



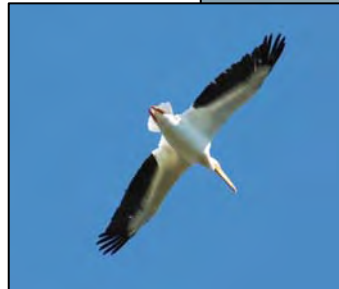
Wildlife Survey of the Antelope Creek

Habitat Development Area

2007

Fish & Wildlife Division

RESOURCE DATA AND
SPECIES AT RISK SECTION



Alberta Species at Risk Report No. 118

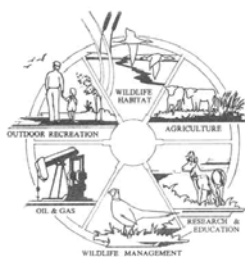
**Wildlife Survey of the Antelope Creek
Habitat Development Area – 2007**

Jennifer Carpenter

Joel Nicholson

Alberta Species at Risk Report No.118

2007



ANTELOPE CREEK
HABITAT DEVELOPMENT AREA

Publication No.: I/198
ISBN: 978-0-7785-7013-4 (Printed Edition)
ISBN: 978-0-7785-7014-1 (On-line Edition)
ISSN: 1496-7219 (Printed Edition)
ISSN: 1496-7146 (On-line Edition)

For copies of this report, visit the Alberta Species at Risk Program web site at:
<http://www.srd.gov.ab.ca/fishwildlife/speciesatrisk/default.aspx>

OR

Information Centre – Publications
Alberta Sustainable Resource Development
Main Floor, Great West Life Building
9920-108 Street
Edmonton, Alberta, Canada T5K 2M4
Telephone: (780) 944-0313 or 1-877-944-0313

This publication may be cited as:

Carpenter, J.E., and J.T. Nicholson. 2008. Wildlife Survey of the Antelope Creek Habitat Development Area - 2007. Alberta Sustainable Resource Development, Fish and Wildlife Division, Alberta Species at Risk Report No. 118, Edmonton, AB. 23 pp.

TABLE OF CONTENTS

Acknowledgements	iii
Executive Summary	iv
1. Introduction	1
2. Methods.....	2
2.1 Avian point counts	3
2.2 Amphibian call surveys.....	4
3.3 Burrowing owl playback survey	5
3.4 Raptor and shrike survey	5
3.5 Incidental monitoring.....	5
4. Species Observations	5
4.1 Birds	5
4.2 Amphibians	8
4.3 Mammals.....	8
4.4 Other observations	9
5. Discussion and Recommendations	10
5.1 Wetland habitats.....	10
5.2 Upland habitats	11
5.3 Noise	12
5.4 Monitoring strategy.....	13
References.....	14
Appendix I.	17
Appendix II.	19
Appendix III.....	20
Appendix IV.....	21
Appendix V.....	22

TABLE OF FIGURES

Table 2.0.1. The general location and name applied to fields that are used in this report.

Table 2.1.1. The total number of upland and wetland point count plots in each field.

Table 4.1.1. Sensitive avian species recorded during surveys of the ACHDA.

Table 4.2.1. Amphibian species recorded during surveys.

Table 4.3.1. Mammal species recorded during the survey and in previous records.

ACKNOWLEDGEMENTS

We express thanks to several individuals and organizations that benefited this project. The Antelope Creek Habitat Development Area (ACHDA) provided funding for the 2007 wildlife survey. Fieldwork was conducted under an Alberta Fish and Wildlife Division Research Permit (# 21932). Shannon Burnhard and Neal Wilson (ranch managers for the ACHDA) provided valuable information of previous wildlife observations and facilitated this work with their extensive knowledge of the ranch. Lee Bell (Alberta Fish and Game Association) administered the financial aspect of the project. Joel Nicholson (Alberta Sustainable Resource Development, Fish and Wildlife Division) provided a game caller with burrowing owl calls. Nicola Koper (Natural Resources Institute, University of Manitoba) provided pre-existing point count locations from research conducted between 2000 and 2002 on portions of the ranch. We also thank Walter Holloch for allowing access to land north of the ACHDA.

EXECUTIVE SUMMARY

The Antelope Creek Habitat Development Area (ACHDA), located west of Brooks, Alberta, is a working ranch cooperatively managed by multiple partners. An objective of the ACHDA is to balance the needs of a multiple land uses while also promoting wildlife habitat. To assess species occurrence on the ranch, wildlife surveys were made from 15 June to 30 June 2007 and included avian point counts, amphibian call surveys, burrowing owl playback surveys, shrike and hawk searches, and incidental observation. Eighty-two wildlife species were seen or heard during the surveys, including 72 bird, seven mammal, and three amphibian species. Twenty-eight species of interest were seen or heard, including four 'may be at risk', 22 'sensitive', and two of 'undetermined' status. Many of these species are strongly associated with prairie wetlands or native mixed-grass prairie uplands. These surveys are one element in long-term monitoring to evaluate changes in the relative abundance and diversity of wildlife on the ranch.

1. INTRODUCTION

The Antelope Creek Habitat Development Area (ACHDA) is a ranch that aims through cooperation with multiple agencies to balance the needs of livestock, wildlife, and the oil and gas industry (DUC 2007). Established in 1986, the ACHDA encompasses a >22 km² area ~10 km west of Brooks, Alberta (DUC 2007). Founding partners for the ranch included the Alberta Fish and Wildlife Division, Wildlife Habitat Canada, Ducks Unlimited Canada and the Alberta Fish and Game Association. Through cooperative efforts, a multitude of other organizations and individuals have contributed to the ACHDA, including: Alberta Environment; Alberta Agriculture, Food and Rural Development; the Eastern Irrigation District; the Universities of Alberta, Lethbridge and Calgary; Public Lands; EnCana; and Murphy Oil (DUC 2007).

The ACHDA is composed primarily of dry mixed-grass prairie but also contains several managed wetlands. These wetlands and their associated riparian areas provide a mosaic of upland and wetland habitat that supports multiple prairie-dependent wildlife species. Upland prairie habitat in this region is dominated by needle and thread (*Stipa comata*) and blue grama grass (*Bouteloua gracilis*) and includes dispersed prickly pear (*Opuntia polyacantha*), ball cactus (*Coryphantha vivipara*), and sagebrush (*Artemisia cana*) (Guyn and Clark 1999, Koper and Schmiegelow 2006b).

There are several substantial water bodies within the ACHDA, including Lake San Francisco and 36 constructed wetland basins managed by Ducks Unlimited Canada (DUC 2007). In addition, there are many smaller ephemeral water bodies, including: the canals that connect managed basins; spillover from these canal systems; spillover from managed basins; and natural depressions. The fringes of wetland basins and canals are typically dominated by common cattail (*Typha latifolia*), spike rush (*Eleocharis palustris*), and great bulrush (*Scirpus acutus*) (Koper and Schmiegelow 2006b). In some locations, wetlands are bordered by salty mudflats edged by foxtail (*Hordeum jubatum*). While there are generally few trees and shrubs in the area, willow (*Salix spp.*), silver buffaloberry (*Shepherdia argentea*), and a few stands of aspen (*Populus tremuloides*) can be found in wetter areas, mainly along canals.

The ACHDA is primarily used for livestock grazing, however, petroleum extraction is significant, particularly on the eastern portion of the ranch. This development has generated an extensive network of roads throughout the eastern portion of the ranch. Recreational use and public access of the ranch is encouraged, and there are posted maps, designated parking areas, and a public access road that loops through the ranch. Other than this designated route, public access is by foot only.

The purpose of the 2007 wildlife survey was to provide information to ACHDA managers regarding wildlife occurrence on the ranch. This information will be used (1) to guide current management and planning efforts, particularly those beneficial to sensitive species, and (2) as one element in long-term monitoring to evaluate changes in the relative abundance and diversity of wildlife on the ranch.

2. METHODS

Methods for the wildlife surveys generally followed those outlined in the 2005 Sensitive Species Inventory Guidelines (SSIG), published by Alberta Sustainable Resource Development and Fish and Wildlife (2005). All surveys took place between 15 June and 30 June 2007 in weather conditions with no precipitation and wind speeds less than 20 km/h. Following the SSIG, “species of interest” in this report include: (1) species determined to be endangered or threatened under Alberta’s *Wildlife Act*; (2) species of special concern following a provincial detailed status assessment by the Alberta Endangered Species Conservation Committee (ESCC), and (3) all species ranked by the 2005 general status assessment process as at risk, may be at risk, sensitive, or undetermined. All observations of species made during surveys were submitted to The Fisheries and Wildlife Management Information System (FWMIS).

For survey purposes, the ranch was divided along pre-existing fence line divisions. Fields were labeled following Table 2.0.1. Five fields of native mixed-grass prairie are labeled field 1, field 2, field 3, field 4, and Cassil’s field. A 6th smaller field with continual grazing is labeled the grazed field. Two additional areas, managed without grazing for thick duck nesting cover, are labeled the NE idle, and NW idle field.

An additional small field labeled home was also surveyed. Other areas of the

ranch were not extensively surveyed and included planted and irrigated fields, labeled the pivot and CWG fields. Some surveys were also conducted on land adjacent to the ACHDA, labeled Oakland's for this report.

Table 2.0.1. The general location and name applied to fields that are used in this report.

Field Name	General Location
Field 1	northwest
Field 2	northeast
Field 3	south
Field 4	southwest
Cassils	east
Grazed field	southeast
Home field	central
NE idle	northeast
NW idle	northwest
Oakland's	north of the ACHDA
Pivot and CWG fields	central and southeast

2.1 Avian point counts

Birds were surveyed using circular point counts (see Appendix III for locations). Points (n=104) were placed following Koper and Schmiegelow (2006) with 100 m radius plots centred every 300 m along transects radiating from wetlands or roads. All point count plots were accessed by foot. The number of plots in each field was determined by field size and configuration (Table 2.1.1). Count duration was five minutes and was not limited to birds, with all species within the 100 m radius recorded. In addition, evidence of breeding activity (song, display, den or nesting behaviour) was noted. Upland point counts were centred at least 100 m from a wetland edge. Wetland point counts were made at the wetland edge and included all the wetland habitat within a 100 m radius. When winds were <20 km/h, counts began after sunrise (~05:15) and concluded by 10:00. Most counts were repeated after a seven day interval, however counts in

Oakland's were conducted only once. If a species of interest was observed outside of the plot radius, it was recorded as an incidental observation.

Table 2.1.1. The total number of upland and wetland point count plots in each field. The number of plots was determined by field size and configuration. Plots within the ACHDA boundary were counted twice on a seven day interval. Plots in the Oakland's field just north of the ACHDA, were counted once.

Field Name	Number of Count Plots		Times Counted
	Upland	Wetland	
Field 1	10	4	2
Field 2	8	6	2
Field 3	14	6	2
Field 4	13	3	2
Cassils	7	4	2
Grazed field	3	1	2
Home field	1	1	2
NE idle	1	1	2
NW idle	2	2	2
Oakland's	14	3	1
Total	73	31	

2.2 Amphibian call surveys

Call surveys for amphibians were located (1) at randomly selected points along wetland edges, and (2) at points along roads and trails near wetlands (see appendix V for locations). Points along roads and trails were selected based on proximity of the road or trail to a wetland. Call surveys took place after dark between 22:30 and 02:00 and followed the SSIG (section 1.7.2). After a delay of two minutes, a three minute survey was conducted. If sensitive species were heard, the site was revisited during the day and egg masses and tadpoles were searched for.

3.3 Burrowing owl playback survey

Call playback surveys and associated ground searches were conducted at sites with (1) previous observations of burrowing owl activity, and (2) sites with suspected burrowing owl breeding activity. Call playback survey methodology followed the SSIG (section 4.7.1 and 4.7.2).

3.4 Raptor and shrike survey

Observers walked along canals and searched shrubby and treed areas for loggerhead shrike and raptor breeding activity. Silver buffaloberry (*Shepherdia argentea*) shrubs were observed first from a distance of >200 m with a spotting scope and then again at close range on foot for evidence of loggerhead shrikes. Areas with Swainson's hawk circling and calling were searched for a nest site.

3.5 Incidental monitoring

All incidental observations made of species of interest were recorded during the study period. This included all observations made while walking or driving between sites, and while conducting other surveys. During avian point counts, any sensitive species observed beyond the 100 m radius plot was recorded separately as an incidental.

4. SPECIES OBSERVATIONS

A total of 82 wildlife species were observed (seen or heard) on the ACHDA during the 2007 surveys (see appendix I for complete species listing). These include 72 bird, seven mammal, and three amphibian species. Of these, four are classified as 'may be at risk', 22 as 'sensitive' and two as of 'undetermined' status in Alberta (Alberta Sustainable Resource Development 2007).

4.1 Birds

Seventy-two bird species were observed and 26 bird species of interest were located (table 4.1.1). Seventeen of these species are strongly associated with wetland habitats and 10 with native mixed-grass upland prairie. There was direct evidence that

most of the sensitive bird species were actively breeding on the ACHDA through breeding displays or songs, observations of juveniles, nest defence behaviour, or by finding a nest.

No burrowing owls were found during playback surveys. An active Swainson's hawk nest was located on the ranch in the NW idle field. A second nest was located in trees adjacent to the ranch and this pair of birds also used the ACHDA extensively for foraging. Ferruginous hawks were not observed during the survey and there are no prior records for ferruginous hawks on the ACHDA. In Alberta, ferruginous hawks are reliant on ground squirrel prey (Alberta Sustainable Resource Development and Alberta Conservation Association 2006) and the low number of ground squirrels on the ACHDA likely precludes Ferruginous hawks. A few silver buffaloberry shrubs (*Shepherdia argentea*) grew along canals and also near the wetlands in the NW and NE idle fields. Loggerhead shrikes were located in both the NE idle and NW idle fields near these shrubs.

Table 4.1.1. Sensitive avian species recorded during surveys of the ACHDA. Direct evidence of breeding included hearing or observing a breeding display, observing juveniles, observing nest defence behaviour or finding a nest. Primary habitat association is listed although many species require both upland and wetland habitats. Nomenclature and status follow The General Status of Alberta Wild Species 2005 (Alberta Sustainable Resource Development 2007). Those with an asterisk beside their status are also listed as of Special Concern, following a detailed status assessment by the ESCC (Alberta Sustainable Resource Development 2007b).

Species Name	Primary Habitat	Evidence of Breeding	Evidence of Foraging	Status
Baird's Sparrow	upland	✓	✓	May Be At Risk
Barn Swallow	upland		✓	Sensitive
Bobolink	upland	✓	✓	Sensitive
Grasshopper Sparrow	upland	✓	✓	Sensitive
Loggerhead Shrike	upland		✓	Sensitive*
Long-billed curlew	upland		✓	Sensitive*
Short-eared Owl	upland	✓	✓	May be at risk
Sprauge's Pipit	upland	✓	✓	Sensitive*
Swainson's Hawk	upland	✓	✓	Sensitive
Upland Sandpiper	upland		✓	Sensitive
American Bittern	wetland	✓	✓	Sensitive
American Green-winged Teal	wetland	✓	✓	Sensitive
American White Pelican	wetland		✓	Sensitive
Black Tern	wetland	✓	✓	Sensitive
Black-crowned Night Heron	wetland	✓	✓	Sensitive
Black-necked Stilt	wetland	✓	✓	Sensitive
Common Yellowthroat	wetland	✓	✓	Sensitive
Forster's tern	wetland		✓	Sensitive
Great Blue Heron	wetland		✓	Sensitive
Lesser Scaup	wetland	✓	✓	Sensitive
Northern Harrier	wetland	✓	✓	Sensitive
Northern Pintail	wetland	✓	✓	Sensitive
Pied-billed grebe	wetland		✓	Sensitive
Sora	wetland	✓	✓	Sensitive
Virginia Rail	wetland	✓	✓	Undetermined
Yellow Rail	wetland	✓	✓	Undetermined

4.2 Amphibians

Three species of amphibians were located during wildlife surveys (Table 4.2.1). Heavy rains fell on the first and seventh day of the project and all amphibian call surveys took place within 4 days of those rainfalls. Plains spadefoot toad calls were heard at five separate sites in field 4. Of these, 3 sites were located along the shallow ephemeral overflow leading south and east from the most southern wetland in field 4. Two sites were located in ephemeral overflow in the central wetland in field 4. Plains spadefoot toads were also heard at one site just east of the largest wetland in field 1, again in an overflow. The number of toads heard at each site was between two or three. No evidence of plains spadefoot toad eggs or tadpoles could be found during the day, however such searches are often difficult and call surveys are a more accurate indicator of breeding activity.

Table 4.2.1. Amphibian species recorded during surveys. Amphibians were detected through both nighttime call surveys and daytime searches for larvae.

Species Name	Breeding Calls	Individual(s) Located	Status
Tiger Salamander		✓	Secure
Boreal Chorus Frog	✓	✓	Secure
Plains Spadefoot Toad	✓		May Be at Risk

4.3 Mammals

Six mammal species were observed during general and incidental surveys (Table 4.3.1). The long-tailed weasel was observed in the southeast corner of field 4. In addition, there are previous records on the ACHDA for the American badger and pronghorn (Alberta Sustainable Resource Development, unpublished data). No specific effort was made to survey for small mammals and those expected in the area are not designated as sensitive (see Appendix II).

Table 4.3.1. Mammal species recorded during the survey and in previous records (Alberta Sustainable Resource Development, unpublished data).

Species Name	Observed	General Status
Long-tailed Weasel	✓	May be at Risk
Pronghorn	2005	Sensitive
American Badger	2005	Sensitive
Coyote	✓	Secure
Muskrat	✓	Secure
Red Fox	✓	Secure
Richardson’s Ground Squirrel	✓	Secure
White-tailed Deer	✓	Secure
White-tailed Jackrabbit	✓	Secure

4.4 Other observations

While conducting general surveys, industrial noise in field 3 could be heard at all point count locations and was often cumulative, with noise coming from multiple sources and directions. In field 3, noise was also heard from sources south of the ACHDA boundary. Furthermore, in Cassil’s field, noise was heard from across San Francisco Lake. Particularly in field 3, this noise disrupted survey efforts by reducing the ability to hear bird and amphibian song and calls.

5. DISCUSSION AND RECOMMENDATIONS

5.1 Wetland habitats

Managed wetland basins are important to allay the overall loss of wetland habitat across the prairie (Gibbs 2000). This is supported by survey results on the ACHDA where 19 of the sensitive species observed are of important conservation status, primarily because of their dependence on disappearing wetland habitats (Alberta Sustainable Resource Development 2007).

Local habitat characteristics are important for wetland species distributions (Murkin et al. 1997, Koper and Schmeigelow 2006a). Responses of one species to habitat characteristics are not the same as for another species (Koper and Schmeigelow 2006b). Thus maintenance of a diversity of wetland sizes and types across the ACHDA benefit a variety of sensitive wildlife species. The ACHDA supports both ephemeral and permanent wetlands of variable size with shorelines that range from muddy and exposed to densely vegetated with cattail and bulrush. The largest wetland, Lake San Francisco, borders the ACHDA and has a thick contiguous wetland fringe. Koper and Schmeigelow (2006a) identify thick wetland fringe as important in models for songbird richness and abundance (Koper and Schmeigelow 2006a). Sightings of juveniles indicate Lake San Francisco is an important breeding habitat for black-crowned night herons, and calling indicates its importance to other sensitive species, such as the American bittern and sora. At fairly large shallow wetlands with muddy shores, such as in field 1 and 4, observations were made of large numbers of foraging shorebirds and ducks, including the black-necked stilt, northern pintail, and American green-winged teal.

The availability of suitable breeding habitat is a major limiting factor for plains spadefoot toads in Alberta (Lauzon 1999). Wetland drainage and cultivation, pesticide and herbicide use, and oil and gas activity have decreased habitat suitability and availability (Klassen 1998). Klassen (1998) emphasized the importance of small, semi-permanent and ephemeral water to the breeding activity of spadefoot toads. In the drainage system of field 4, where toads were detected at several locations, small

ephemeral wetlands such as canal overflows are of conservation importance for plains spadefoot toads.

No bats were sighted during nighttime amphibian surveys; however, no specific survey effort for bats was made. It is unlikely that sensitive species of bats breed on the ACHDA due to a lack of suitable natural roost habitat (see Appendix II). There is potential however, that sensitive species of bats could forage over wetlands with abundant invertebrates.

Restricting development near the shoreline of Lake San Francisco and other managed wetland basins, and also along smaller ephemeral water bodies, including canal and basin spillovers, will reduce disturbance to the many sensitive and may be at risk species dependent on wetland and wetland fringe habitats. It is important to note that many wetland associated species, such as the northern pintail, also require a matrix of well managed wetland and upland habitat (Podruzney et al. 2002).

5.2 Upland habitats

The conservation of native mixed-grass prairie is critical to several sensitive upland songbird species (Koper and Schmiegelow 2006b, Davis et al. 2006, Davis 2004). Fragmentation from road development in prairie habitats can reduce upland songbird species richness (Koper and Schmiegelow 2006b). The Sprague's pipit is reliant on large areas of native grassland (Davis 2004, Davis et al. 2006) and is less abundant along roads (Sutter et al. 1999). Baird's sparrow density increases with distance from non-native habitat (Koper and Schmiegelow 2006b). Furthermore, Davis (2004) identifies that even within smaller grassland patches, the more attractive patches to area sensitive species are those with a relatively lower proportion of edge habitat relative to interior habitat. To benefit sensitive upland songbirds, including the Baird's sparrow and Sprague's pipit, the relatively contiguous upland habitats in field 4 and field 1 should be left intact by (1) avoiding any further fragmentation from road and trail development, and (2) limiting development that will remove or divide upland habitat through structures and extensive human activity.

While no active burrowing owl nests were found during the 2007 survey, records of burrowing owl activity from October 2004 (Alberta Sustainable Resource Development, unpublished data) indicate that the ACHDA is used for roosting and foraging during the fall, a time period outside the scope of this survey. The most recent record of an active burrowing owl nest site on the ACHDA was in 1993 (Alberta Sustainable Resource Development, unpublished data). Current grazing regimes promote relatively tall vegetation in the native grass and idle fields. Burrowing owls effectively forage in habitats with denser taller vegetation, such as in ephemeral wetland areas that support populations of small mammal prey items (Alberta Sustainable Resource Development and Alberta Conservation Association 2005). Thus, the matrix of wetlands and thick cover available on the ACHDA supports the management goal of providing high quality forage habitat for burrowing owls. Furthermore, maintaining dense vegetation near shorelines and ephemeral wetland habitats will benefit other sensitive predators, such as the short-eared owl, northern harrier, and long-tailed weasel. Limited prey availability, due to loss of wetland edge habitats, has contributed to population declines of long-tailed weasels (Gehring and Swihart 2004), and short-eared owl distribution is highly dependent on prey availability (Clayton 2000, Poulin et al. 2001).

In Alberta, loggerhead shrikes are limited by suitable breeding habitat (Prescott and Collister 1993). Management for tall grass by reducing the grazing pressure of cattle around areas with silver buffaloberry (*Shepherdia argentea*) shrubs will increase availability of breeding habitat (Prescott and Collister 1993). Because the NW and NE idle fields on the ACHDA are managed for tall nesting cover for ducks, they contain the tall grass required by loggerhead shrikes. Although no nest sites were found, the loggerhead shrike activity and apparent available nesting habitat in the NE and NW idle fields indicates these areas are a priority for loggerhead shrike conservation on the ACHDA. When clearing obstructive brush in and around canals, leaving areas with silver buffaloberry bushes intact will protect nesting habitat for loggerhead shrikes.

5.3 Noise

Despite the reliance of many species on songs and calls for breeding displays and communication, there is limited research into the isolated effects of noise on wildlife.

Chronic noise, however, can change the age structure and reduce the pairing success of songbirds (Habib et al. 2007). Non-passerine species can also be impacted by noise. For example, courtship behaviour in harlequin ducks have been reduced for over an hour following noise from military jets (Goudie and Jones 2004). Noise is a potentially important stressor to wildlife populations on the ACHDA, however, research into the specific effects of chronic noise on prairie birds and amphibians remains extremely limited. The cooperative management of the ACHDA presents an opportunity to encourage research of anthropogenic noise in prairie upland and wetland habitats. The cumulative noise at a site, including noise with a source outside the ACHDA, should be considered when planning development in areas with sensitive species.

5.4 Monitoring strategy

Long-term monitoring will guide management efforts by tracking changes in species abundance and species occurrence. Future survey efforts should use standardized methodology and survey locations to increase the interpretability of survey results through time.

The calling, timing, and location of breeding can be irregular for plains spadefoot toads in Alberta (Klassen 1998). If a spring is dry or does not have heavy rains, spadefoot toads may not call or breed at all that year. Monitoring efforts should therefore occur in the days immediately following heavy spring rains (Lauzon 1999). Due to the reliance on weather conditions for plains spadefoot toad detection, annual surveys are recommended so that years with calling activity are not missed. The ACHDA could encourage annual participation in the Alberta Volunteer Amphibian Monitoring Program coordinated by the Alberta Conservation Association, at accessible wetlands on the ranch.

REFERENCES

- Alberta Sustainable Resource Development and Alberta Conservation Association. 2005. Status of the burrowing owl (*Athene cunicularia*) in Alberta: update 2005. Alberta Sustainable Resource Development, Wildlife Status Report No. 11 (Update 2005), Edmonton, AB. 28 pp.
- Alberta Sustainable Resource Development and Alberta Conservation Association. 2006. Status of the ferruginous hawk (*Buteo regalis*) in Alberta: update 2006. Alberta Sustainable Resource Development, Wildlife Status Report No. 18 (Update 2006), Edmonton, AB. 22 pp.
- Alberta Sustainable Resource Development. 2005. Draft Sensitive Species Inventory Guidelines (SSIG). Alberta Sustainable Resource Development. [Online, updated January 2007]
URL:<www.srd.gov.ab.ca/fishwildlife/guidelinesresearch/inventoryguidelines.aspx>
- Alberta Sustainable Resource Development. 2007. The 2005 general status of Alberta wild species. [Online, updated January 2007]
URL:<<http://www.srd.gov.ab.ca/fw/wildspecies/index.htm>>
- Alberta Sustainable Resource Development. 2007b. Species Currently Listed under the Wildlife Act and new Species Assessed by the ESCC. [Online, updated December 2007]
URL:<<http://www.srd.gov.ab.ca/fishwildlife/escc/currentlylisted.aspx>>
- Clayton, K. M. 2000. Status of the Short-eared Owl (*Asio flammeus*) in Alberta. Alberta Environment, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Wildlife Status Report No. 28, Edmonton, AB. 15 pp.
- Davis, S.K. 2004. Area sensitivity in grassland passerines: effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. *The Auk* 121: 1130-1145.
- Davis, S.K., R.M. Brigham, T.L. Shaffer, and P.C. James. 2006. Mixed-grass prairie passerines exhibit weak and variable responses to patch size. *The Auk* 123:807-821.
- DUC 2007. Antelope Creek Habitat Development: A model for conservation management of mixed grass prairie. Ducks Unlimited Canada (DUC). [Online, accessed 2007]
URL:<<http://www.ducks.ca/province/ab/projects/antelope/index.html>>

- Gehring, T.M., and R.K. Swihart. 2004. Home range and movements of long-tailed weasels in a landscape fragmented by agriculture. *Journal of Mammology* 85:79-86.
- Gibbs, J.P. 2000. Wetland loss and biodiversity conservation. *Conservation Biology* 14:314-317.
- Goudie, R.I. and I.L. Jones. 2004. Dose-response relationships of harlequin duck behaviour to noise from low-level military jet over-flight in central Labrador. *Environmental Conservation* 31:289-298.
- Guyn K., and R.G. Clark. 1999. Factors affecting survival of northern pintail ducklings in Alberta. *The Condor* 101:369-377.
- Habib, L., E.M. Bayne, and S. Boutin. 2007. Chronic industrial noise affects pairing success and age structure of ovenbirds *Seiurus aurocapilla*. *Journal of Applied Ecology* 44:176-184.
- Koper, N., and F.K.A. Schmiegelow. 2006a. A multi-scaled analysis of avian response to habitat amount and fragmentation in the Canadian dry mixed-grass prairie. *Landscape Ecology* 21:1045-1059.
- Koper N., and F.K.A. Schmiegelow. 2006b. Effects of habitat management for ducks on target and nontarget species. *The Journal of Wildlife Management* 70:823-834.
- Klassen, M. A. 1998. Observations on the breeding and development of the Plains Spadefoot, *Scaphiopus bombifrons*, in southern Alberta. *Canadian Field-Naturalist* 112:387-392.
- Lauzon, R. D. 1999. Status of the Plains Spadefoot (*Spea bombifrons*) in Alberta. Alberta Environment, Fisheries and Wildlife Management Division, and Alberta Conservation Association, Wildlife Status Report No. 25, Edmonton, AB. 17 pp.
- Pattie D. and C. Fisher. 1999. *Mammals of Alberta*. Lone Pine Publishing, Edmonton, AB. 240 pp.
- Podruzny, K.M., J.H. Devries, L.M. Armstrong, and J.J. Rotella. 2002. Long-term response of northern pintails to changes in wetlands and agriculture in the Canadian prairie pothole region. *The Journal of Wildlife Management* 66:993-1010.
- Poulin, R.G., T.I. Wellicome, and L.D. Todd. 2001. Synchronous and delayed numerical responses of a predatory bird community to a vole outbreak on the Canadian prairies. *Journal of Raptor Research* 35:288-295.

Prescott, D.R.C and D. M. Collister. 1993. Characteristics of Occupied and Unoccupied Loggerhead Shrike Territories in Southeastern Alberta. *The Journal of Wildlife Management* 57:346-352.

Sutter, G.C., S.K. Davis, and D.C. Duncan. 1999. Grassland songbird abundance along roads and trails in southern Saskatchewan. *Journal of Field Ornithology* 71:110-116.

Appendix I.

List of all species observed during the 2007 survey of the ACHDA. Nomenclature and status follow The General Status of Alberta Wild Species 2005 (Alberta Sustainable Resource Development 2007).

Animal Type	Scientific Name	Common Name	Status
Amphibians	<i>Spea bombifrons</i>	Plains Spadefoot Toad	May Be at Risk
Amphibians	<i>Pseudacris maculata</i>	Boreal Chorus Frog	Secure
Amphibians	<i>Ambystoma tigrinum</i>	Tiger Salamander	Secure
Mammals	<i>Mustela frenata</i>	Long-tailed Weasel	May Be at Risk
Mammals	<i>Canis latrans</i>	Coyote	Secure
Mammals	<i>Ondatra zibethicus</i>	Muskrat	Secure
Mammals	<i>Vulpes vulpes</i>	Red Fox	Secure
Mammals	<i>Spermophilus richardsonii</i>	Richardson's Ground Squirrel	Secure
Mammals	<i>Odocoileus virginianus</i>	White-tailed Deer	Secure
Mammals	<i>Lepus townsendii</i>	White-tailed Jack Rabbit	Secure
Birds	<i>Ammodramus bairdii</i>	Baird's Sparrow	May Be at Risk
Birds	<i>Asio flammeus</i>	Short-eared Owl	May Be at Risk
Birds	<i>Botaurus lentiginosus</i>	American Bittern	Sensitive
Birds	<i>Anas crecca</i>	American Green-winged Teal	Sensitive
Birds	<i>Pelecanus erythrorhynchos</i>	American White Pelican	Sensitive
Birds	<i>Hirundo rustica</i>	Barn Swallow	Sensitive
Birds	<i>Chlidonias niger</i>	Black Tern	Sensitive
Birds	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Sensitive
Birds	<i>Himantopus mexicanus</i>	Black-necked Stilt	Sensitive
Birds	<i>Dolichonyx oryzivorus</i>	Bobolink	Sensitive
Birds	<i>Geothlypis trichas</i>	Common Yellowthroat	Sensitive
Birds	<i>Sterna forsteri</i>	Forster's Tern	Sensitive
Birds	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Sensitive
Birds	<i>Ardea herodias</i>	Great Blue Heron	Sensitive
Birds	<i>Aythya affinis</i>	Lesser Scaup	Sensitive
Birds	<i>Lanius ludovicianus</i>	Loggerhead Shrike	Sensitive
Birds	<i>Numenius americanus</i>	Long-billed Curlew	Sensitive
Birds	<i>Circus cyaneus</i>	Northern Harrier	Sensitive
Birds	<i>Anas acuta</i>	Northern Pintail	Sensitive
Birds	<i>Podilymbus podiceps</i>	Pied-billed Grebe	Sensitive
Birds	<i>Porzana carolina</i>	Sora	Sensitive
Birds	<i>Anthus spragueii</i>	Sprague's Pipit	Sensitive
Birds	<i>Buteo swainsoni</i>	Swainson's Hawk	Sensitive
Birds	<i>Bartramia longicauda</i>	Upland Sandpiper	Sensitive
Birds	<i>Rallus limicola</i>	Virginia Rail	Undetermined
Birds	<i>Coturnicops noveboracensis</i>	Yellow Rail	Undetermined
Birds	<i>Perdix perdix</i>	Gray Partridge	Exotic/Alien
Birds	<i>Phasianus colchicus</i>	Ring-necked Pheasant	Exotic/Alien
Birds	<i>Columba livia</i>	Rock Pigeon	Exotic/Alien

Continued on next page

Appendix I continued

Animal Type	Scientific Name	Common Name	Status
Birds	<i>Recurvirostra americana</i>	American Avocet	Secure
Birds	<i>Fulica americana</i>	American Coot	Secure
Birds	<i>Corvus brachyrhynchos</i>	American Crow	Secure
Birds	<i>Falco sparverius</i>	American Kestrel	Secure
Birds	<i>Anas americana</i>	American Wigeon	Secure
Birds	<i>Anas discors</i>	Blue-winged Teal	Secure
Birds	<i>Euphagus cyanocephalus</i>	Brewer's Blackbird	Secure
Birds	<i>Molothrus ater</i>	Brown-headed Cowbird	Secure
Birds	<i>Larus californicus</i>	California Gull	Secure
Birds	<i>Branta canadensis</i>	Canada Goose	Secure
Birds	<i>Calcarius ornatus</i>	Chestnut-collared Longspur	Secure
Birds	<i>Anas cyanoptera</i>	Cinnamon Teal	Secure
Birds	<i>Spizella pallida</i>	Clay-colored Sparrow	Secure
Birds	<i>Sterna hirundo</i>	Common Tern	Secure
Birds	<i>Phalacrocorax auritus</i>	Double-crested Cormorant	Secure
Birds	<i>Podiceps nigricollis</i>	Eared Grebe	Secure
Birds	<i>Tyrannus tyrannus</i>	Eastern Kingbird	Secure
Birds	<i>Larus pipixcan</i>	Franklin's Gull	Secure
Birds	<i>Anas strepera</i>	Gadwall	Secure
Birds	<i>Bubo virginianus</i>	Great Horned Owl	Secure
Birds	<i>Eremophila alpestris</i>	Horned Lark	Secure
Birds	<i>Charadrius vociferus</i>	Killdeer	Secure
Birds	<i>Ammodramus leconteii</i>	Le Conte's Sparrow	Secure
Birds	<i>Anas platyrhynchos</i>	Mallard	Secure
Birds	<i>Limosa fedoa</i>	Marbled Godwit	Secure
Birds	<i>Cistothorus palustris</i>	Marsh Wren	Secure
Birds	<i>Zenaida macroura</i>	Mourning Dove	Secure
Birds	<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	Secure
Birds	<i>Anas clypeata</i>	Northern Shoveler	Secure
Birds	<i>Vireo olivaceus</i>	Red-eyed Vireo	Secure
Birds	<i>Aythya americana</i>	Redhead	Secure
Birds	<i>Podiceps grisegena</i>	Red-necked Grebe	Secure
Birds	<i>Agelaius phoeniceus</i>	Red-winged Blackbird	Secure
Birds	<i>Larus delawarensis</i>	Ring-billed Gull	Secure
Birds	<i>Oxyura jamaicensis</i>	Ruddy Duck	Secure
Birds	<i>Passerculus sandwichensis</i>	Savannah Sparrow	Secure
Birds	<i>Poocetes gramineus</i>	Vesper Sparrow	Secure
Birds	<i>Tyrannus verticalis</i>	Western Kingbird	Secure
Birds	<i>Sturnella neglecta</i>	Western Meadowlark	Secure
Birds	<i>Catoptrophorus semipalmatus</i>	Willet	Secure
Birds	<i>Phalaropus tricolor</i>	Wilson's Phalarope	Secure
Birds	<i>Gallinago delicata</i>	Wilson's Snipe	Secure
Birds	<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	Secure

Appendix II.

The At Risk, May Be at Risk, and Sensitive mammals listed in The General Status of Alberta Wildlife 2005 (Alberta Sustainable Resource Development 2007). Current species range was determined by comparison with range maps in Pattie and Fisher (1999). The presence of a species record is derived from both this survey and previous records (Alberta Sustainable Resource Development, unpublished data).

Within current species range	Existing species record	Potential for use of the ACHDA	Common Name	Scientific Name	Status	
Yes	Yes	Yes	Long-tailed Weasel	<i>Mustela frenata</i>	May Be at Risk	
			Pronghorn	<i>Antilocapra americana</i>	Sensitive	
			American Badger	<i>Taxidea taxus</i>	Sensitive	
	No	No	Lack of roost habitat. Some potential as a foraging site.	Hoary Bat	<i>Lasiurus cinereus</i>	Sensitive
				Red Bat	<i>Lasiurus borealis</i>	Sensitive
				Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Sensitive
Western Small-footed Bat				<i>Myotis ciliolabrum</i>	Sensitive	
No	No	No	Bobcat	<i>Lynx rufus</i>	Sensitive	
			Fisher	<i>Martes pennanti</i>	Sensitive	
			Olive-backed Pocket Mouse	<i>Perognathus fasciatus</i>	Sensitive	
			Red-tailed Chipmunk	<i>Tamias ruficaudus</i>	Sensitive	
			Water Vole	<i>Microtus richardsoni</i>	Sensitive	
			Canada Lynx	<i>Lynx canadensis</i>	Sensitive	
			Northern Long-eared Bat	<i>Myotis septentrionalis</i>	May Be at Risk	
			Vagrant Shrew	<i>Sorex vagrans</i>	May Be at Risk	
			Wolverine	<i>Gulo gulo</i>	May Be at Risk	
			Grizzly Bear	<i>Ursus arctos</i>	May Be at Risk	
			Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	At Risk	
			Swift Fox	<i>Vulpes velox</i>	At Risk	
			Woodland Caribou	<i>Rangifer tarandus caribou</i>	At Risk	
Wood Bison	<i>Bos bison athabascaae</i>	At Risk				

Appendix III.

Locations of upland point counts given as an UTM Easting and Northing in Zone 12, map datum NAD 83. Plot codes consist of field name or number followed by the plot number within that field, and finally the habitat type.

Plot Code	Easting	Northing	Plot Code	Easting	Northing
1-1-upland	415421	5606823	4-9-upland	416062	5603300
1-2-upland	415219	5606604	4-10-upland	415447	5603902
1-3-upland	415095	5606331	4-11-upland	415216	5603715
1-4-upland	415030	5606036	4-12-upland	414990	5603515
1-5-upland	415428	5605900	4-13-upland	414762	5603322
1-6-upland	415336	5605610	4-14-upland	415313	5603093
1-7-upland	415320	5605304	4-15-upland	415083	5603213
1-8-upland	415933	5606173	4-16-upland	416683	5604946
1-9-upland	416118	5606411	cassils-1-upland	421243	5604311
1-10-upland	415812	5607510	cassils-2-upland	421228	5604614
2-1-upland	417214	5605739	cassils-3-upland	421480	5604545
2-2-upland	417318	5606009	cassils-4-upland	421553	5604282
2-3-upland	417700	5606370	cassils-5-upland	421770	5604643
2-4-upland	417270	5606763	cassils-6-upland	422140	5604736
2-5-upland	417700	5607050	cassils-7-upland	422167	5604341
2-6-upland	417413	5607622	grazed-1-upland	420133	5603140
2-7-upland	417712	5607641	grazed-2-upland	419986	5603300
2-8-upland	418071	5606754	grazed-3-upland	419903	5603338
3-1-upland	417560	5604059	home-1-upland	418565	5605073
3-2-upland	417407	5604174	ne idle-1-upland	418385	5607239
3-3-upland	417124	5604263	nw idle-1-upland	416357	5607401
3-4-upland	417097	5604573	nw idle-2-upland	416500	5607678
3-6-upland	418839	5603760	oakland-1-upland	416929	5608631
3-7-upland	418990	5603500	oakland-2-upland	417225	5608565
3-8-upland	419154	5603243	oakland-3-upland	417511	5608501
3-9-upland	418140	5603552	oakland-4-upland	417806	5608439
3-10-upland	418450	5603552	oakland-6-upland	417403	5608067
3-11-upland	418750	5603530	oakland-7-upland	417116	5608146
3-12-upland	416980	5605027	oakland-8-upland	416818	5608226
3-14-upland	417393	5603242	oakland-9-upland	416280	5608086
3-15-upland	417350	5603050	oakland-10-upland	416402	5608372
3-16-upland	417090	5603211	oakland-11-upland	416507	5608658
4-2-upland	416344	5604375	oakland-12-upland	416192	5608810
4-4-upland	416121	5604184	oakland-13-upland	415998	5608583
4-5-upland	416574	5604573	oakland-14-upland	415809	5608353
4-7-upland	416652	5603312	oakland-15-upland	415617	5608124
4-8-upland	416359	5603298			

Appendix IV.

Locations of wetland counts given as an UTM Easting and Northing in Zone 12, map datum NAD 83. Plot codes consist of field name or number followed by the plot number within that field, and finally the habitat type.

Plot Code	Easting	Northing
1-1-wetland	415554	5606960
1-5-wetland	415550	5605881
1-8-wetland	415847	5606109
1-10-wetland	415812	5607390
2-1-wetland	417190	5605630
2-2-wetland	417392	5606105
2-3-wetland	417635	5606291
2-3b-wetland	417794	5606481
2-6-wetland	417311	5607606
2-8-wetland	417978	5606715
3-1-wetland	417608	5603946
3-5-wetland	417438	5604779
3-6-wetland	418786	5603844
3-8-wetland	419189	5603077
3-9-wetland	418040	5603540
3-12-wetland	417104	5605033
4-4-wetland	416051	5604114
4-9-wetland	415962	5603300
4-10-wetland	415286	5603785
cassils-2-wetland	421245	5604715
cassils-3-wetland	421480	5604650
cassils-5-wetland	421770	5604745
cassils-6-wetland	422141	5604822
grazed-1-wetland	420190	5603230
home-1-wetland	418767	5605274
ne idle-1-wetland	418455	5607307
nw idle-1-wetland	416457	5607400
nw idle-2-wetland	416400	5607678
oakland-4-wetland	417906	5608382
oakland-5-wetland	417900	5608053
oakland-9-wetland	416220	5607980

Appendix V.

Locations of amphibian counts given as an UTM Easting and Northing in Zone 12, map datum NAD 83. Foot accessed plots match the naming of avian point counts. Road accessed points are numbered arbitrarily as a road route.

Plot Code	Easting	Northing	Plot Code	Easting	Northing
1-1-wetland	415554	5606960	Road Route-5	421930	5604780
1-5-wetland	415550	5605881	Road Route-6	420137	5603617
1-8-wetland	415847	5606109	Road Route-7	419366	5604008
1-10-wetland	415812	5607390	Road Route-8	419315	5604115
2-1-wetland	417190	5605630	Road Route-9	418547	5604943
2-2-wetland	417392	5606105	Road Route-10	416188	5607463
2-3-wetland	417635	5606291	Road Route-11	416378	5607279
2-3b-wetland	417794	5606481	Road Route-12	420190	5603230
2-6-wetland	417311	5607606	Road Route-13	416190	5607460
2-8-wetland	417978	5606715	Road Route-14	417245	5607150
3-1-wetland	417608	5603946	Road Route-15	416891	5606128
3-5-wetland	417438	5604779	Road Route-16	418168	5604257
3-6-wetland	418786	5603844	Road Route-17	419480	5603358
3-8-wetland	419189	5603077	Road Route-18	418618	5603216
3-9-wetland	418040	5603540	Road Route-19	418213	5603453
3-12-wetland	417104	5605033	Road Route-20	418213	5603890
4-4-wetland	416051	5604114	Road Route-21	416188	5607463
4-9-wetland	415962	5603300	Road Route-22	417312	5607191
4-10-wetland	415286	5603785	Road Route-23	416880	5605200
cassils-2-wetland	421245	5604715	Road Route-24	418003	5603474
cassils-3-wetland	421480	5604650	Road Route-25	415877	5603872
cassils-5-wetland	421770	5604745	Road Route-26	416874	5604193
cassils-6-wetland	422141	5604822	Road Route-27	416072	5603937
grazed-1-wetland	420190	5603230	Road Route-28	415588	5604056
home-1-wetland	418767	5605274	Road Route-29	415292	5604471
ne idle-1-wetland	418455	5607307	Road Route-30	421930	5604780
nw idle-1-wetland	416457	5607400	Road Route-31	420137	5603617
nw idle-2-wetland	416400	5607678	Road Route-32	419366	5604008
oakland-4-wetland	417906	5608382	Road Route-33	419315	5604115
oakland-5-wetland	417900	5608053	Road Route-34	418547	5604943
oakland-9-wetland	416220	5607980	Road Route-35	416188	5607463
Road Route-1	415877	5603872	Road Route-36	417312	5607191
Road Route-2	416874	5604193	Road Route-37	416880	5605200
Road Route-3	416072	5603937	Road Route-38	418003	5603474
Road Route-4	415588	5604056	Road Route-39	415292	5604471