

BIOPHYSICAL IMPACT ASSESSMENT OLDS

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For:

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	iii
1 INTRODUCTION.....	1
2 OBJECTIVES.....	1
3 METHODOLOGY.....	1
4 BIOPHYSICAL RESOURCES.....	2
4.1 General Biophysical Description	2
4.1.1 Regional Setting.....	2
4.1.2 Topography and Soils	2
4.1.3 Land Use.....	2
4.2 Habitats and Vegetation	2
4.2.1 Tame Grass/Cropland.....	2
4.2.2 Disturbed.....	2
4.2.3 Dugout.....	3
4.2.4 Aspen Woodland.....	3
4.2.5 Aspen Windbreak/Willow Windbreak	3
4.2.6 Wetland	3
4.3 Wildlife.....	6
4.3.1 Tame Grass/Cropland.....	6
4.3.2 Disturbed.....	6
4.3.3 Dugout.....	6
4.3.4 Aspen Woodland.....	6
4.3.5 Aspen Windbreak/Willow Windbreak	7
4.3.6 Wetland	7
4.4 Species at Risk.....	7
4.4.1 Rare Plants	7
4.4.2 Wildlife Species at Risk.....	8
4.4.3 Sensitive Wildlife	8
4.5 Significant Habitats	8
5 EFFECTS OF DEVELOPMENT ON BIOPHYSICAL RESOURCES.....	8
6 DISCUSSION OF REGIONAL ECOSYSTEM CONCEPTS.....	9
6.1 Habitat Fragmentation.....	9
6.2 Wildlife Corridors.....	9
6.3 Biodiversity.....	9
7 CONCLUSIONS AND MITIGATION	9
8. REFERENCES.....	10

Appendix 1. List of Vascular Plants	11
Appendix 2. List of Birds	12
Appendix 3. List of Mammals.....	12
Appendix 4. List of Amphibians.....	13
Appendix 5. Stewart and Kantrud Wetland Classification.....	13
Appendix 6. Habitat Photographs	14

LIST OF TABLES

Table 1. Habitat Areas	4
Table 2. Wetland Classification and Size.....	4

LIST OF MAPS

Olds Habitats	5
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EXECUTIVE SUMMARY

Sweetgrass Consultants Ltd. was contracted in the spring of 2007 to conduct a biophysical assessment of the Olds property.

An information review and field program were conducted to assess habitat significance, evaluate effects of planned developments, discuss regional ecosystem processes, and formulate recommendations for mitigation of effects of planned developments.

Eight habitats are described and mapped: tame grass, cropland, disturbed, dugout, aspen woodland, aspen windbreak, willow windbreak, and wetland. Non-native habitats occupy the large majority of the land base.

One rare plant species and three provincially Sensitive species occur on the property.

The only significant habitat on the property is a complex of sedge/willow wetland-dugout-aspen woodland-tame grass that has not been recently disturbed and that includes a relatively diverse assemblage of native plants and wildlife.

Conclusions and mitigation include:

- Direct habitat loss associated with the development will be mainly non-native habitat of low significance. Associated loss of biodiversity will involve wide-ranging, common species
- It is proposed that Wetlands 2, 3 and 4 will be eliminated. As components of an expansive area of open space, Wetland 1 and a portion of Wetland 6 will be retained, while Wetland 5 will be converted to a stormwater pond. Areas around Wetlands 5 and 6 will be enhanced with native vegetation. A detailed wetland report will be forwarded to Alberta Environment at an appropriate time in the design and approval process to Alberta Environment for the compensation process.
- With the preceding, a representative portion of the most productive and significant habitat (Wetland 6: sedge/willow-aspen woodland-dugout-tame grass) will be retained and enhanced.
- Contribution of the project toward cumulative regional habitat fragmentation, loss of wildlife corridor potential, and loss of regional biodiversity will be negligible or very minor.
- With the proposed mitigation, there will be no significant biophysical constraints for the proposed development.

1. INTRODUCTION

Sweetgrass Consultants was contracted in the summer of 2007 to conduct a biological impact assessment of the Carstairs East property comprising approximately 440 acres in a portion of E9-30-1-5-W5 and a portion of NE4-30-1-5-W5 in the County of Mountain View. This report provides an assessment of ecological resources, identifies significant natural features, and provides an evaluation of impacts and mitigation to assist in planning of the area. A key component of the study was an assessment of wetlands, which constitute the only significant remaining native habitats.

2. OBJECTIVES

Objectives of the study included the following:

1. mapping and description of habitats, wildlife and vegetation;
2. analysis of significant habitats and species at risk potential;
3. assessment of habitat connectivity and wildlife corridor potential;
4. discussion of ecosystem processes within a regional context;
5. evaluation of effects of planned development on significant habitats and species at risk; and
6. identification of impacts and formulation of recommendations for mitigation of effects of the planned development.

3. METHODOLOGY

1. Information survey.
2. Interpretation of aerial photography of the property to map basic habitat units and selection of sites for field-checking.
3. A field program in the spring and summer of 2008 that included the following surveys:
 - Habitat Ground Truthing – the entire area was driven and walked and habitat units and boundaries were confirmed and mapped. Wetland boundaries were accurately mapped using GPS (Global Positioning System) tracks and GIS (Geographic Information System) technology.
 - Vegetation – vegetation was described for the various habitats, noting dominant plant species.
 - Wetlands – boundaries of wetlands were mapped using GPS (Global Positioning System) and GIS (Geographic Information System) technology. Classification is according to Stewart and Kantrud (1971) (see Appendix 5).
 - Wildlife – in addition to general observation of individuals and sign (scat, foraging sign, burrows/diggings, tracks, trails/runways, nests/dens), specific survey techniques were used to inventory various species groups: song/call for birds and amphibians, and shoreline visual encounter surveys for amphibians and reptiles.
 - Species at Risk – based on the types of habitats occurring on the property and provincially rare plants documented for similar habitats in the Carstairs region (ANHIC 2001; Kershaw

et al. 2001), habitats with the highest potential for species at risk were identified and field-checked in early and late summer. Similarly, potential of various habitats for wildlife species of concern was evaluated and checked at appropriate times throughout the field season.

- Wetland Assessment – based on two visits in the spring and summer, wetlands on the site were classified and their significance determined.

4. BIOPHYSICAL RESOURCES

4.1 General Biophysical Description

4.1.1 Regional Setting

The property is located on the southwestern extremity of the Central Parkland Natural Subregion of Alberta. Vegetation of this area was originally dominated by plains rough fescue grassland, with aspen groves occurring on moister sites. Today the majority of this subregion is under cultivation. Native habitats are restricted to localized areas of remnant grassland-aspen woodland. Wetlands are important localized habitats (Downing and Pettapiece 2006).

4.1.2 Topography and Soils

The dominant landform on the property is undulating till plain. Soils include Black Chernozems on the upland and imperfectly to poorly drained in the wetlands.

4.1.3 Land Use

The majority (nearly 92%) of upland that was originally native grassland and aspen groves has been converted to cropland. In total, more than 97% of the property is either non-native or disturbed.

4.2 Habitats and Vegetation

Eight habitat groupings have been identified (*Olds Habitats* map, p. 5). Habitat areas are tabulated in *Table 1*. Photographs of representative habitats appear in *Appendix 6*. For a full species list of plants, annotated to habitat, refer to *Appendix 1*.

4.2.1 Tame Grass/Cropland

The majority of the property is currently farmed in agricultural cropland, which also includes a variety of weed species. This habitat, which also includes two small disturbed dugouts, has also been grazed by domestic livestock in the past. A relatively small area of dominated by non-native grasses (Kentucky bluegrass, awnless brome, timothy and quack grass) occurs within in the aspen woodland-Wetland 6 complex.

4.2.2 Disturbed

Disturbed habitats, areas with significant surface disturbance, include farmyards and roadways. Vegetation in these areas is non-native and is restricted to small areas of planted lawn grasses, trees and shrubs, and invasive weedy plants.

4.2.3 Dugout

This category is represented by a dugout artificial pond situated within Wetland 6. It is relatively large and contains very limited aquatic vegetation. It has not been used by livestock in recent years.

4.2.4 Aspen Woodland

Aspen woodland occurs within a complex that also contains Wetland 6 and tame grass. It is dominated by aspen with a largely non-native understory. A few native shrubs and forbs also occur in this community.

4.2.5 Aspen Windbreak/Willow Windbreak

A remnant windbreak of native aspen and beaked willow is situated along the eastern boundary of the northernmost quarter. The understory is non-native with the exception of northern gooseberry shrubbery and a few scattered red-osier dogwood shrubs.

4.2.6 Wetland

There are two major categories of wetlands on the property—Class III ponds disturbed by cultivation and a Class III complex that has been undisturbed in recent years. Together, they constitute 1.7% of the property area (refer to the *Olds Habitats* map for numbered locations and *Table 2* for classification and size).

Class III Cultivated

These are shallow ponds that have been repeatedly cultivated in drier years. Large scale cultivation has resulted in a drying trend in the general area and more temporary ponding of water in these ponds as opposed to seasonal ponding that normally characterizes Class III ponds. When surveyed, these ponds were in a cropland drawdown phase. Some had been partially or wholly cultivated in the spring of 2008 and all were dry. Remnant vegetation from the previous year was used to classify these wetlands.

Vegetation in these wetlands has been transformed into a distinctive community consisting largely of pioneering plants, plants that invade newly exposed mudflats and bare soil. These include mainly native species such as needle spike-rush, rough cinquefoil, foxtail barley and marsh yellow cress, as well as non-native species such as common dandelion, quack grass, stinkweed and tumbling mustard. In addition, there are a few remnants of typical Class III shallow marsh, including beaked sedge, bottlebrush sedge and slough grass—these may become more prominent in portions of some sites during a series of wet years when cultivation is non possible.

Class III Sedge-Willow Complex

An extensive complex of shallow marsh and scattered beaked willow is restricted to an area protected from cultivation and grazing in the northern quarter. This protected habitat also includes areas of aspen woodland and tame grass.

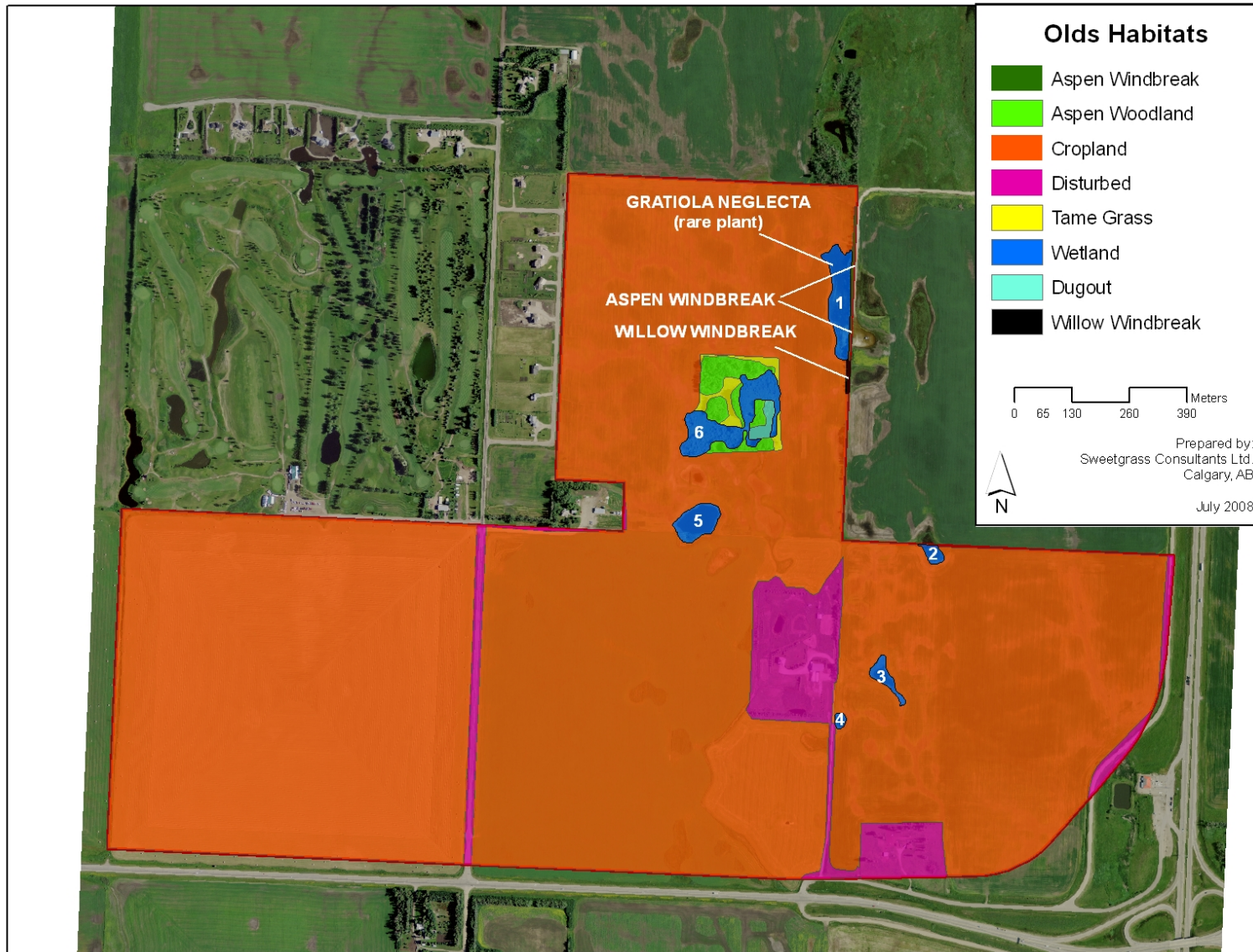
Vegetation in shallow marsh is dominated by awned sedge. Other major plants include northern reed grass, tufted hair grass and fowl bluegrass.

Table 1. Habitat Areas

Habitat	Area (hectares)	Percentage of Total
Aspen Woodland	1.67	<1%
Aspen/Willow Windbreak	0.17	<1%
Wetland	3.89	1.7%
Sub-total Native	5.72	2.5%
Tame Grass	0.70	<1%
Cropland	207.41	91.9%
Disturbed	11.73	5.2%
Dugout	0.13	<1%
Sub-total Non-native/Disturbed	219.97	97.5%
Total Native + Non-native/Disturbed	225.69	100%

Table 2. Wetland Classification and Size

Map Number	Class	Area (hectares)
1	III (cultivated)	1.08
2	III (cultivated)	0.15
3	III (cultivated)	0.27
4	III (cultivated)	0.08
5	III (cultivated)	0.63
6	III	1.68
Total Class III		3.89



4.3 Wildlife

4.3.1 Tame Grass/Cropland

The non-native character of these habitats and the lack of diversity in the vegetation structure makes them relatively unproductive for wildlife. Low densities of the following species were recorded in cropland:

Birds:

- European Starling (non-native)
- Gray Partridge (non-native)
- Rock Pigeon (non-native)
- Horned Lark
- Killdeer
- Canada Goose

Mammals:

- Coyote
- Richardson's Ground Squirrel

Tame Grass is inhabited by Savannah Sparrow.

4.3.2 Disturbed

Wildlife in disturbed areas are found mainly in the planted trees and shrubbery. These include American Crow, American Robin, Barn Swallow, and House Wren.

4.3.3 Dugout

A diversity of birds, including four species of waterfowl, was observed at the dugout pond:

- Gadwall
- Green-winged Teal
- Killdeer
- Lesser Scaup
- Mallard
- Spotted Sandpiper

The pond and adjoining Wetland 6 and tame grass habitats collectively represent the only reliably productive foraging and nesting habitat for waterfowl on the property.

4.3.4 Aspen Woodland

Aspen woodland supports a diversity of species including the following:

Birds:

- American Crow
- American Robin
- Black-billed Magpie
- Brown-headed Cowbird
- European Starling

House Wren
Northern Flicker
Song Sparrow
Yellow Warbler

Mammals:

Coyote
Moose
Mule Deer

4.3.5 Aspen Windbreak/Willow Windbreak

Many of the species found in the aspen woodland and Wetland 6 also occur in relatively smaller numbers in these small remnants of native vegetation. In addition, a species found nowhere else on the property, Vesper Sparrow, occurs here.

4.3.6 Wetland

Class III Cultivated

These frequently disturbed wetlands provide only temporary, marginal habitat for wildlife. During the survey, only Killdeer and Savannah Sparrow were recorded.

Class III Sedge-Willow Complex

The lush willow and sedge growth in this habitat is utilized by a diversity of wildlife including the following:

Birds:

Black-billed Magpie
Clay-colored Sparrow
Red-winged Blackbird
Song Sparrow
Sora
Wilson's Snipe
Yellow Warbler

Mammal:

Moose

Amphibian:

Boreal Chorus Frog

4.4 Species at Risk

4.4.1 Rare Plants

Habitats with the greatest potential for both rare plant species were wetlands and field surveys were concentrated in these areas. Transects were conducted in representative habitats in all wetlands.

One species (clammy hedge-hyssop *Gratiola neglecta*) was found in cultivated wetland habitat in Wetland 1. It is a provincially rare plant and is listed in Alberta as a S2/S3 species but is

considered secure in its overall North American range (ANHIC 2006). The designation S2 is defined as a species with 6-20 occurrences, or with many individuals in few occurrences, in Alberta. An S3 species is one with 21-100 occurrences in Alberta; may be rare and local throughout its range, or have a more restricted range where it may be abundant in some locations or vulnerable to extirpation due to some factor in its biology.

The major habitat for *Gratiola* in Alberta appears to be mud flats that are exposed by rapidly receding water levels in shallow, cultivated wetland basins. These habitats have not been well surveyed to date, but a few relatively large populations have been found in recent years at sites in the Langdon and Shepard areas east of Calgary. The status of rare plants is reviewed periodically and it is possible that the status of this species will eventually be downgraded to a category of lesser concern.

Because of the specific habitat requirement of *Gratiola*, it is not the type of species that would respond well to transplanting to other locations.

4.4.2 Wildlife Species at Risk

Wetland, specifically the sedge-willow habitat of Wetland 6, was also considered to have the highest potential for wildlife species at risk, specifically two federally listed species: Northern Leopard Frog and Yellow Rail. Directed surveys were conducted for these species in transects through this wetland. However, neither of these species was observed and, following the field surveys, it was concluded that habitat is marginal for both species.

4.4.3 Sensitive Wildlife

Three wildlife species that occur on the property are listed as Sensitive by the Government of Alberta (Sustainable Resource Development no date). These are still common in portions of the Olds region and have a lower status species than species at risk. They have been listed as species to watch and monitor in Alberta in the future:

- Barn Swallow – a common species that is declining in Alberta and all surrounding jurisdictions.
- Lesser Scaup – long-term decline in populations in Alberta and surrounding jurisdictions. Alteration and loss of suitable habitat may pose threats.
- Sora – large (>50%) declines have occurred in Alberta and all surrounding jurisdictions since 1994. Threatened by loss of wetland habitat.

4.5 Significant Habitats

The most significant habitat on the property from a biodiversity perspective is the complex of Wetland 6, aspen woodland and tame grass. This diverse habitat has not been recently disturbed by agricultural practices and contains by far the best variety of species of plants and animals.

5. EFFECTS OF DEVELOPMENT ON BIOLOGICAL RESOURCES

The effects of the development will be primarily of local significance and involve the loss of the large majority of habitat on the property. However, this habitat is mainly non-native with relatively low environmental significance.

6. DISCUSSION OF REGIONAL ECOSYSTEM CONCEPTS

6.1 Habitat Fragmentation

Past rural and urban development in the Olds region have resulted in an overall loss of native habitat. Native habitats have been broken into relatively small units and small remnant areas are often isolated by critical distances from other native habitats. This *habitat fragmentation* is symptomatic of urban and rural agricultural environment, resulting in a gradual loss of biodiversity, especially wildlife.

Habitat loss from the project will not contribute significantly to habitat fragmentation. The only significant remnant of native habitat on the property will be conserved.

6.2 Wildlife Corridors

Connections between habitats in the project area and surrounding area are currently weak due habitat fragmentation. There are no important wildlife corridors that involve the property.

6.3 Biodiversity

The existing biodiversity of the non-native habitats that will be lost is low. Species of plants and animals that will be lost are generally wide-ranging and common in Alberta.

7. CONCLUSIONS AND MITIGATION

1. Direct habitat loss associated with the development will be mainly non-native habitat of low significance. Associated loss of biodiversity will involve wide-ranging, common species
2. It is proposed that Wetlands 2, 3 and 4 will be eliminated. As components of an expansive area of open space, Wetland 1 and a portion of Wetland 6 will be retained, while Wetland 5 will be converted to a stormwater pond. Areas around Wetlands 5 and 6 will be enhanced with native vegetation. A detailed wetland report will be forwarded to Alberta Environment at an appropriate time in the design and approval process to Alberta Environment for the compensation process.
3. With the preceding, a representative portion of the most productive and significant habitat (Wetland 6: sedge/willow-aspen woodland-dugout-tame grass) will be retained and enhanced.
4. Contribution of the project toward cumulative regional habitat fragmentation, loss of wildlife corridor potential, and loss of regional biodiversity will be negligible or very minor.
5. With the proposed mitigation, there will be no significant biophysical constraints for the proposed development.

8. REFERENCES

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Appendix 1. List of Vascular Plants

Habitat Notations: We1, 2, 3, 4, 5, 6 = Wetland 1, 2, 3; 4, 5, 6; A = Aspen Woodland; Wb = Aspen/Willow Windbreak; N = Tame Grass/Cropland/Disturbed

* – non-native species

aspen (*Populus tremuloides*) – Wb
awned sedge (*Carex atherodes*) – We2
*awnless brome (*Bromus inermis*) – We2, A, N
balsam poplar (*Populus balsamifera*) – A
beaked willow (*Salix bebbiana*) – Wb, We2, A, We6
bottlebrush sedge (*Carex utriculata*) – We2
buckbrush (*Symphoricarpos occidentalis*) – A
Canada anemone (*Anemone canadensis*) – A
Celery-leaved buttercup (*Ranunculus sceleratus*) – We1, 5
Clammy hedge-hyssop (*Gratiola neglecta*) – We1
common cattail (*Typha latifolia*) – We3, 4, 5
*common dandelion (*Taraxacum officinale*) – We1, 4; A
*common plantain (*Plantago major*) – We5
*creeping thistle (*Cirsium arvense*) – A
dock (*Rumex* sp.) – We3
fowl bluegrass (*Poa palustris*) – We6
foxtail barley (*Hordeum jubatum*) – We1, 3, 4, 5
graceful cinquefoil (*Potentilla gracilis*) – A
hairy speedwell (*Veronica peregrina*) – We1, 3, 4
*Kentucky bluegrass (*Poa pratensis*) – N, A
large-leaved yellow avens (*Geum macrophyllum* sp.) – A
marsh hedge-nettle (*Stachys palustris*) – W
marsh yellow cress (*Rorippa palustris*) – We1, 3, 5
needle spike-rush (*Eleocharis acicularis*) – We1, 3, 5
northern bedstraw (*Galium boreale*) – A
northern gooseberry (*Ribes oxycanthoides*) – Wb, A
northern reed grass (*Calamagrostis inexpansa*) – We6
northern willowherb (*Epilobium ciliatum*) – A
pennyroyal (*Hedeoma hyspidum*) – We1
*quack grass (*Elytrigia repens*) – We1, N
red-osier dogwood (*Cornus stolonifera*) – Wb
*reed canary grass (*Phalaris arundinacea*) – We2
rough cinquefoil (*Potentilla norvegica*) – We1, 5
sandbar willow (*Salix exigua*) – We6
saskatoon (*Amelanchier alnifolia*) – A
showy everlasting (*Antennaria pulcherrima*) – A
slender wheat grass (*Elymus trachycaulus*) – A
slough grass (*Beckmannia syzigachne*) – We1, 2, 3, 4, 5
*stinkweed (*Thlapsi arvense*) – We1, 2
*timothy (*Phleum pratense*) – A, N
tumbling mustard (*Sisymbrium altissimum*) – We1
tufted hair grass (*Deschampsia cespitosa*) – W6

water smartweed (*Polygonum amphibium*) – W4
wild oat (*Avena fatua*) – We1
wild rose (*Rosa* sp.) – A
wild vetch (*Vicia americana*) – A

Appendix 2. List of Birds

Habitat Notations: We1, 2, 3, 4, 5, 6 = Wetland 1, 2, 3; 4, 5, 6; A = Aspen Woodland; Wb = Aspen/Willow Windbreak; N = Tame Grass/Cropland/Disturbed; Dugout

* – non-native species

American Crow – Wb, A, N
American Robin – Wb, A, N
Barn Swallow – N
Black-billed Magpie – Wb, A, We6
Blackpoll Warbler – A (migrant)
Brown-headed Cowbird – A
*European Starling – N, A
Canada Goose – N
Clay-colored Sparrow – Wb, We6
Gadwall – D
*Gray Partridge – N
Green-winged Teal – D
Horned Lark – N
House Wren – A, N
Killdeer – N, D
Lesser Scaup – D
Mallard – D
Northern Flicker – A
Red-winged Blackbird – We6
*Rock Pigeon – N
Savannah Sparrow – Wb, N, We1-6
Song Sparrow – Wb, A, We6
Spotted Sandpiper – D
Vesper Sparrow – Wb
Western Tanager – A, N (migrant)
Wilson's Snipe – We6
Yellow Warbler – A, We6
Yellow-rumped Warbler – A (migrant)

Appendix 3. List of Mammals

Habitats: We6 = Wetland 6; A = Aspen Woodland; Wb = Aspen/Willow Windbreak; N = Tame Grass/Cropland/Disturbed

Mule Deer – A
Moose – Wb, We6, A
Richardson's Ground Squirrel – N

Appendix 4. List of Amphibians

Boreal Chorus Frog – Wetland 6

Appendix 5. Stewart and Kantrud Wetland Classification

Under the Stewart and Kantrud system of classification, each class is distinguished by the vegetation zone occurring in the central or deeper part of the wetland and occupying five percent or more of the total wetland area being classified. Other zones often occur in shallower/drier parts of a wetland.

Appendix 6. Habitat Photographs



Wetland 1



Wetland 2



Wetland 3



Wetland 5



Wetland 6



Dugout in Wetland 6



Aspen Woodland