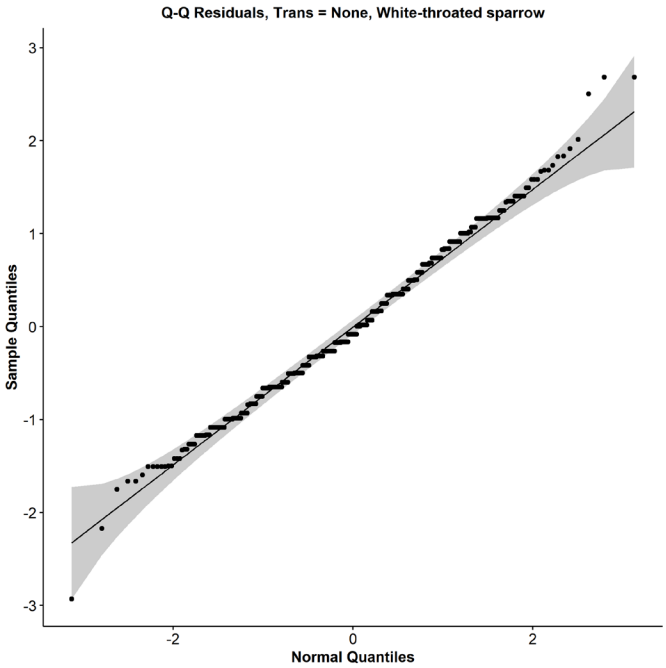


Species of Conservation Concern – White-throated Sparrow Abundance

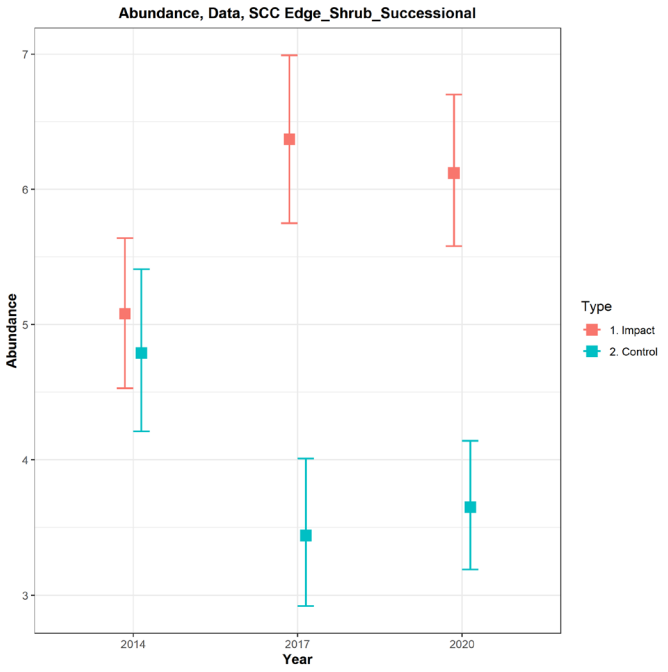


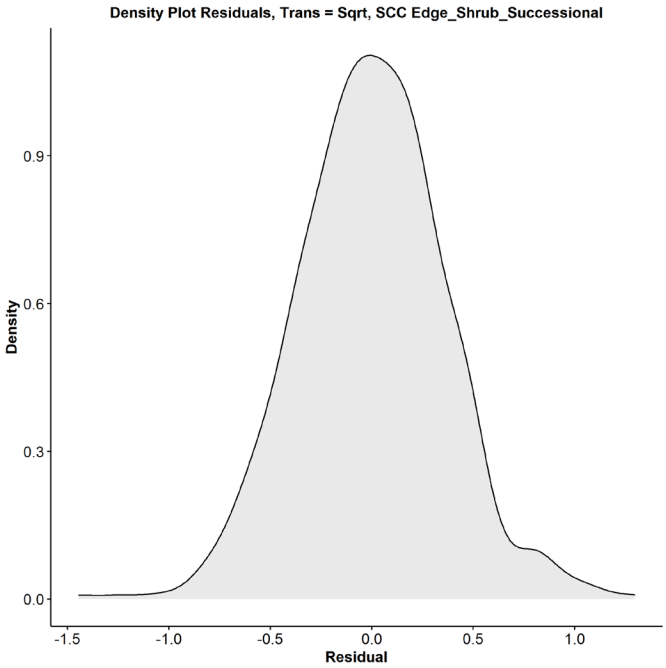


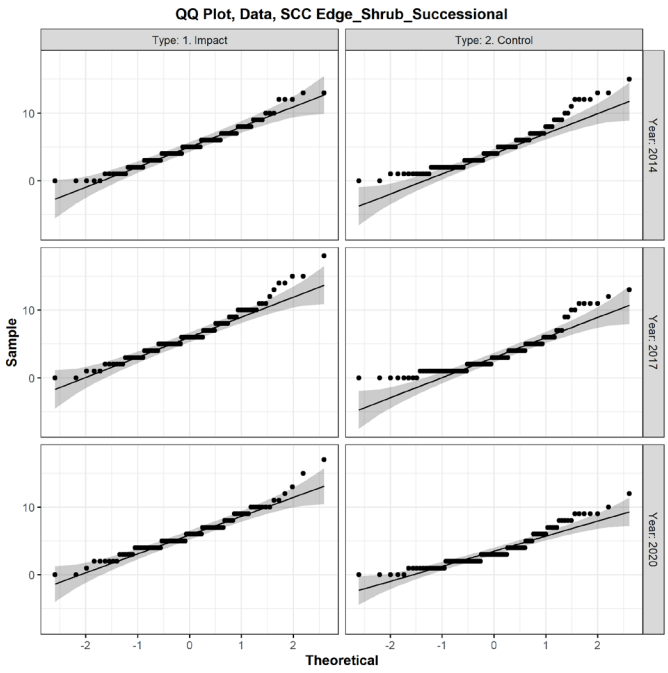


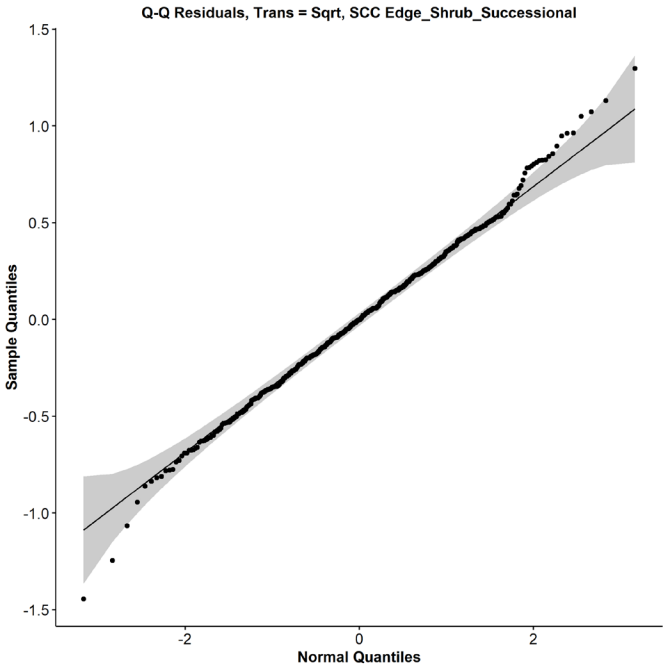


Species of Conservation Concern – Edge/Shrub/Successional Guild Abundance

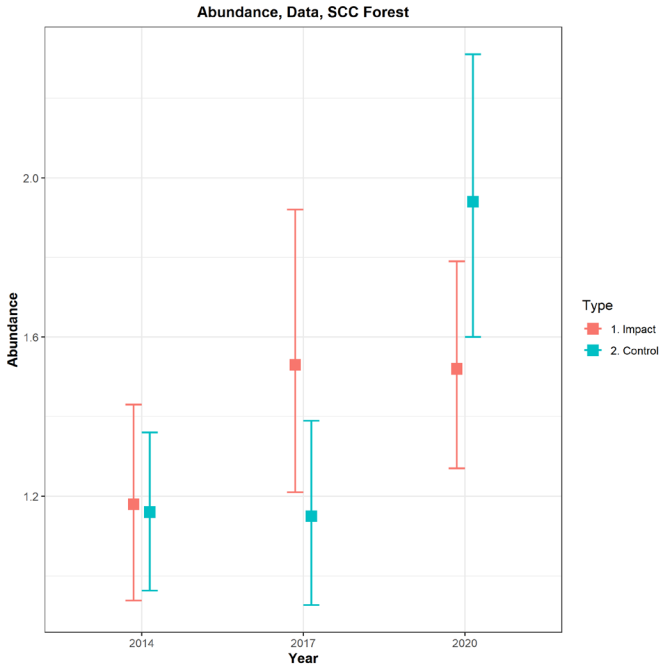


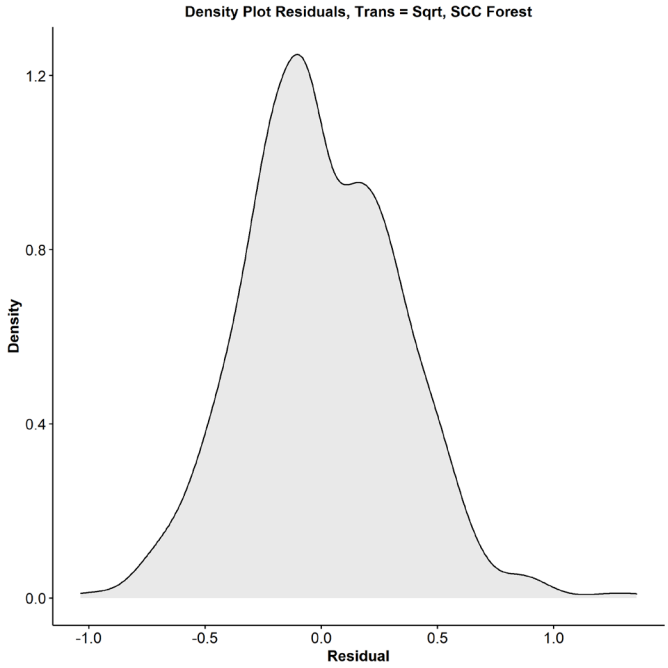


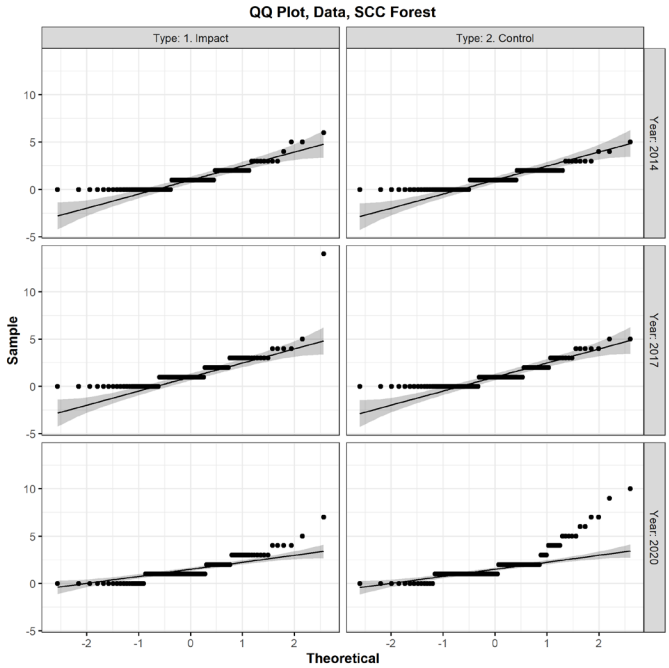


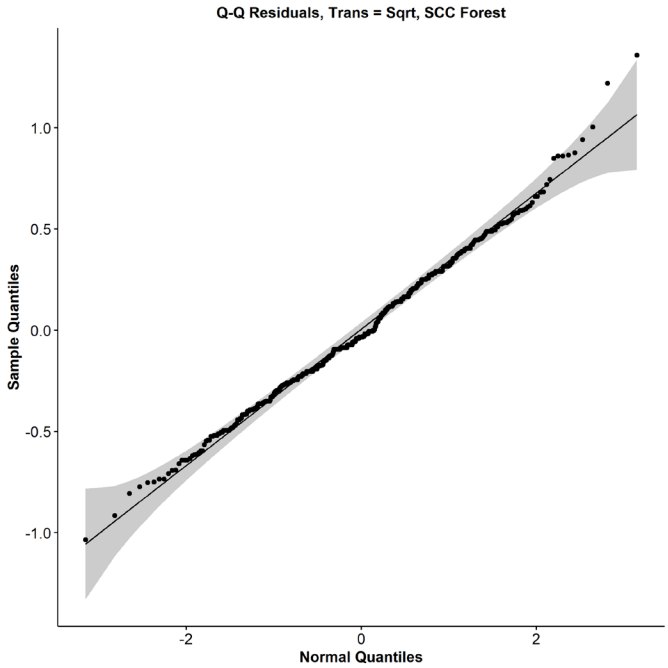


Species of Conservation Concern – Forest Guild Abundance

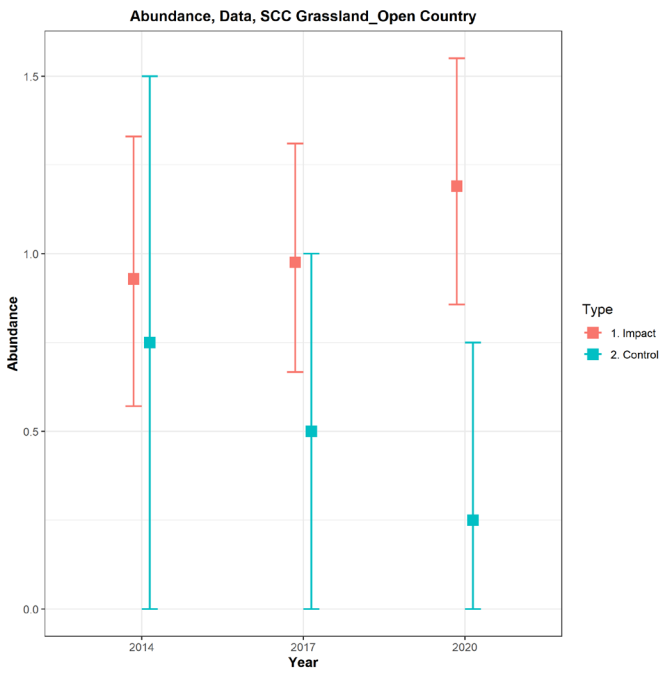


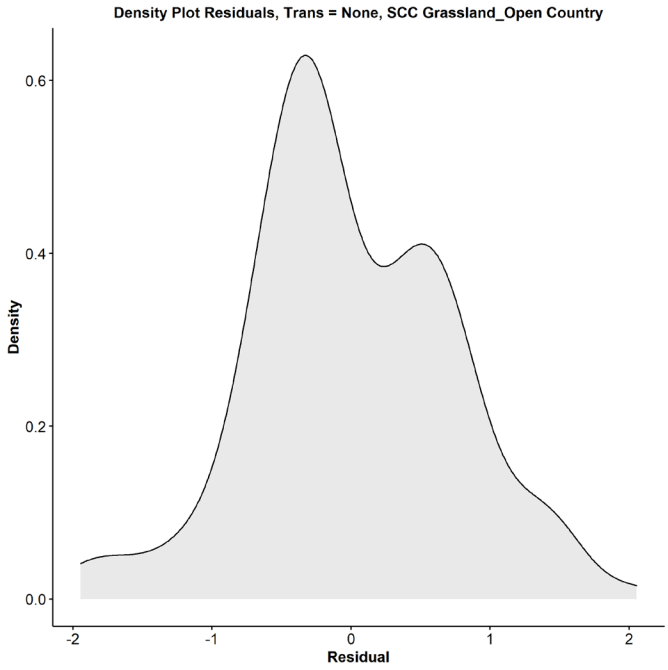


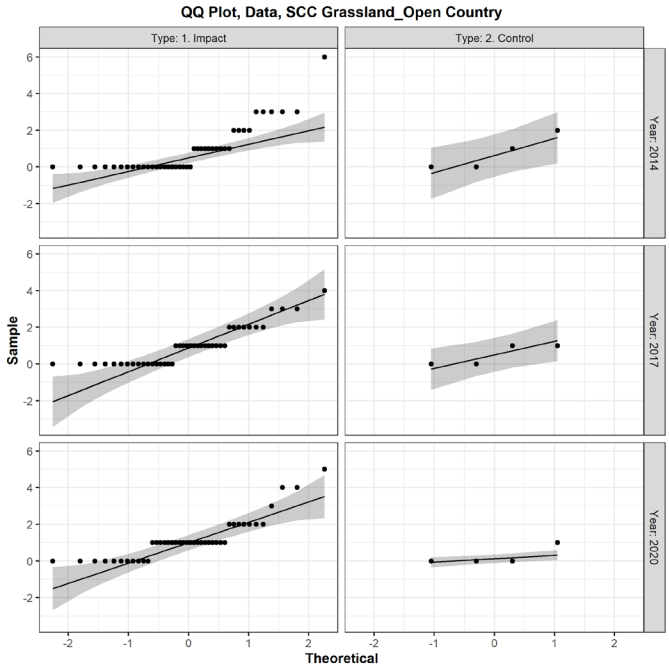


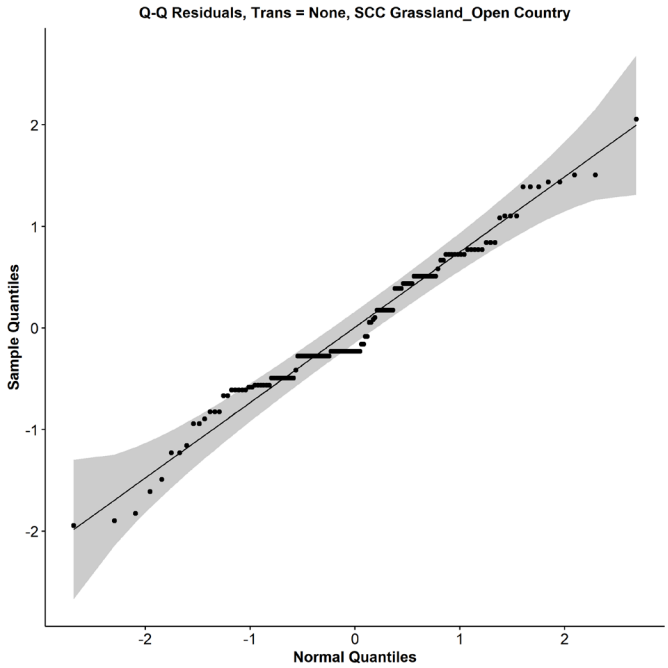


Species of Conservation Concern – Grassland/Open Country Guild Abundance

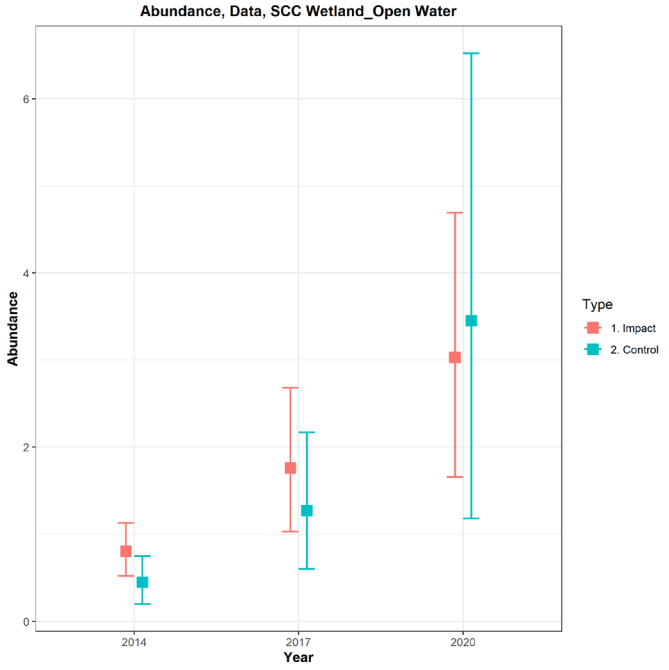


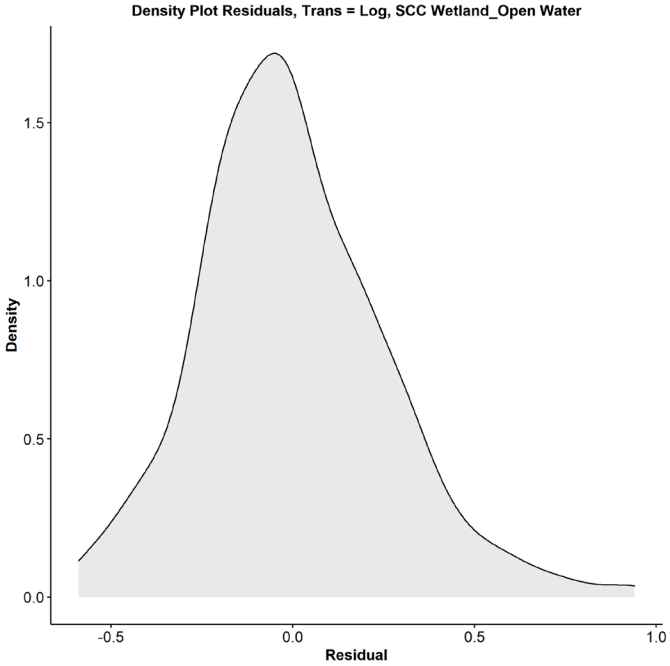


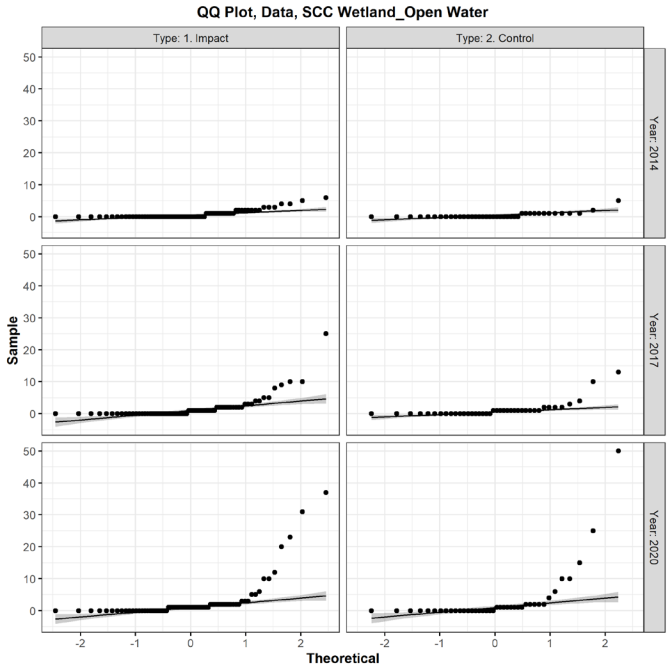


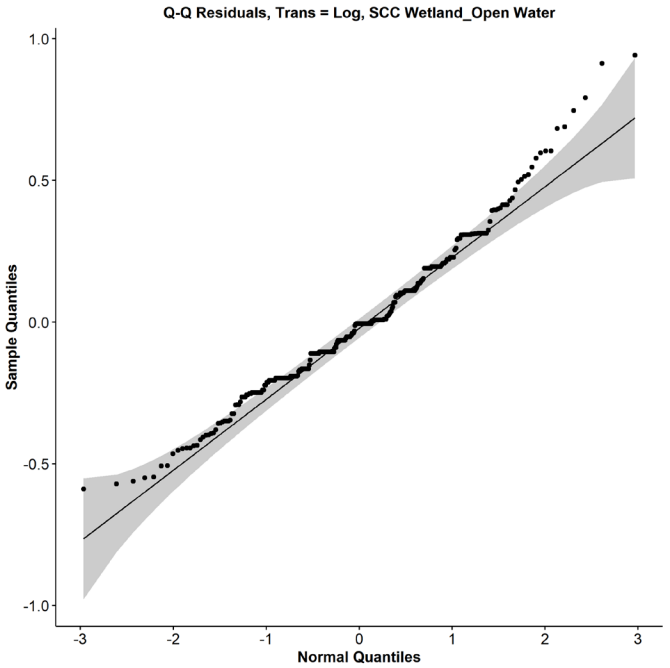


Species of Conservation Concern – Wetland/Open Water Guild Abundance

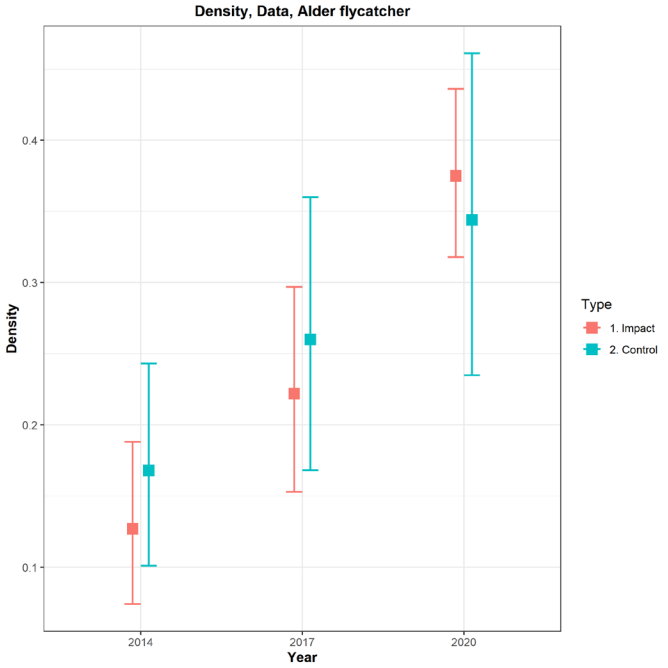


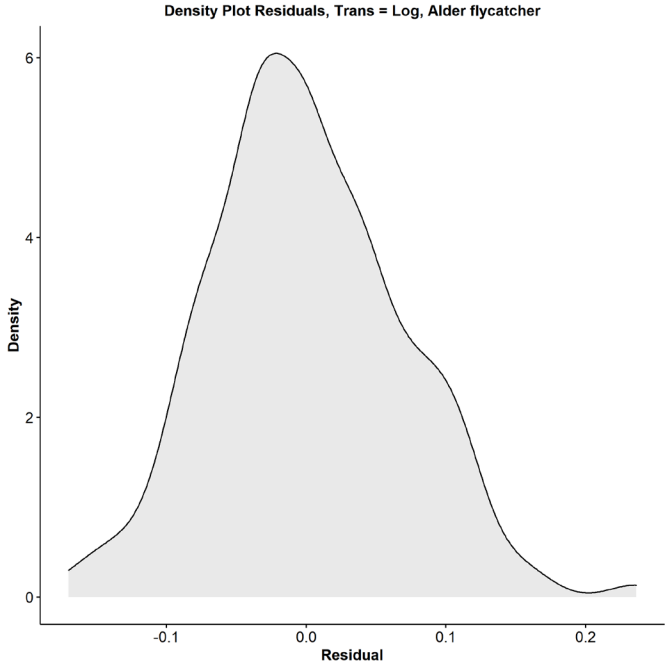


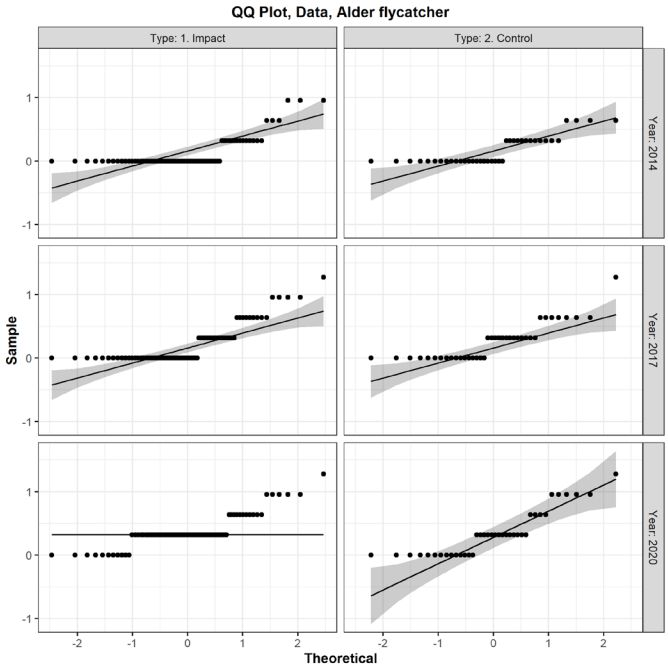


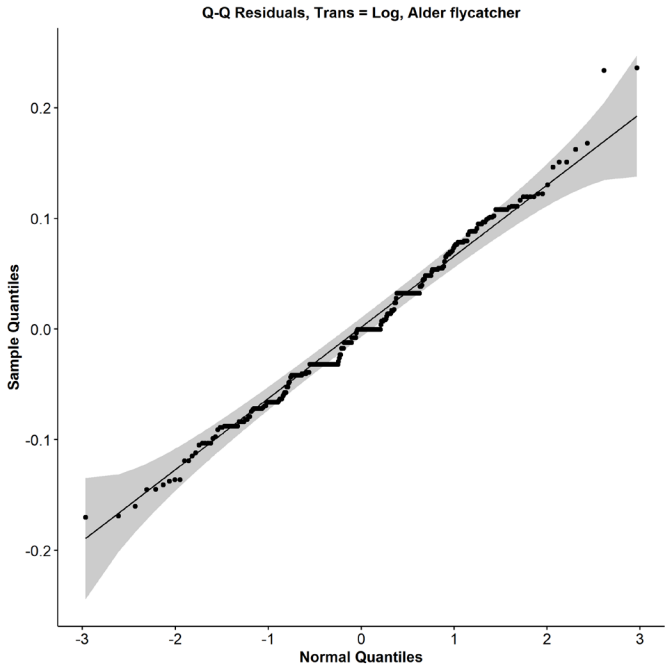


Species of Conservation Concern – Alder Flycatcher Density

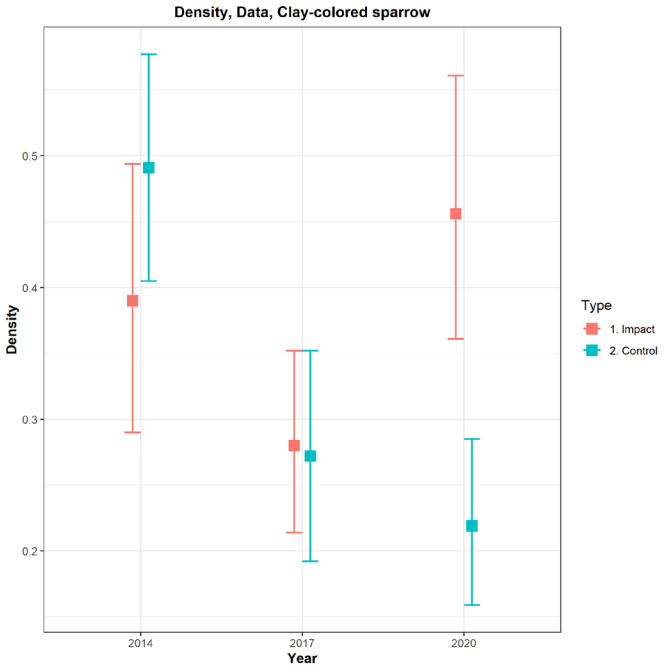


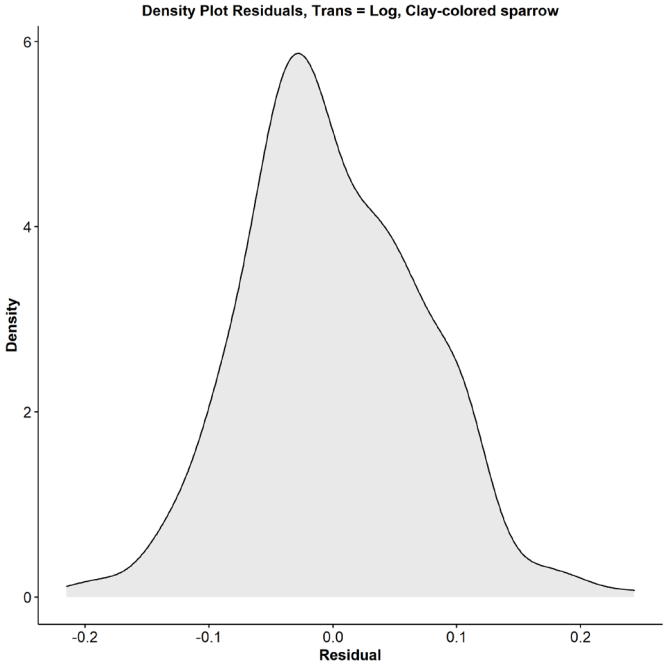


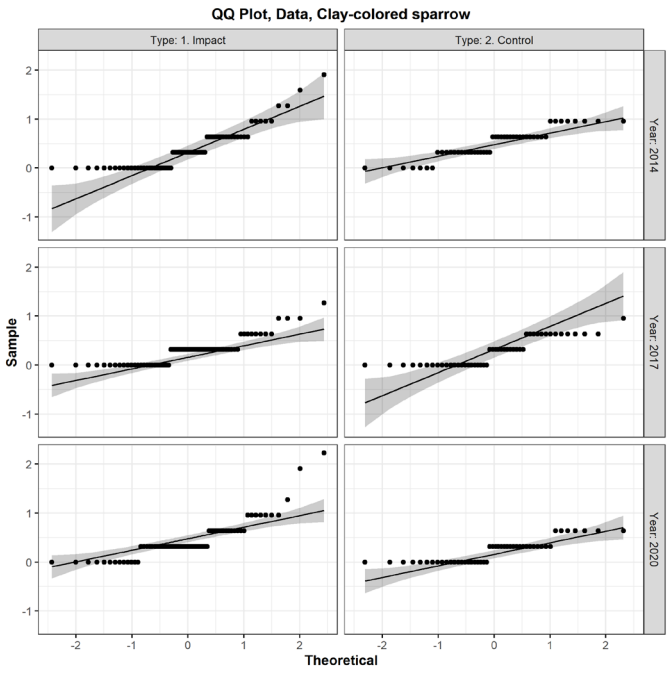


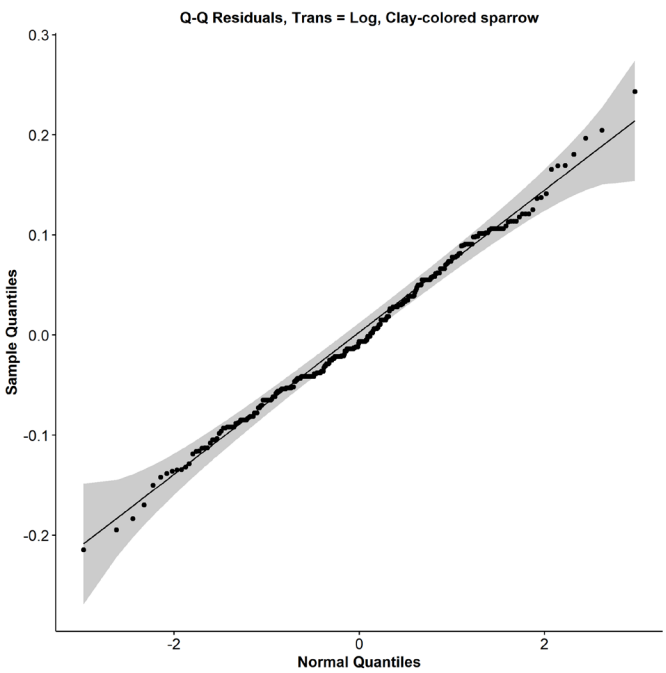


Species of Conservation Concern – Clay-colored Sparrow Density

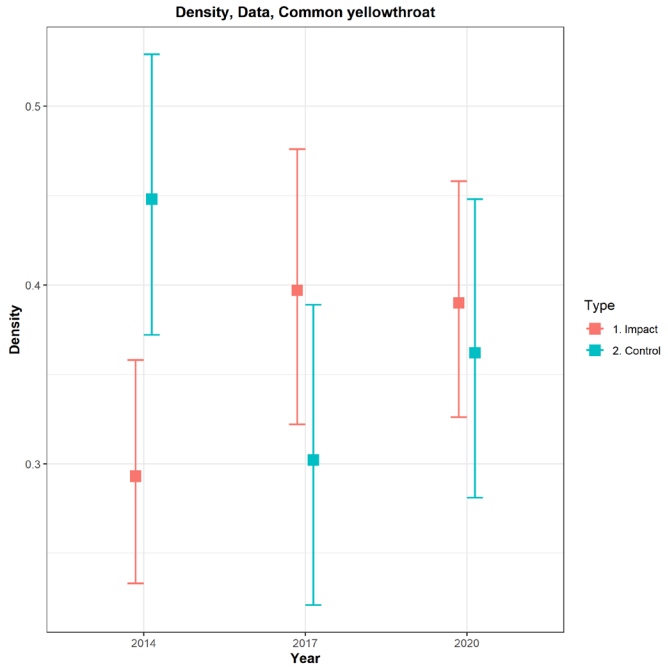


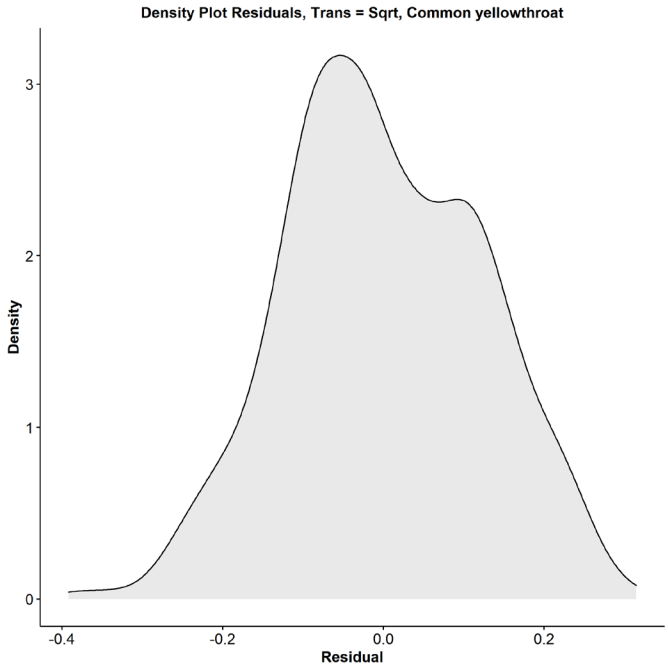


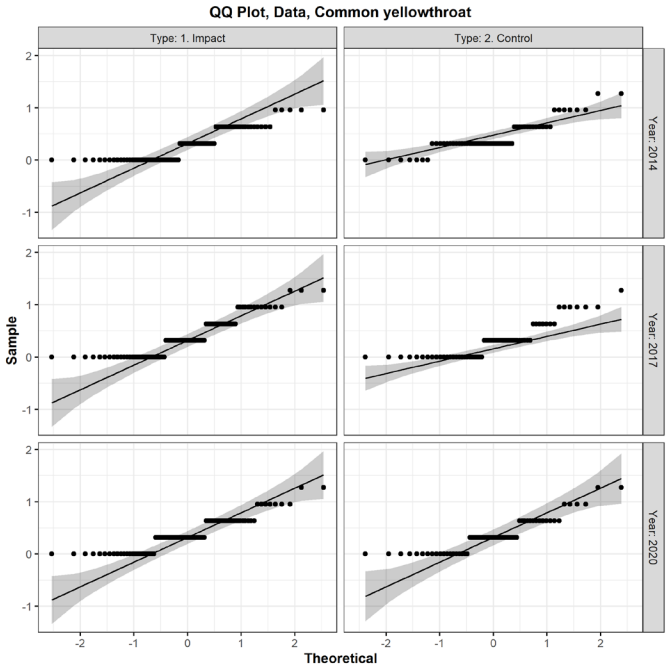


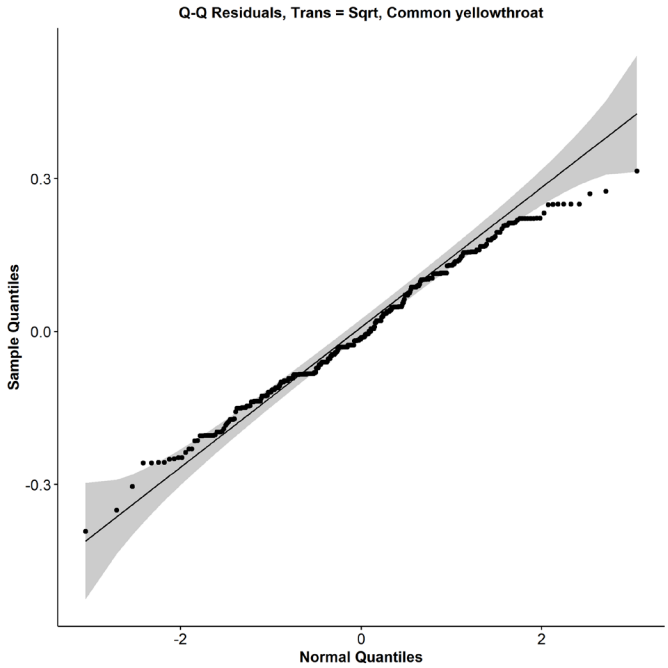


Species of Conservation Concern – Common Yellowthroat Density

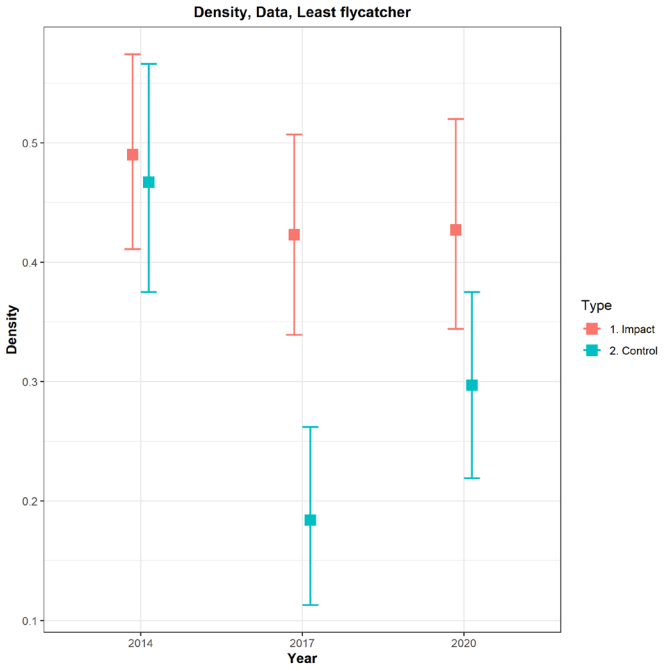


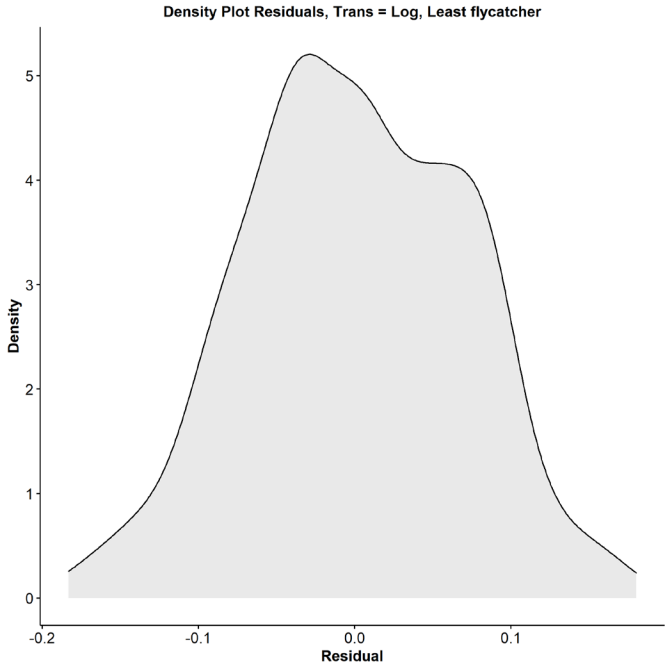


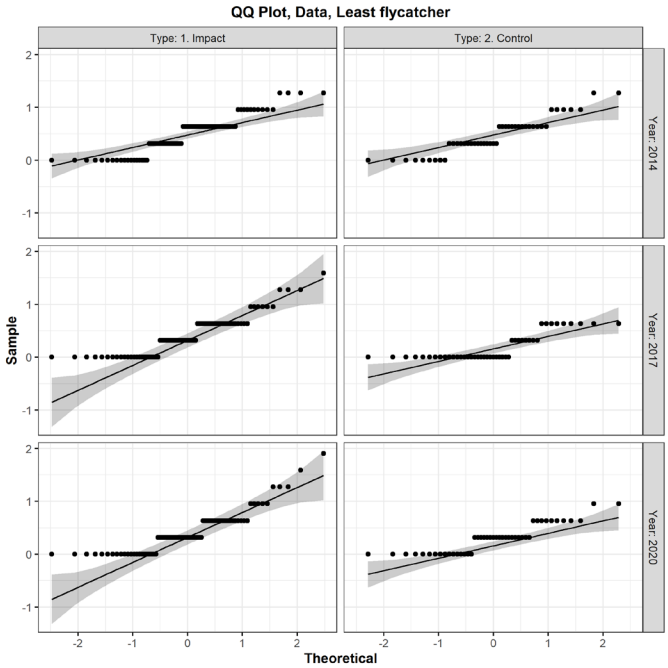


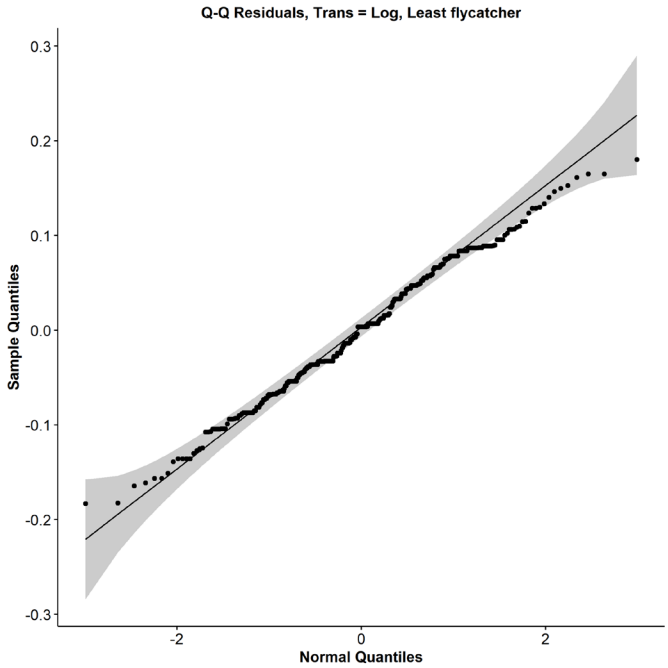


Species of Consevation Concern – Least Flycatcher Density

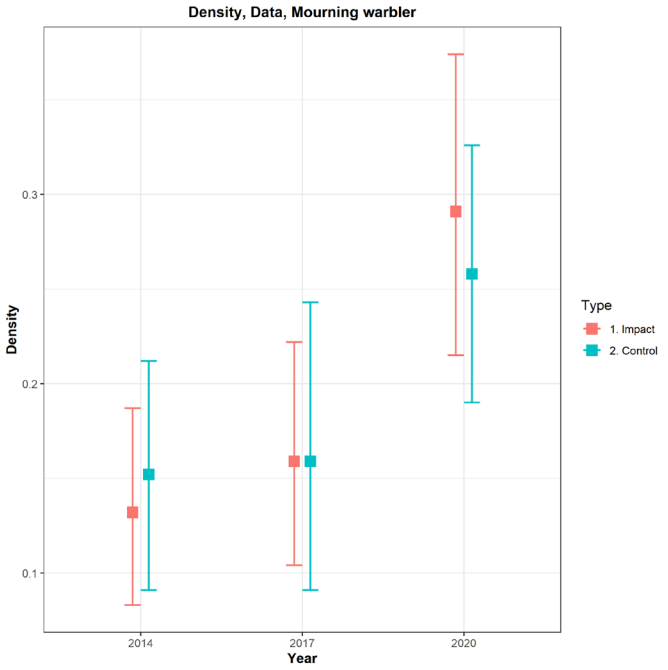


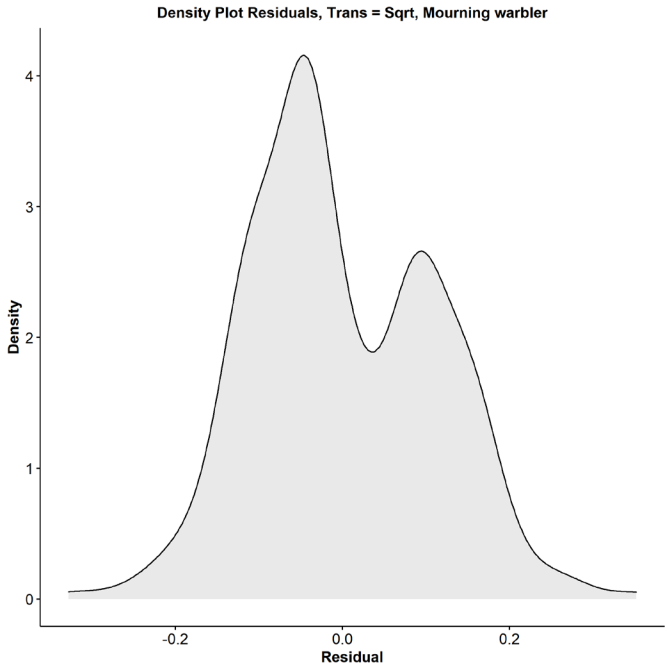


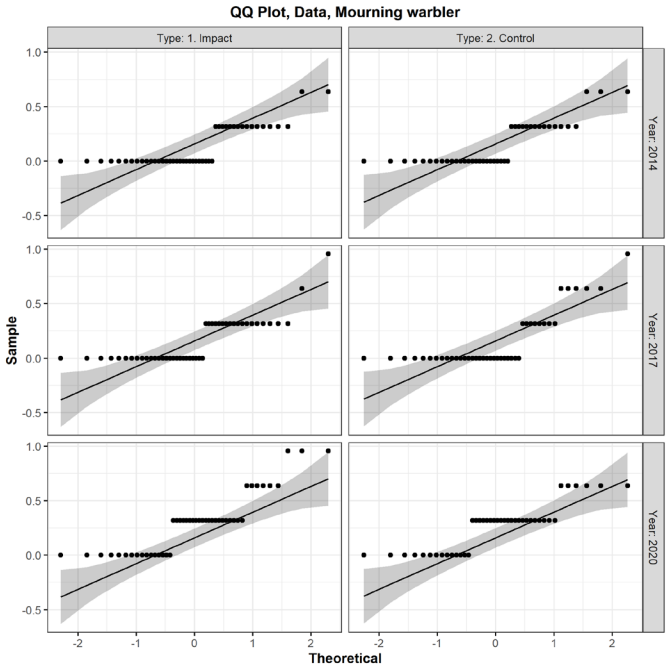


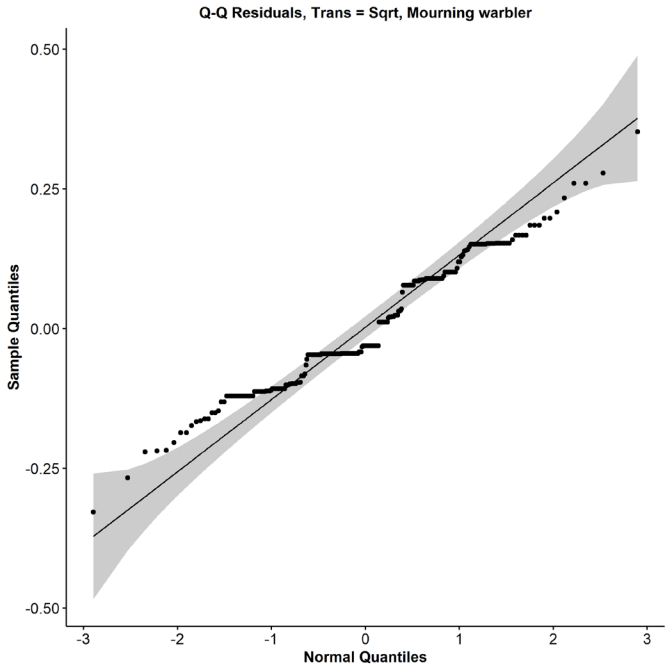


Species of Conservation Concern – Mourning Warbler Density

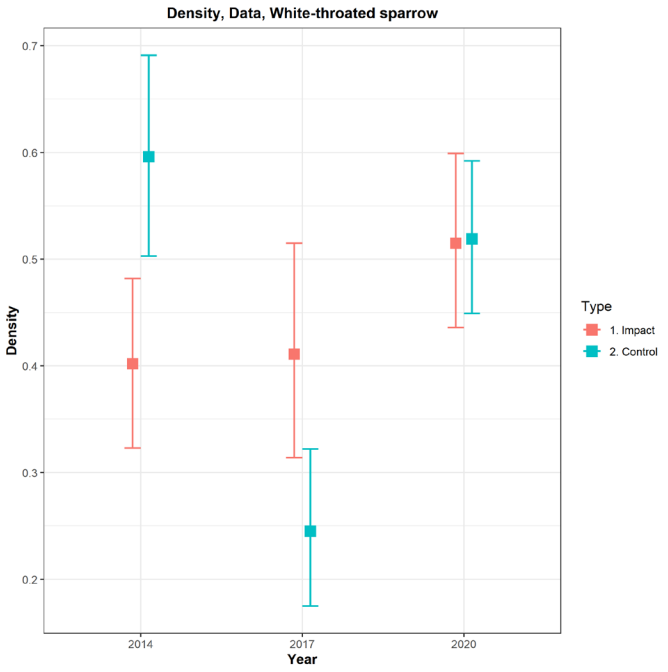


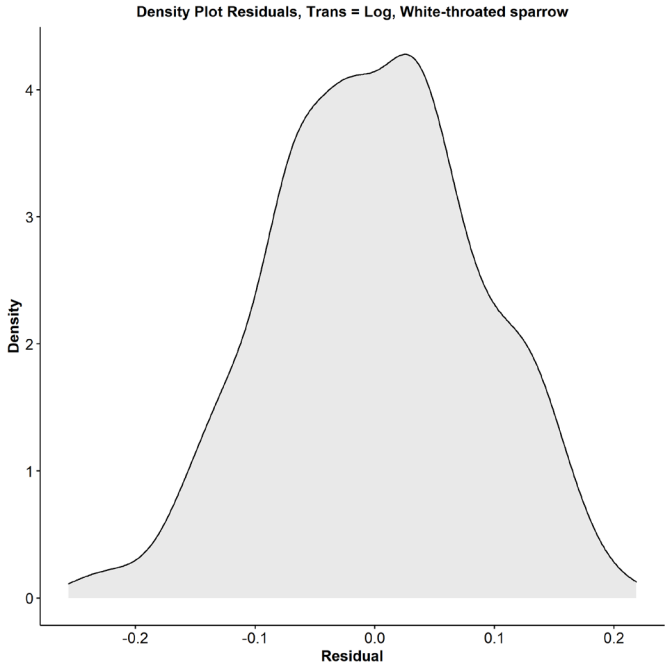


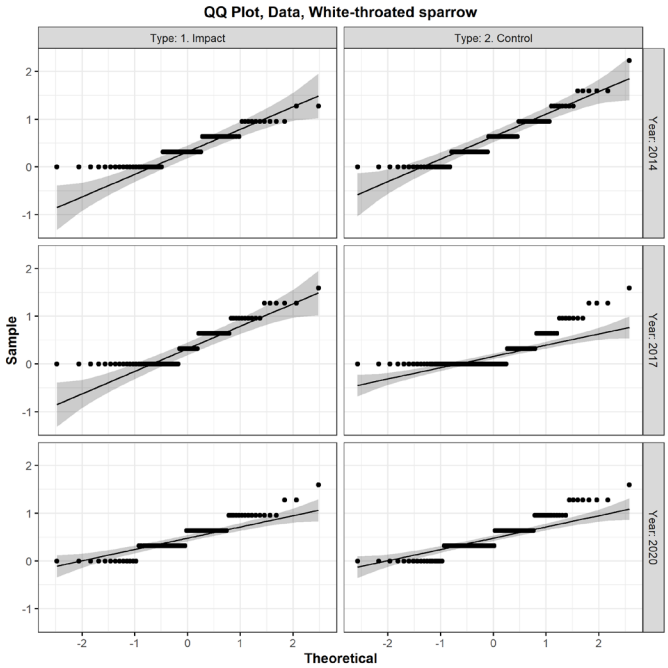


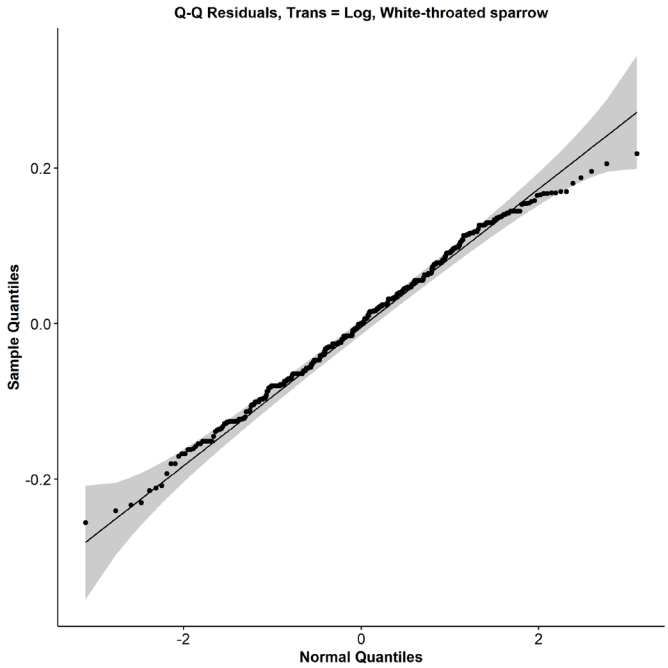


Species of Consevation Concern – White-throated Sparrow Density

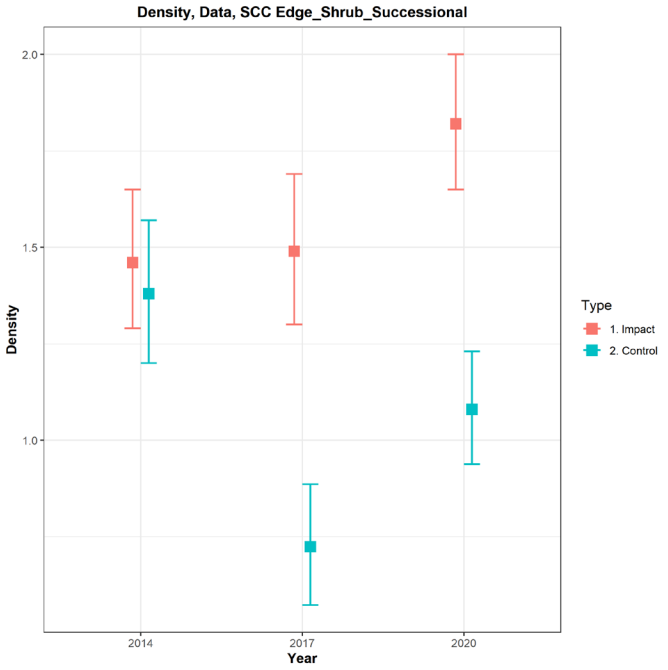


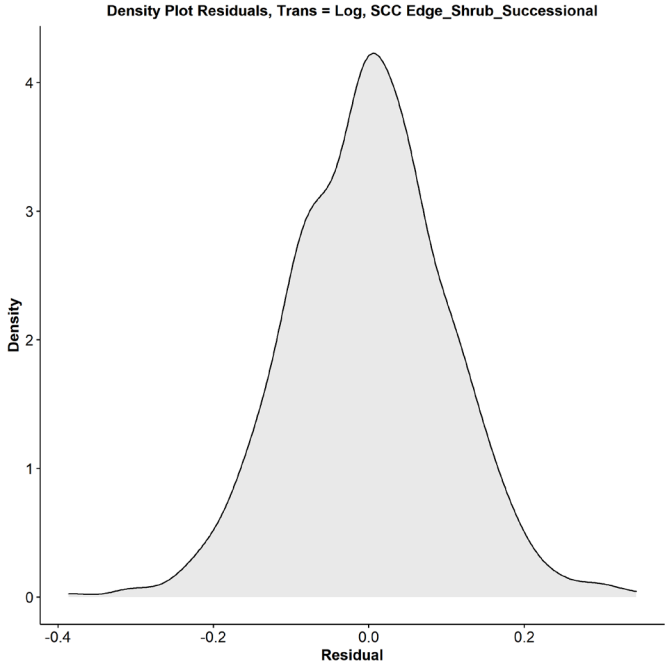


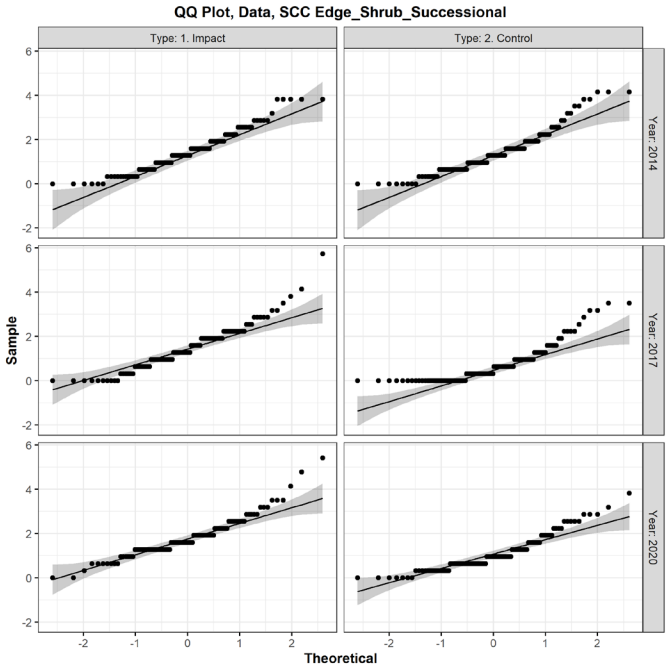


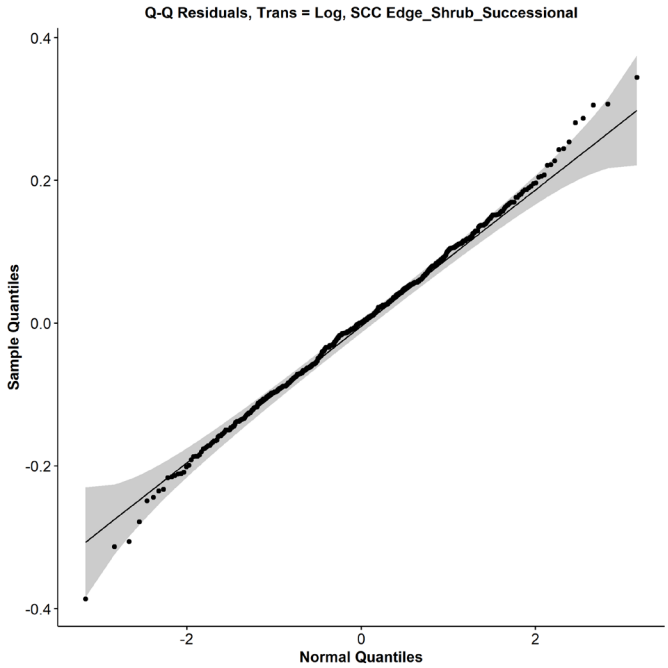


Species of Consevation Concern – Edge/Shrub/Sucessional Guild Density

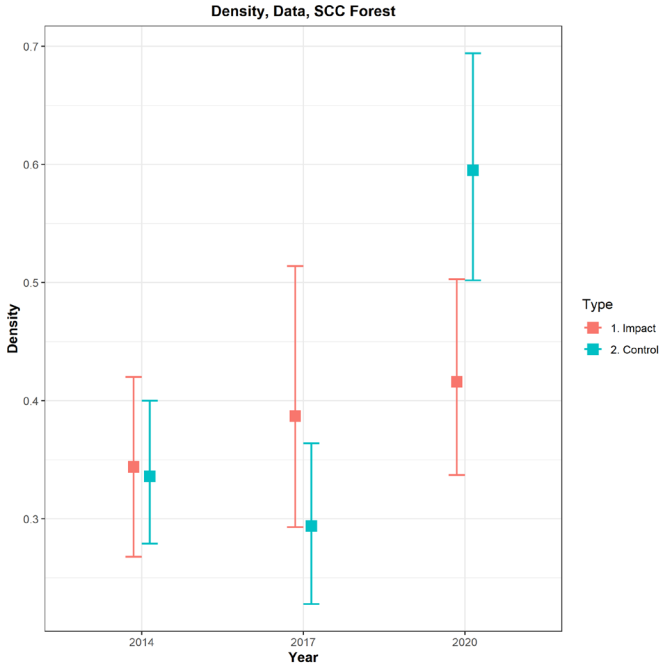


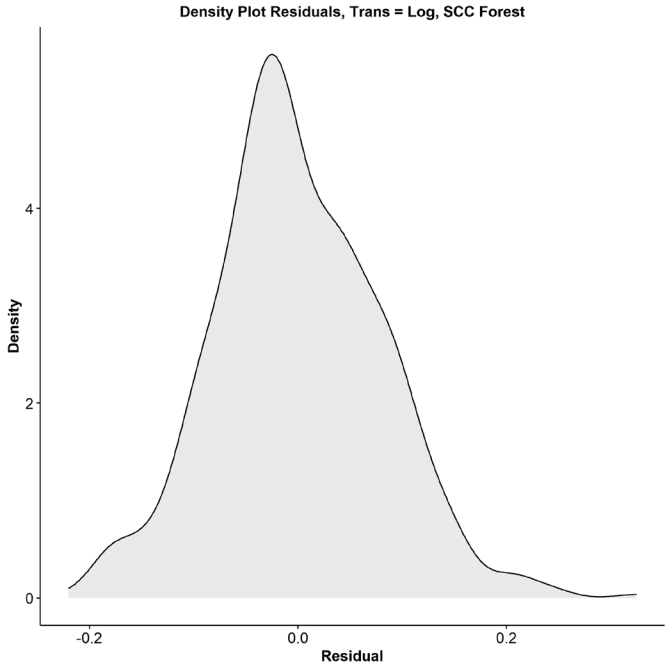


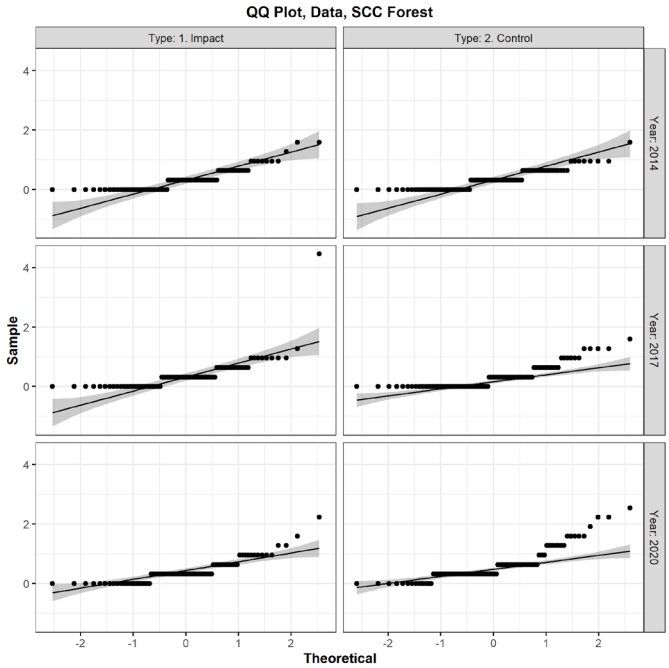


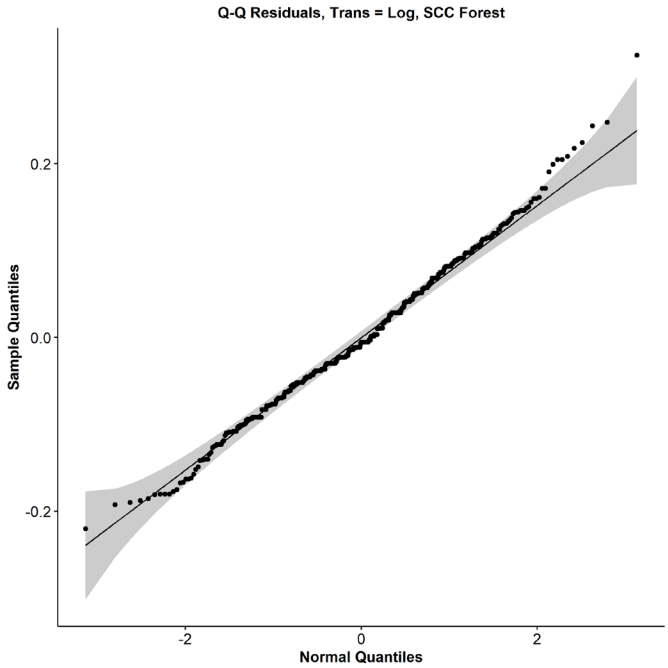


Species of Conservation Concern – Forest Guild Density

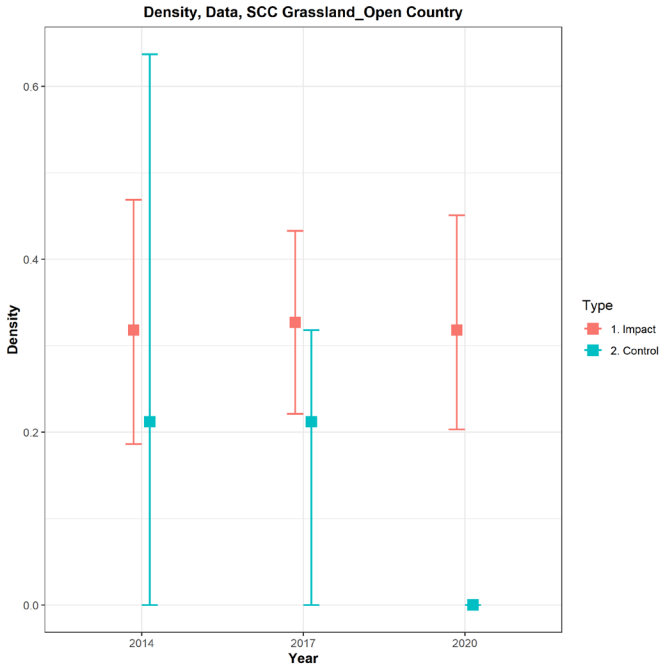


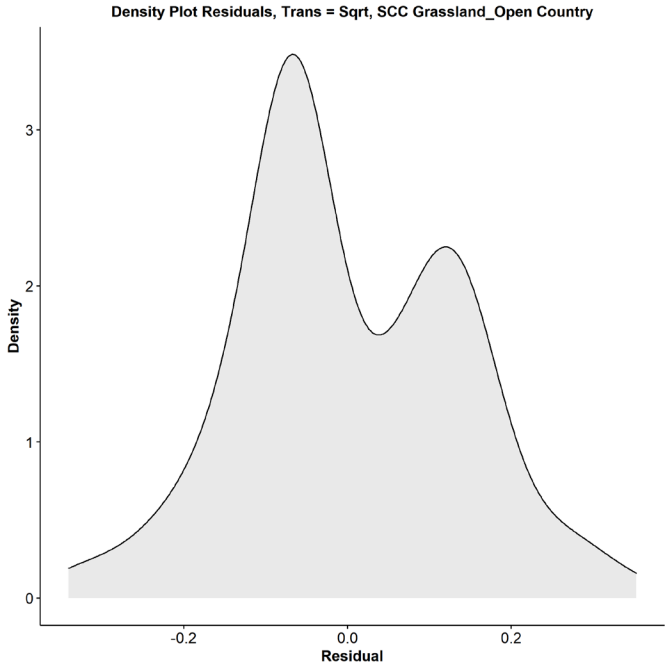


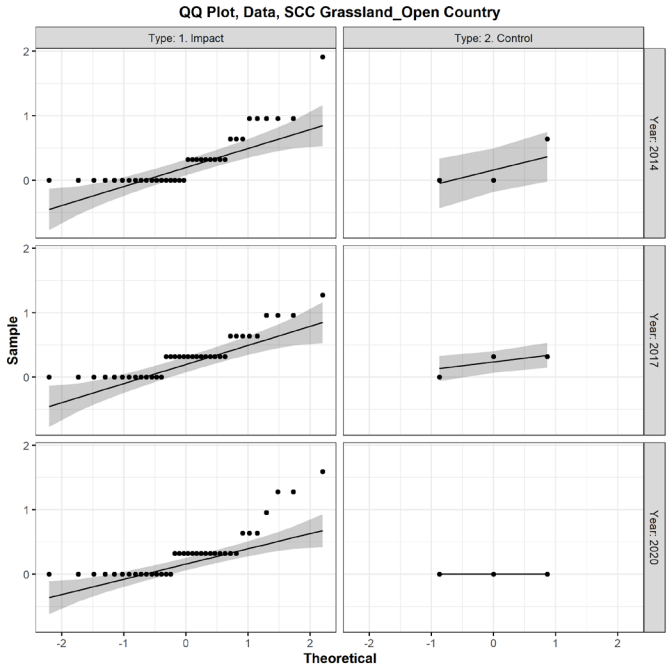


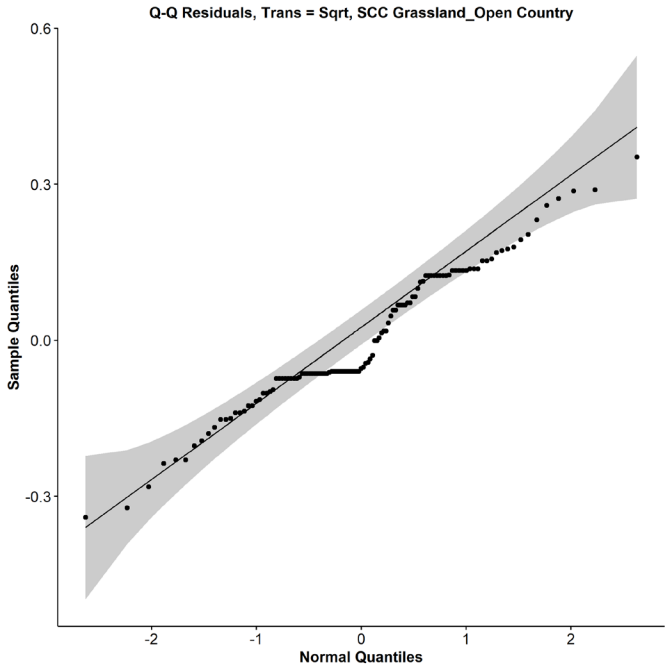


Species of Conservation Concern – Grassland/Open Country Guild Density

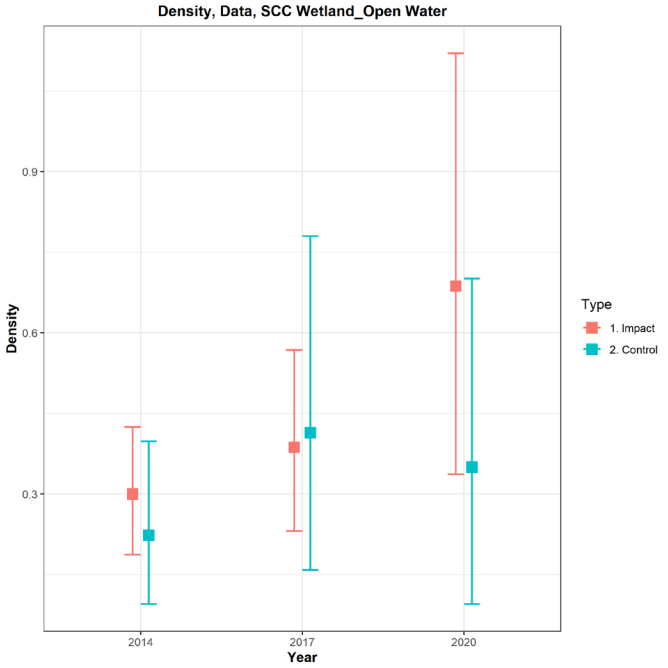


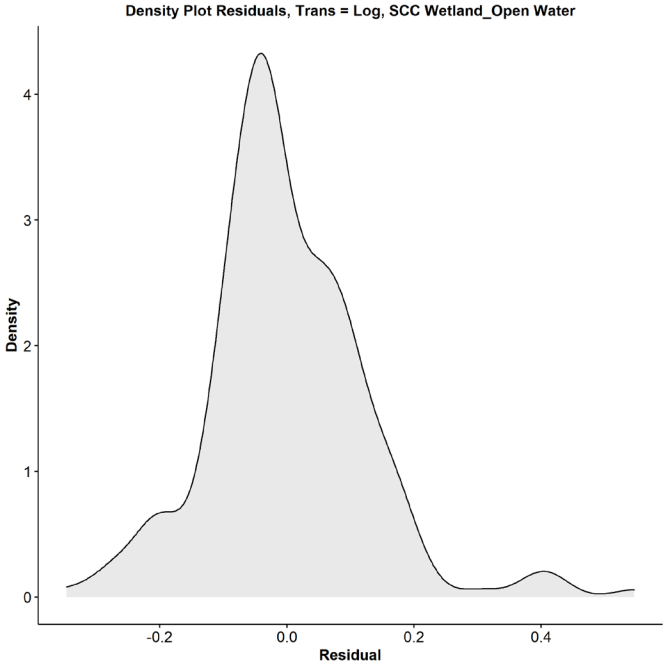


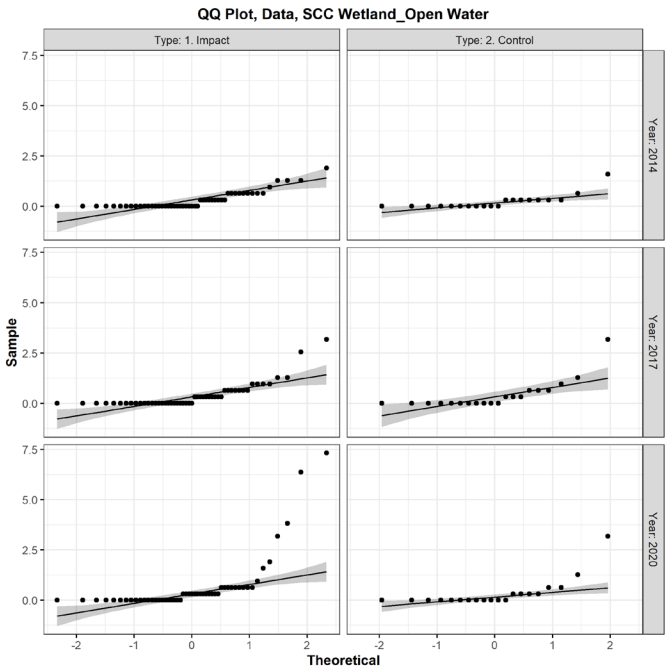


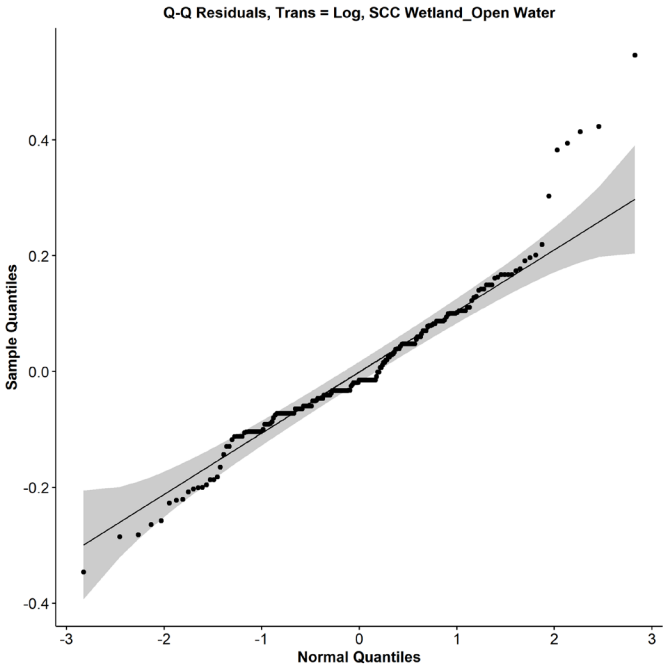


Species of Conservation Concern – Wetland/Open Water Guild Density

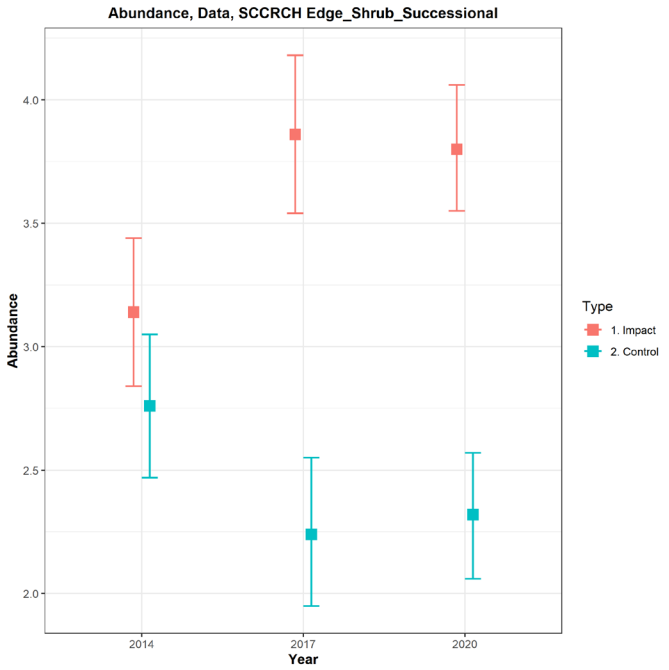


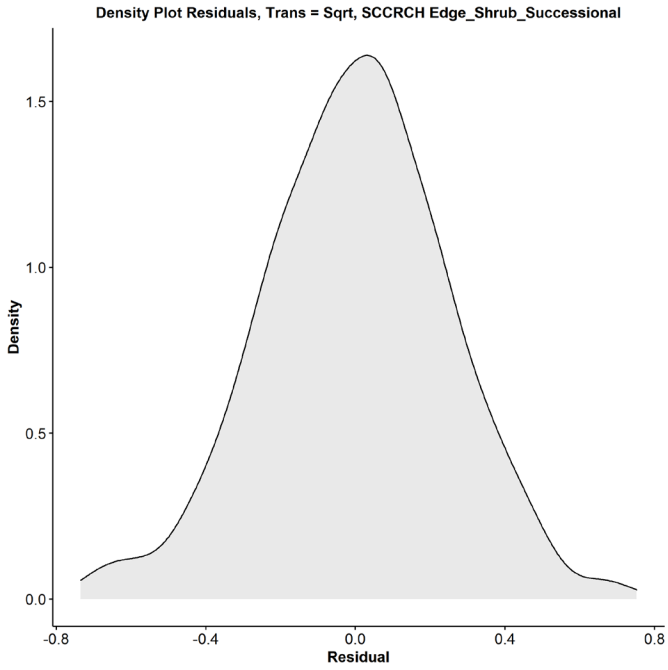


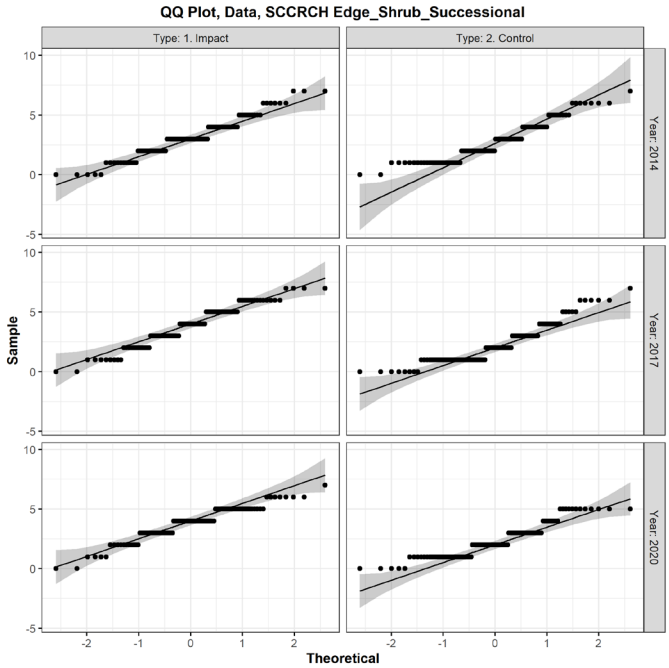


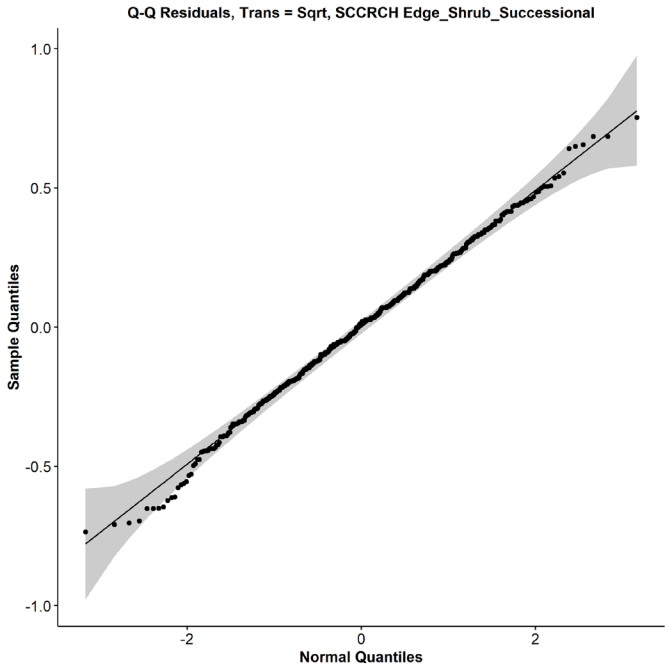


Species of Conservation Concern – Edge/Shrub/Successional Guild Species Richness

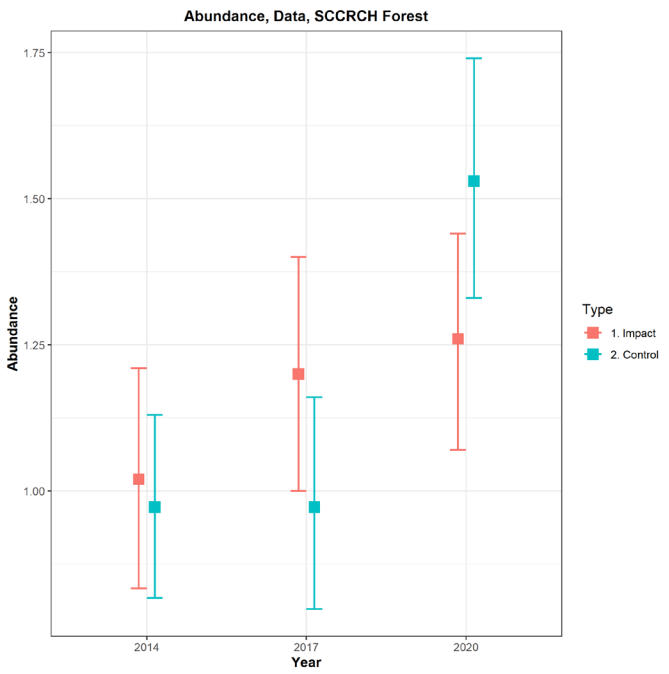


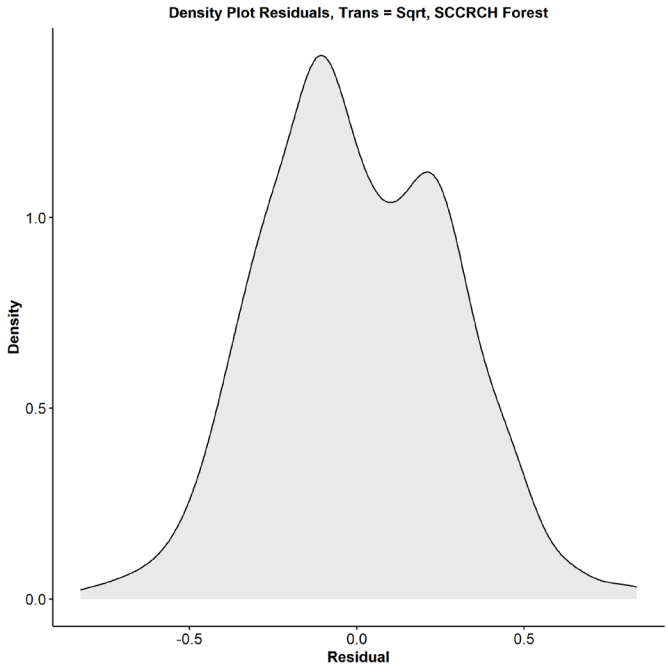


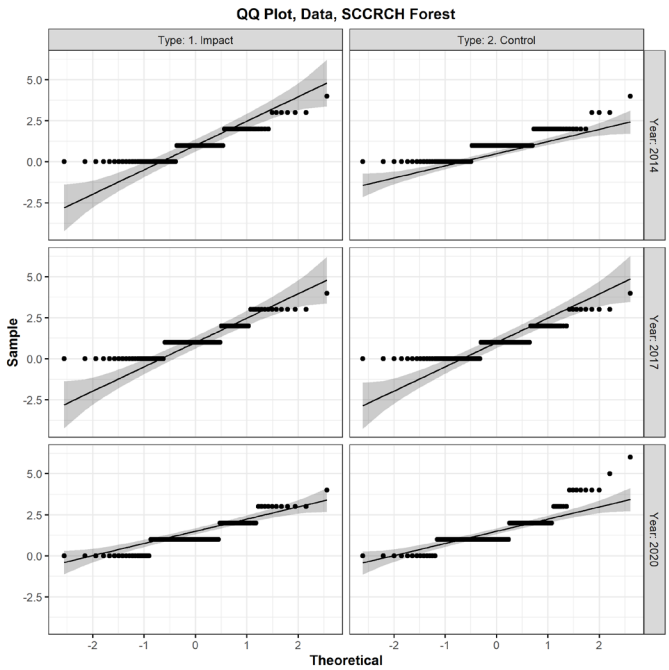


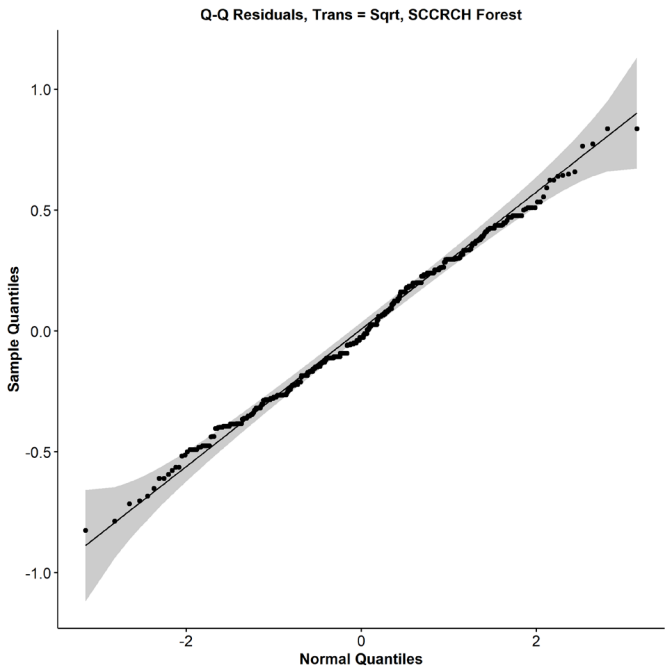


Species of Conservation Concern – Forest Guild Species Richness

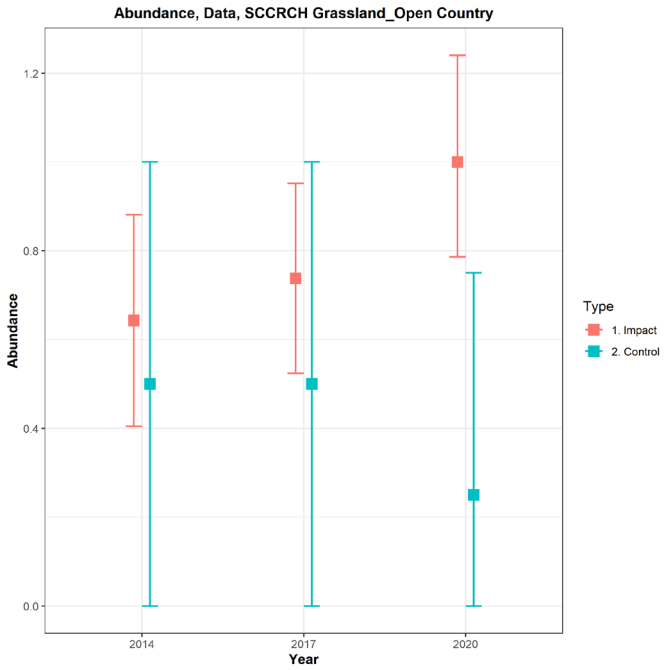


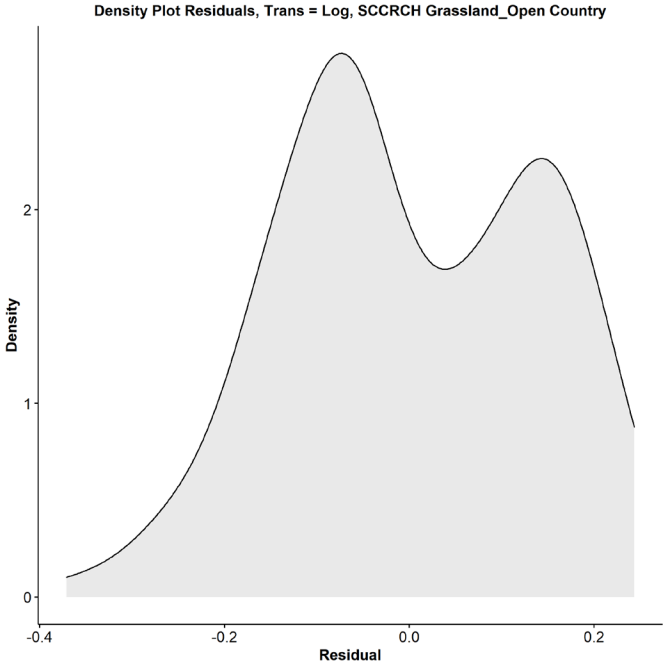


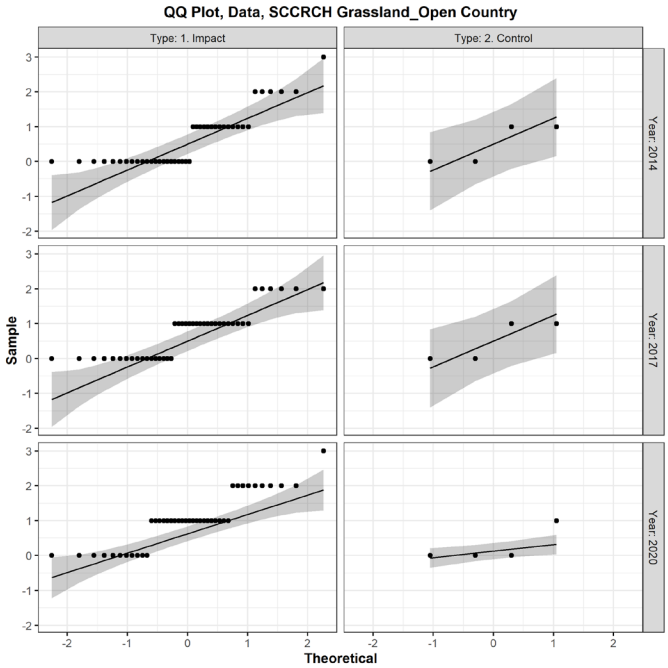


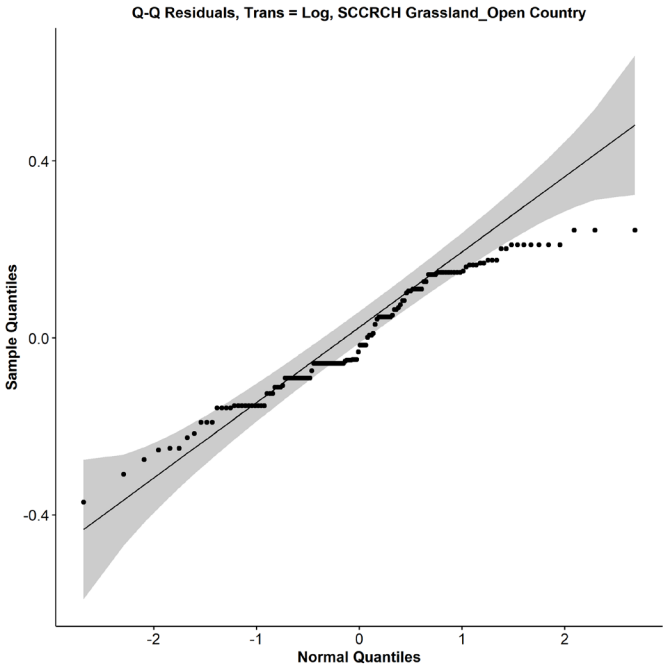


Species of Conservation Concern – Grassland/Open Country Guild Species Richness

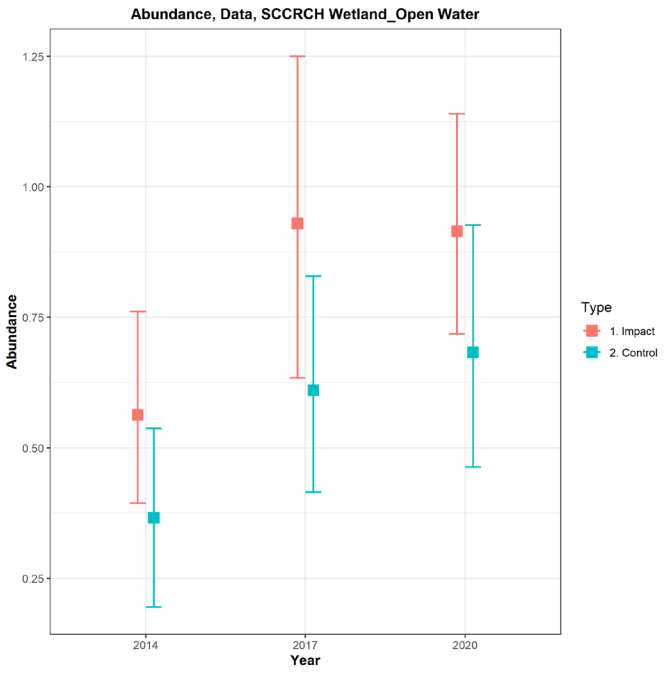


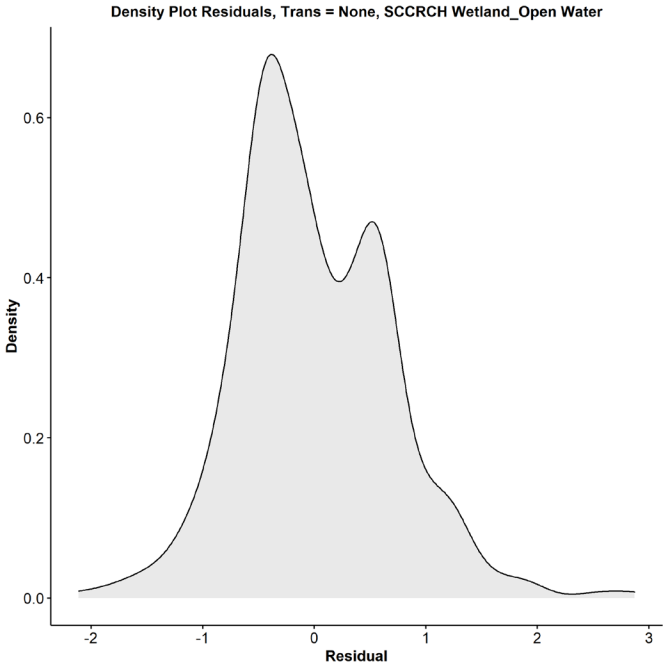


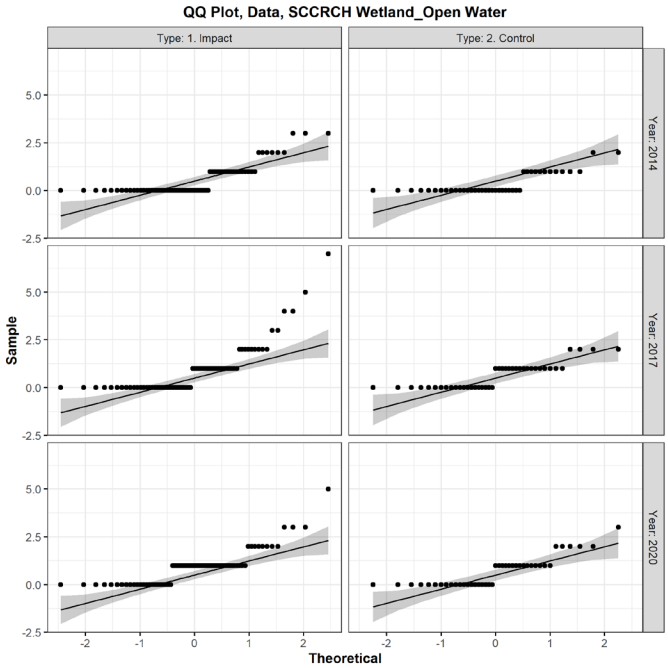


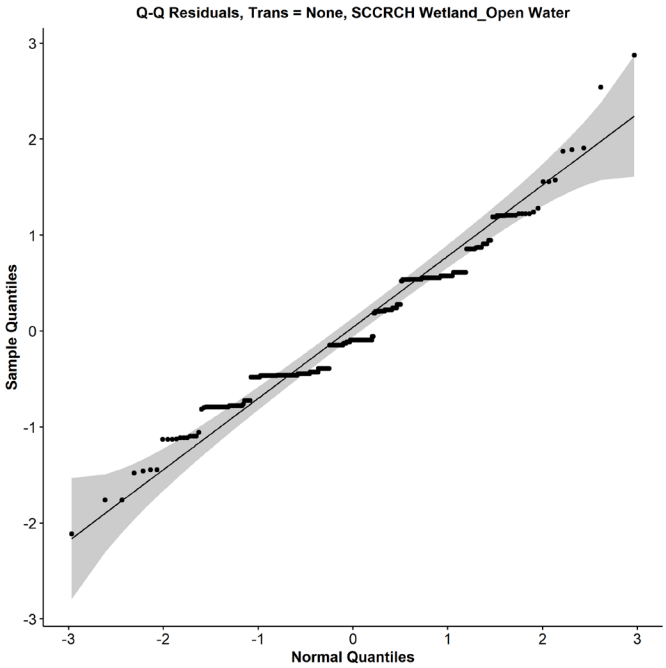


Species of Conservation Concern – Wetland/Open Water Guild Species Richness

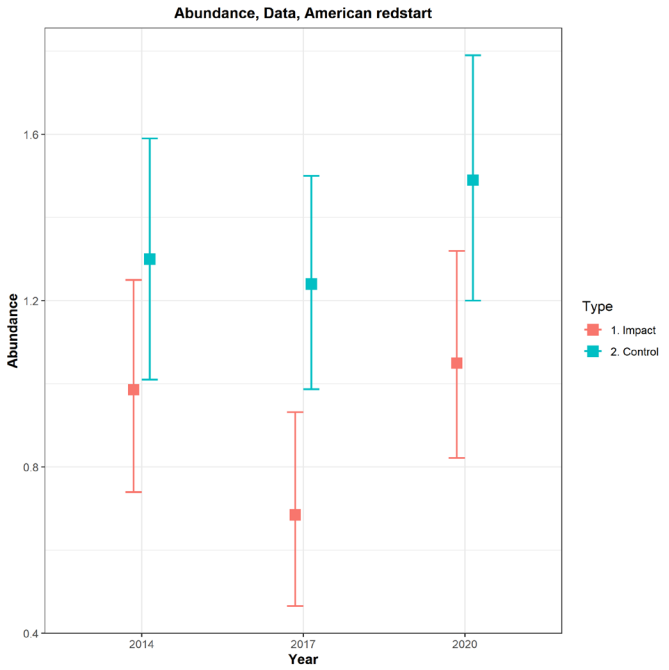


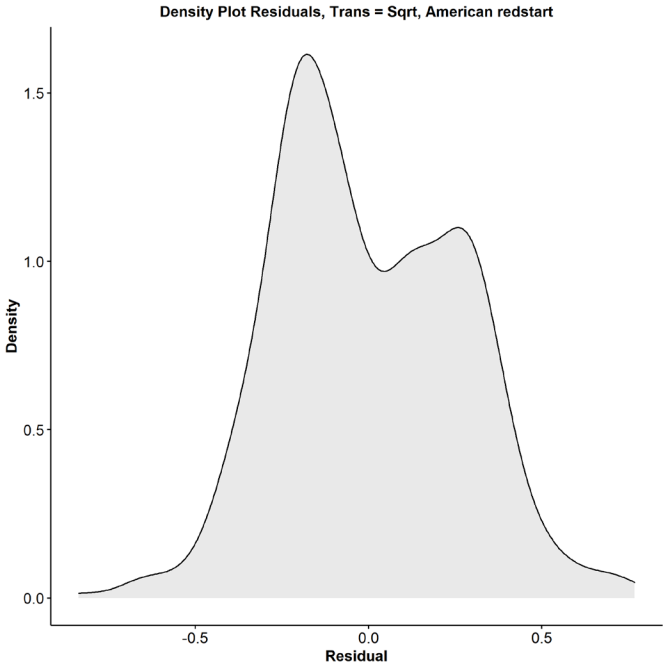


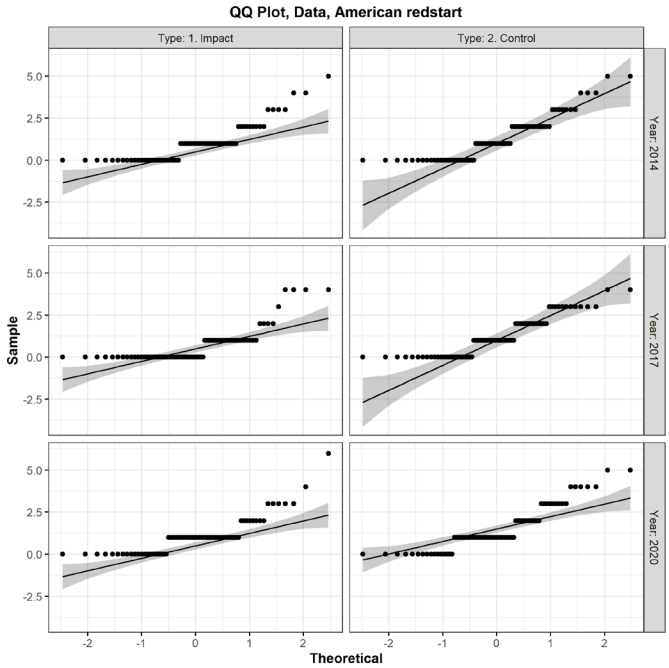


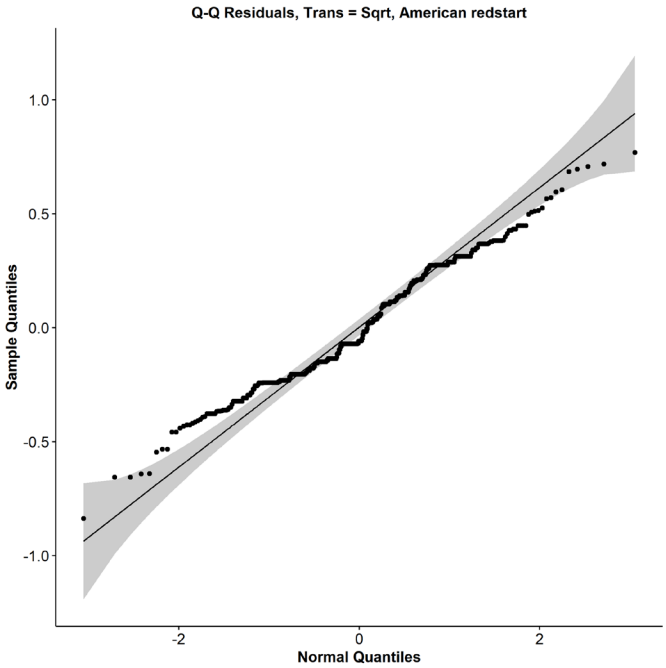


Non-species of Conservation Concern – American Redstart Abundance

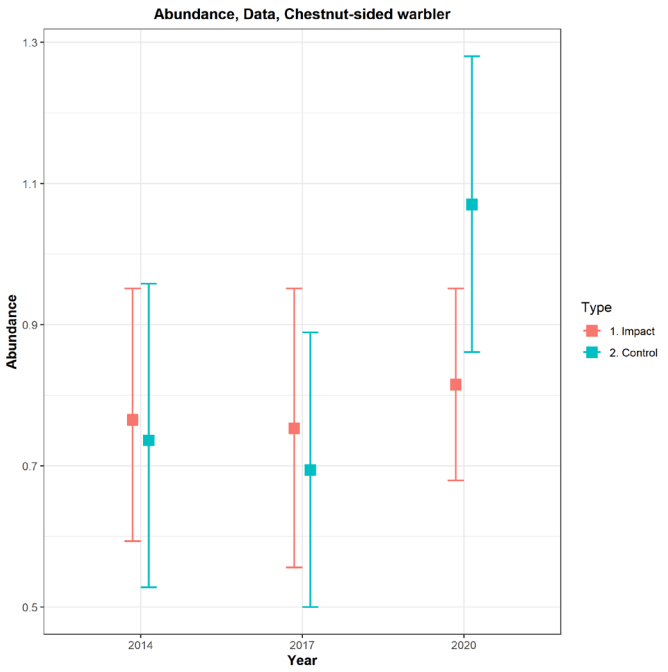


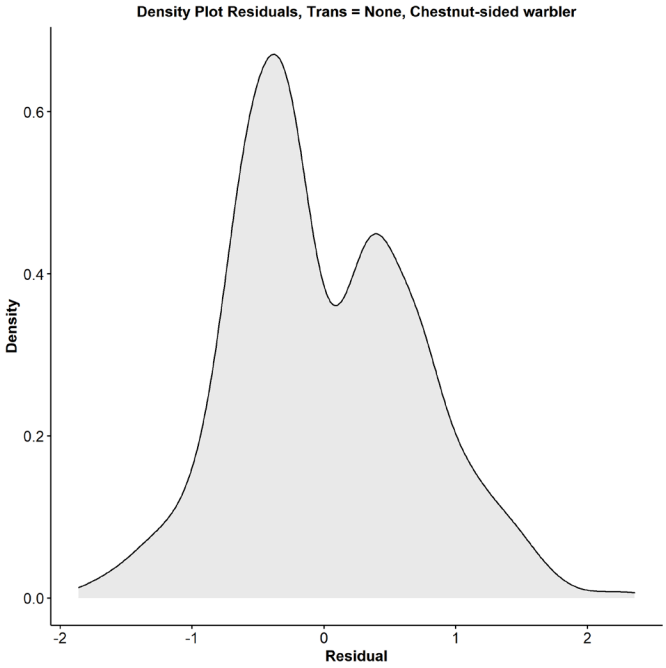


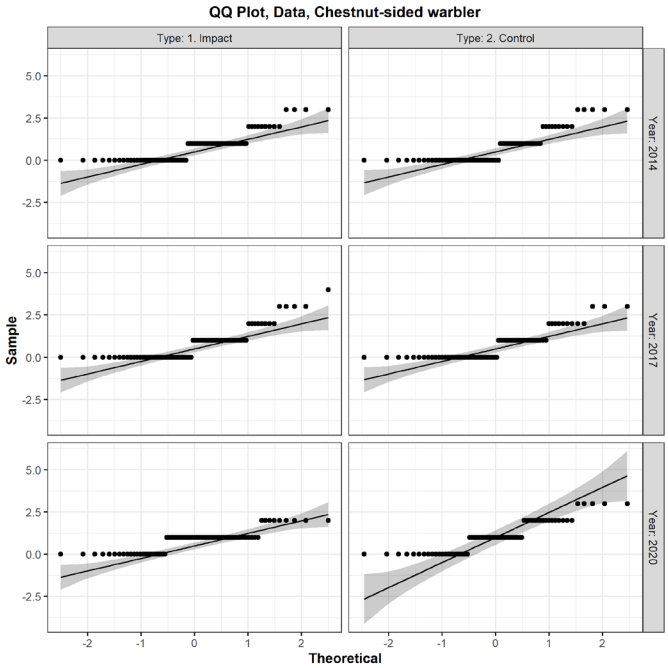


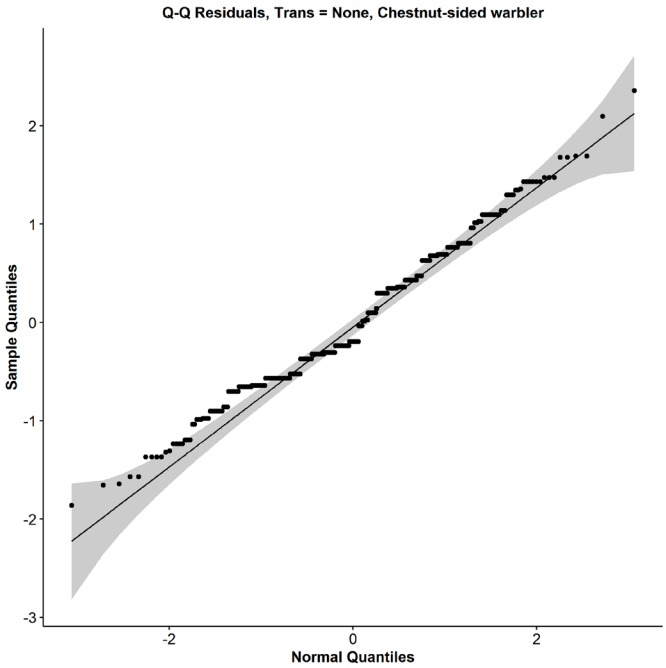


Non-Species of Conservation Concern – Chestnut-sided Warbler Abundance

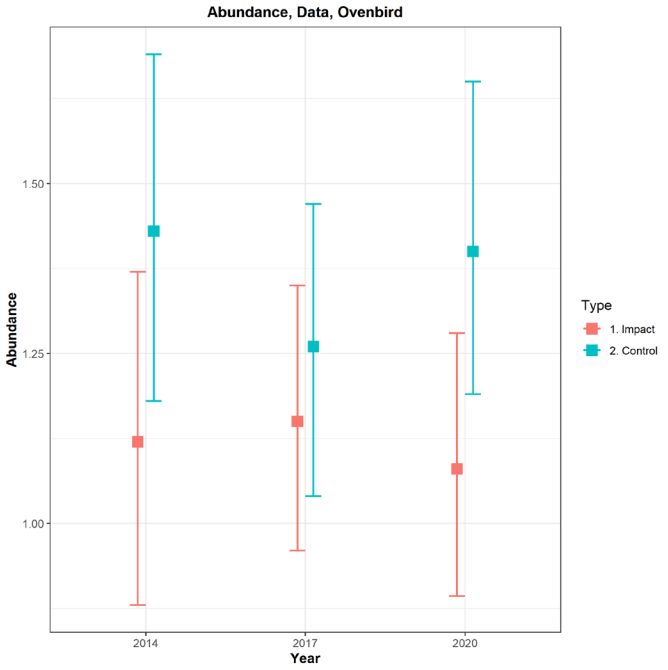


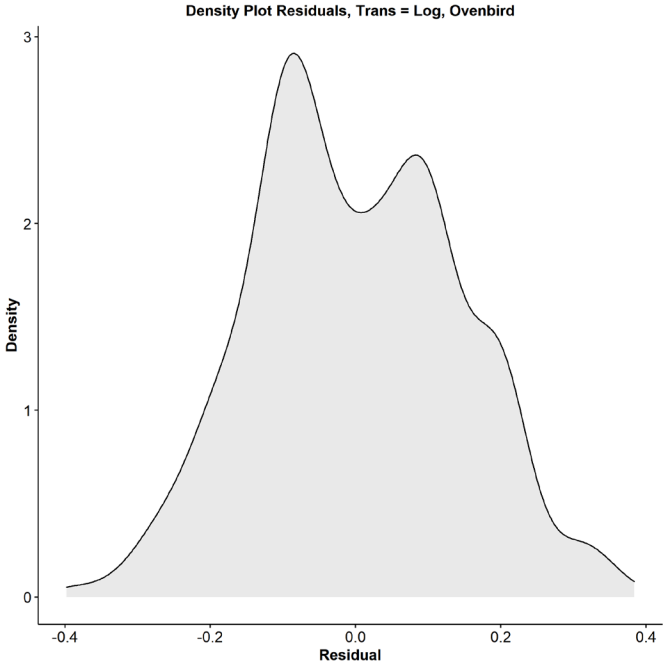


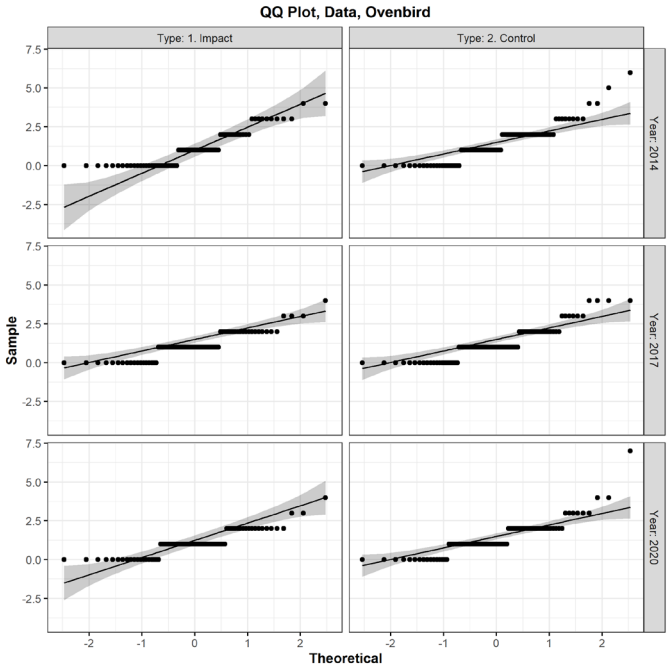


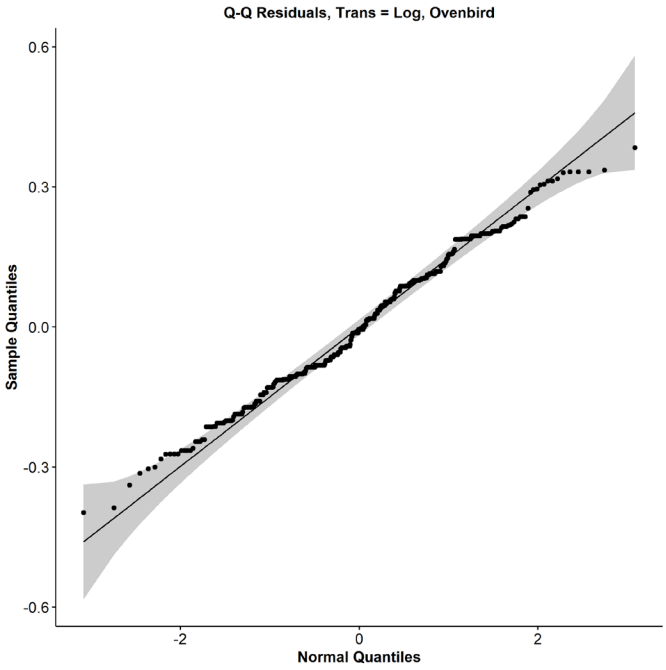


Non-Species of Conservation Concern – Ovenbird
Abundance

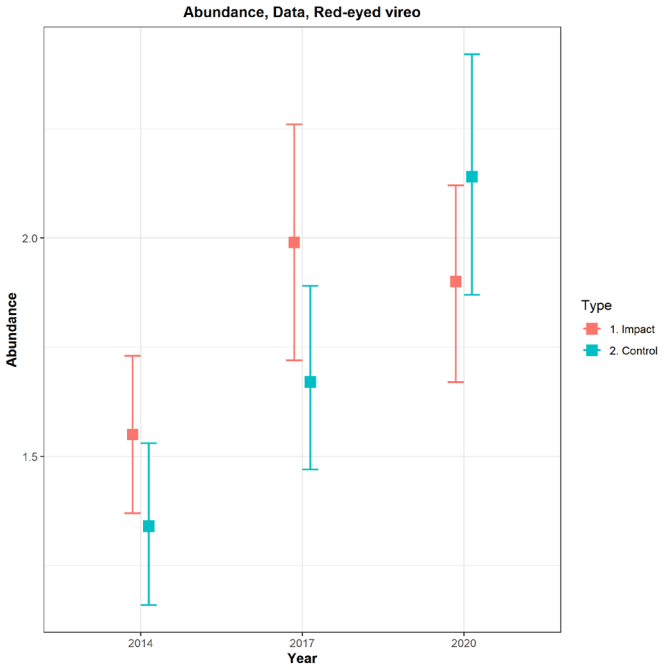


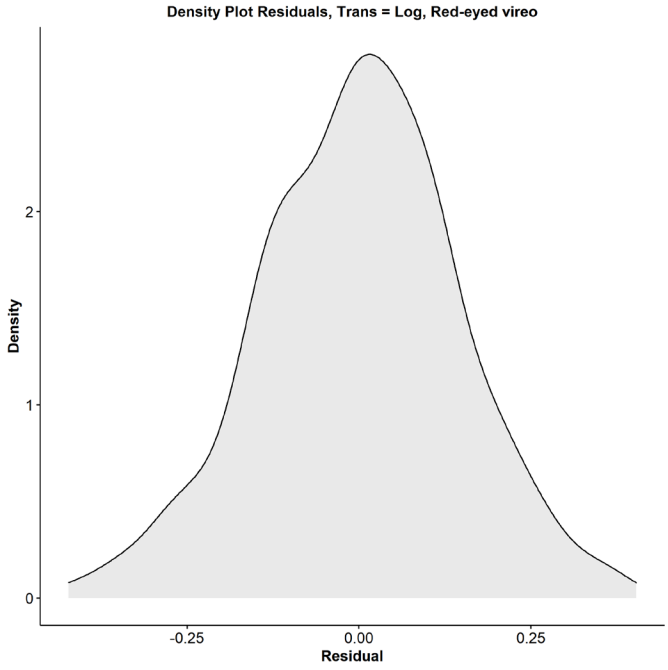


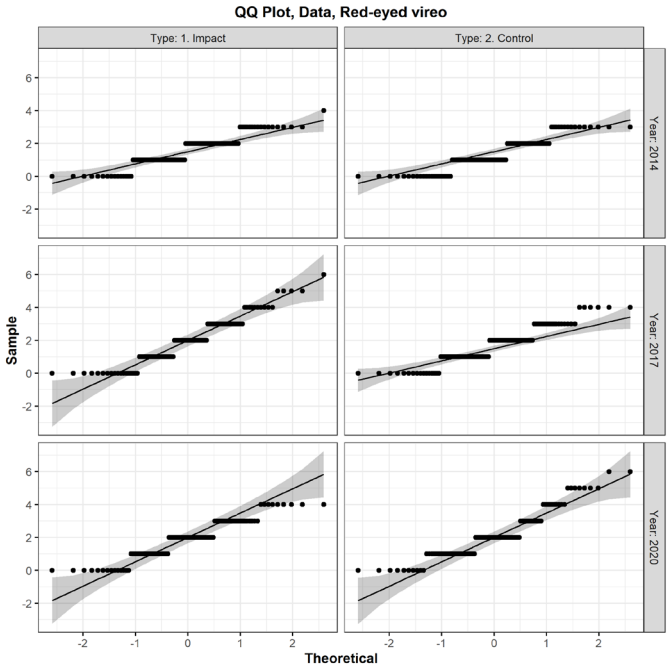


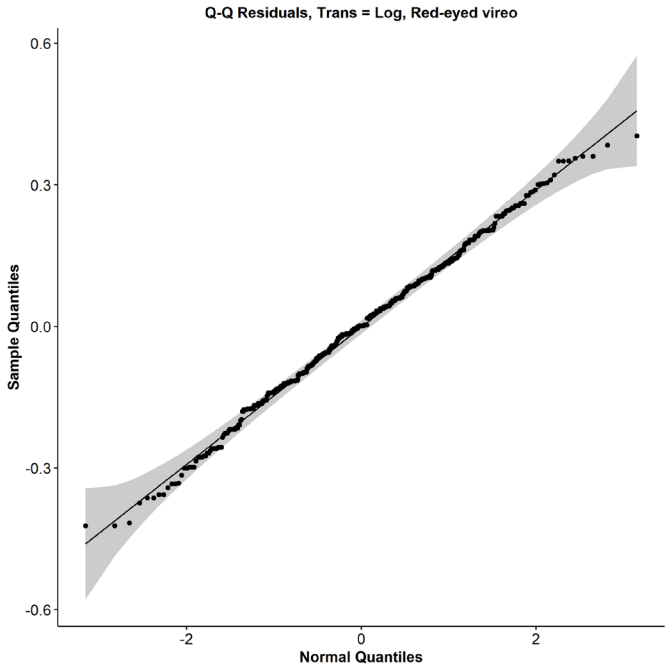


Non-species of Conservation Concern – Red-eyed Vireo Abundance

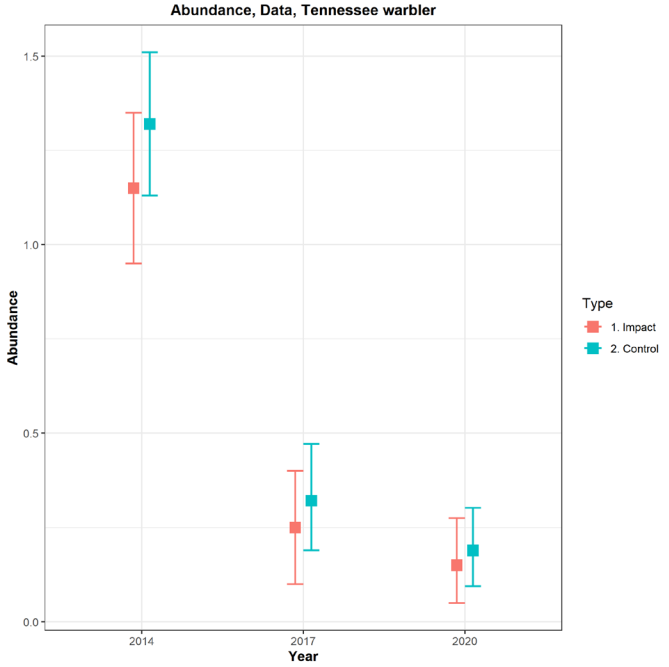


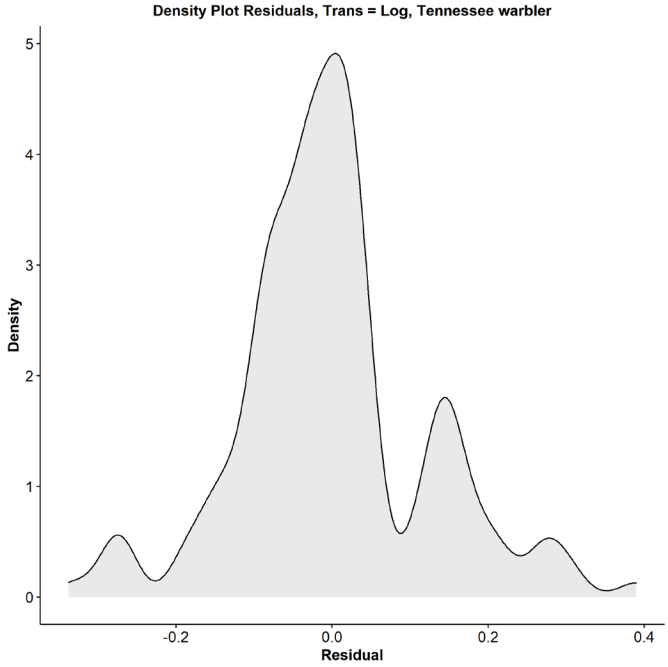


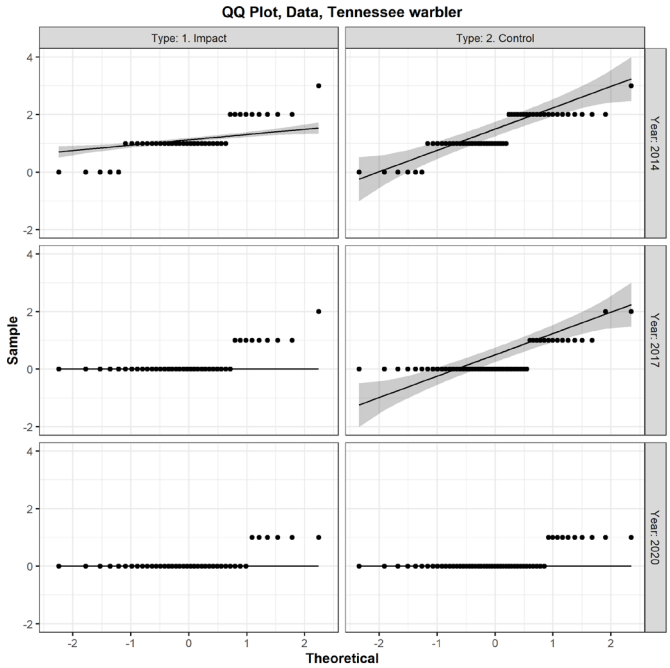


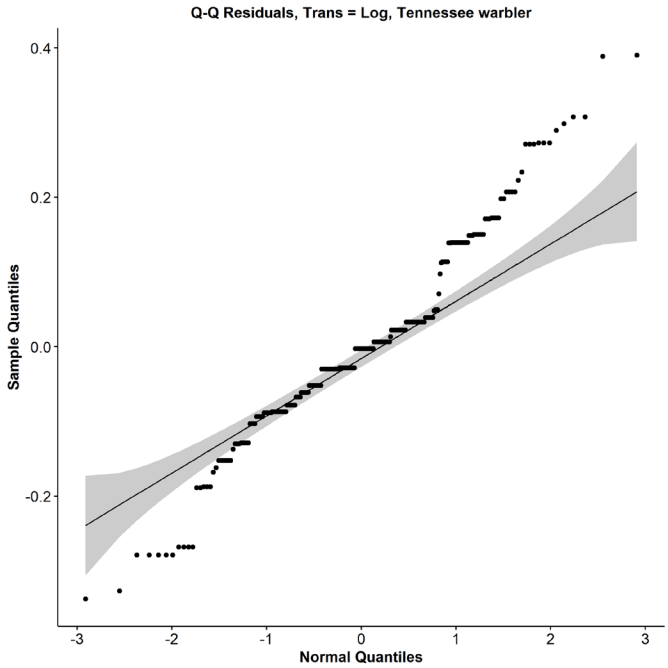


Non-species of Conservation Concern – Tennessee Warbler Abundance

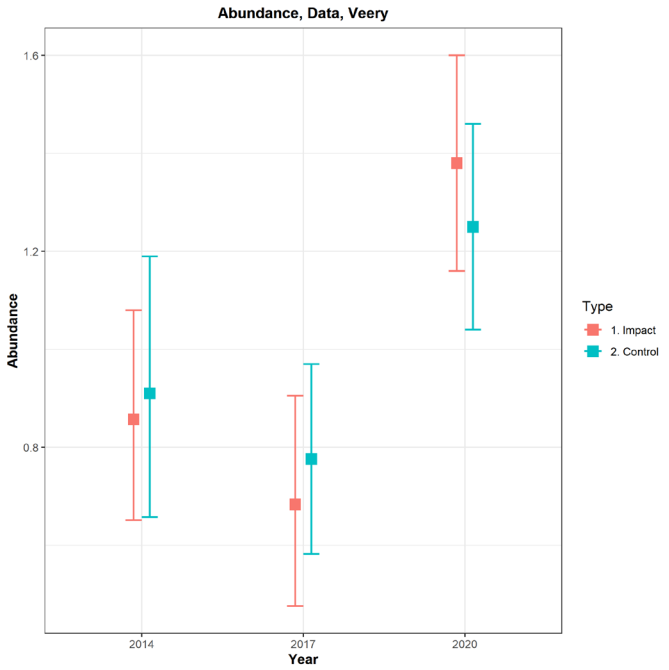


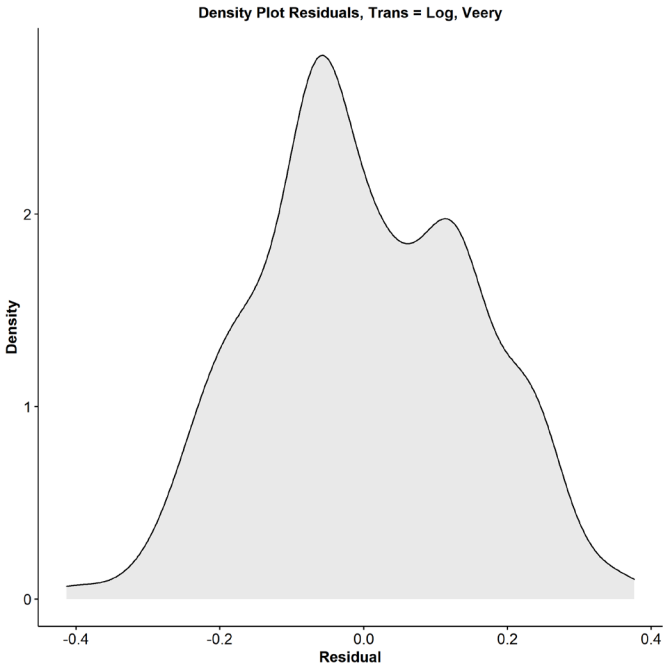


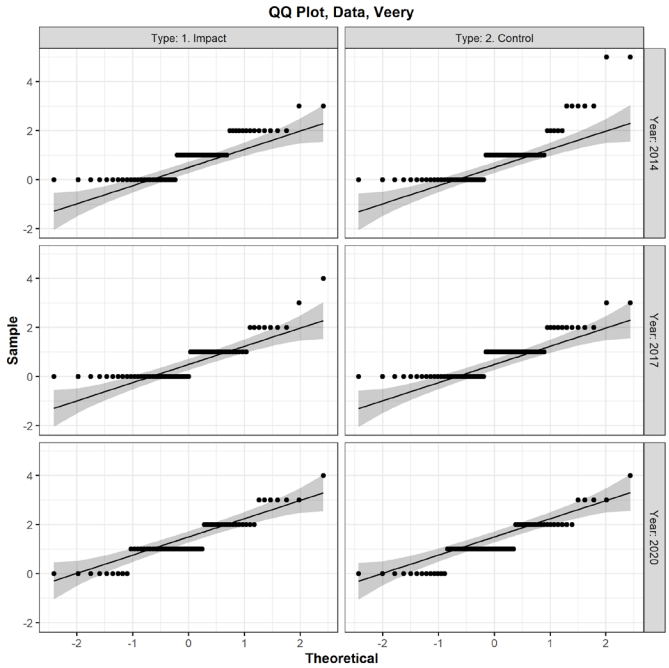


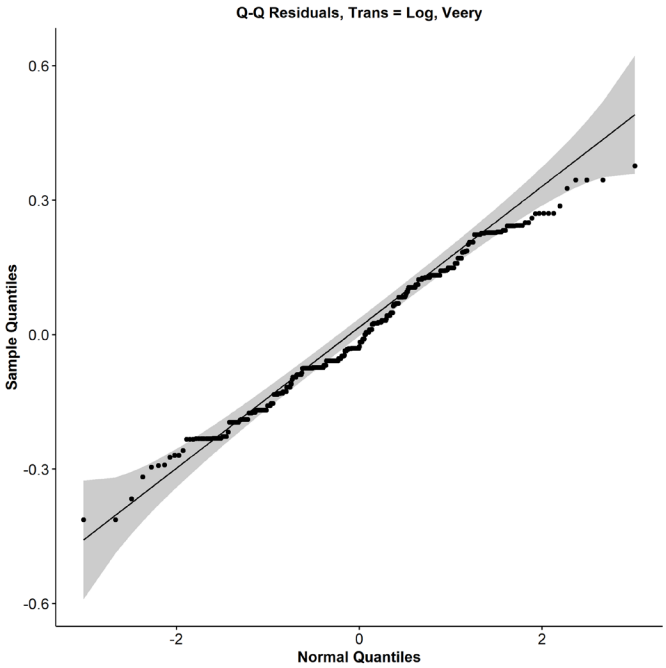


Non-species of Conservation Concern – Veery Abundance

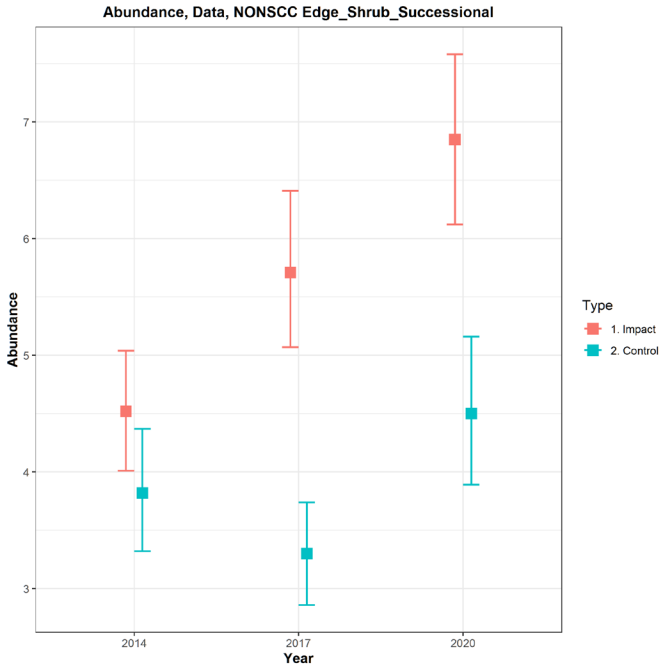


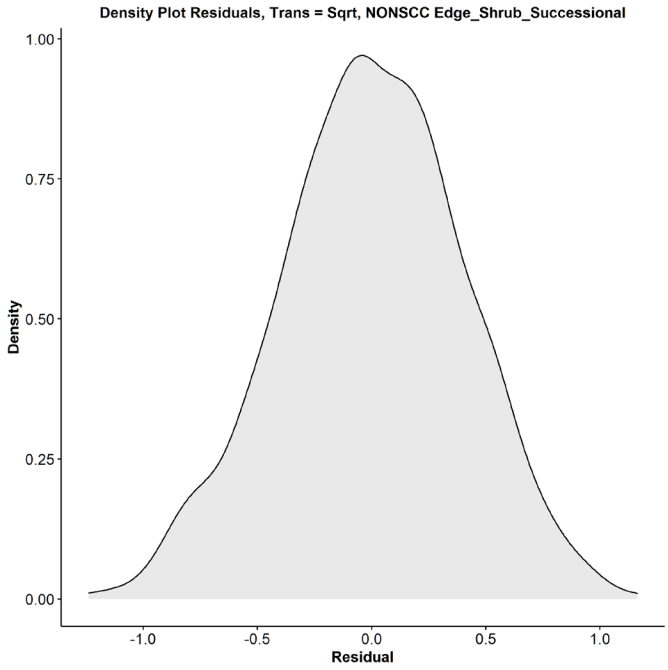


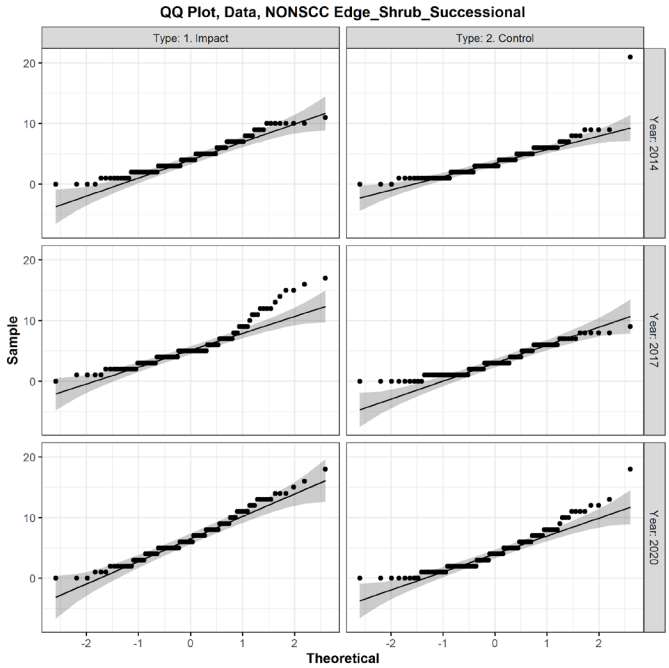


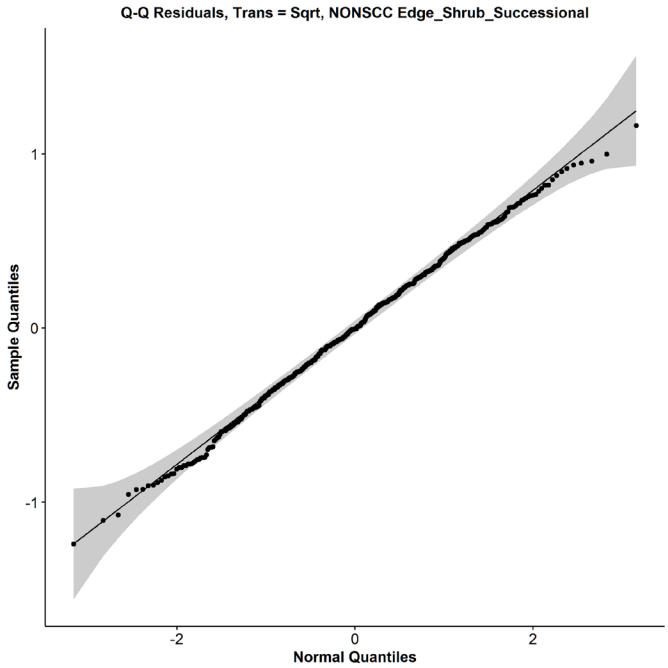


Non-species of Conservation Concern – Edge/Shrub/Successional Guild Abundance

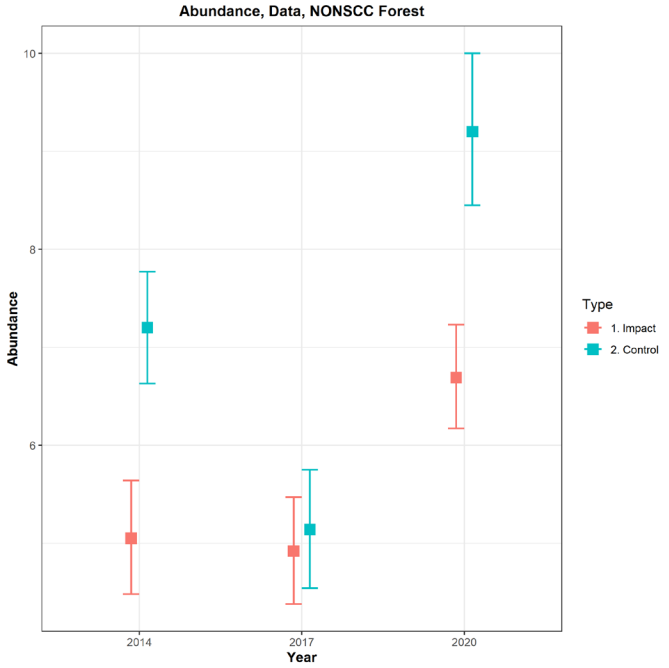


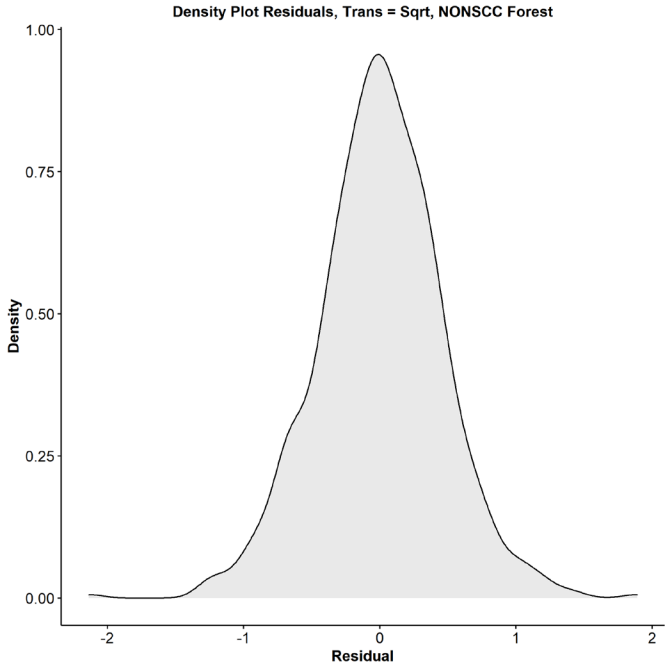


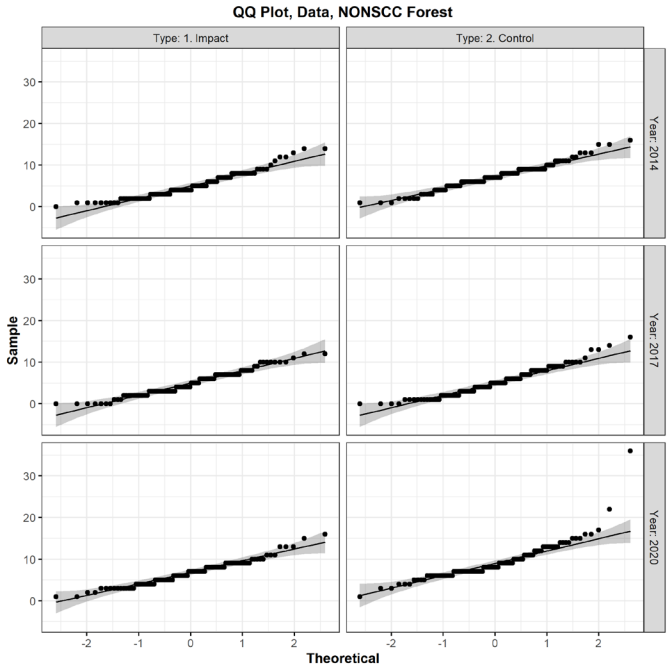


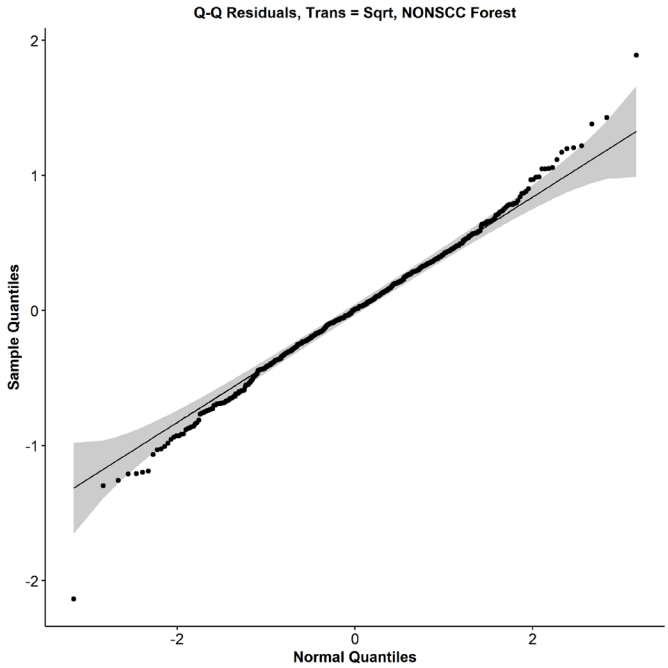


Non-species of Conservation Concern – Forest Guild Abundance

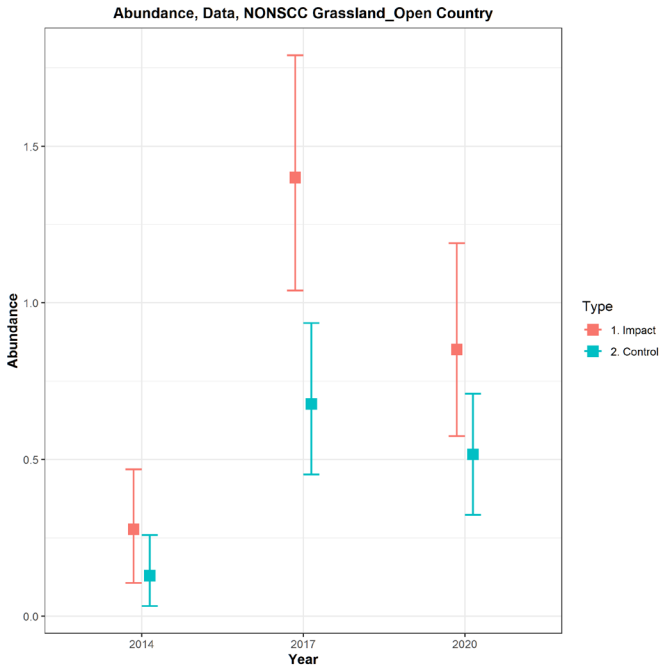


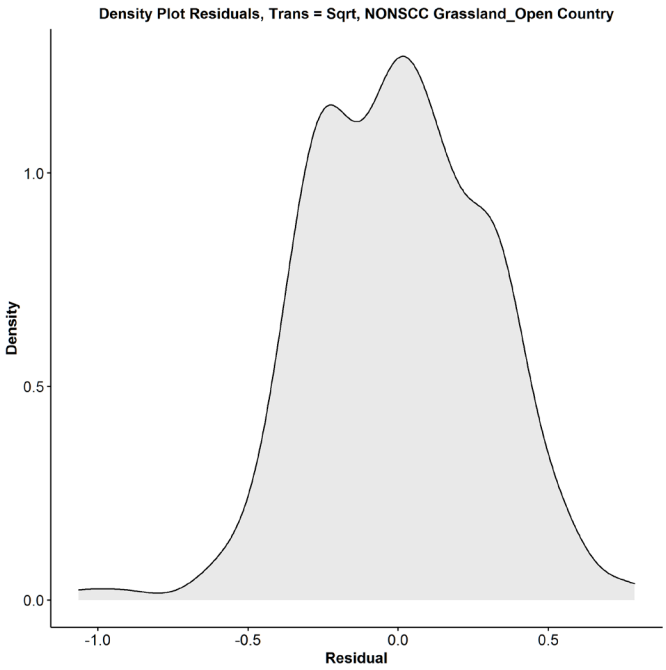


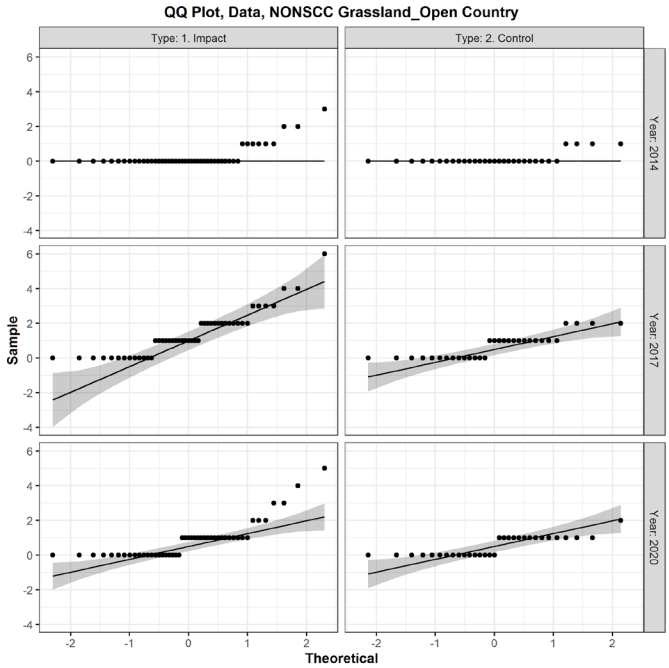


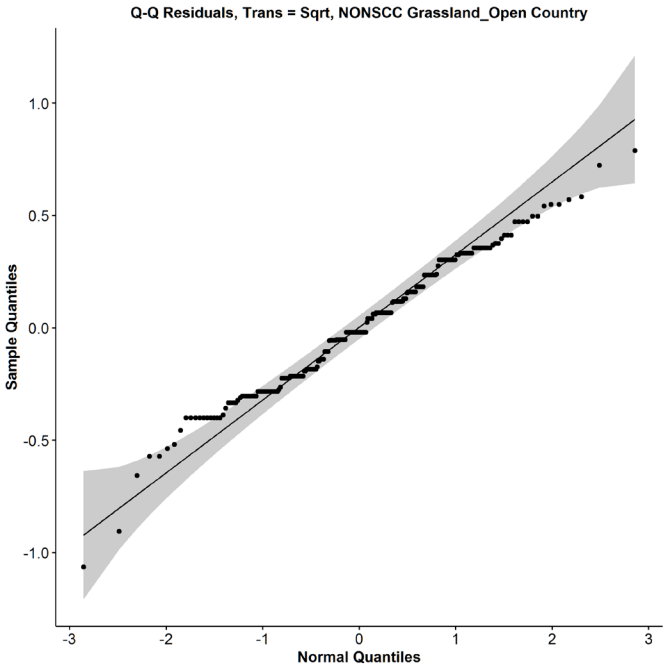


Non-species of Conservation Concern – Grassland/Open Country Guild Abundance

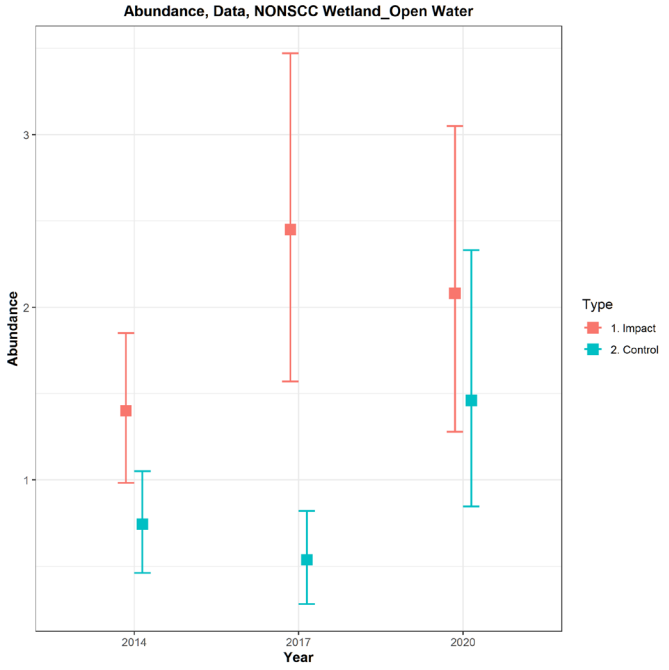


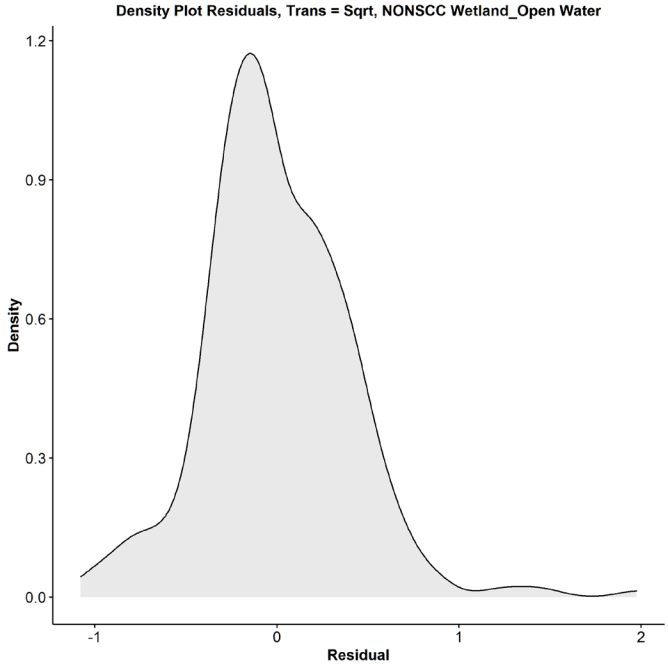


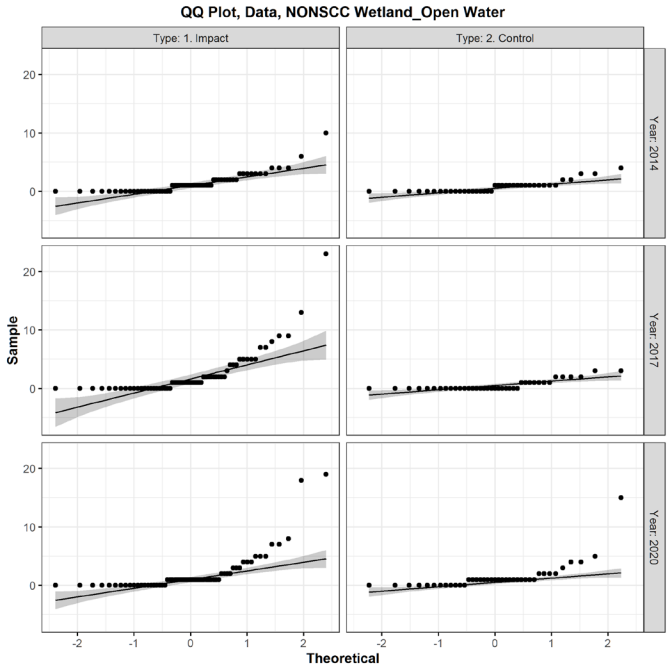


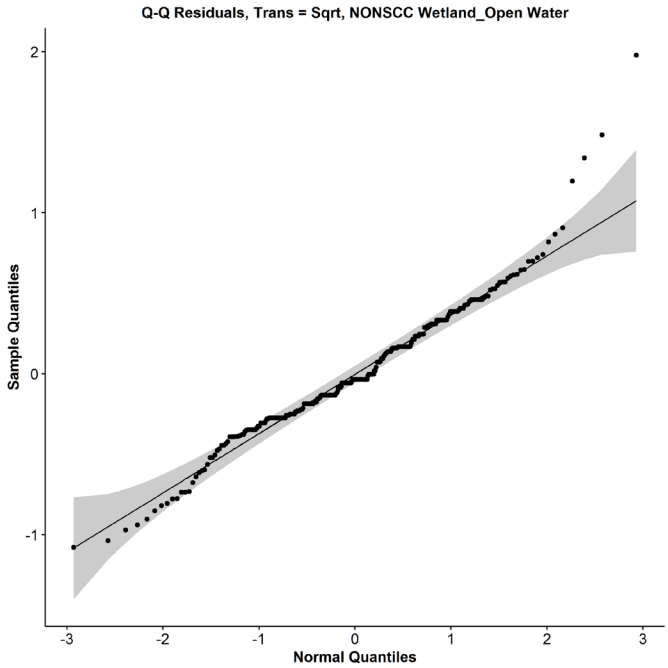


Non-species of Conservation Concern – Wetland/Open Water Guild Abundance

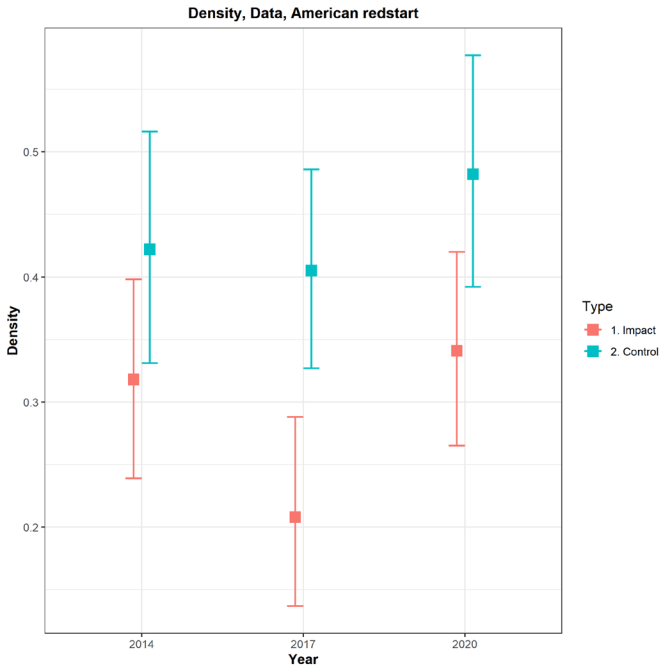


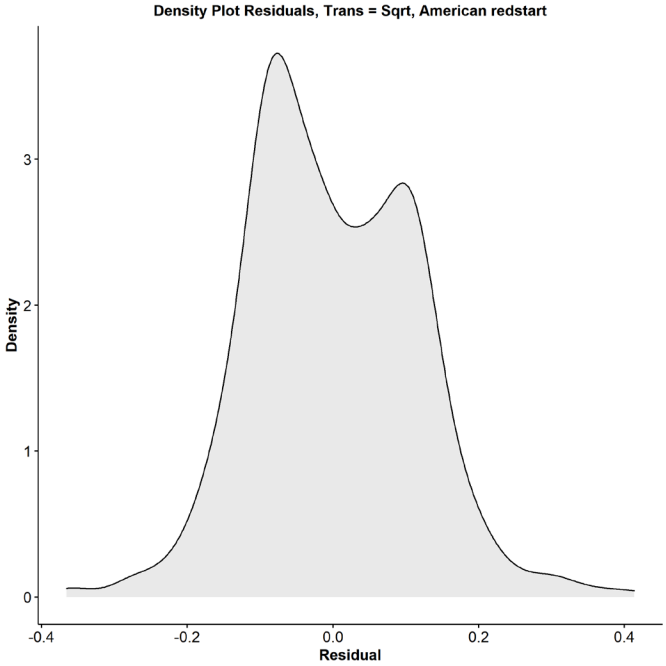


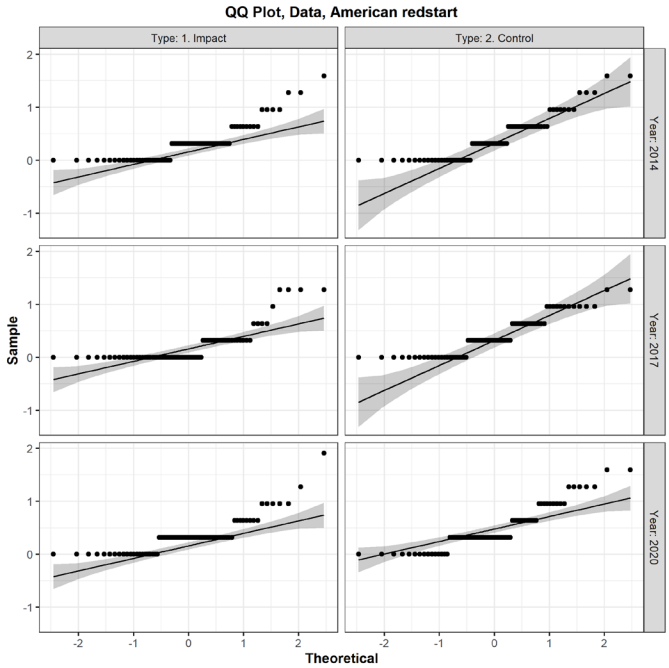


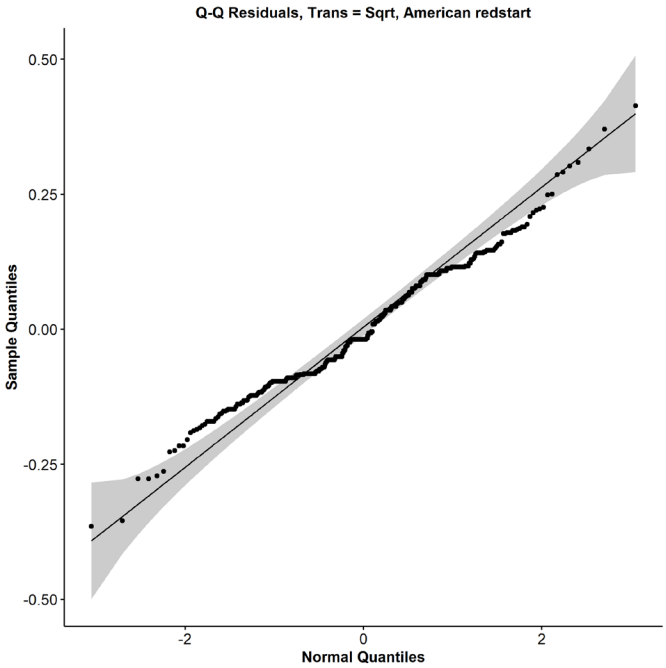


Non-species of Conservation Concern – American Redstart Density

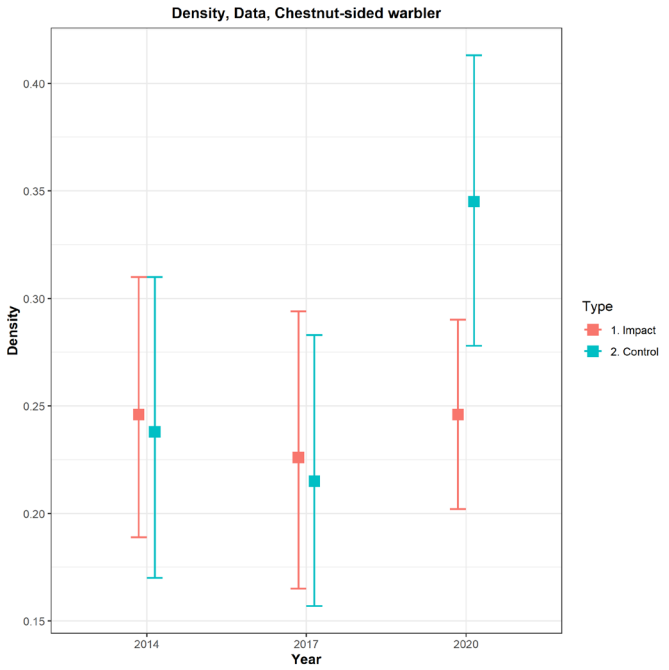


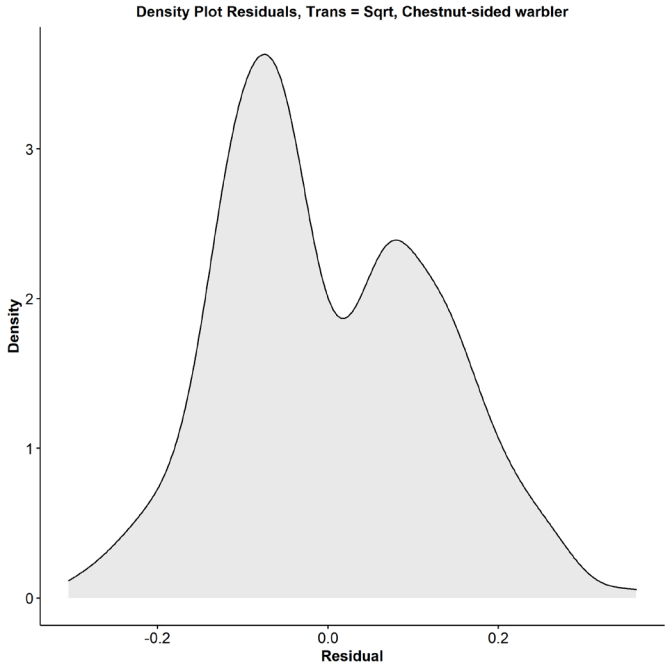


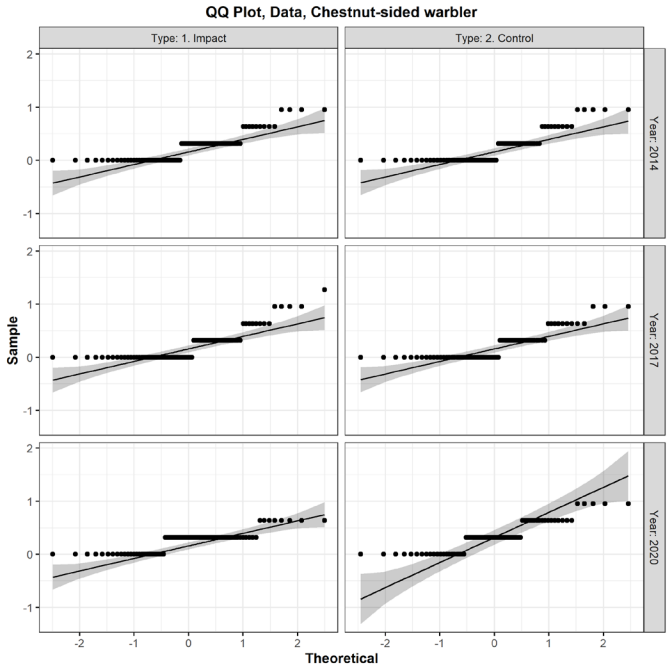


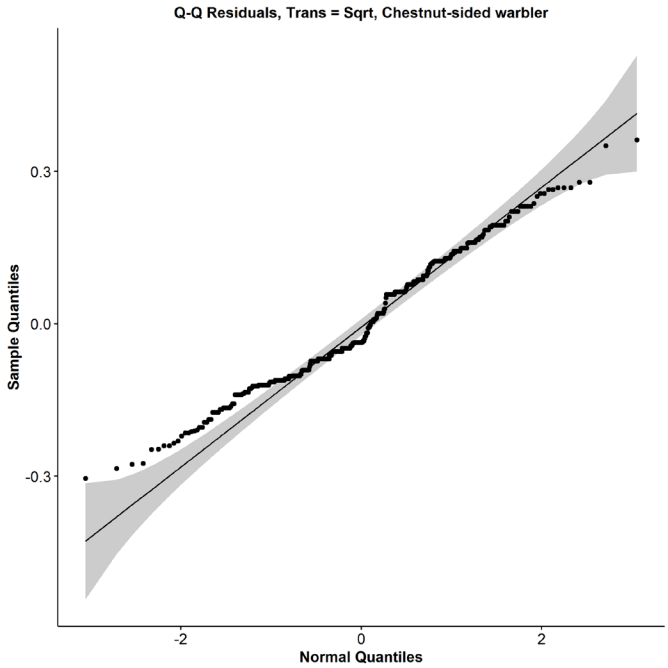


Non-species of Conservation Concern – Chestnut-sided Warbler Density



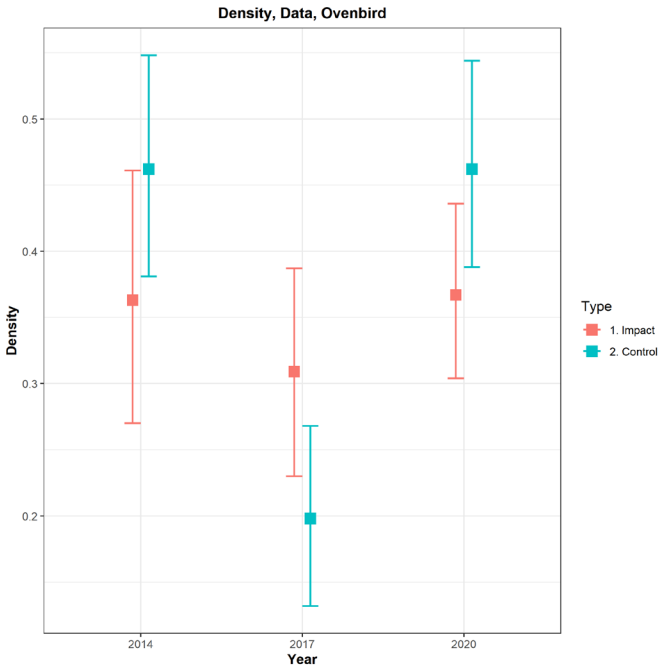


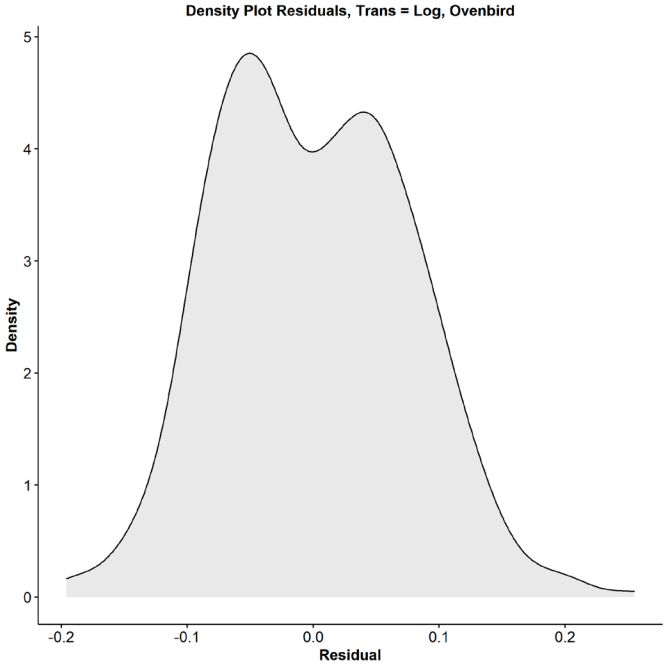


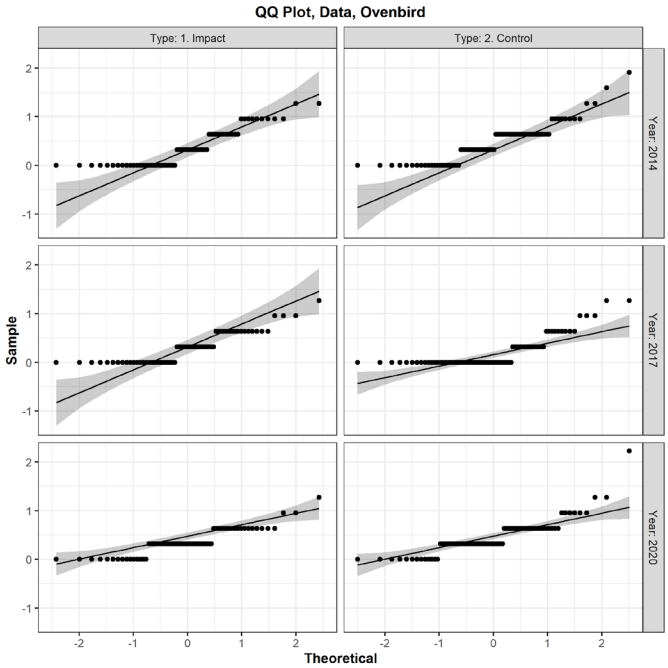


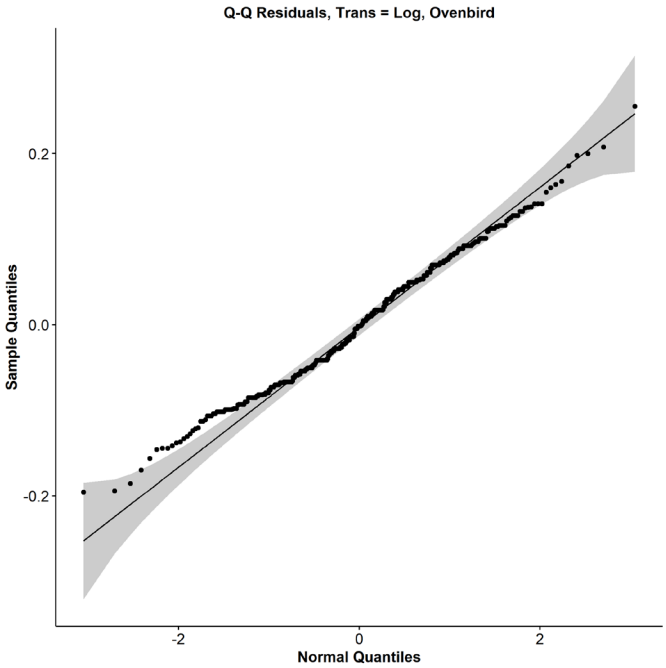
Non-species of Conservation Concern – Ovenbird

Density

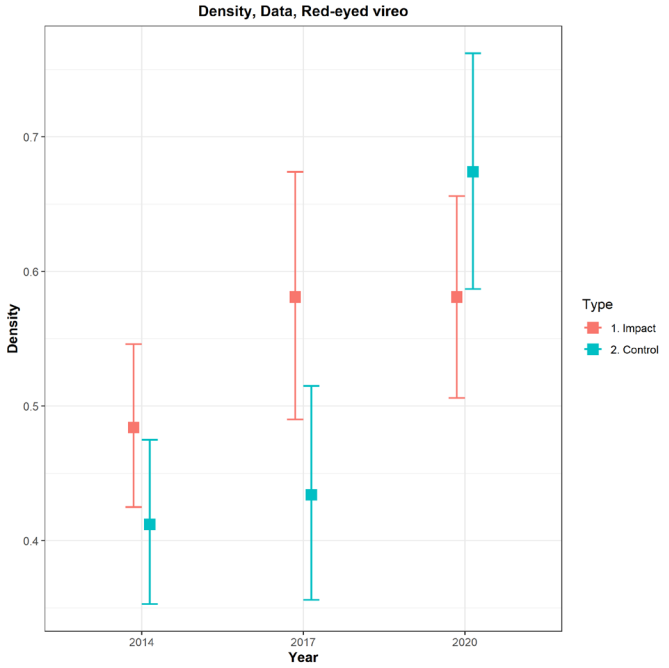


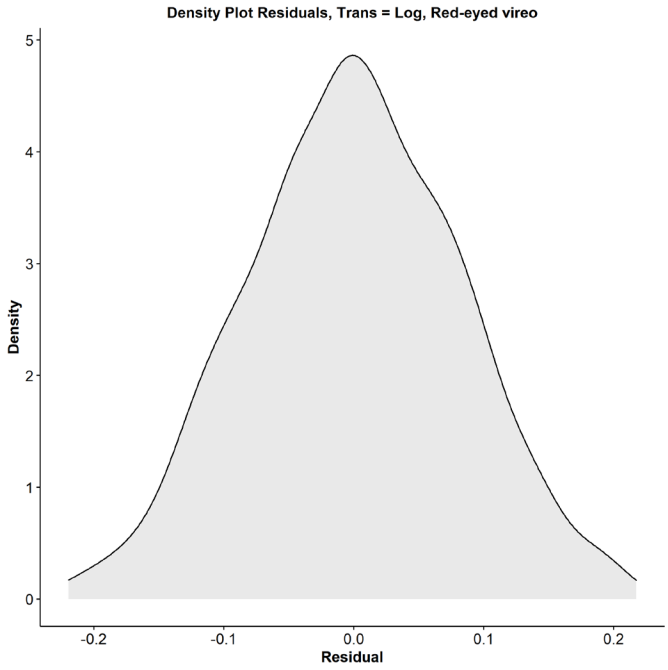


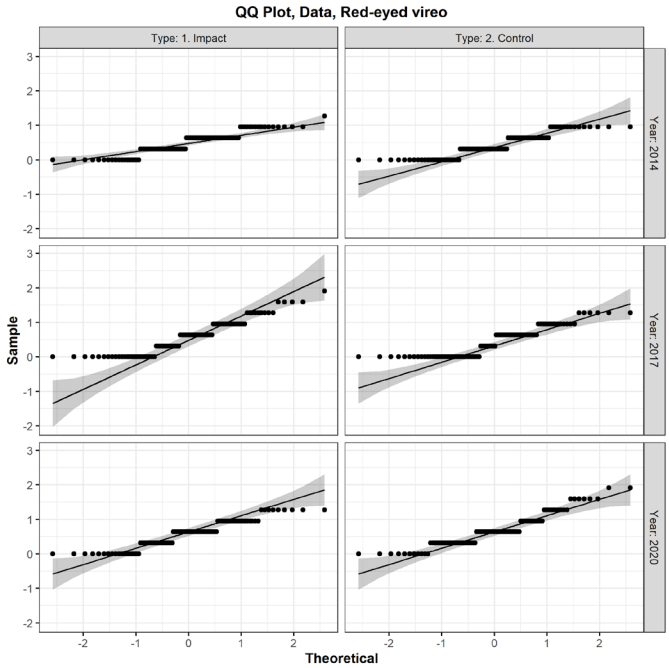


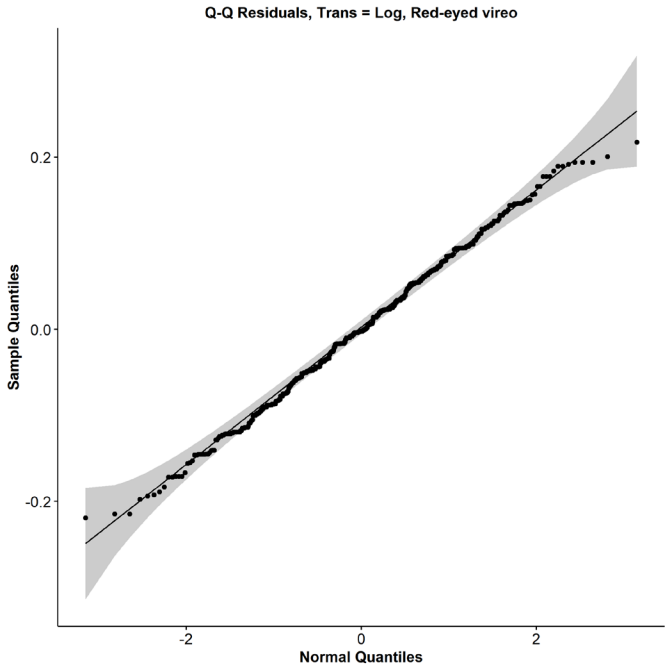


Non-species of Conservation Concern – Red-eyed Vireo Density

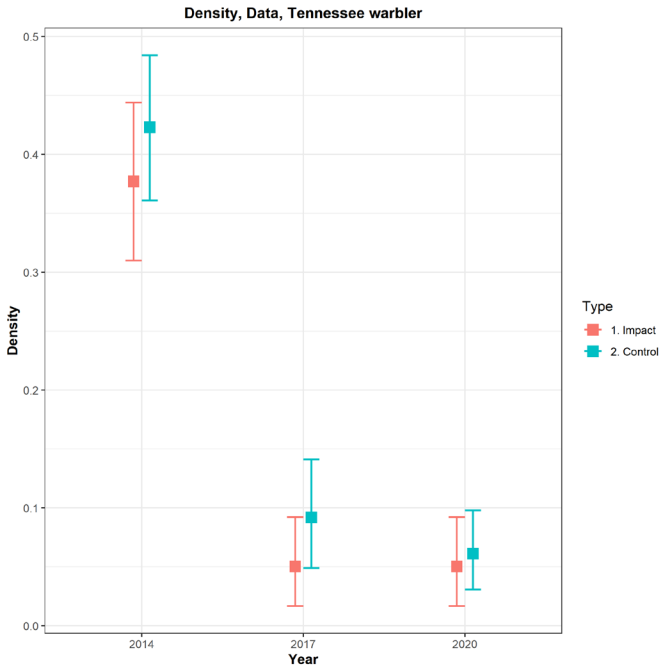


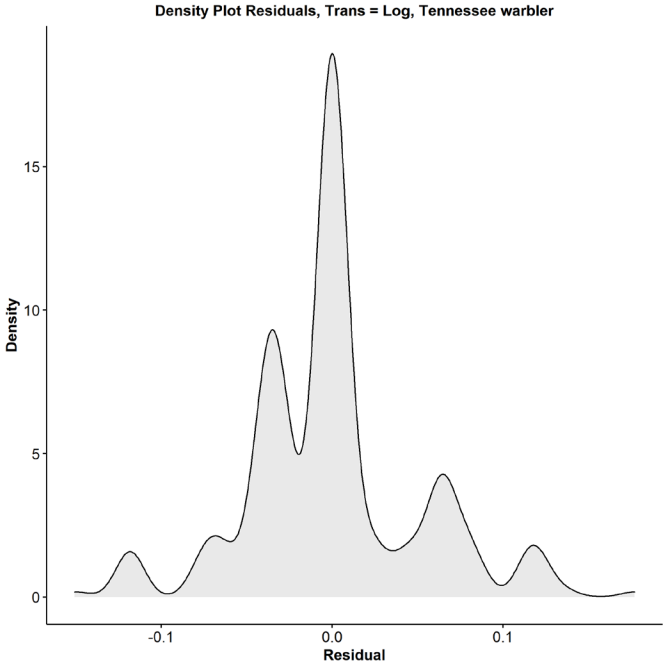


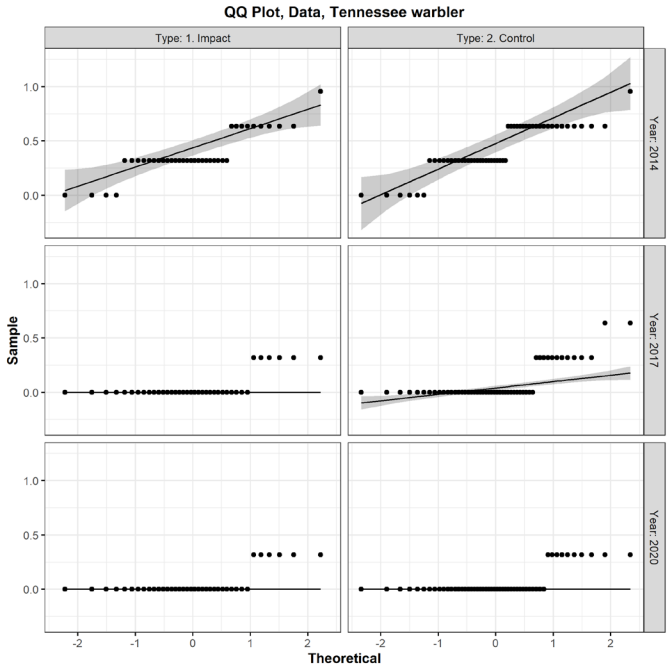


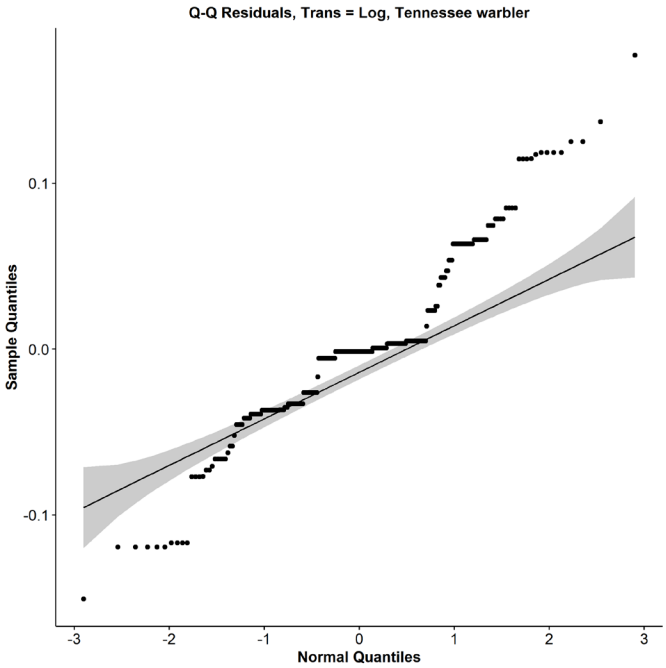


Non-species of Conservation Concern – Tennessee Warbler Density

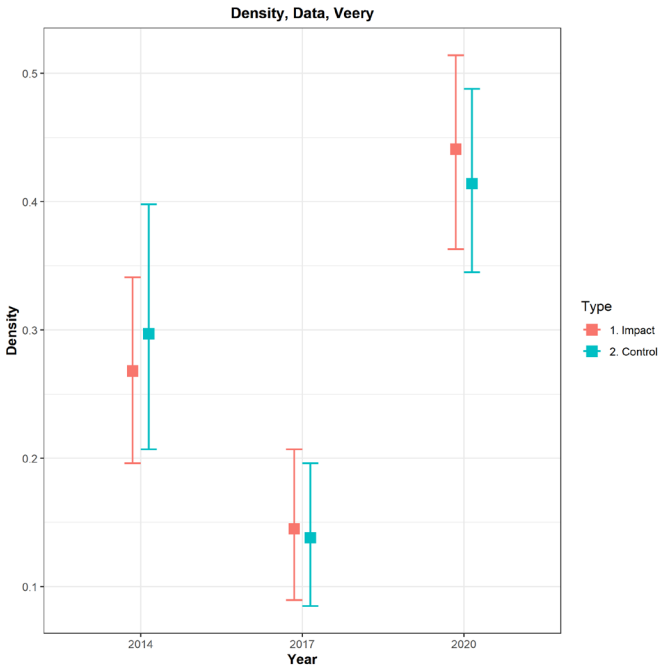


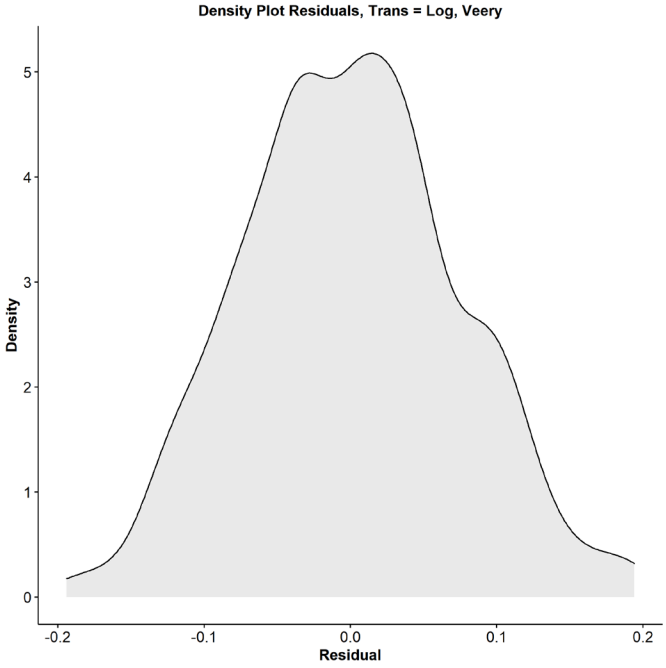


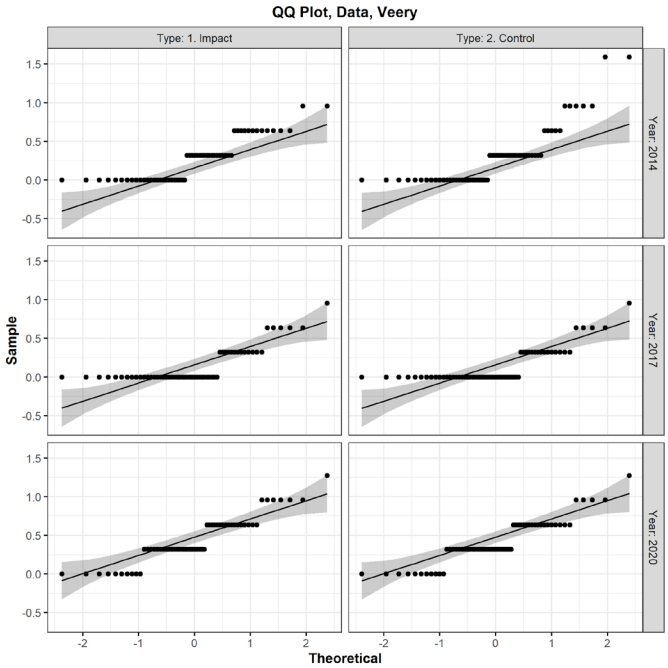


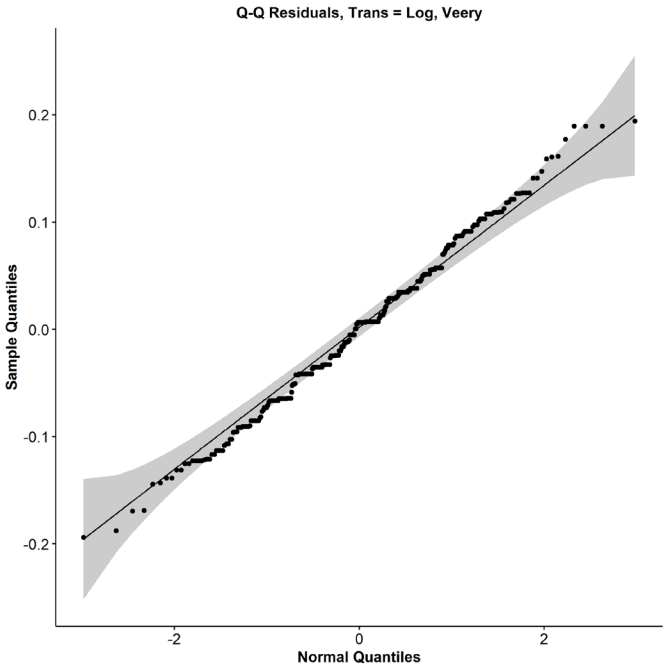


Non-species of Conservation Concern – Veery Density

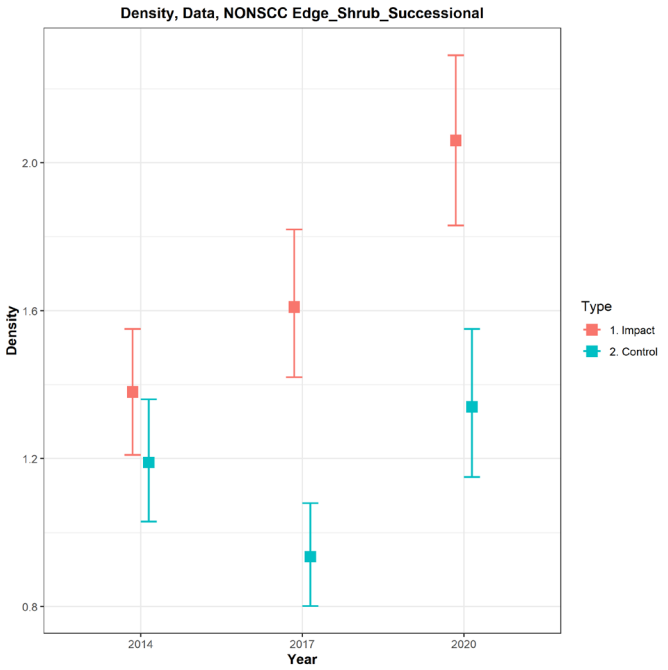


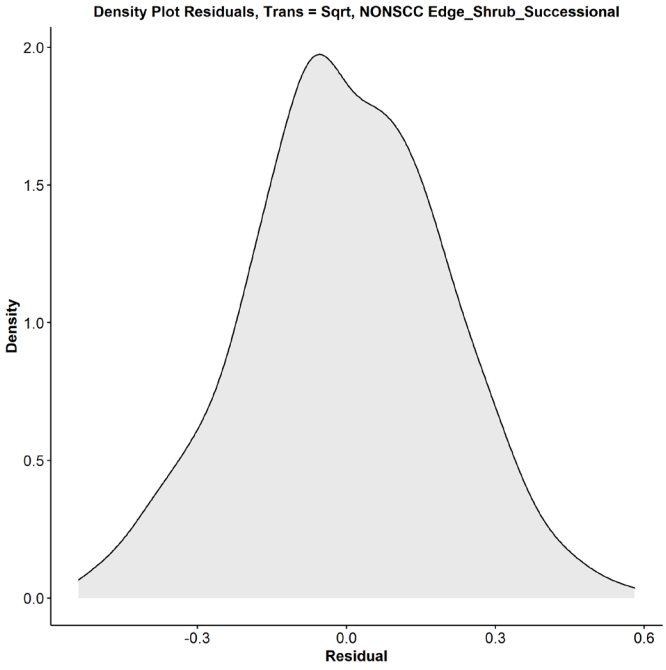


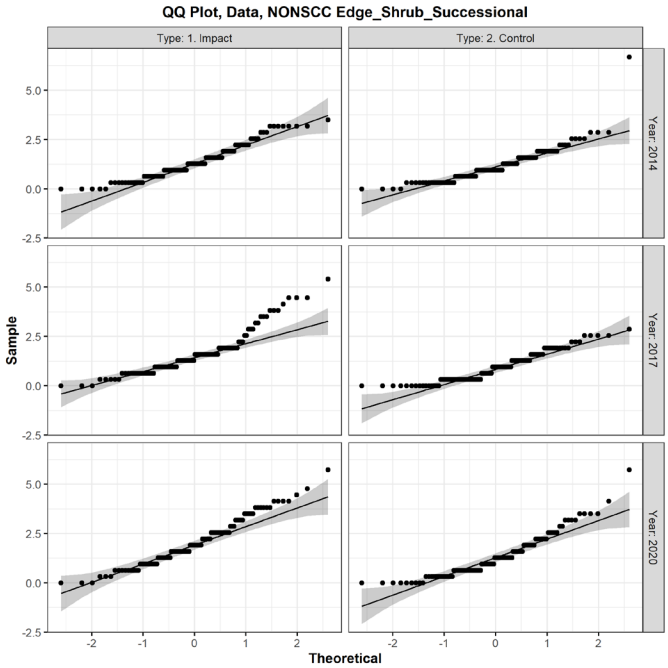


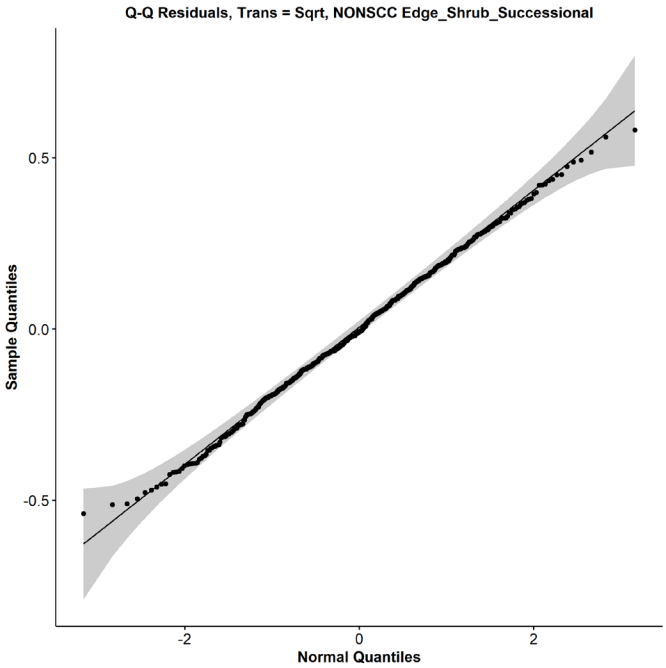


Non-species of Conservation Concern – Edge/Shrub/Successional Guild Density

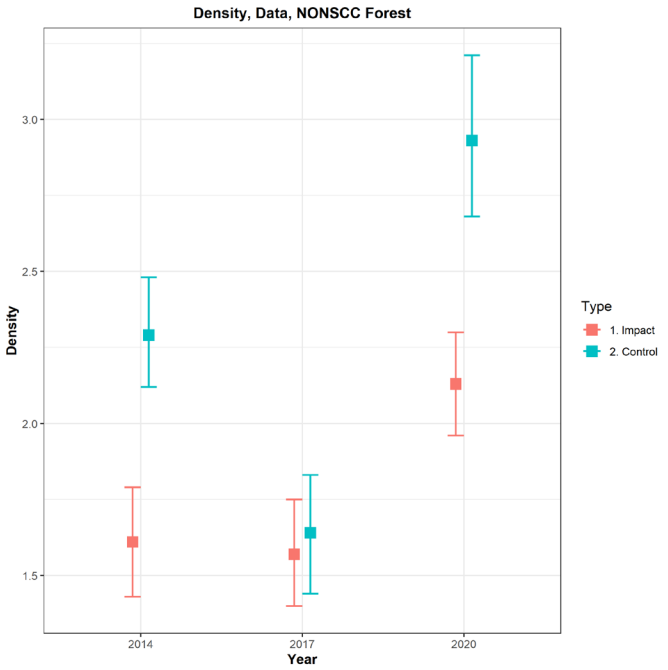


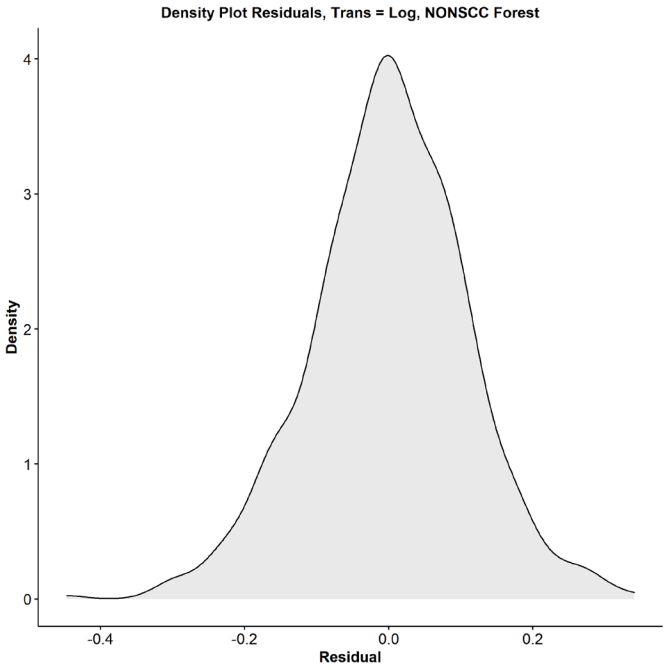


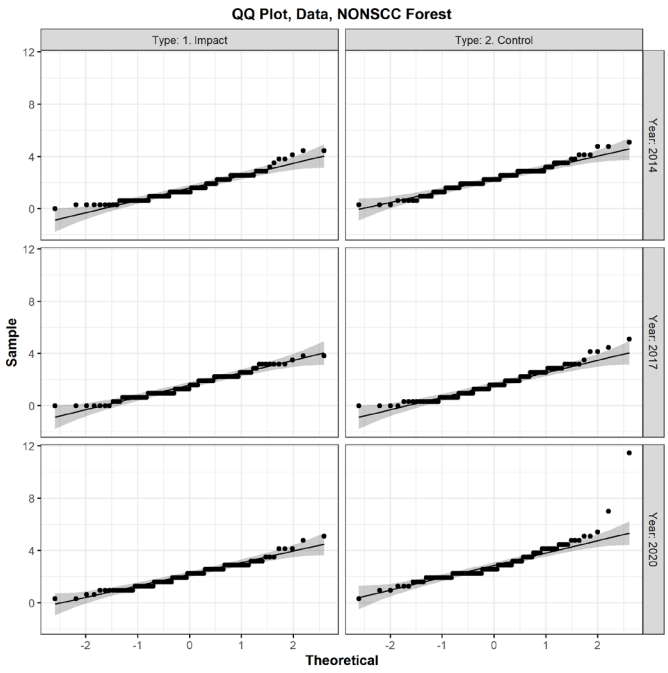


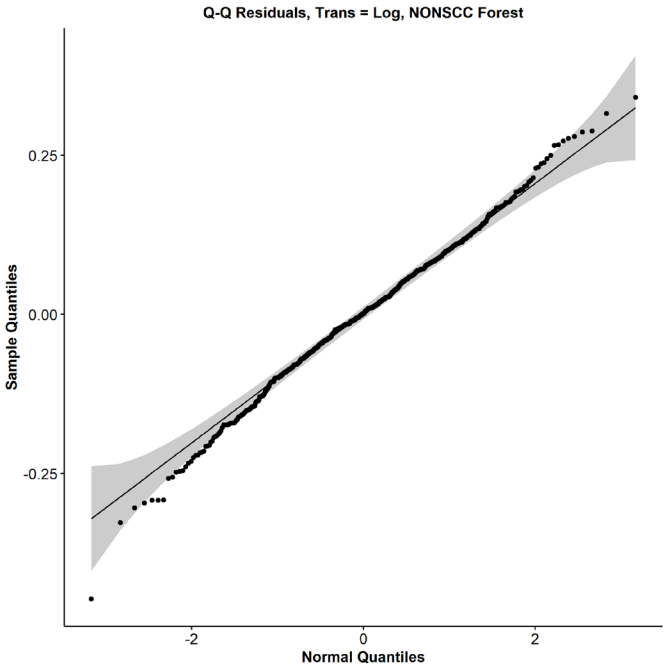


Non-species of Conservation Concern – Forest Guild Density

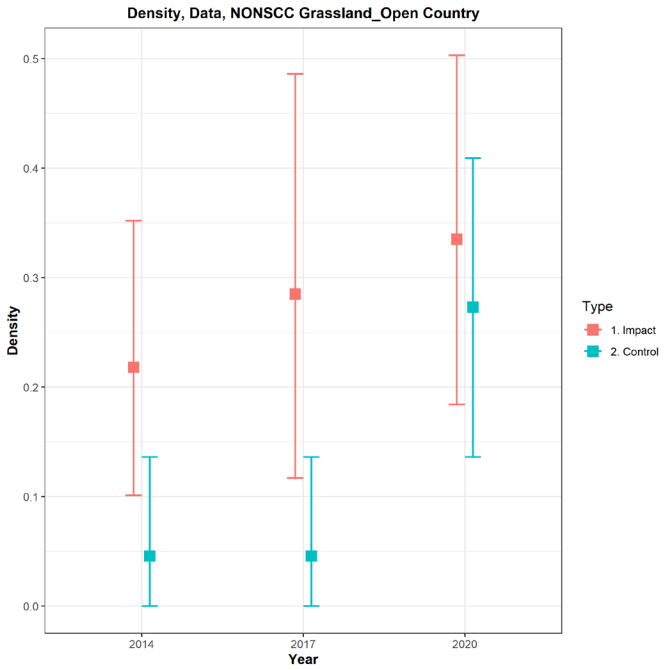


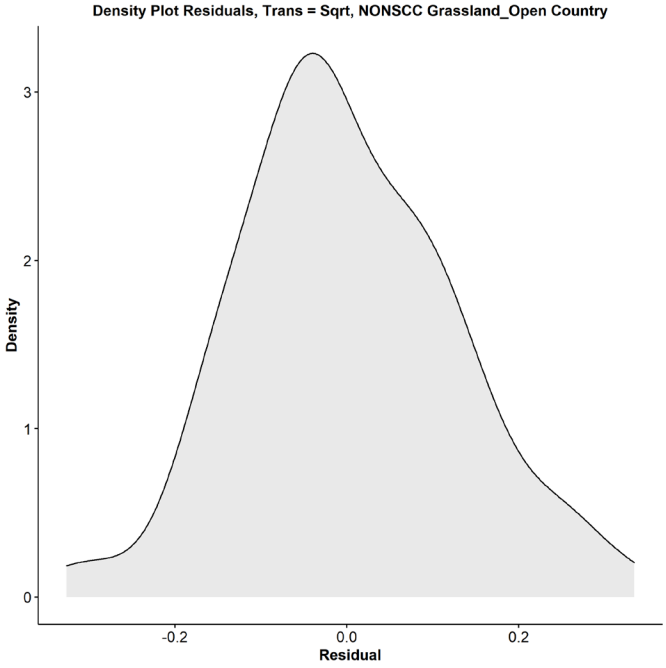


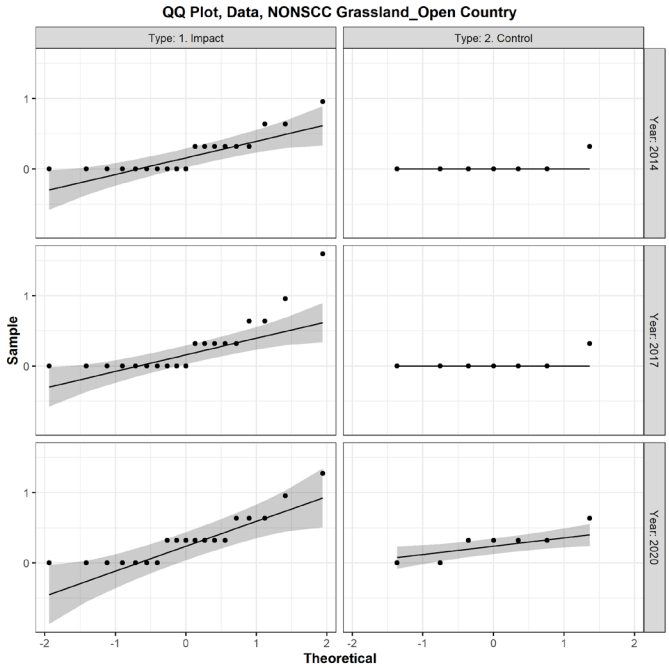


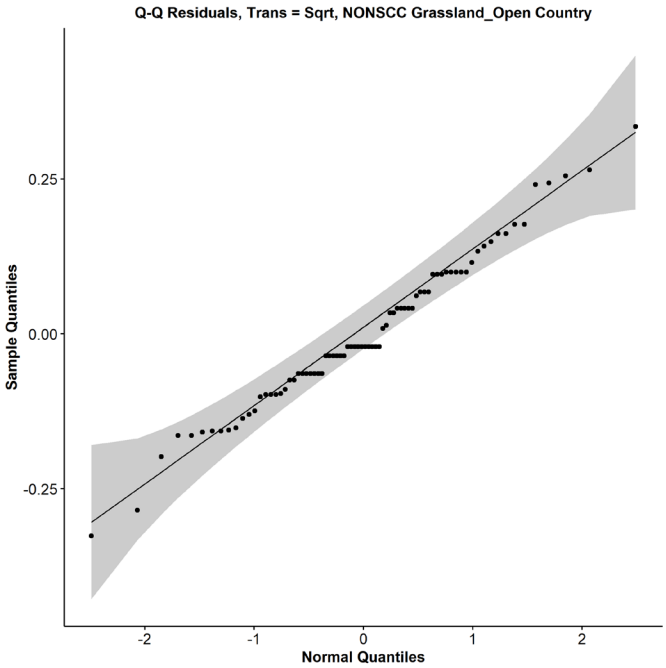


Non-species of Conservation Concern – Grassland/Open Country Guild Density

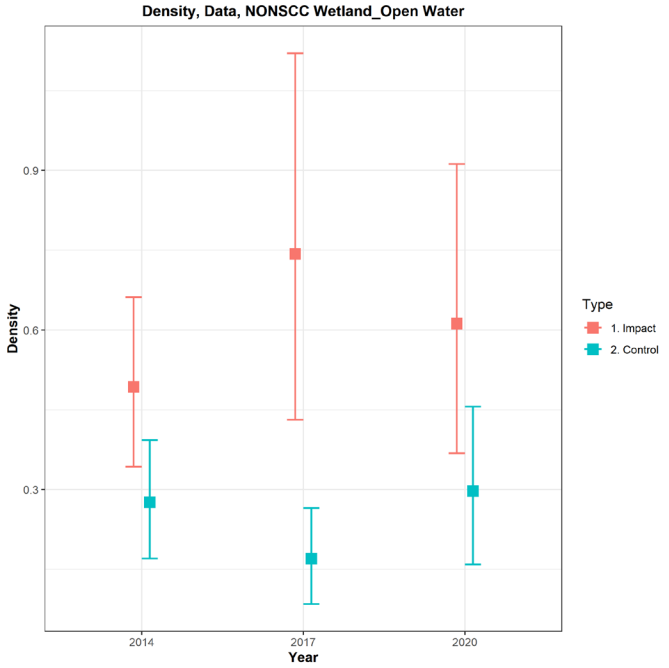


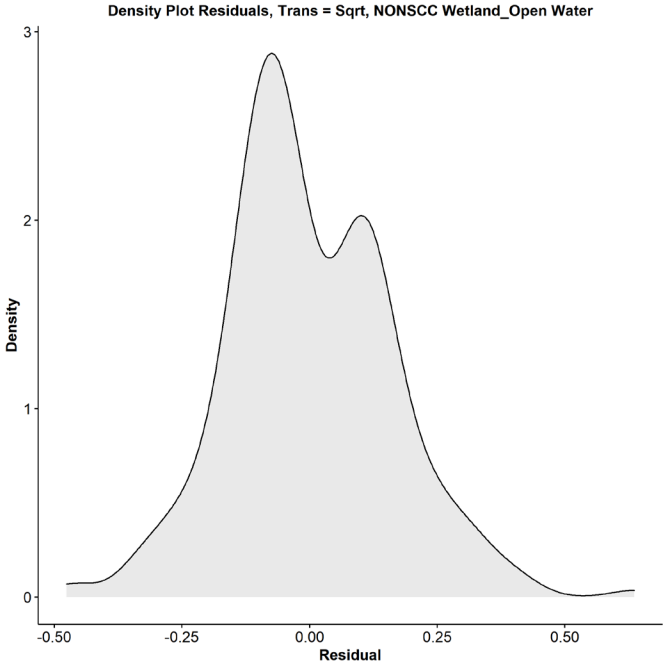


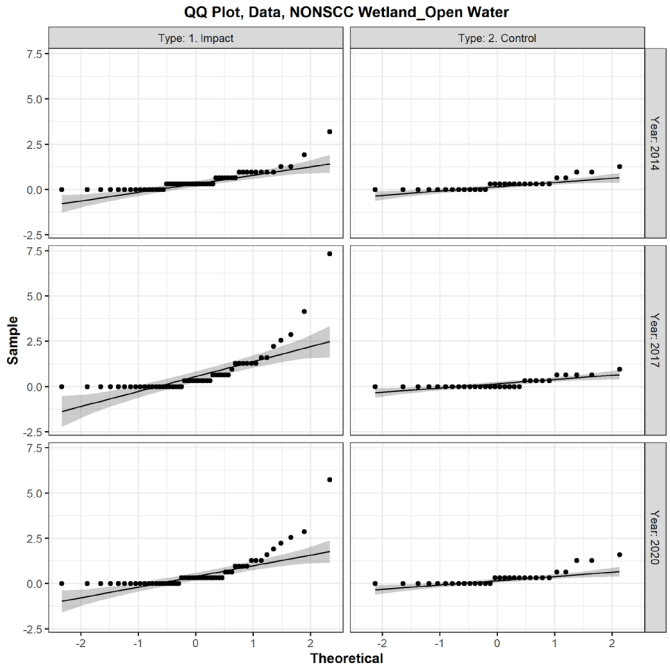


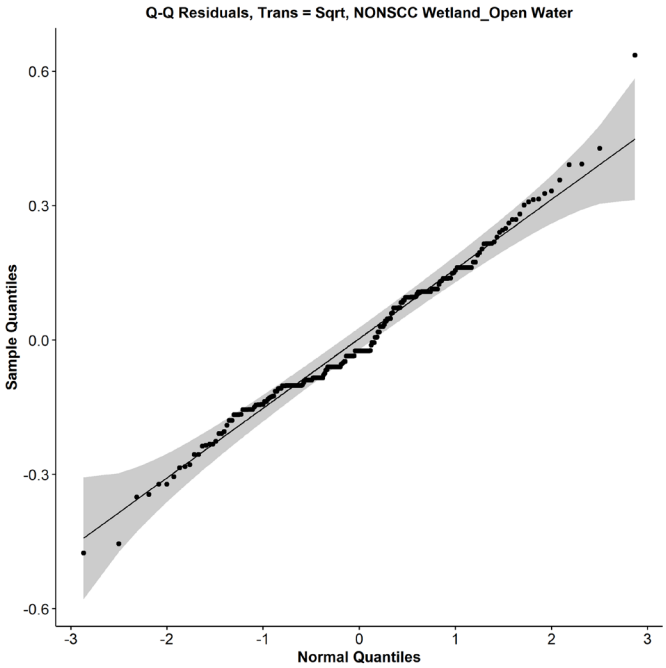


Non-species of Conservation Concern – Wetland/Open Water Guild Density

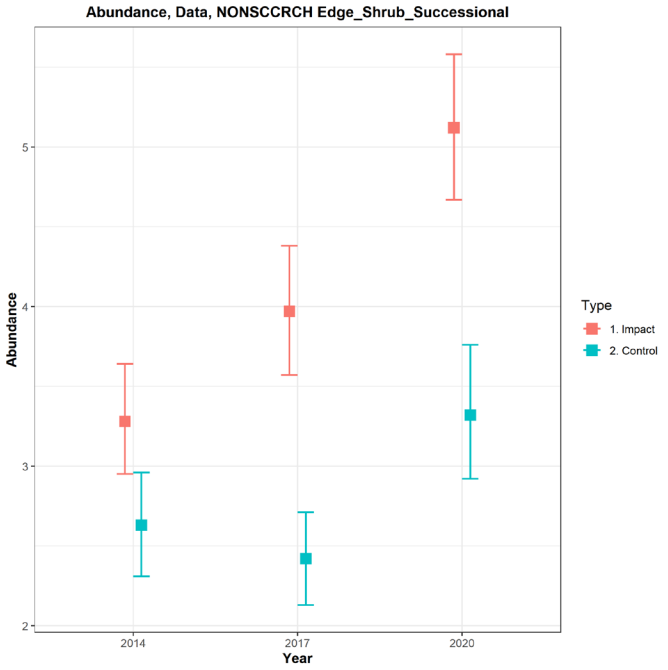


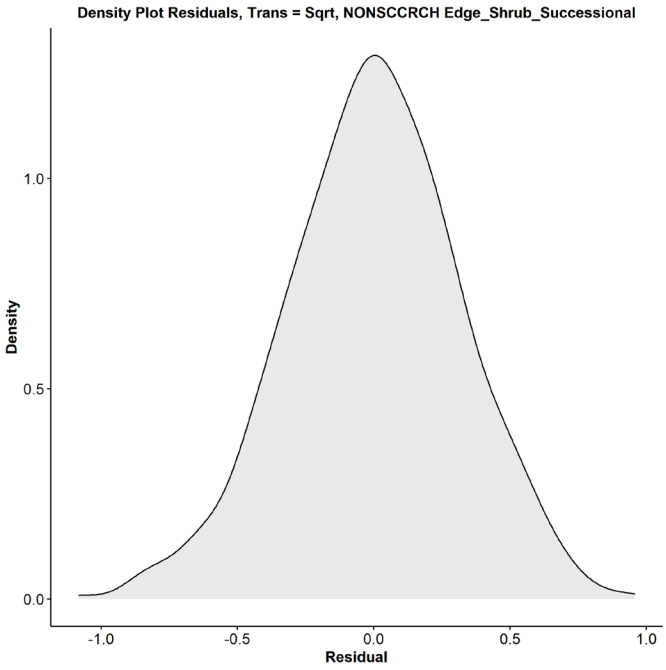


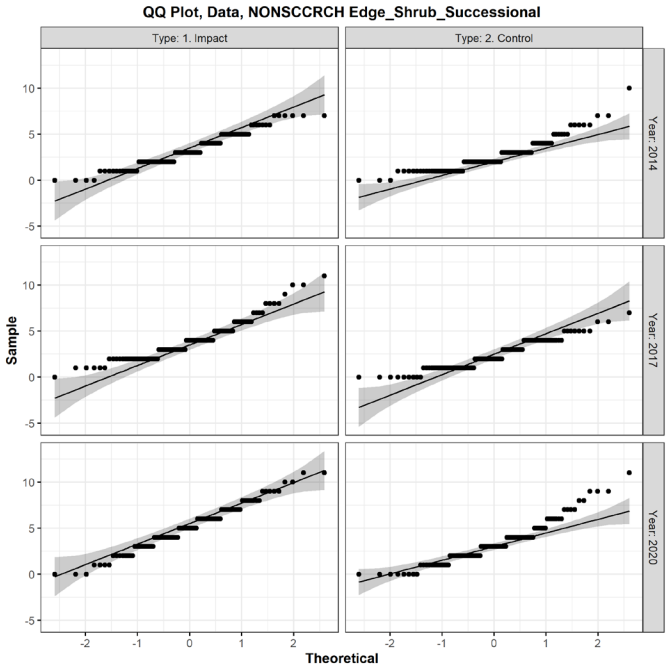


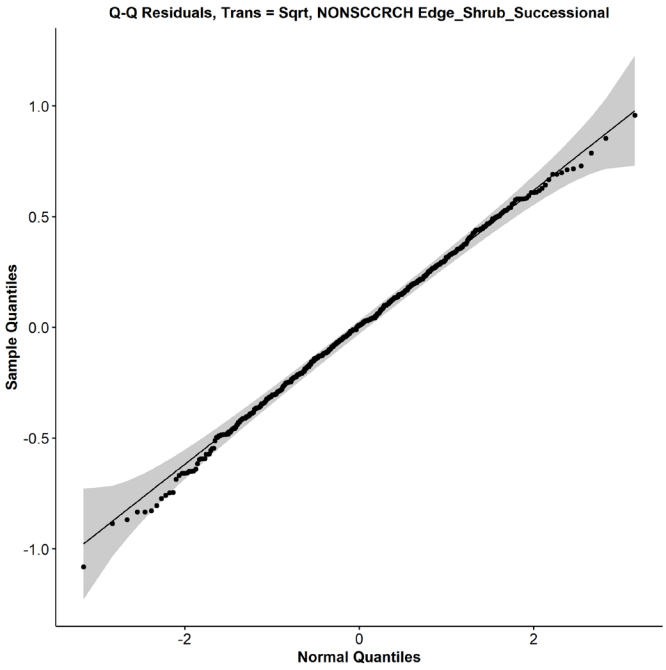


Non-species of Conservation Concern – Edge/Shrub/Successional Guild Species Richness

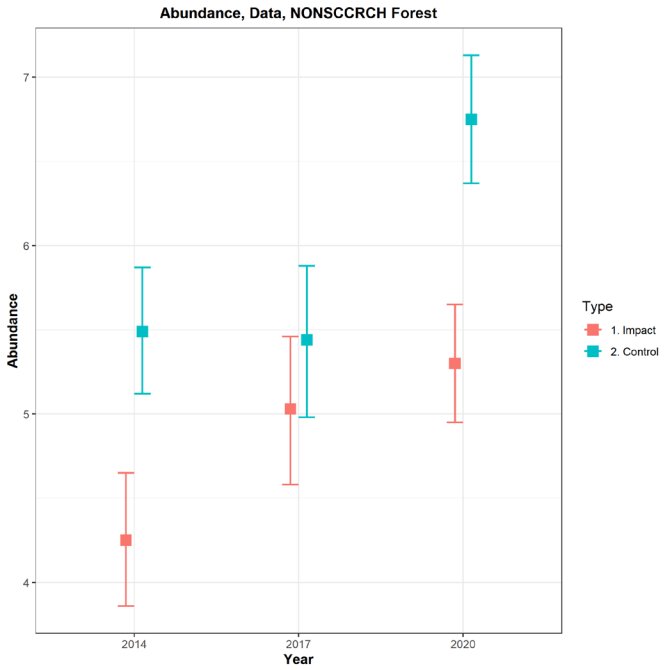


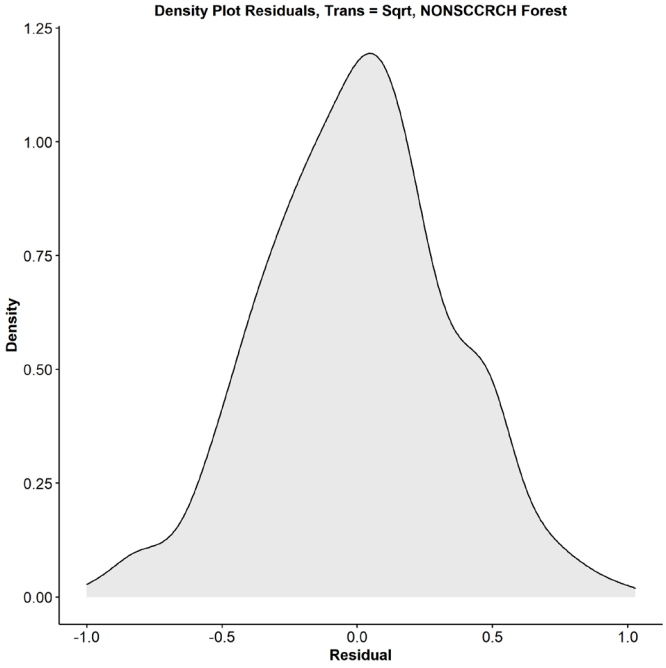


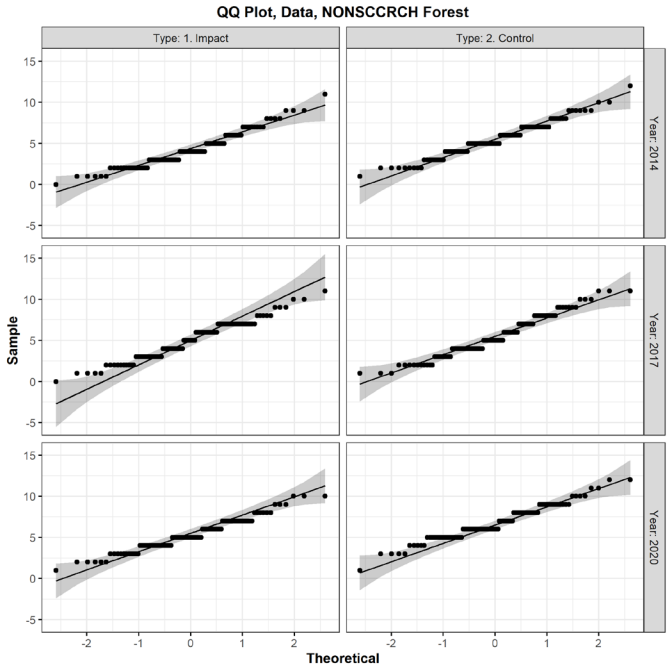


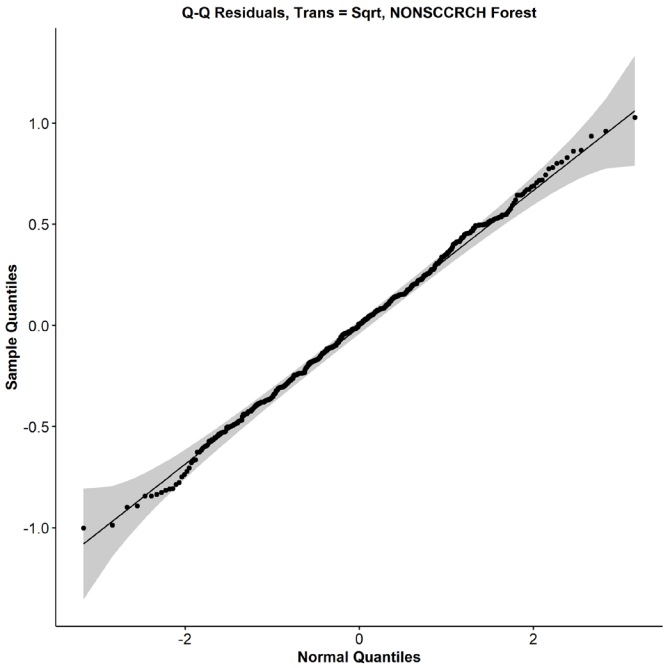


Non-species of Conservation Concern –
Forest Guild Species Richness

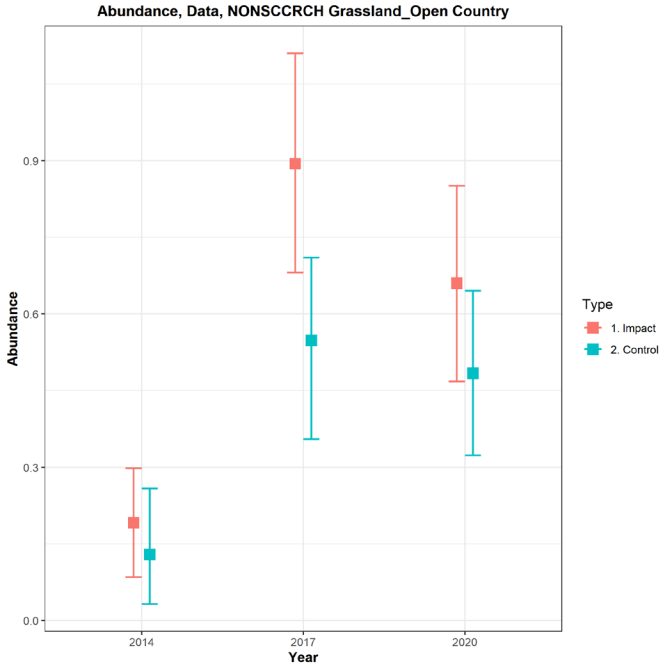


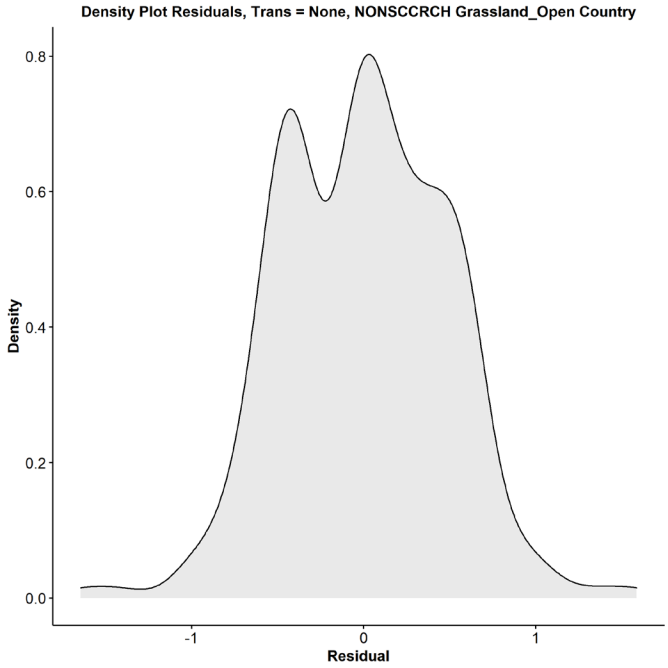


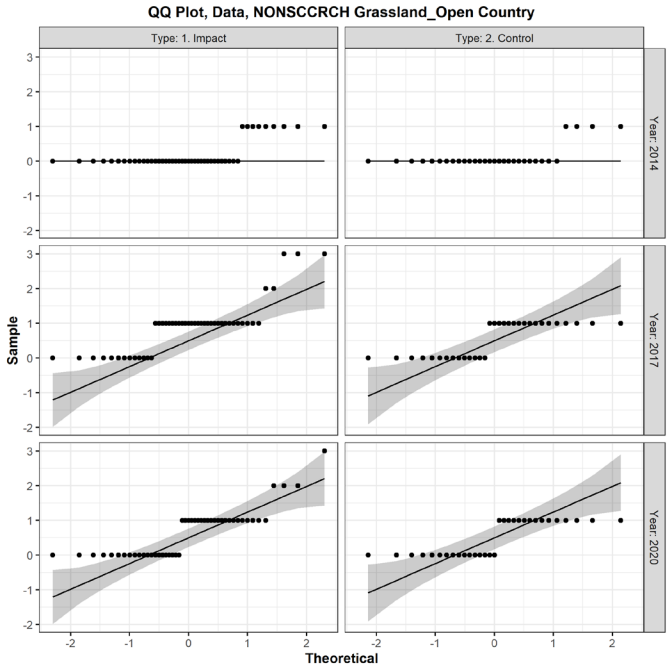


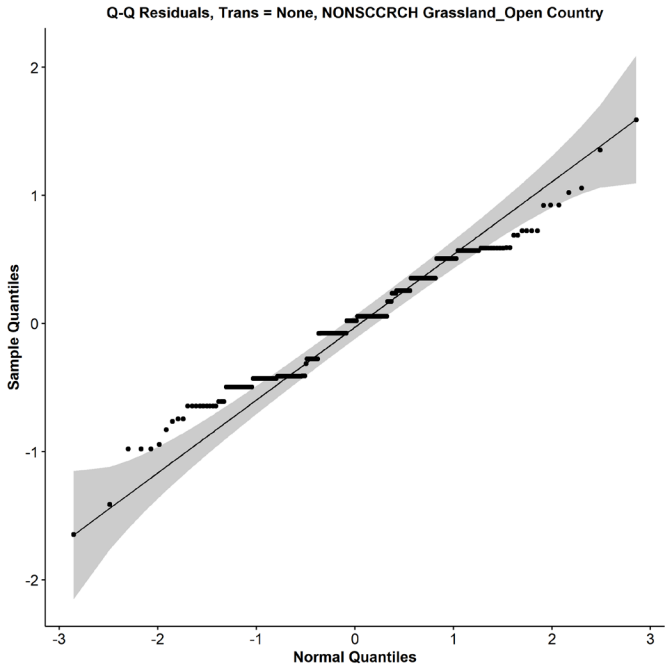


Non-species of Conservation Concern –
Grassland/Open Country Guild Species Richness

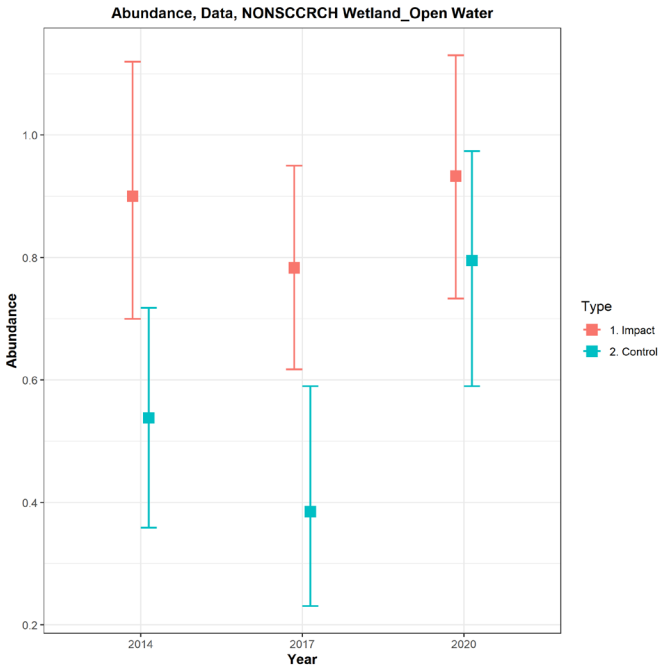


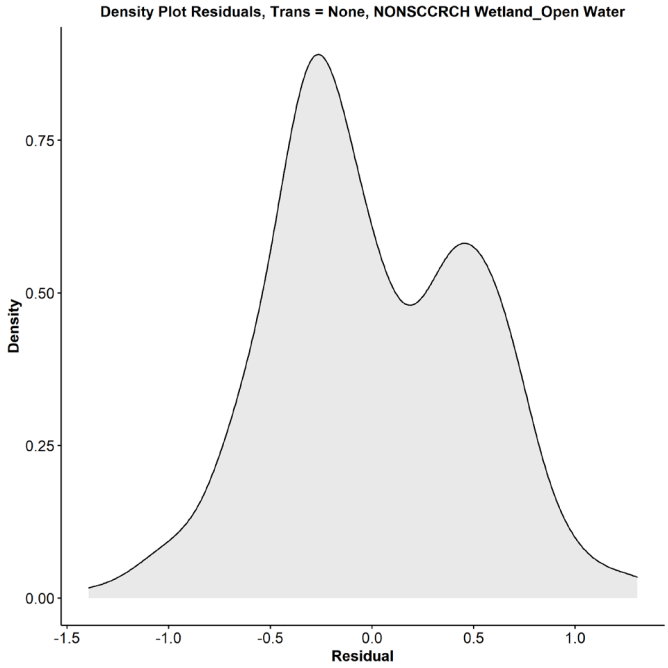


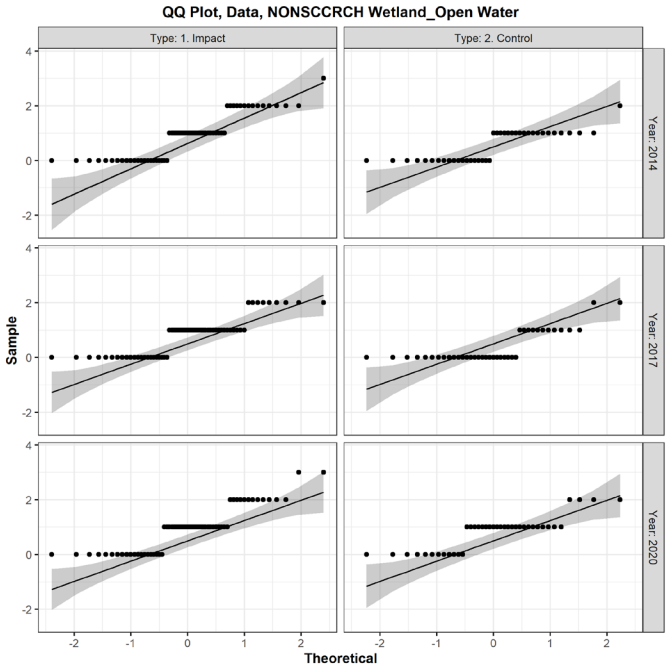


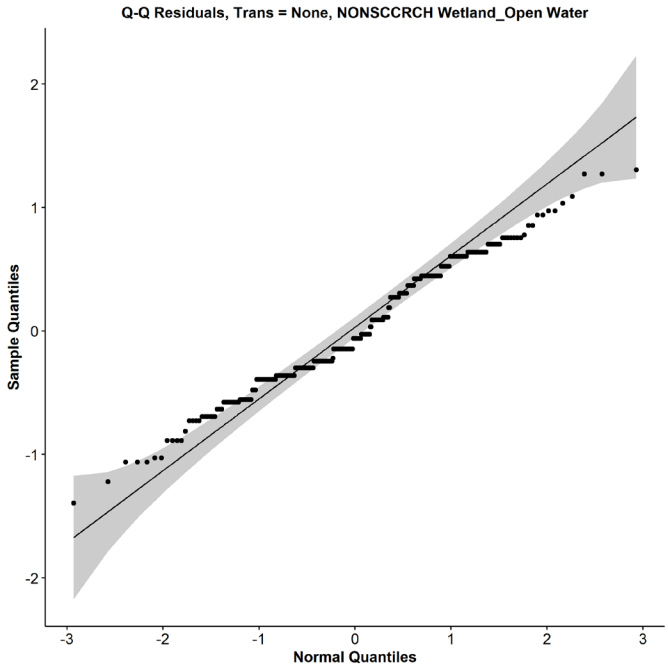


Non-species of Conservation Concern – Wetland/Open Water Guild Species Richness

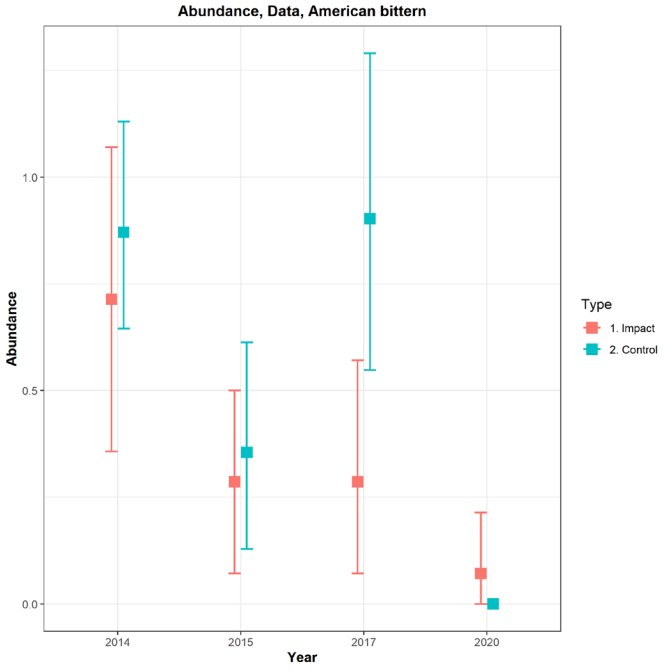


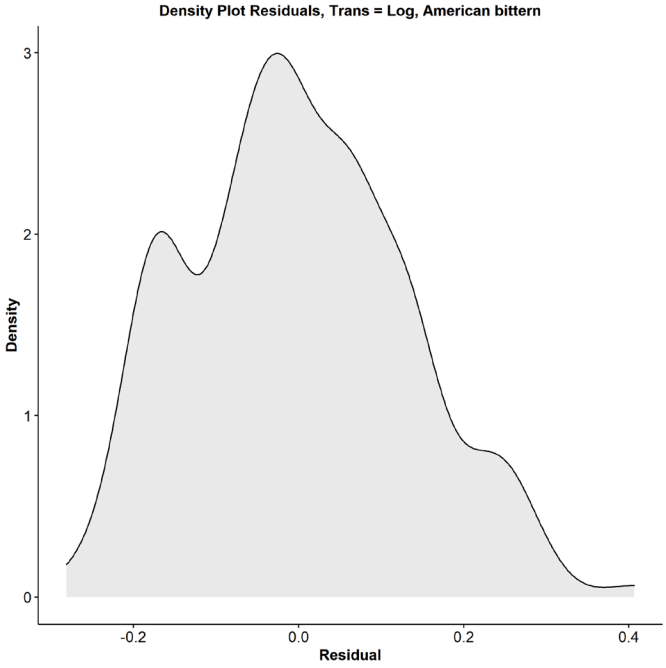


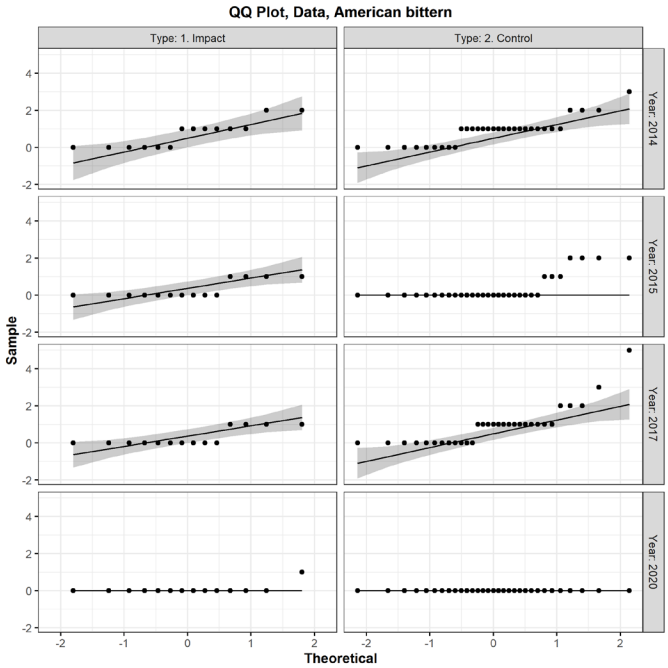


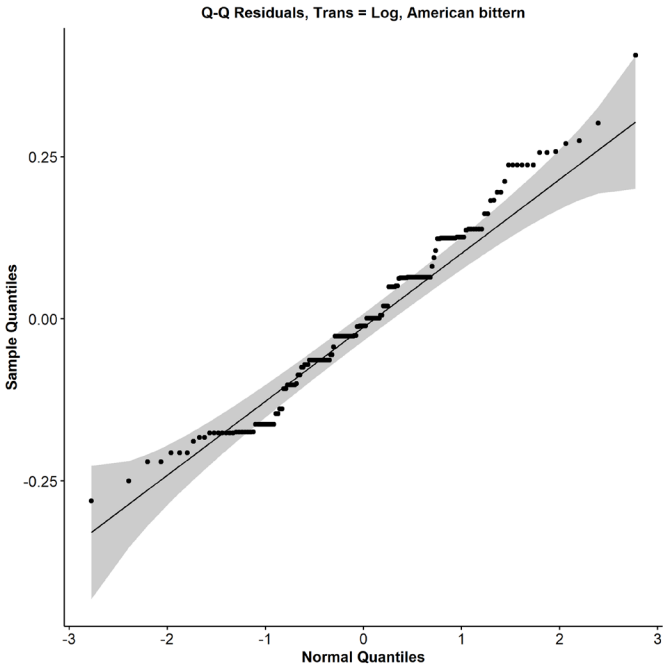


Marsh Birds –
American Bittern Abundance

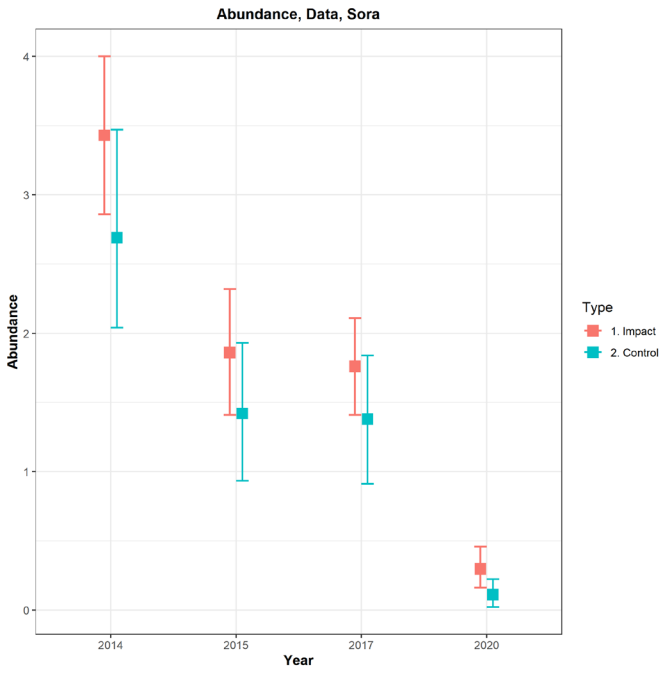


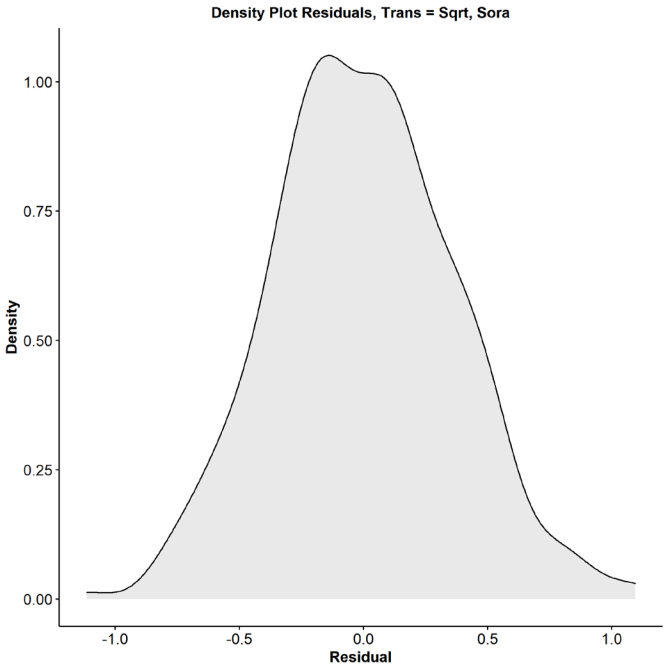


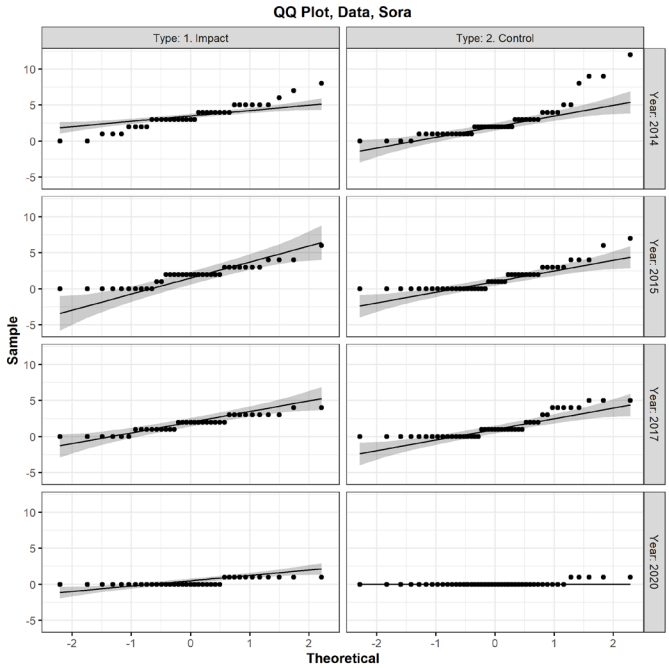


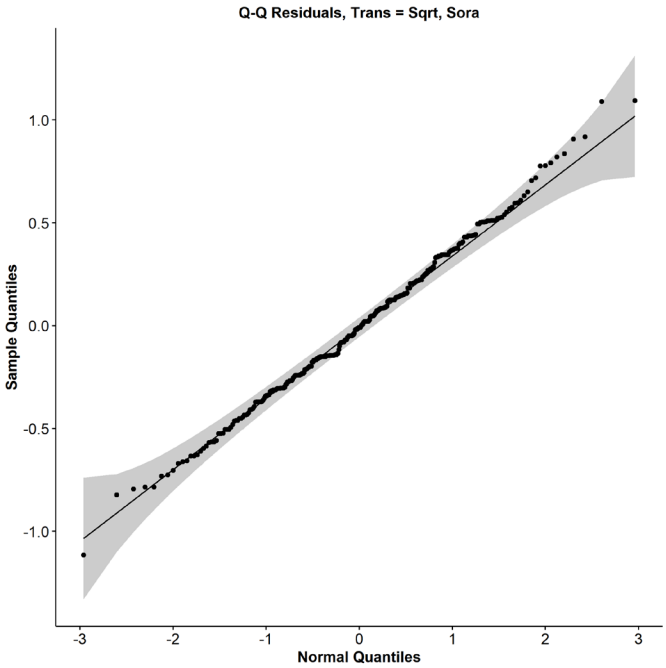


Marsh Birds – Sora Abundance

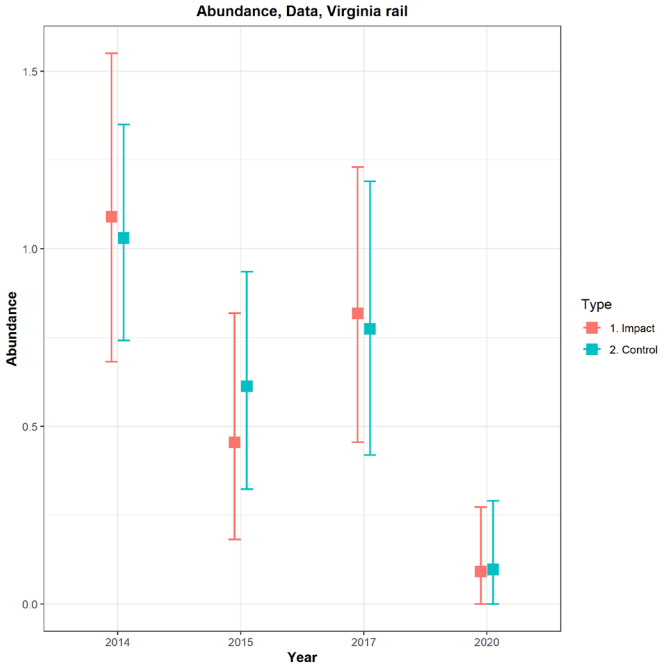


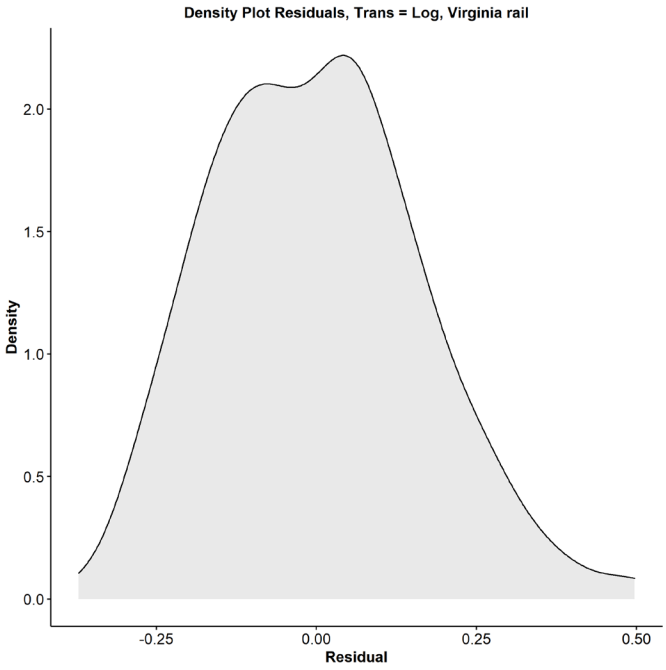


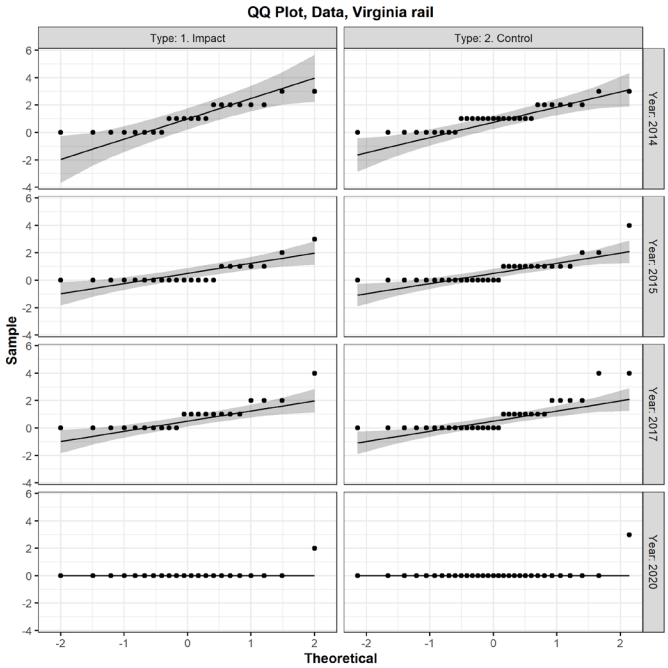


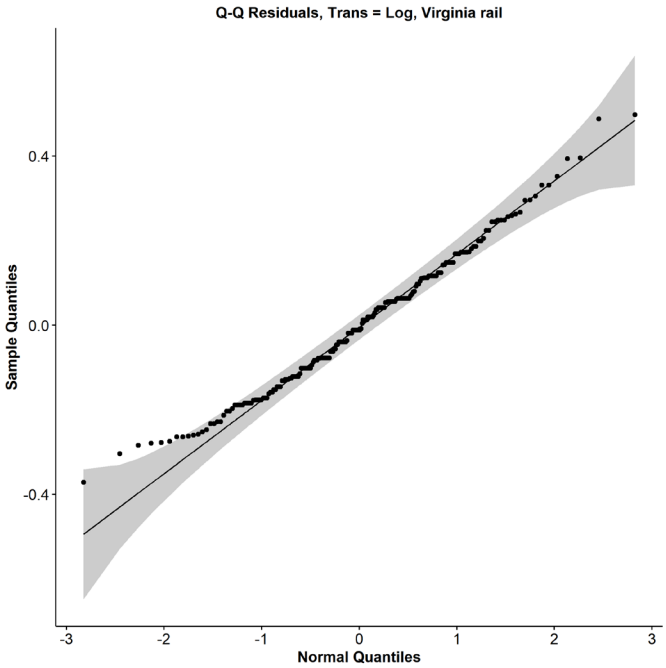


Marsh Birds – Virginia Rail Abundance

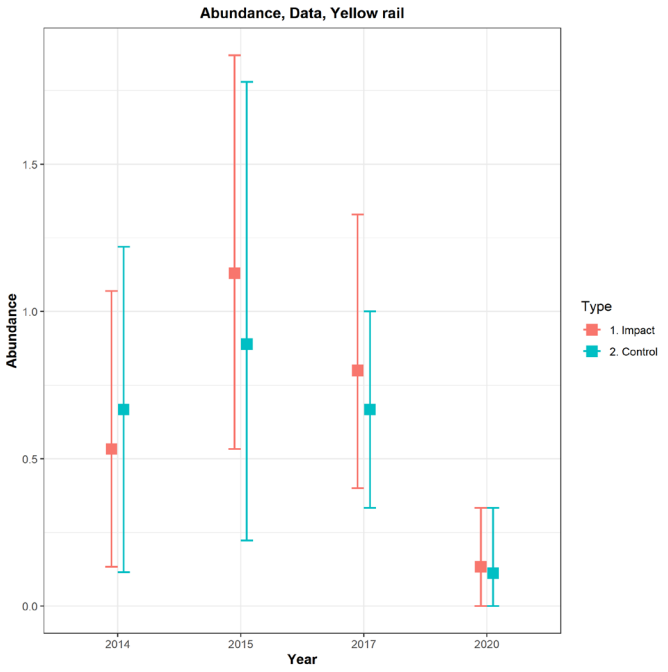


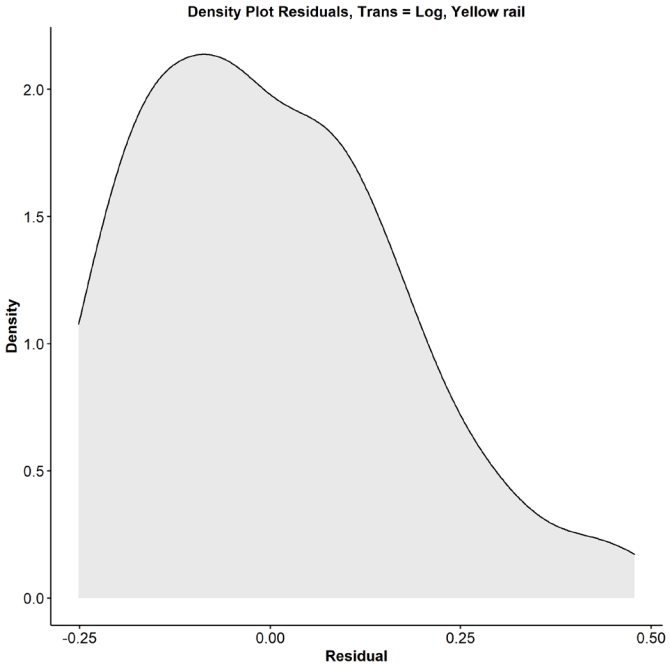


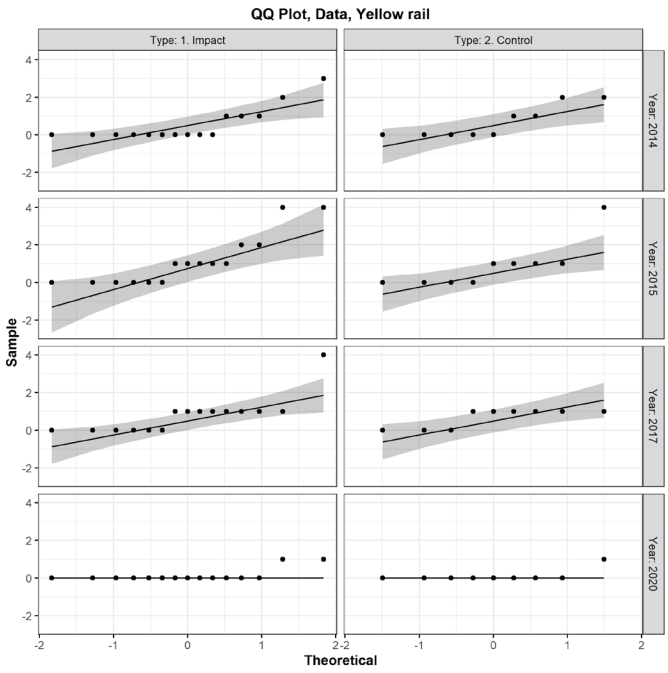


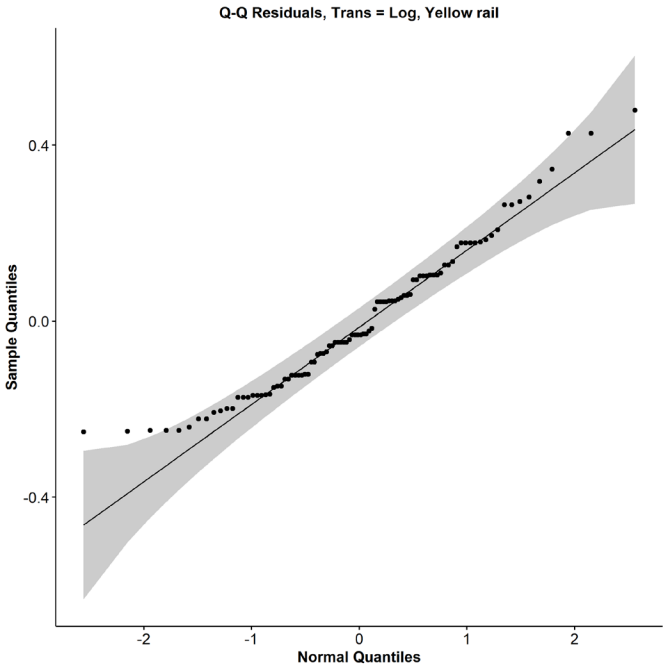


Marsh Birds – Yellow Rail Abundance









Available in accessible formats upon request.