Marsh Monitoring Program Report

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Introduction

Wetlands are important habitats for a wide variety of reasons. These include hydrological factors like reducing the effects of floods and filtering water, economic reasons like crops including cranberries and rice, and materials like peat and lumber (Government of Canada, 2016). Furthermore, wetlands are an important habitat for a variety of species including many birds (Government of Canada, 2016). Despite this importance, many wetlands have been destroyed and in some areas of Canada only 25% remain (Government of Canada, 2016).

The wetlands of Beaverhill Lake and the surrounding area contain many factors important to birds including large insect populations that support species like tree swallows and allow them to have very large clutch sizes, tracts of mudflats that act as a staging area for vast flocks of migratory shorebirds, and marshes that support a variety of rare and reclusive bird species. All of this played a part in Beaverhill Lake being designated by RAMSAR as a wetland of international importance in 1987.

Many species of wetland birds have population concerns: several rail species including Sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), and Yellow Rail (*Coturnicops noveboracensis*), as well as birds in other groups like American Bitterns (*Botaurus lentiginosus*) and Pied-billed Grebes (*Podilymbus podiceps*) (Conway, 2011). Sampling for these reclusive species can be difficult, and one technique used frequently is playback where a species' breeding call or song is played to induce a response from the target species. It has been shown that using playback can significantly increase the detection of several wetland species; specifically, Yellow Rail detection can be increased by 112%, Soras by over 100%, and Virginia Rails by over 400% (Martin et al., 2014). Despite this trend, not all birds react to playback similarly with American Bitterns and Pied-billed Grebes even potentially showing a negative change in detection rates after playback (Conway & Gibbs, 2005). However, this study does corroborate the increased detection rates for Rallidae species with Virginia Rails having a particularly high increase in detection. Despite the clear benefits of using playback, there are instances where it can have negative outcomes such as causing birds to abandon their current behaviour, like incubation or foraging, as well as expending unnecessary energy on aggression towards a non-existent rival (Audubon, 2022). Because of this, playback must be used with a plan and purpose and not overused to make the most out of this tool (Audubon, 2022).

One poorly studied species that makes its home in wetlands is the Yellow Rail. Though this species' population trends are currently unknown, both the Species at Risk Act (SARA) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) list it as a species of special concern (Government of Canada, 2015). Detecting this species can be problematic due to its furtive nature, nocturnal lifestyle, and tendency to run away rather than flushing. Due to these behaviours, playback is a commonly used option to locate Yellow Rails. Despite this, a nighttime playback survey was conducted by Martin et al. in 2014 specifically targeting Yellow Rails and found that using playback did not significantly increase detection rates. The researchers also found that ideal Yellow Rail surveys should be conducted between one hour after sunset and one hour before sunrise to maximize detections. On the other hand, during morning and evening surveys, playback can more than double the detections of this species (Conway & Nadeau,

2010). One aspect of this species that is well understood is its affinity for sedges especially those in the genus *Carex* (Bookhout & Stenzel, 1987; Gibbs et al., 1991; Popper & Stern, 2000; Robert et al., 1997). So, while potential Yellow Rail habitat may be easy to identify, successfully sampling for this species is difficult and often inconvenient.

Methods

The survey methods for this study are heavily based on the Prairie & Parkland Marsh Monitoring Program (PPMMP) designed for Saskatchewan (Bird Studies Canada, 2010). Because the Beaverhill Bird Observatory (BBO) is located in Alberta and has different priority species, the protocol for the PPMMP conducted here was altered slightly. The list of primary species was not altered, however, and consists of these 10 species: American Bittern, Least Bittern (*Botaurus exilis*), Sora, Virginia Rail, Yellow Rail, Eared Grebe (*Podiceps nigricollis*), Horned Grebe (*Podiceps auritus*), Pied-billed Grebe, Red-necked grebe (*Podiceps grisegena*), and Nelson's Sparrow (*Ammospiza nelsoni*).

Eight survey stations (Figure 1: MMP1-8) were placed along the west shore of Lister Lake separated by a distance of 100-200m taking into account both habitat diversity and ease of access to stations. Each of these stations was surveyed four times between May and July; this being one of the changes from the PPMMP which calls for only three surveys. On each of the surveys, MMP1-8 were visited in alternating directions and with at least four days between each survey. Upon arrival at a station, the survey conditions were filled out and bird detections were recorded under "before survey period." After this was completed the survey began. Morning surveys started within 15 minutes of sunrise while evening surveys started between 19:00 and 20:00 intending to finish the survey at sunset. Each survey was 15 minutes long and consisted of a recording played from an Anker Soundcore 3 Bluetooth speaker on a tripod approximately one meter above the ground. This recording was broken into three sections with the first being five minutes of silence with a voice marking the passing of each minute, the second being one minute of playback from five primary species, and the third being five minutes of silence with the end marked by two beeps. The five species with playback on the recording were, in this order, Yellow Rail, Sora, Virginia Rail, American Bittern, and Pied-billed Grebe. Each of these one-minute playback periods consisted of 30 seconds of playback followed by 30 seconds of silence. When one of the primary species was detected, it was noted which period it was detected in and whether it was detected auditorily, visually, or both. Also, a map was filled out with the estimated location of the bird relative to the station. For non-primary birds, it was only noted which of the three sections of the recording the bird was detected in and whether it was a flyover, an aerial forager, or neither.

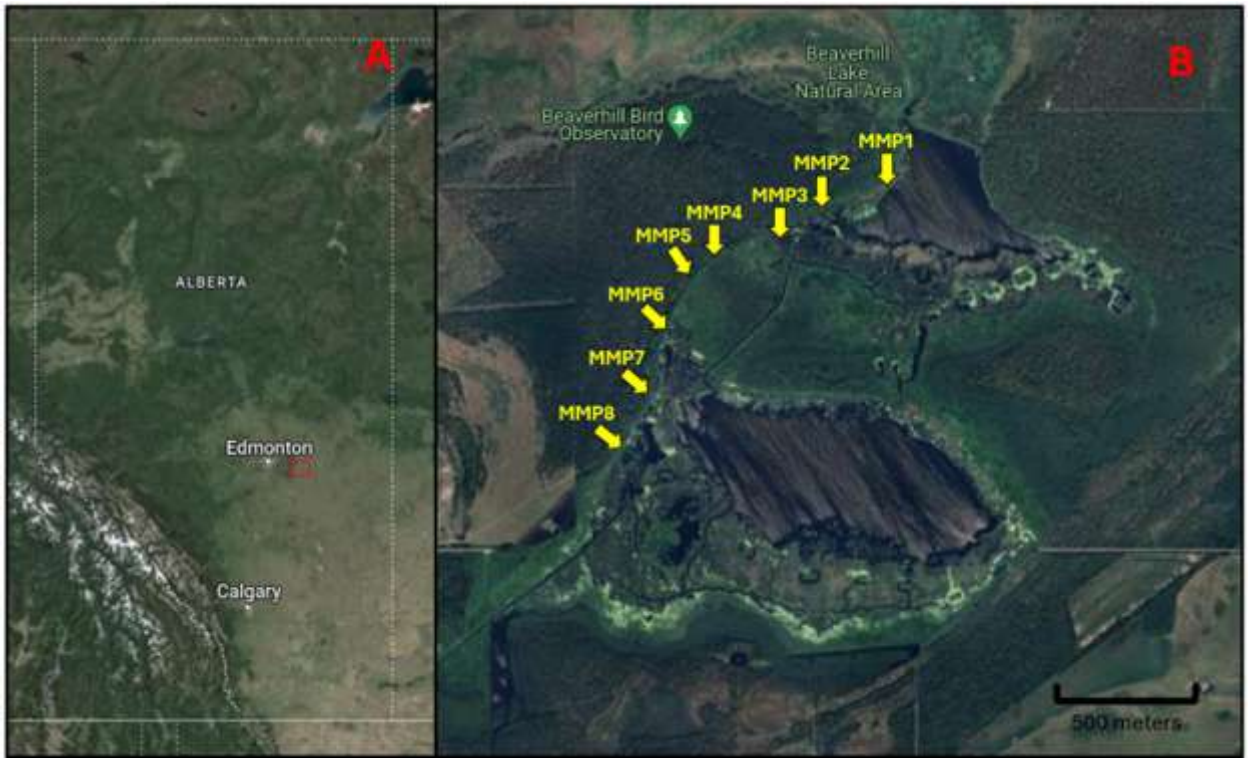

Figure 1. **A**. Alberta and the surrounding provinces, territory, and states with the approximate location of map B outlined in red. **B**. Lister Lake and the surrounding natural area with the locations of the eight survey stations (MMP1-8) marked.

Table 1. The latitude and longitude of the eight survey stations that are represented in Figure 1.

MMP 1	MMP 2	MMP 3	MMP 4	MMP 5	MMP 6	MMP 7	MMP 8
N 53°22'43.6"	N 53°22'42.2"	N 53°22'39.1"	N 53°22'35.6"	N 53°22'33.5"	N 53°22'27.6"	N 53°22'19.4"	N 53°22'12.9"
W 112°30'57.5"	W 112°31'11.5"	W 112°31'20.3"	W 112°31'30.3"	W 112°31'35.8"	W 112°31'41.4"	W 112°31'44.8"	W 112°31'48.7"

In addition to the playback surveys, a habitat description form was filled out at each station. This form documents the types of habitats within 100 meters of the station as well as the types of vegetation that make up these habitats. In addition to this, water depth and vegetation height were recorded at five-meter intervals directly forward from the station. Finally, a map was drawn to represent this habitat and vegetation. This survey was conducted in July so that plants were easy to identify but not so tall that they obstructed views. To supplement this broad-scope habitat assessment, incidental and approximate observations of the primary plant species and their respective percent cover for the grasses and grass-like sedges habitat from the form (hereafter referred to as sedge meadows) were taken to better understand the habitat that Yellow Rails may use.

Results/Discussion

All four MMP surveys as well as the habitat descriptions were completed without major issues this year. The first MMP survey was completed on the morning of May 23rd with one issue: the data sheet for MMP6 was lost so it was completed a second time on the evening of May 24th. This resulted in an incidental yellow rail detection, however (Appendix 1). The next survey was completed entirely on the morning of June 9th. The third survey was started on the evening of June 23rd but winds picked up after MMP3 was completed; because of this, MMP4-8 were completed on the evening of June 25th. A similar situation occurred on the fourth and final survey: MMP8 and 7 were completed in the morning on July 5th before wind forced MMP6-1 to be completed on the morning of July 8th. The habitat descriptions were completed on July 3rd without issue. Because of scheduling and erratic weather this year, no surveys were conducted on the east shore of Lister Lake.

Of the 10 primary species this survey is designed to sample seven were detected. These seven species are Sora (SORA), Virginia Rail (VIRA), American Bittern (AMBI), Pied-billed Grebe (PBGR), Nelson's Sparrow (NESP), Eared Grebe (EAGR), and Yellow Rail (YERA) (Table 2). The first five species listed were also detected in MMP surveys in previous years while Yellow Rail and Eared Grebe were detected for the first time on surveys this year (Table 3.B & 3.C).

Table 2. The total detections of each primary species were successfully sampled at each of the eight survey stations.

YERA	0	0	0	2	4	1	0	0	7
VIRA	0	0	0	0	0	2	1	0	3
SORA	10	10	11	20	15	14	8	3	91
PBGR	2	3	1	1	1	1	8	12	29
NESP	1	1	0	5	5	2	0	0	14
AMBI	1	1	0	0	0	1	0	0	3
EAGR	0	0	0	0	0	0	2	1	3
	MMP1	MMP2	MMP3	MMP4	MMP5	MMP6	MMP7	MMP8	Total

Table 3. The number of detections for each primary species during each of the periods of the recording. Note that only initial detections of an individual bird were counted and not re-detections after a period of silence. **A**. Detections for 2024. **B**. Detections for 2023. **C**. Detections for 2022. **D**. Detections for all three years combined.

A

YERA	6	0	0	0	0	1	0	7
VIRA	0	0	1	2	0	0	0	3
SORA	60	4	12	3	2	0	10	91
PBGR	13	0	1	2	2	5	6	29
NESP	12	0	0	0	0	0	2	14
AMBI	3	0	0	0	0	0	0	3
EAGR	2	1	0	0	0	0	0	3
Period	Before	YERA	SORA	VIRA	AMBI	PBGR	After	Total
Minute	1-5	6	7	8	9	10	11-15	

B

YERA	0	0	0	0	0	0	0	0
VIRA	0	0	0	1	1	1	1	4
SORA	22	1	4	5	1	2	4	39
PBGR	6	1	1	1	2	0	1	12
NESP	5	0	0	0	0	1	0	6
AMBI	6	2	1	1	0	1	1	12
EAGR	0	0	0	0	0	0	0	0
Period	Before	YERA	SORA	VIRA	AMBI	PBGR	After	Total
Minute	1-5	6	7	8	9	10	11-15	

C

YERA	0	0	0	0	0	0	0	0
VIRA	1	0	2	6	0	0	1	10
SORA	19	3	7	7	4	3	5	48
PBGR	4	0	0	1	0	6	3	14
NESP	8	2	0	2	0	0	1	13
AMBI	7	0	0	0	0	1	0	8
EAGR	0	0	0	0	0	0	0	0
Period	Before	YERA	SORA	VIRA	AMBI	PBGR	After	Total
Minute	1-5	6	7	8	9	10	11-15	

D

YERA	6	0	0	0	0	1	0	7
VIRA	1	0	3	9	1	1	2	17
SORA	101	8	23	15	7	5	19	178
PBGR	23	1	2	4	4	11	10	55
NESP	25	2	0	2	0	1	3	33
AMBI	16	2	1	1	0	2	1	23
EAGR	2	1	0	0	0	0	0	3
Period	Before	YERA	SORA	VIRA	AMBI	PBGR	After	Total
Minute	1-5	6	7	8	9	10	11-15	

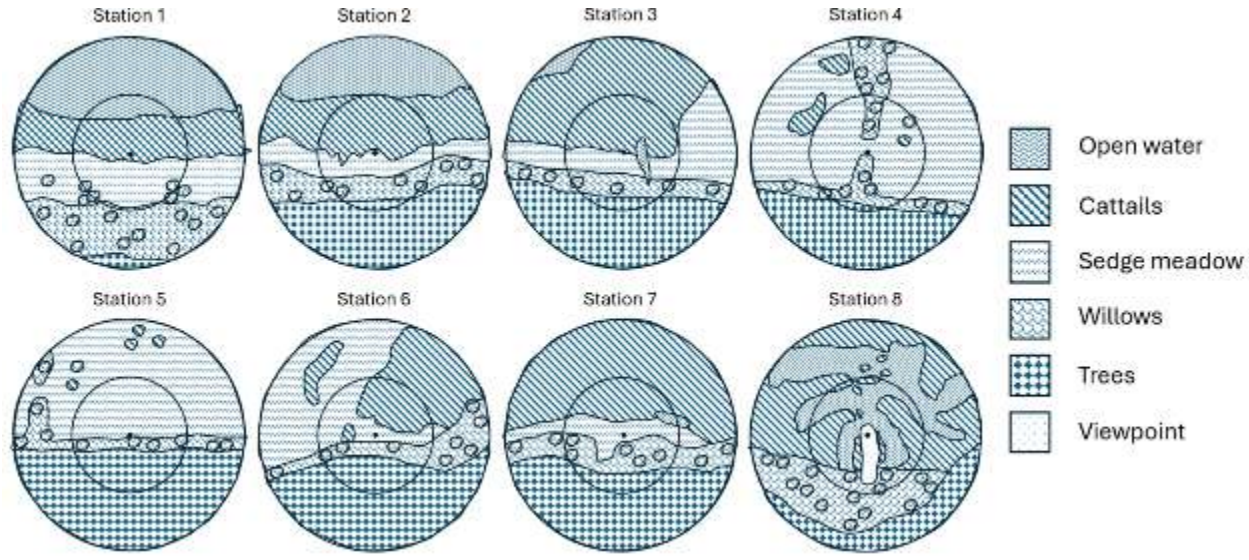

Figure 2. The results of the habitat description forms. The central dot represents the station where surveys were conducted. The inner circle of each station map has a radius of 50 meters from the station while the outer circle has a radius of 100 meters.

At all stations (MMP1-8), there were detections of both Soras and Pied-billed Grebes. For Soras, most points had high detections; despite this, the Soras detected at MMP4, 5, and 6 make up 54% of this year's detections (Table 2). Pied-billed Grebes were even more

concentrated with several points only having a single detection while MMP7 and 8 were responsible for 69% of detections (Table 2). Also, several species were only detected at a handful of points. For instance, Yellow Rails were only detected at MMP4, 5, 6, Virginia Rails at MMP6 and 7, and Eared Grebes at MMP7 and 8 (Table 2). In each of these cases, the stations a species was detected at show habitat similarities. For the Yellow Rail, the points where it was found have the highest proportion of sedge meadow (Figure 2). Both points with Virginia Rails present had extensive edge habitat between sedge meadow and cattails although MMP1, 2, and 3 share this habitat feature but had no Virginia rails detections(Figure 2). For the points with Eared Grebes, large swaths of cattails were adjacent to the open water on the southern section of Lister Lake (Figure 2). Of all the points, MMP6 had the highest primary species count with six detected and only missing Eared Grebe (Table 2). On the other hand, MMP4 had the highest number of detections for primary species with 28 (Table 2). However, this count is inflated by the very high detections of Soras. In fact, on the first survey of MMP4 alone, there were six Soras detected.

Playback had mixed results as far as increasing detections go. The species where playback was most helpful was Virginia Rails; over the past three years, 82% of detections for this species were during the 5-minute playback period (Table 3.D). Of the Virginia Rails detected 53% were during the VIRA period and 18% in the Sora period (Table 3.D). The next most responsive species to playback was the Pied-billed Grebe with 40% of detections during the playback period and 20% during the PBGR period (Table 3.D). Soras also responded to playback frequently with 32% of detections during this period, 13% during the SORA period, and an additional 8% during the VIRA period (Table 3.D). Of all primary species, the Yellow Rail was least responsive to playback with a single bird detected during the playback period and this bird was detected during the PBGR period which is almost five minutes after the YERA period (Table 3.D). While 26% of American Bitterns were detected during the playback period, not a single bird for any of the years was detected during the AMBI period (Table 3.D). So, while the use of playback is helpful for detecting several species for others it may even be detrimental.

The detections for several species were markedly different between years; for instance, the detections of Pied-billed Grebes were more than double in either of the previous years (Table 3). In addition, the Soras detected in 2024 make up over half of all the Soras detected in the last three years (Table 3.A & 3.D). By comparison, American Bitterns and Virginia Rails both had counts much lower than in previous years (Table 3). Virginia Rails detections saw a decline between 2022 and 2023 and this trend continued in 2024 (Table 3). On the other hand, American Bitterns saw an increase in detections between the previous years before dropping off by 75% this year (Table 3).

Some interesting correlations can also be drawn between the detections of Soras and Yellow Rails. Firstly, MMP4, 5, and 6 had the highest Sora counts while also being the only stations where Yellow Rails were detected (Table 2.). Also of note, this was the first of the three years of MMP surveys where Yellow Rails were detected while also producing a high count of Soras (Table 3.). Whether this correlation between Sora and Yellow Rail populations represents anything more than a coincidence remains to be seen.

The detection of Yellow Rails for the first time on MMP surveys was exciting. The areas where this species was detected were dominated by graminoid species including several sedges in the genus *Carex* (Appendix 2). Although Yellow Rails were not detected at an MMP point until June 25th there were several incidental detections when surveys were not being conducted (Appendix 1). The earliest of these instances was May 20th. Some of these incidental detections occurred at MMP stations where Yellow Rails were detected; in addition, detections occurred outside of the areas surveyed. One of these incidental detections occurred at MMP1, though Yellow Rails were not detected here again. The first survey was conducted at MMP 1 only three days later so it is entirely possible that Yellow Rails were present but not detected. These factors show that playback was surprisingly unhelpful in detecting Yellow Rails.

Conclusion

Overall, this year's surveys had intriguing results with all-time high counts for certain species as well as all-time lows. In addition, two new primary species were detected this year. The data from this year adds to the well-known fact that the wetlands of Beaverhill Lake are valuable for a wide variety of avian species.

Despite these results, there are some shortcomings in this survey method. These surveys are designed to sample a wide variety of secretive marsh birds which is effective for the limited personnel at BBO but also means that prime activity for Yellow Rails, 1hr after sunset until 1hr before sunrise, is outside of the standardized timing for surveys to be conducted. For this reason and because of the Yellow Rails' poor response to playback during these surveys, the most effective way to expand knowledge about how this species uses the area may be to introduce a nighttime survey; although, these surveys may be logistically difficult to achieve. One other possible way to more efficiently sample Yellow Rails could be to use passive acoustic monitoring devices that can work throughout the season and at night. Another suggestion for future surveys would be to replace the American Bittern playback with the Eared Grebe, which was detected on surveys this year. None of the American Bittern detections have been in response to the AMBI playback period in the three years of this survey despite being detected during all other periods. The primary issue with swapping playback would be altering standardization between years; also, the American Bittern's refusal to respond to playback is data itself so swapping is not necessary. Despite these issues, this survey method appears quite effective at detecting a variety of wetland birds.

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Appendix 1

Incidental yellow rail detections

Table 4. Yellow Rails incidentally detected outside of the standardized surveys in 2024. The approximate location and conditions surrounding each incident were also recorded.

Number	Date	Time	Weather	Coordinates	Notes
3	May 20th	22:08	Overcast with, light wind, and 6°C.	53.375, -112.526	First record of the species for the year. Used playback to initate calling.
2	May 20th	23:30	Same as above.	53.381, -112.515	One heard north of the Weir and one heard south.
2	May 24th	22:10	Light wind, 10°C, few clouds.	53.374, -112.527	Started calling imediately after a survey was completed.
1	June 9th	04:40	Cloudy, no wind, 7°C.	53.376, -112.524	Detected while navigating to Station 8 to begin my survey.
2	June 20th	13:09	Some clouds, low winds, 20°C.	53.376, -112.525	Detected while preparing mist nets at LILA.
2	June 20th	14:12	Same as above.	53.376, -112.525	Likely same individuals as early in the day.
1	June 21st	04:45	Low winds, 5°C.	53.375, -112.527	Detected just before banding at LILA.

Appendix 2

Dominant plant species of the sedge meadow habitat

Table 5. The six most common plant species that comprise the sedge meadow habitat. No standardized survey method was used to acquire approximate % cover so it is a rough estimate; however, species identification was thoroughly checked (Appendix 3). Notes are to give a general description of how the species grows within the sedge meadow.

Scientific name	Common name	Approximate % cover	Notes
Carex atherodes	Wheat sedge	65	The dominate species in the majority of the meadow.
Carex utriculata	Beaked sedge	10	Secondary sedge in most areas but isolate patches where this species is dominant exist.
Carex aquatilis	Water sedge	5	Tertiary sedge in most areas but isolate patches where this species is dominant exist.
Scolochloa festucacea	Sprangletop	5	A few large patches of this plant exist throughout the meadow but no isolated individuals.
Phleum pratense	Timothy	3	Growing in large patches similar to the sprangletop.
Clamagrostis canadensis	Canadian Bluejoint	3	A few small patches are found throughout the meadow.

Appendix 3

Digital herbarium of dominant sedge meadow species

Figure 3. Images of *Carex atherodes* (Cyperaceae). **A.** Growing in habitat. **B.** Staminate spikes above the pistillate spikes with bracts between each spike. **C.** Sessile pistillate spikes. **D.** Laceolate perigynia with long divergent teeth arranged on a pistillate spike. **E.** Developing trigonous achene showing thee stigmas on a continuous style. **F.** Hairy blade sheath.

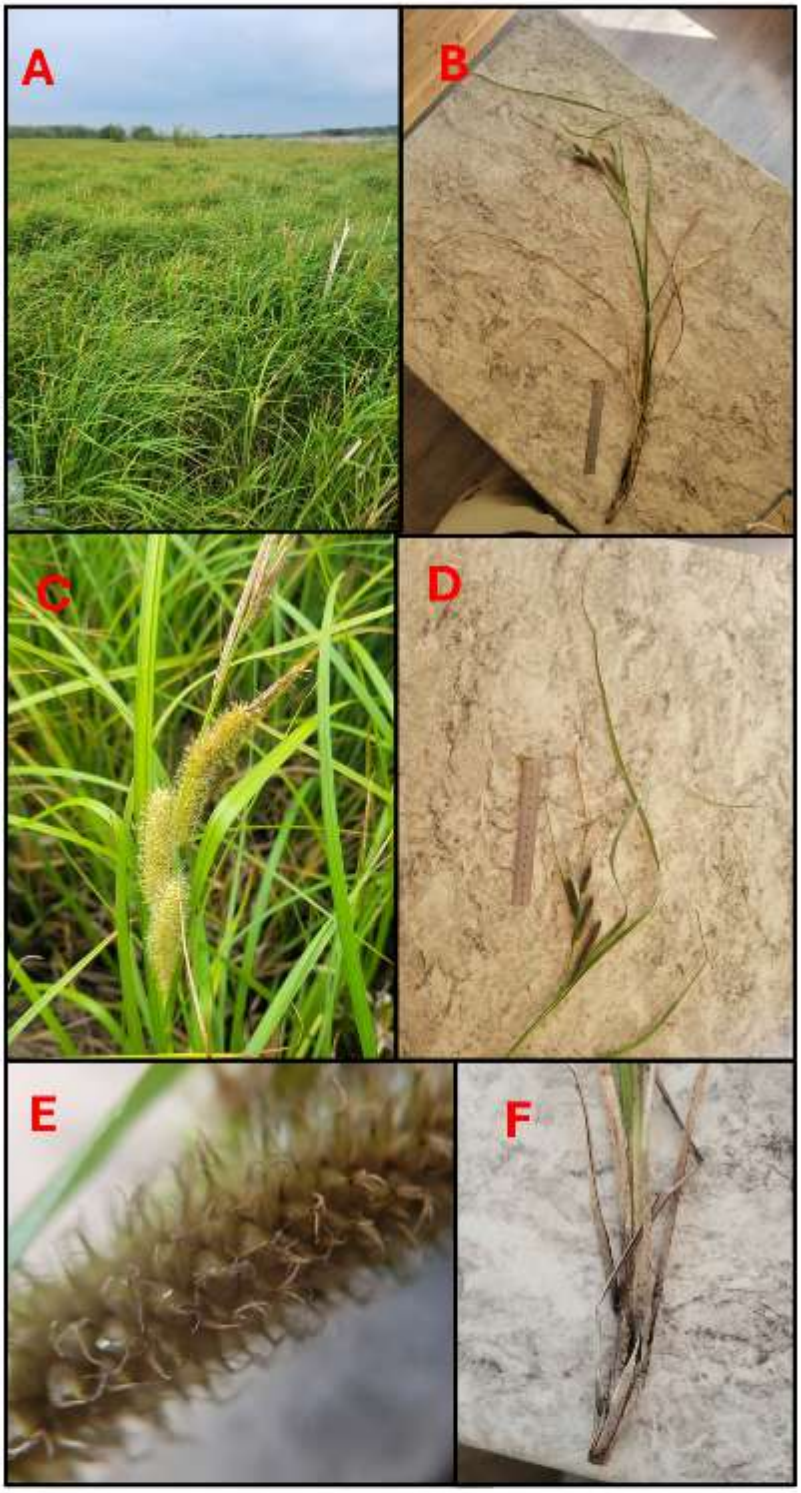

Figure 4. Images of *Carex utriculata* (Cyperaceae). **A.** Live plant in habitat. **B**. Whole plant previously frozen.**C**. Nearly sessile pistillate spikes with the upper spike being androgynous.**D**. Whole inflorescence showing staminate and pistillate spikes and bracts next to a 30cm ruler.**E**. Magnified view of inflated membranous perigynia, short beaks, and three stigmas.**F**. Spongy base.

Figure 5. Images of *Carex aquatilis* (Cyperaceae). **A.** Live plants in habitat. **B.** Whole plant previously frozen next to a 30cm ruler. **C.** Whole inflorescence displaying staminate and pistillate spike and bracts next to a 30cm ruler. **D.** Live inflorescence showing multiple androgynous spikes. **E.** magnified view of perigynia and dark pistillate scales with pale midrib. **F.** Magnified view of obovate perigynia with tiny beak and lenticular achene.

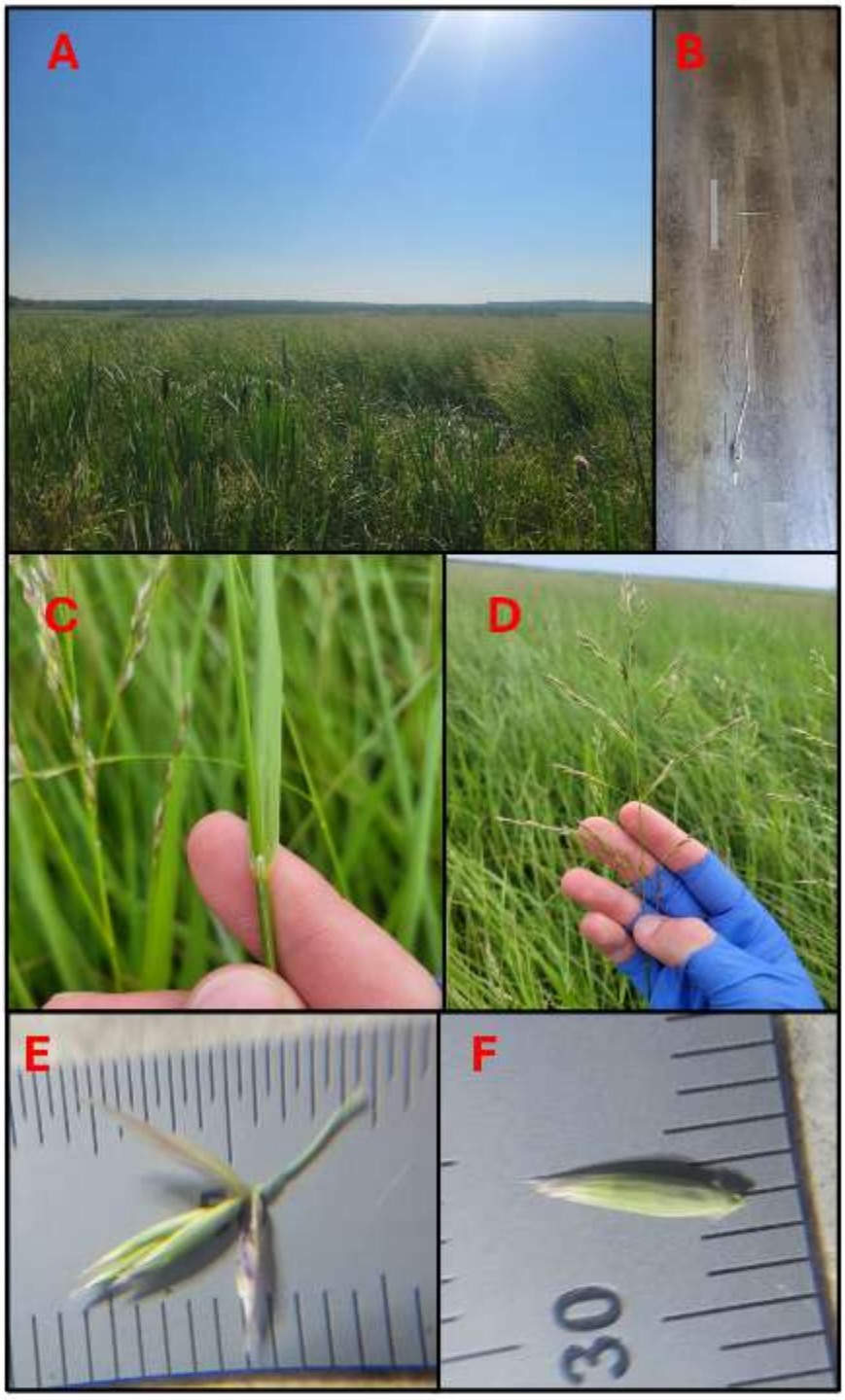

Figure 6. Images of *Scolochloa festucacea* (Poaceae). **A.** Plants growing in a sedge meadow habitat **B.** Full plant next to a 15cm ruler and displaying rhizomes **C.** Open sheath and membranous ligule. **D.** Inflorescence isa open panicle. **E.** Spikelet with three florets and unequal glumes. **F.** Single floret with lacerate lemma and bearded callus.

Figure 7. Images of *Phleum pratense* (Poaceae). **A.** Plants growing at the edge of the sedge meadow. **B.** Inflorescence in a long cylindrical panicle. **C.** Flat leaves, sheaths, and ligule displayed here.

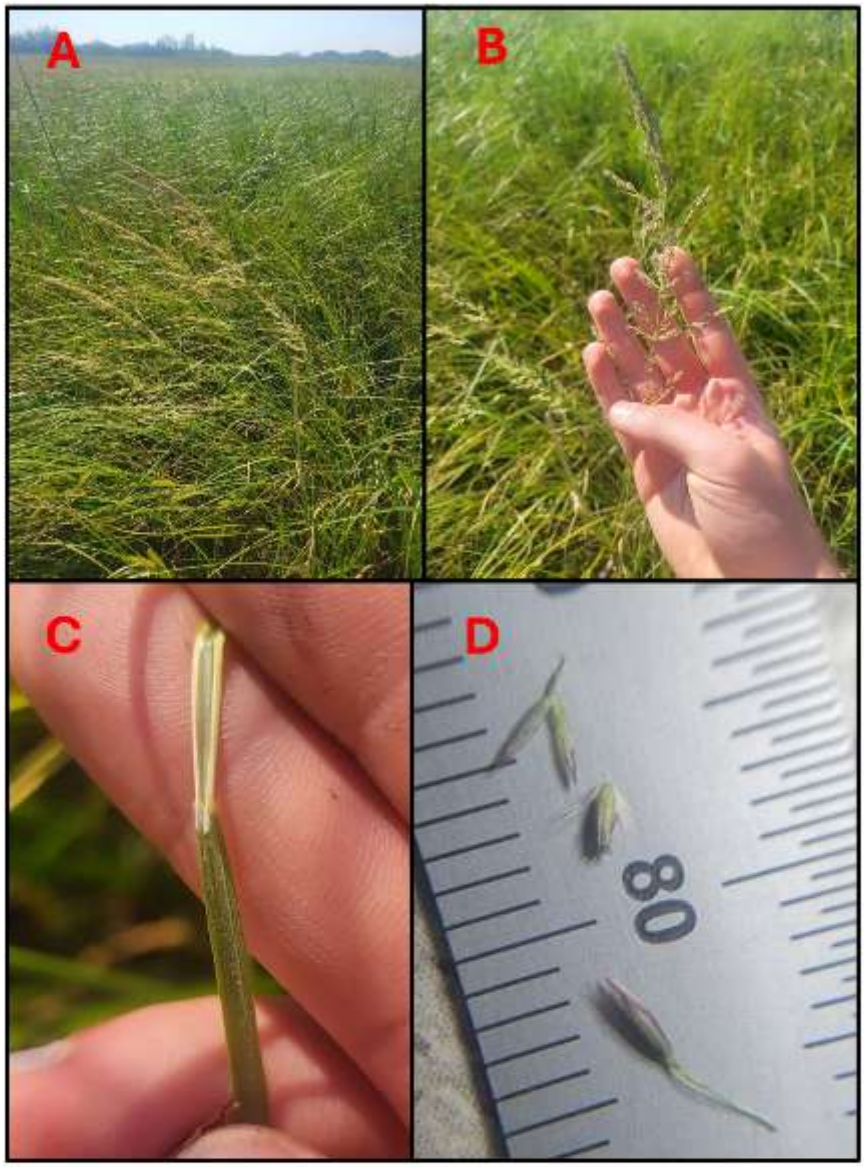

Figure 8. Images of *Calamagrostis canadensis* (Poaceae). **A**. Plants growing in the sedge meadow habitat. **B**. Panicle inflorescence in anthesis. **C**. Leaf blade and ligule shown separated from the culm. **D**. Single flowered spikelet with abundant callus hairs and keeled glumes.