

NOSE HILL PARK BIRD MONITORING 2006

Prepared by:
Sweetgrass Consultants Ltd.
Calgary, AB

For:
CITY OF CALGARY PARKS

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Sweetgrass Consultants Ltd.
15112 Deer Run Dr. S.E.
Calgary, AB T2J 5M8
CANADA
phone: (403) 278-1025
email: sweetgrass@shaw.ca

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EXECUTIVE SUMMARY

Sweetgrass Consultants Ltd. was contracted in June 2006 to conduct breeding bird monitoring surveys in Nose Hill Park to provide baseline information on current bird populations and to address how populations have changed overtime.

Objectives of the study included documentation of bird use in the various habitats, analysis of results (which included comparisons with 1993 survey data), evaluation of trends in bird populations and habitats, and formulation of recommendations for future monitoring.

A total of 24 circular plots were surveyed on 8 occasions during the breeding season, except for one plot that was added later in the season and only surveyed three times.

Plots were recorded with GPS technology and mapped in ArcGIS, and habitats described and photographed. Records were entered into a database (Microsoft Access format). Data was analyzed for birds for various habitat groupings and, where possible, comparisons were made with 1993 survey results.

The most productive habitat groupings in 2006 were tall shrub, low shrub, and woodland, in that order.

A total of 44 species were recorded in the plot surveys, compared with 49 in 1993. An additional 26 species were recorded through random observations, outside of the plots; these were mainly less common species that probably did not nest in the Park. While the 1993 and 2006 totals were similar, the species composition varied between years, with a number of species occurring in one year but not in both. This included the virtual disappearance of four species of grassland birds (Baird's Sparrow, Sharp-tailed Grouse, Sprague's Pipit, and Western Meadowlark) and declines in three other species that use grassland habitats (Northern Harrier, Swainson's Hawk and Vesper Sparrow).

The most significant study finding was the overall decline in nesting grassland bird species, since three of these species (Baird's Sparrow, Sprague's Pipit and Sharp-tailed Grouse) are either threatened or sensitive, and the native grassland is a threatened ecosystem and a high profile habitat in the Park.

Potential explanations for the trends observed through the study include the following:

1. human disturbance associated with the use of the system of formal and informal trails;
2. invasion, and subsequent loss of native grassland by non-native plant species;
3. regional (Calgary and surrounding area) habitat fragmentation;
4. habitat deterioration related to the cessation of grazing associated with the establishment of the Park;
5. natural bird population oscillations related to climatic fluctuations;
6. some grassland bird species being at the edge of their Alberta range in the Calgary area; and
7. non-compliance with off-leash dog activities on the escarpment, especially during the breeding season for birds.

Recommendations and guidelines are presented for continued monitoring of breeding birds for effective Park conservation and management strategies.

1. INTRODUCTION

Sweetgrass Consultants Ltd. was contracted in June 2006 to conduct breeding bird monitoring surveys in Nose Hill Park to provide baseline information on current bird populations and to address how populations have changed overtime.

The City of Calgary Parks commissioned this study to begin assessing how bird populations have been evolving in Nose Hill Park over time, and to address how populations have changed since 1993, when a similar study was undertaken. Additionally, this study was undertaken as a follow-up to the *Biophysical Impact Assessment Nose Hill Park – Cross-Park Pathways Route* prepared by URSUS Ecosystems Management Ltd. in June 2006, which recommended that a “Park-wide breeding bird survey be undertaken to establish a baseline for monitoring success of installing designated routes and overall mitigation success of the NHTPP (Nose Hill Trail and Pathway Plan).

2. OBJECTIVES

The objectives of the study included:

1. documentation of bird use in the various habitats;
2. analysis of results and comparison with results of survey conducted in 1993;
3. evaluation of trends in bird populations and habitats;
4. formulation of recommendations for future monitoring.

3. WORK PLAN AND METHODS

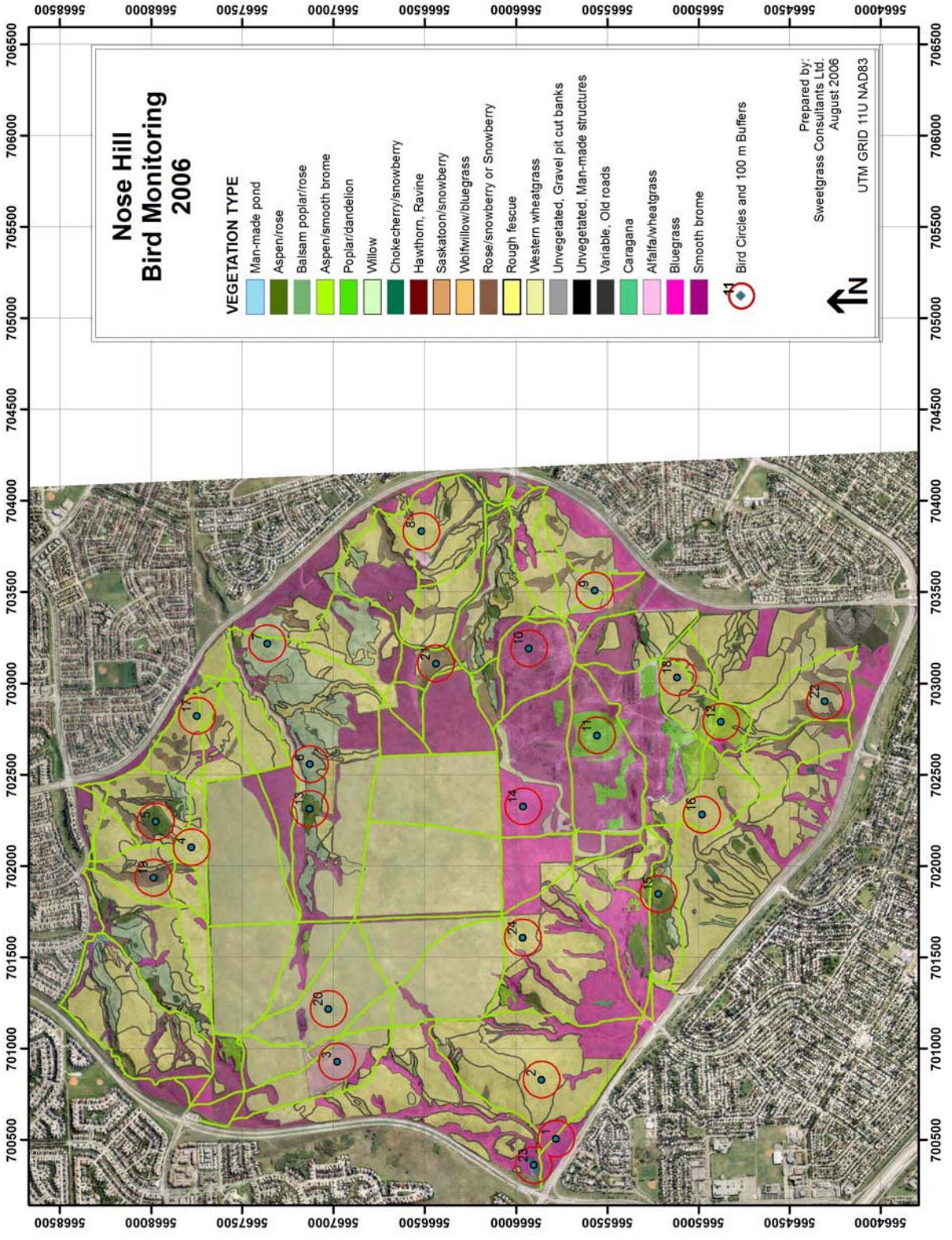
Bird monitoring locations were selected based on the following considerations:

- habitat representation of the variety of cover types and land forms in the Park, as defined in Kansas et al. (1993);
- inclusion of sites in proximity to existing formal and informal trail systems;
- sites with ecosite class corresponding as closely as possible with sites surveyed for birds in 1993; and
- accessibility to permit efficient use of survey time.

Methods included the following:

- fixed circular plots of 100 m radius were established in 24 locations in ecosite types sampled in 1993 (Nose Hill Bird Monitoring Map--see next page; see Appendix 2 for descriptions and photos and Appendix 3 for coordinates). An ecosite is defined as an area with a unique recurring combination of vegetation, soil, landform, and other environmental components. It was not possible to sample precisely the same locations as in 1993 as documentation of those sites was not available.
- plot locations were recorded with GPS technology and mapped in ArcGIS.
- plots were sampled over a 10-minute period, between sunrise and approximately 10:00 a.m. and all singing and non-singing individuals observed were recorded.

- the majority of plots were surveyed for a total of 8 times, between early June and early July; one plot (#24) was established mid-way through the survey period and, consequently, was surveyed only three times.
- observations were entered into a database (Microsoft Access format) and included information on species, location, date, time, habitat, observer, age/sex, behavior (singing, calling, flying etc.), and relevant notes.
- digital photographs were taken at survey sites.



4. RESULTS AND ANALYSIS

4.1 2006 Surveys

4.1.1 Overall Species Occurrence

A grand total of 70 species were recorded in the Park in 2006.

A total of 44 species were observed in the circular plot surveys (Appendix 1). Of this total, 22 were known or strongly suspected of nesting in the Park, while 22 appeared to be only visitors.

An additional 26 species (Appendix 2) were recorded off the plots as random observations during the plot surveys or during linear bird transect surveys in 2006. Of these, 2 nested or probably nested in the Park in 2006.

4.1.2 Species at Risk

No federally listed—Endangered, Threatened, Special Concern—species (COSEWIC 2006) or provincially listed "Species at Risk" (ASRD 2006) were observed in 2006. However, the following provincially listed species of concern (ASRD 2006) were observed:

"May Be At Risk" (species that may be at risk of extinction or extirpation and is therefore a candidate for a detailed risk assessment):

- Baird's Sparrow (off-plot random observation only)

"Sensitive" (species that is not at risk of extinction or extirpation but may require special attention or protection to prevent it from becoming at risk); all of these species appeared to be non-breeding visitors to the Park, except for Northern Harrier that probably nested:

- Baltimore Oriole
- Barn Swallow
- Great Blue Heron
- Green-winged Teal
- Least Flycatcher
- Lesser Scaup
- Northern Harrier
- Swainson's Hawk

In addition to species formally listed as "Sensitive," there are several other birds of prey that are scarce in the Park and potentially vulnerable to disturbance from human activity during the nesting season:

- Cooper's Hawk – nested
- Merlin – non-nesting visitor; could potentially nest in woodland
- Northern Harrier – apparently nested but was not successful
- Red-tailed Hawk – visitor to western edge; could potentially nest in woodland
- Sharp-shinned Hawk – could potentially nest in woodland
- Swainson's Hawk – could potentially nest in trees or tall shrubs

4.1.3 Productivity of Habitat Groupings

Circular plot habitat groupings with the largest diversity of nesting species were, in descending order: (1) woodland and tall shrub groupings (15 species nesting in plots), (2) low shrub and non-native grass groupings (10 species nesting in plots), and (3) native grassland and pond groupings (5 species nesting in plots) (Table 1).

The largest diversity of singing species (species, including songbirds, where males sing to proclaim nesting territories, as opposed to non-singing species, like hawks and ducks, whose vocalizations are not songs) were, in descending order: (1) tall shrub, (2) woodland, and (3) low shrub (Table 2). The largest diversity of all species (singing + non-singing), in descending order, were: (1) woodland and tall shrub (equal numbers of species) and (2) pond. It should be noted that the pond includes numerous non-nesting/visiting species.

The largest relative densities of all singing individual birds on circular plots were found, in descending order, in tall shrub, low shrub and woodland (Table 2). The largest relative densities of all non-singing + singing birds were found, in descending order, in pond, tall shrub, low shrub, and woodland habitat groupings (Table 3).

Table 1. 2006 Circular Plots – Nesting Species in Habitat Groupings

	NATIVE GRASSLAND	NON-NATIVE GRASS	TALL SHRUB	LOW SHRUB	WOODLAND	POND
total species (singing + non-singing) nesting on plots	5	10	15	10	15	5

Table 2. 2006 Circular Plots – Singing Birds in Habitat Groupings

	NATIVE GRASSLAND	NON-NATIVE GRASS	TALL SHRUB	LOW SHRUB	WOODLAND	POND
total # plot surveys	67	40	15	16	40	8
av. # singing individuals (all species) per count	2.91	2.88	5.13	4.75	3.83	3.13
species diversity (total species singing)	4	5	15	8	13	4

Table 3. 2006 Circular Plots – Total (Singing + Non-singing) Birds in Habitat Groupings

	NATIVE GRASSLAND	NON-NATIVE GRASS	TALL SHRUB	LOW SHRUB	WOODLAND	POND
# plot surveys	67	40	15	16	40	8
av. # individuals per count	5.42	5.43	12.81	11.19	7.78	27
species diversity (total species observed)	6	10	21	11	21	20

4.2 Comparison of 1993 and 2006 Surveys

Comparing the survey data of the 2006 circular plots with that of 1993 has significant limitations. The 1993 data that was available to us did not allow a determination as to whether an observation was of a bird in the habitat, near the habitat or flying over it. It was also not possible to determine behavior (singing etc.), sex or other important biological conditions.

Singing birds for a given species represent potential numbers of breeding territories (and, therefore, potential nests), since singing males sing to proclaim territories. The census of singing birds in nesting habitat is an accepted and economical method for monitoring changes in species diversity and relative abundance over time.

The majority of plots from 1993 could not be resurveyed because the documentation of their locations was not available. In 2006, survey locations in similar ecosites were chosen in the largest areas of relatively homogeneous habitat available, so that the 100 m circular plots could sample single ecosites with minimal influence from other ecosite types. A perusal of the data from 1993 indicates a greater mixing of species from dissimilar habitats, which may be the result of plots that were too small or heterogeneous or the above mentioned lack of specific information within the observation records. In 2006, birds flying over and not using the habitat have been excluded from the analysis.

Further complicating comparison of data between years was the use of volunteers to conduct the surveys in 1993, presenting more chance of variability in methodology and results than would a team of trained observers with previous experience in conducting bird surveys. Even with these constraints, some species trends are still evident and generalized comparisons can be made.

4.2.1 Overall Species Occurrence

A total of 44 species of birds (based on singing + non-singing observations) were recorded in the circular plot surveys in 2006. This compares with 49 species recorded in 1993. However, the composition of the birds that made up the total number of species recorded was quite different in 2006 compared with 1993 (Table 4).

A total of 15 species observed in 2006 were not found in 1993. While most of these appeared to be scarce non-breeders, at least three species nested in 2006:

- Common Raven – scarce
- Cooper's Hawk – scarce
- Gray Catbird – fairly common

A total of 20 species observed in 1993 were not found in 2006. As was the case with the previous list, most were relatively scarce. However, three species are native grassland inhabitants that were major breeding species in 1993:

- Baird's Sparrow
- Sprague's Pipit
- Western Meadowlark

A fourth grassland species, Sharp-tailed Grouse, was already declining in numbers in 1993 and has been absent from the area for several years.

Table 4. Comparison of Species Recorded on Circular Plots in 1993 and 2006

Species	1993	2006
Alder Flycatcher	X	X
American Crow	X	
American Goldfinch	X	X
American Kestrel	X	
American Robin	X	X
American Wigeon	X	X
Baird's Sparrow	X	
Baltimore Oriole		X
Barn Swallow	X	
Black-billed Magpie	X	X
Black-capped Chickadee	X	X
Black-crowned Night-Heron	X	
Blue-winged Teal	X	X
Brewer's Blackbird	X	X
Brown-headed Cowbird	X	X
Brown Thrasher	X	
Cedar Waxwing	X	X
Chipping Sparrow	X	X
Clay-colored Sparrow	X	X
Common Grackle		X
Cooper's Hawk		X
Eastern Kingbird		X
European Starling	X	X
Franklin's Gull	X	X
Gadwall	X	X
Gray Catbird		X
Gray Partridge	X	X
Great Blue Heron		X
Green-winged Teal		X
Hermit Thrush	X	
Horned Lark	X	
House Finch		X
House Sparrow	X	
House Wren	X	X
Killdeer	X	X
Le Conte's Sparrow	X	X
Least Flycatcher		X
Lesser Scaup		X
Lincoln's Sparrow	X	X
Long-billed Curlew	X	
MacGillivray's Warbler		X
Mallard	X	X
Northern Flicker		X
Northern Harrier	X	X
Orange-crowned Warbler	X	
Pied-billed Grebe	X	
Red-eyed Vireo		X

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Table 4. Comparison of Species on Circular Plots in 1993 and 2006
 (continued from previous page)

Species	1993	2006
Red-winged Blackbird	X	X
Ring-billed Gull	X	
Ring-necked Pheasant	X	X
Rock Pigeon	X	
Savannah Sparrow	X	X
Sharp-tailed Grouse	X	
Spotted Sandpiper	X	
Spotted Towhee		X
Sprague's Pipit	X	
Swainson's Hawk	X	X
Swainson's Thrush		X
Tree Swallow	X	X
Vesper Sparrow	X	X
Warbling Vireo	X	
Western Meadowlark	X	
Western Wood-Pewee	X	
Yellow Warbler	X	X

4.2.2 Species at Risk

Two federally listed species were recorded on circular plots in 1993, but not recorded in the Park in 2006:

- Long-billed Curlew – "Special Concern" (COSEWIC 2006); rare (only one individual) on circular plots in 1993.
- Sprague's Pipit – "Threatened" (COSEWIC 2006); observed on 11 circular plots in 1993.

Three species now listed as "Sensitive" by Alberta Sustainable Development (2006) were recorded on circular plots in 1993, but not observed in the Park in 2006:

- Black-crowned Night-Heron – one recorded at the Pond in 1993.
- Pied-billed Grebe – one recorded at the Pond in 1993.
- Sharp-tailed Grouse – one recorded at the Pond in 1993.

One "Sensitive" species was widespread on circular plots in 1993 but absent in 2006:

- Baird's Sparrow – only one singing male observed singing off-plot in 2006.

Five "Sensitive" species were recorded in 2006, but not in 1993 (all were scarce non-nesters):

- Baltimore Oriole
- Green-winged Teal
- Great Blue Heron
- Least Flycatcher
- Lesser Scaup

Regarding birds of prey vulnerable to human disturbance, the following species were listed as nesting in the Park area in 1993:

- Great-horned Owl – not observed in Park in 2006
- Long-eared Owl – not observed in Park in 2006
- Swainson's Hawk – scarce visitor in 2006 but observed more frequently in 1993, possibly related to a greater abundance of Richardson's ground squirrels at that time

One bird of prey species was observed more frequently on plots in 1993 than in 2006:

- Northern Harrier

One birds of prey species was observed in the Park in 2006 but not in 1993:

- Cooper's Hawk

4.2.3 Productivity of Habitat Groupings

Of the species recorded in both 1993 and 2006 surveys, the following were significantly less abundant in these habitat groupings in 2006:

Woodland/Tall Shrub

- American Crow
- Black-billed Magpie
- Swainson's Hawk

Grassland/Low Shrub

- Northern Harrier
- Vesper Sparrow

Of the species recorded in both 1993 and 2006 surveys, the following were more abundant in 2006:

Woodland/Tall Shrub

- Black-capped Chickadee
- Cedar Waxwing
- Yellow Warbler

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Table 5. 1993 & 2006 Circular Plot Comparison: Native Grassland – Rough Fescue/Parry's Oatgrass

Species	1993 Average # Individuals/Count - total 4 plots, 40 counts	2006 Average # Individuals/Count - total 4 plots, 27 counts
American Crow	0.2	—
American Goldfinch	0.1	—
American Robin	0.1	0.1
Baird's Sparrow	0.9	—
Barn Swallow	0.1	—
Black-billed Magpie	0.6	<.1
Brewer's Blackbird	0.3	—
Clay-colored Sparrow	0.7	0.9
House Wren	<.1	—
Le Conte's Sparrow	0.1	—
Mallard	0.1	—
Northern Harrier	0.1	—
Savannah Sparrow	2.5	3.7
Sprague's Pipit	0.3	—
Swainson's Hawk	<.1	—
Vesper Sparrow	0.8	<.1
Western Meadowlark	0.5	—

Table 6. 1993 & 2006 Circular Plot Comparison: Native Grassland – Rough Fescue/Golden Bean

Species	1993 Average # Individuals/Count - total 3 plots, 30 counts	2006 Average # Individuals/Count - total 3 plots, 24 counts
American Crow	0.1	—
American Goldfinch	0.1	—
American Robin	0.3	0.1
Baird's Sparrow	0.1	—
Barn Swallow	0.2	—
Black-billed Magpie	0.7	<.1
Brewer's Blackbird	0.4	—
Cedar Waxwing	0.1	—
Clay-colored Sparrow	1.0	0.7
House Wren	0.1	—
Killdeer	<.1	—
Le Conte's Sparrow	—	—
Long-billed Curlew	<.1	—
Mallard		—
Northern Harrier	<.1	<.1
Savannah Sparrow	1.9	4.6
Sprague's Pipit	0.9	—
Swainson's Hawk	—	—
Vesper Sparrow	1.0	—
Western Meadowlark	0.9	—

Table 7. 1993 & 2006 Circular Plot Comparison: Non-native Grass – Gravel Pit Smooth Brome/Bluegrass (1993) & Gravel Pit Smooth Brome (2006)

Species	1993 Average # Individuals/Count - total 1 plot, 10 counts	2006 Average # Individuals/Count - total 1 plot, 8 counts
American Crow	0.3	—
American Robin	0.5	0.4
Black-billed Magpie	1.2	—
Cedar Waxwing	—	1.3
Clay-colored Sparrow	1.1	3.8
Gadwall	0.2	—
House Finch	—	0.1
Killdeer	0.8	—
Northern Harrier	0.1	—
Savannah Sparrow	1.8	2.4
Spotted Sandpiper	0.1	—
Vesper Sparrow	0.8	0.3
Western Meadowlark	0.6	—

Table 8. 1993 & 2006 Circular Plot Comparison: Non-native Grass – Alfalfa/Western Wheatgrass

Species	1993 Average # Individuals/Count - total 1 plot, 10 counts	2006 Average # Individuals/Count - total 1 plot, 8 counts
American Crow	0.1	—
American Goldfinch	0.3	—
American Robin	0.2	0.6
Baird's Sparrow	0.1	—
Black-billed Magpie	1.2	—
Brewer's Blackbird	0.3	—
Clay-colored Sparrow	2.0	—
Le Conte's Sparrow	—	0.4
Mallard	0.2	—
Rock Pigeon	0.2	—
Savannah Sparrow	9.8	4.1
Sprague's Pipit	0.8	—
Swainson's Hawk	0.4	—
Vesper Sparrow	1.4	—
Western Meadowlark	1.1	—

Table 9. 1993 & 2006 Circular Plot Comparison: Woodland – Balsam Poplar/Dandelion (Gravel Pit)

Species	1993 Average # Individuals/Count - total 1 plot, 10 counts	2006 Average # Individuals/Count - total 1 plot, 8 counts
American Crow	0.2	—
American Goldfinch	0.2	0.1
American Robin	0.2	1.3
Baltimore Oriole	—	0.1
Black-billed Magpie	2.6	0.8
Brown Thrasher	0.1	—
Cedar Waxwing	—	0.9
Chipping Sparrow	—	0.1
Clay-colored Sparrow	1.4	1.9
Gadwall	0.5	—
House Wren	0.9	0.1
Killdeer	0.7	—
Mallard	1.8	—
Pied-billed Grebe	0.1	—
Red-eyed Vireo	—	0.1
Spotted Sandpiper	0.1	—
Savannah Sparrow	2.0	1.6
Vesper Sparrow	0.8	0.8
Western Meadowlark	0.2	—

Table 10. 1993 & 2006 Circular Plot Comparison: Tall Shrub – Willow/Snowberry

Species	1993 Average # Individuals/Count - total 2 plots, 20 counts	2006 Average # Individuals/Count - total 1 plot, 8 counts
Alder Flycatcher	1.6	0.5
American Crow	0.2	—
American Goldfinch	1.8	1.1
American Robin	0.2	1.3
Black-billed Magpie	2.6	0.8
Black-capped Chickadee	0.1	0.6
Brown-headed Cowbird	—	0.4
Cedar Waxwing	—	1.3
Clay-colored Sparrow	3.4	5.6
Cooper's Hawk	—	0.1
Eastern Kingbird	—	0.1
Gray Catbird	—	1.0
House Finch	—	0.9
House Wren	0.9	1.0
Lincoln's Sparrow	0.2	0.4
MacGillivray's Warbler	—	0.1
Northern Flicker	—	0.4
Orange-crowned Warbler	0.1	—
Spotted Towhee	—	0.1
Ring-necked Pheasant	0.3	0.1
Savannah Sparrow	0.1	—
Western Wood-Pewee	0.1	—
Yellow Warbler	—	0.9

Table 11. 1993 & 2006 Circular Plot Comparison: Tall Shrub – Shrub Dominated with Grass (1993) & Willow/Rough Fescue (2006)

Species	1993 Average # Individuals/Count - total 1 plot, 10 counts	2006 Average # Individuals/Count - total 1 plot, 8 counts
Alder Flycatcher	0.1	—
American Goldfinch	0.6	—
American Robin	0.4	1.0
Black-billed Magpie	0.3	—
Brewer's Blackbird	0.5	0.9
Cedar Waxwing	—	0.8
Clay-colored Sparrow	2.0	0.7
Gray Catbird	—	0.4
Lincoln's Sparrow	0.2	0.3
Northern Harrier	0.1	—
Savannah Sparrow	1.3	1.5
Western Meadowlark	0.1	—
Yellow Warbler	—	0.1

Table 12. 1993 & 2006 Circular Plot Comparison: Woodland – Aspen/Rose

Species	1993 Average # Individuals/Count - total 2 plots, 20 counts	2006 Average # Individuals/Count - total 3 plots, 24 counts
Alder Flycatcher	0.3	—
American Crow	0.9	—
American Goldfinch	0.4	0.4
American Robin	0.5	0.8
Black-billed Magpie	1.5	0.4
Black-capped Chickadee	0.4	1.5
Brewer's Blackbird	0.2	—
Brown-headed Cowbird	—	0.1
Cedar Waxwing	0.3	0.7
Clay-colored Sparrow	1.5	1.6
Cooper's Hawk	—	0.1
Gray Catbird	—	0.2
Hermit Thrush	0.1	—
House Wren	1.8	1.7
Least Flycatcher	—	<.1
Lincoln's Sparrow	0.1	0.1
Red-eyed Vireo	—	0.1
Ring-necked Pheasant	0.2	—
Savannah Sparrow	2.0	—
Spotted Towhee	—	<.1
Swainson's Hawk	0.4	—
Swainson's Thrush	—	<.1
Warbling Vireo	0.1	—
Western Wood-Pewee	0.1	—
Yellow Warbler	—	<.1

Table 13. 1993 & 2006 Circular Plot Comparison: Wetland - Stormwater Pond

Species	1993 Average # Individuals/Count - total 1 plot, 10 counts	2006 Average # Individuals/Count - total plot, 8 counts
American Goldfinch	0.1	—
American Kestrel	0.1	—
American Robin	0.4	1.0
American Wigeon	0.1	4.5
Barn Swallow	0.3	—
Black-billed Magpie	—	0.4
Black-crowned Night-Heron	0.1	—
Blue-winged Teal	0.1	0.1
Brewer's Blackbird	0.4	0.1
Brown-headed Cowbird	0.1	—
Cedar Waxwing	0.1	0.4
Clay-colored Sparrow	0.8	1.6
Common Grackle	—	1.0
European Starling	0.2	0.4
Franklin's Gull	—	0.1
Gadwall	—	0.3
Great Blue Heron	—	0.1
Green-winged Teal	—	0.1
Killdeer	0.9	0.5
Lesser Scaup	—	0.3
Mallard	1.0	13.9
Red-winged Blackbird	—	0.4
Ring-billed Gull	0.1	—
Savannah Sparrow	1.0	1.7
Sprague's Pipit	0.9	—
Swainson's Hawk	0.3	0.1
Tree Swallow	0.1	0.1
Vesper Sparrow	0.4	—
Western Meadowlark	0.6	—

4.3 Additional Observations

In addition to species observed on the circular plots, 26 species were recorded in 2006 (a) flying over the Park, (b) through random observations off-plot, and (c) on linear bird transects surveys conducted in response to mitigate redevelopment of the trail and pathway system. Two of these species nested in the Park:

- Common Raven
- White-crowned Sparrow

The remaining 24 species were either scarce visitors or migrants, a few of which possibly nested in 2006 (*); others:

- *American Crow – flying over; numerous on circular plots in 1993
- Barn Swallow – feeding
- *Baird's Sparrow – singing; numerous on circular plots in 1993
- *Brown Thrasher – singing; numerous singing males in early June, no observations thereafter
- California Gull – flying over
- *Downy Woodpecker – feeding
- Dusky Flycatcher – singing
- Greater Yellowlegs - flying over
- Horned Lark – flying over
- House Sparrow – feeding
- Merlin – hunting
- Mountain Bluebird – flying over
- Northern Mockingbird – singing
- Pine Siskin – flying over, feeding
- Red-tailed Hawk – hunting
- Ring-billed Gull – flying over
- Rock Pigeon – flying over
- Rose-breasted Grosbeak – singing
- Sharp-shinned Hawk – hunting
- *Veery – singing
- *Warbling Vireo – singing
- *Western Meadowlark – singing; numerous on circular plots in 1993
- White-winged Crossbill – flying over

5. DISCUSSION AND CONCLUSIONS

The marked changes in the composition of species diversity from 1993 to 2006 can be largely accounted for by the relatively small areas of native habitat in the Park and by habitat fragmentation in Calgary and the surrounding region. Many of the species that were present in one year or the other, but not in both years, were represented by very low densities of singing males and were probably non-breeders.

More significant has been the virtual disappearance of four key nesting grassland species—Baird's Sparrow, Sharp-tailed Grouse, Sprague's Pipit, and Western Meadowlark—and declines in numbers of three other nesting grassland species: Northern Harrier, Swainson's Hawk, and Vesper Sparrow.

Potential causes, either singly or in combination, for declines in grassland birds in the Park include the following:

1. Human Disturbance – disturbance from human recreational use along the extensive system of formal and informal trails, especially during the breeding season—this is especially a threat to sensitive species, including birds of prey and Sharp-tailed Grouse (which is no longer observed in the park) .
2. Loss of Grazing – deterioration in quality of grassland habitats in the Park as the result of the elimination of grazing—grasslands have evolved over millennia with grazing animals and grazing plays a major role in the recycling of nutrients and habitat diversity and productivity.
3. Non-native Plant Invasion – invasion of shrubbery and weedy/non-native vegetation into native grassland—this is a major challenge in natural areas in urban settings, with invasive species out-competing native species, resulting in changes in vegetation structure and insect species.
4. Habitat Fragmentation – regional (Calgary and surrounding area) habitat fragmentation resulting in relatively small, isolated areas of native grassland and isolated wildlife populations—continuous habitats are needed for the long-term maintenance of biodiversity.
5. Natural Population Declines – natural population oscillations associated with climatic fluctuations—in native grasslands this is the rule rather than the exception.
6. Species at the Limits of their Range – some grassland species, including Sprague's Pipit and Baird's Sparrow are near the western limit of their range in Alberta, which may make these species particularly vulnerable to the effects of the preceding factors.
7. Canine Disturbance – non-compliance with off-leash dog activities on the escarpment, especially during the breeding season for birds.

Major Findings

- no federally-listed species at risk were observed in 2006, compared with two species in 1993.
- of all species observed in 2006, 37% (26 species) were nesting and 63% (44 species were non-nesting).
- a total of 44 species (22 nesters and 22 scarce, non-breeding visitors) were observed in the circular plot surveys in 2006. This compares with 49 species observed in 1993 (approx. 29 nesters and 20 scarce, non-breeding visitors).
- species composition was quite different in 2006 compared with 1993. A total of 15 species observed in 2006 were not found in 1993. While most of these appeared to be scarce non-breeders, at least three species nested in 2006.
- a total of 20 species observed in 1993 were not found in 2006. As was the case with the previous list, most were relatively scarce. However, three species (Baird's Sparrow, Sprague's Pipit and Western Meadowlark) are native grassland inhabitants that were major breeding species in 1993; a fourth grassland species, Sharp-tailed Grouse, was already declining in numbers in 1993 and has been absent from the area for several years.
- the decline in nesting grassland bird species is the most significant finding, since three of these species (Baird's Sparrow, Sprague's Pipit and Sharp-tailed Grouse) are either threatened or sensitive, and the native grassland is a threatened ecosystem and a high profile habitat in the Park.

6. RECOMMENDED MANAGEMENT STRATEGIES

6.1 Monitoring Strategies

It is recommended that monitoring of breeding bird populations be continued in Nose Hill Park in order to track trends in species diversity and populations. The results would provide valuable information on which to base strategies for park management and conservation.

Future survey protocol should follow that which was developed for the 2006 surveys to ensure that the results are comparable amongst all surveys. We recommend using the WILDOBS data entry system and database to ensure that various behaviors, sexes, age classes, etc. are entered to avoid mixing up behaviors that are "higher order" indicating breeding or other habitat utilization and those which are of lower significance representing birds passing over and not really occupying the habitat.

As a guideline, monitoring should be undertaken at least every 5 years, although more frequent monitoring during the initial stages of the program should be considered to establish a baseline that includes natural fluctuations between wet and dry years.

6.2 Habitat Management Strategies

Documented declines in grassland birds in the breeding bird circular plot surveys and the linear transect survey (see companion report to this one) point to deteriorating habitat conditions. This has also been noted by previous researchers (Kansas et al. 1993). The Nose Hill Trail & Pathway Plan recommendations to formalize a designated trail and pathway network, close informal trails, and require users to stay on designated trails are important initial steps in maintaining and protecting existing habitat for grassland birds. However, additional complementary strategies are required in order to further enhance the quality of grasslands in the Park.

The following management prescriptions should be explored, either singly or in combination, for the conservation of biodiversity in the grasslands:

1. Habitat Improvement

- a prescribed burning program in native grassland for control of non-native plants and shrub invasion, and to promote habitat diversity. For effective shrub control, mowing or other mechanical removal may be necessary in conjunction with burning.
- mowing and grazing prescriptions in native grassland to create more microhabitat diversity (patch dynamics) and enhanced nutrient cycling (production and availability of a greater variety of prey species, including Richardson's Ground Squirrels, insects and other food sources from habitat enhancement, manure deposition, etc.);
- monitoring vegetation and wildlife to assess the success of habitat enhancement prescriptions—a component of this would be the breeding bird monitoring program, using the protocols (circles and linear transects) developed for the 2006 surveys. A parallel series of permanent sample locations should be identified to sample vegetation in these areas.
- many of these prescriptions would provide benefits beyond birds, e.g. rare plants. It is known that species like crowfoot violet (*Viola pedatifida*) has declined and that it has been found in recently burned areas at Nose Hill (B. Hallworth pers. comm).

2. Education and Enforcement

- creative approaches to education and enforcement should be explored. For example, for breeding birds, it is very important to effectively keep dogs on-leash and park users on designated trails during the nesting season to avoid damages to nests and prevent mortality of nesting species—enforcement and education in the spring and early summer may be best focused on informing users about the key habitats and nesting areas for sensitive species and the importance of staying on designated trails and keeping dogs on-leash and out of these sensitive areas during the nesting season..
- at other times of the year, the concern may be more related to vegetation damage (e.g. wet or extremely dry conditions) and education and enforcement of trail use could focus on those aspects; for example, encouraging users to stay on gravel trails during wet periods, to prevent soil and vegetation erosion issues.

3. Trail and Pathway Development

- it is important in wildlife conservation to look for opportunities to consolidate the most productive and sensitive habitats into larger, less fragmented systems, as the current *Nose Hill Trail and Pathway Plan* has planned for. This will provide larger areas of relatively undisturbed, continuous native habitat for species that require them.

7. LITERATURE CITED

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APPENDIX 1. ANNOTATED LIST OF BIRDS RECORDED IN NOSE HILL PARK CIRCULAR PLOT SURVEYS IN 2006

This list includes 44 species of birds that were recorded in Nose Hill Park on bird plot surveys from June 3 to July 5, 2006. This total includes 22 species in bold letters that nested or probably nested in the Park—18 species (marked *) nested in survey plots, and 5 species (marked **) nested off-plots; nesting habitats or possible nesting habitats appear in parentheses. The remaining 22 species did not appear to be nesting in the Park, but a few of these could have nested in very low numbers.

Alder Flycatcher *Empidonax alnorum* (*Tall Shrub, Low Shrub)

Summer Resident. Restricted to willow shrubbery in coulees on the north and east sides of the Park.

American Goldfinch *Carduelis tristis* (*Tall Shrub, Woodland, Low Shrub)

Summer Resident. Common in tall shrub and woodland habitats.

American Robin *Turdus migratorius* (*Tall Shrub, Woodland, Non-native Grass, Low Shrub)

Summer Resident. Common in woodland, tall shrubbery, and scattered tall shrubs and trees in more open habitats.

American Wigeon *Anas americana* (*Pond/Non-native Grass)

Summer Resident. Family group recorded at the stormwater pond area. Maximum of 16, including 15 young of the year on July 5. Also observed on pond at extreme northern end of Park.

Baltimore Oriole *Icterus galbula*

Summer Visitor/possible Summer Resident. One record in late June in poplar woods in an old gravel pit.

Black-billed Magpie *Pica hudsonia* (*Woodland, Tall Shrub)

Resident. Nesting in shrubs and trees; foraging in a wide variety of habitats, including grassland and non-native grass

Black-capped Chickadee *Poecile atricapillus* (*Woodland & Tall Shrub)

Resident. Regularly observed in tall shrubbery and woodland.

Blue-winged Teal *Anas discors*

Summer Visitor. One at the stormwater pond on June 26.

Brewer's Blackbird *Euphagus cyanocephalus* (**Tall Shrub)

Summer Resident. Less common in 2006 surveys than in 1993. Probably nesting in shrubbery in coulees or grassland.

Brown-headed Cowbird *Molothrus ater* (*all habitat groupings)

Summer Resident. Observed in a variety of habitats but relatively scarce. Not recorded in 1993 surveys. Parasitic, laying eggs in the nests of other bird species.

Cedar Waxwing *Bombycilla cedrorum* (*Tall Shrub, Woodland, Non-native Grass)

Summer Resident. Common in tall shrubbery and woodland. Because this species returns to its breeding grounds and nests relatively late, small flocks were recorded on circular bird plot surveys, making this species appear more abundant than it actually was.

Chipping Sparrow *Spizella passerina*

Summer Visitor/Possible Resident. One to two observed in woodland on three occasions.

Clay-colored Sparrow *Spizella pallida* (*all habitat groupings)

Summer Resident. The second-most abundant bird species in the Park, in low and tall shrubbery and woodland edges. Also observed singing from lupines in Plot 4.

Common Grackle *Quiscalus quiscula*

Summer Visitor. Regularly observed flying over the Park; a few records in the Park, mainly at the stormwater pond where a (maximum count of 3). Not recorded on 1993 surveys. This is a species whose numbers have increased markedly in suburban environments in recent decades.

Cooper's Hawk *Accipiter cooperii* (*Woodland)

Summer Resident. One nesting pair in Plot 15 (aspen in coulee). The nest, an old magpie nest 4 m above ground, was first found on June 3 and contained 3 eggs. A single adult was also observed hunting over coulee shrubbery on June 25.

Eastern Kingbird *Tyrannus tyrannus*

Summer Visitor/possible Summer Resident. Three records in coulee aspen and shrubbery.

European Starling *Sturnus vulgaris*

Summer Visitor/possible Summer Resident. Non-native species. Scarce during the survey period.

Franklin's Gull *Larus pipixcan*

Summer Visitor. One record at the stormwater pond. Regularly observed traveling over the Park.

Gadwall *Anas strepera*

Summer Visitor. Three records of 1-2 birds at the stormwater pond from mid June to early July. Also observed on pond at extreme northern end of Park.

Gray Catbird *Dumetella carolinensis* (*Tall Shrub, Low Shrub, Woodland)

Summer Resident. Fairly common in tall shrubbery and woodland, especially in coulees. Not recorded on bird counts in 1993.

Gray Partridge *Perdix perdix* (**Non-native Grass/Low Shrub/Native Grassland)

Resident. Non-native species. Several observations in native grassland, non-native grass, and low shrubbery. A family group was observed in non-native grass in early July.

Great Blue Heron *Ardea herodias*

Summer Visitor. Four records of individuals: 3 flying over, and 1 at the stormwater pond (Circular Plot 23) on July 20

Green-winged Teal *Anas crecca*

Summer Visitor. One at the stormwater pond on June 17.

House Finch *Carpodacus mexicanus*

Summer Visitor. Regularly observed flying and occasionally perched in tall shrubbery and trees. This is another species that has recently become common in the City of Calgary. It was not recorded in 1993.

House Wren *Troglodytes aedon* (*Woodland, Tall Shrub)

Summer Resident. Common in woodland and tall shrubbery.

Killdeer *Charadrius vociferus* (**Pond/Non-native Grass)

Summer Resident, probably nesting. Six observations—all but one at the stormwater pond.

Le Conte's Sparrow *Ammodramus leconteii* (*Non-native Grass & Woodland)

Summer Resident. Locally occurring in tall, dense tame grass habitats.

Least Flycatcher *Empidonax minimus*

Summer Visitor/possible Summer Resident. Six records of singing males in coulee aspen woods.

Lesser Scaup *Aythya affinis*

Summer Visitor. Two at the stormwater pond on June 25.

Lincoln's Sparrow *Melospiza lincolnii* (*Woodland, Tall Shrub)

Summer Resident. Regularly recorded but sparsely distributed in woodland and tall shrubbery.

MacGillivray's Warbler *Oporornis tolmiei*

Summer Visitor/Migrant. One singing male in tall coulee shrubbery in mid June

Mallard *Anas platyrhynchos* (*Pond/Non-native Grass)

Summer Resident. Maximum of 25 (3 family groups) at the stormwater pond on June 12. Also singles or pairs also observed flying over other parts of the Park and on a pond at the extreme northern end of the Park.

Northern Flicker *Colaptes auratus*

Summer Visitor/possible Summer Resident. Four records in woods and shrubbery. This species has become much more regular in suburban areas in Calgary in recent years.

Northern Harrier *Circus cyaneus* (**Low Shrub)

Summer Resident. Three records: 1 female giving alarm calls at Plot 21 (low shrubbery) on June 3 and appeared to have a nest nearby, but was not observed subsequently; 1 hunting on Plot 16 (fescue grassland) on June 5, and 1 hunting over Plot 9 (native western wheatgrass) on June 13.

Red-eyed Vireo *Vireo olivaceus*

Summer Visitor/possible Summer Resident. Five records of singing males in aspen and poplar.

Red-winged Blackbird *Agelaius phoeniceus*

Summer Visitor. Three singing males at the stormwater pond in early June is the only

observation.

Ring-necked Pheasant *Phasianus colchicus* (**Woodland/Tall Shrub/Low Shrub)

Resident. Non-native species. Two observations of single birds in the northern part of the Park in grassland and coulee shrubbery. These included an juvenile bird on July 5.

Savannah Sparrow *Passerculus sandwichensis* (*all habitat groupings)

Summer Resident. The most abundant bird species in the Park, in native grassland and tame grass, as well as relatively open low and tall shrubbery.

Spotted Towhee *Pipilo maculatus*

Summer Visitor/Resident. One singing male in coulee shrubbery and aspen woods in early-mid June.

Swainson's Hawk *Buteo swainsoni*

Summer Visitor. Seven observations of single adults from June 5 to July 20. No evidence of nesting. Described as nesting in the Park in 1993. This species has been negatively affected by a decline in Richardson's Ground Squirrels in the Park.

Swainson's Thrush *Catharus ustulatus*

Summer Visitor/Migrant. Two records in early June of a singing male in an aspen clone.

Tree Swallow *Tachycineta bicolor*

Summer Visitor/possible Summer Resident. Several records of individuals and small groups flying over various habitats and feeding over the stormwater pond.

Vesper Sparrow *Pooecetes gramineus* (*Native Grassland, Non-native Grass & Woodland)

Summer Resident. Relatively uncommon and notably less frequent on surveys compared with 1993.

Yellow Warbler *Dendroica petechia* (*Tall Shrub)

Summer Resident. Relatively uncommon in tall shrubbery and woodland.

APPENDIX 2. ANNOTATED LIST OF BIRDS RECORDED ONLY OFF-PLOTS IN NOSE HILL PARK IN 2006

This list includes a total of 26 species of birds that were observed in Nose Hill Park off of bird plots from June 3 to July 20, 2006. They were recorded: (1) as random observations while traveling between plots, (2) flying over during plot surveys, or (3) on linear transect surveys. Only 2 species, marked with an asterisk (*), nested or probably nested in the Park in 2006.

American Crow *Corvus brachyrhynchos* (Woodland)

Summer Visitor/possible Summer Resident. Only four records. Relatively scarce on circular plot surveys, compared with 1993.

Baird's Sparrow *Ammodramus bairdii*

Summer Visitor/possible Summer Resident. Regular species in native and tame grass habitats on surveys in 1993, but only one record in 2006, a singing male southeast of Plot 20 in the western part of the Park.

Barn Swallow *Hirundo rustica*

Summer Visitor. Three records of individuals flying over open areas of the Park.

Brown Thrasher *Toxostoma rufum*

Summer Visitor/possible Summer Resident. Numerous singing males in woodland and shrubbery in the first week of June, but not observed later in the season. Reported on circular bird plot surveys in 1993 but not in 2006.

Canada Goose *Branta canadensis*

Resident in the general region. One record of a flock of 13 flying over on June 4.

California Gull *Larus californicus*

Summer resident in the general region. Observed flying over the Park.

Common Raven *Corvus corax* (Woodland)

Resident. This species has increased significantly in the Calgary area in recent decades. Nested in an aspen clone in the northeastern portion of the Park.

Downy Woodpecker *Picoides pubescens*

Summer Visitor/possible Summer Resident. One record on July 20 in aspen woods.

Dusky Flycatcher *Empidonax oberholseri*

Summer Visitor. One record of a singing male in aspen woods on the southern slope.

Greater Yellowlegs *Tringa melanoleuca*

Migrant. Observed on June 12 flying low over the Park.

Horned Lark *Eremophila alpestris*

Resident in the general region. Two observations of birds flying over the Park in late June.

House Sparrow *Passer domesticus*

Summer Visitor. Non-native species. Recorded once in trees on the southeastern side

Merlin *Falco columbarius*

Summer Visitor. Two observations of birds calling and carrying prey in the southeastern part of the Park.

Mountain Bluebird *Sialia currucoides*

One male observed flying over the northern edge of the Park in early June.

Northern Mockingbird *Mimus polyglottos*

Summer visitor. One record of a singing male in an aspen clone on the northeastern side of the Park in early June.

Pine Siskin *Carduelis pinus*

Summer Visitor. Most often observed flying over and occasionally recorded in shrubs and trees.

Red-tailed Hawk *Buteo jamaicensis*

Summer Visitor. Nests on the west side of Shaganappi Road, just west of the Park.

Ring-billed Gull *Larus delawarensis*

Summer resident in the general region. Observed flying over the Park.

Rock Pigeon *Columba livia*

Non-native species in the general area. Observed on numerous occasions flying over the Park.

Rose-breasted Grosbeak *Pheucticus ludovicianus*

Migrant/Summer Visitor. One singing male in aspen on June 4, east of Plots 6 and 13.

Sharp-shinned Hawk *Accipiter striatus*

Summer Visitor. One adult flew from an aspen clone in mid June.

Veery *Catharus fuscescens*

Summer Visitor/possible Summer Resident. One singing and calling in lush coulee shrubbery and woodland in mid-late June.

Warbling Vireo *Vireo gilvus*

Summer Visitor/possible Summer Resident. Two records in aspen in the southern part of the Park.

Western Meadowlark *Sturnella neglecta*

Summer Visitor/possible Summer Resident. Several records of individual singing males in early June are the only observations. Notably scarcer in 2006 than in 1993 when it appeared to be common in both native grassland and non-native grass habitats.

White-crowned Sparrow *Zonotrichia leucophrys* (Low Shrub/Tall Shrub)

Summer Resident. At least two singing males, in tall shrubbery on the south slope and aspen woods-tall shrubbery on the eastern side.

White-winged Crossbill *Loxia leucoptera*

Visitor in the general region. One observed flying over on July 5.

APPENDIX 3. DESCRIPTIONS AND PHOTOGRAPHS OF 2006 CIRCULAR PLOTS



1. SEMI-NATIVE BUCKBRUSH/KENTUCKY BLUEGRASS
with awnless brome and interior bluegrass; rough fescue invading



2. ROUGH FESCUE/PARRY OATGRASS
includes small incursions of non-native Kentucky bluegrass and smooth brome



3. NON-NATIVE BROME
with some alfalfa and Kentucky bluegrass



4. ROUGH FESCUE/GOLDEN BEAN
includes a few scattered large willows

NO PHOTO

5. ASPEN/ROSE
large clone of dense, immature aspen



6. WILLOW/SNOWBERRY
includes open, low shrub-brome



7. WILLOW/ROUGH FESCUE
includes large patch of rose-brome in center; a former burn

NO PHOTO

8. ROUGH FESCUE/ PARRY OAT GRASS
with western wheat grass and snowberry draws; very little oat grass



9. WESTERN WHEATGRASS
Kentucky bluegrass mixed in

NO PHOTO

10. SMOOTH BROME
former gravel pit
weedy, tame grasses (brome, bluegrass), widely scattered Canada buffaloberry
balsam poplar, and patches of rose and silverberry



11. POPLAR/DANDELION
immature, open poplar and weedy species in old gravel pit



12. ASPEN/SMOOTH BROME
includes tame wheatgrass-Kentucky bluegrass, a few small willows, patches of silverberry and buckbrush, and just the edge of one aspen clone



13. ASPEN/ROSE
includes open area of brome within aspen
numerous exotic shrubs and trees within woods



14. BLUE GRASS/SMOOTH BROME



15. ASPEN/ROSE
with Bebb willow at edge

NO PHOTO

16. ROUGH FESCUE/GOLDEN BEAN
with scattered Bebb willow clumps

NO PHOTO

17. ROUGH FESCUE/PARRY OAT GRASS



18. ROUGH FESCUE/GOLDEN BEAN
includes some patches of buckbrush and weed patches
recent burn



19. ROSE/SNOWBERRY
includes scattered large willows and patches of saskatoon



20. NON-NATIVE/ALFALFA
primarily awnless brome and Kentucky bluegrass with considerable lupine and some alfalfa



21. ROSE/SNOWBERRY
smooth brome, rose, buckbrush and widely scattered willows

NO PHOTO

22. WESTERN WHEAT GRASS
with Kentucky bluegrass, buckbrush and saskatoon



23. POND
with shrub/grass edge and shoreline



24. ROUGH FESCUE/GOLDEN BEAN
with Parry oat grass and some awnless brome and Kentucky bluegrass at edge

APPENDIX 4. LOCATION OF CIRCULAR PLOTS

UTM COORDINATES

DATUM NAD83

GRID 11U

ID	Zne	East	North
1	11U	700506	5665780
2	11U	700829	5665860
3	11U	700928	5666981
4	11U	702102	5667779
5	11U	702243	5667975
6	11U	702557	5667130
7	11U	703219	5667364
8	11U	703833	5666519
9	11U	703508	5665570
10	11U	703191	5665929
11	11U	702715	5665557
12	11U	702789	5664877
13	11U	702313	5667131
14	11U	702326	5665961
15	11U	701847	5665220
16	11U	702281	5664982
17	11U	702822	5667750
18	11U	703033	5665115
19	11U	701935	5667987
20	11U	701216	5667026
21	11U	703109	5666439
22	11U	702902	5664308
23	11U	700362	5665903
24	11U	701608	5665963