

# UNIVERSITY OF MANITOBA WILDLIFE MANAGEMENT PLAN

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Final

Prepared for:



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Prepared by:



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# EXECUTIVE SUMMARY

This Wildlife Management Plan (WMP) was initiated by Joro Consultants to assist the University of Manitoba (UM) in providing a framework/strategy to manage its urban wildlife population, and to help to minimize and/or address the challenges (i.e. conflicts) occurring between people and wildlife on each of the Fort Garry and Bannatyne Campuses. A literature review was performed to determine wildlife policies or management plans, and Beneficial Management Practices (BMPs) available for other university/college campuses in North America that could be applied to the UM. Examples of general health and safety information available to respond to concerns about Campus problem wildlife (such as raccoons and mice), and injured, sick or dead animals were uncovered along with initiatives to promote environmental sustainability and planting native vegetation. Overall, however, literature review revealed that little information on formal wildlife BMPs were specifically available for other Campuses, but BMPs for other political jurisdictions (e.g. local, regional, and global – city/municipal, state/province and country/continent) did have useful information to incorporate.

In general, the UM conforms to BMPs and has had excellent success in dealing with wildlife related conflicts including Canada geese. This WMP identifies BMPs that provide practical management strategies to consider in the humane management of wildlife species of interest. It provides a framework for assisting the UM in adapting to changes in species populations and usage over time. University Animal Care Committee and associated protocols were reviewed, however, considered not applicable for activities associated with this WMP but may be applicable to new research. It also considers opportunities for wildlife habitat enhancement and management to promote species diversity and to reduce human/wildlife conflicts. The species of interest covered in the WMP include several bird species, furbearers, ungulates, amphibians, and reptiles, with attention devoted to specific human/wildlife conflict species and species of conservation concern/at risk. Appendix A provides a detailed plan for Canada goose management based on existing non-invasive approaches, which have been successful to date, and provides information for future reference in adapting to Canada goose management issues.

# ACKNOWLEDGEMENTS

We take this opportunity to thank the UM community for their participation and input in developing this WMP. We have appreciated the opportunity to work with the local Fort Garry and Bannatyne Campuses. Significant contributions to the WMP were provided by UM staff and students and include; Project Liaison Steve Cumpsty, Campus Goose Committee Members: Dr. Jim Shapiro, Dr. Kevin Frazer, Kristina Hunter, Marianne Mays Weibe, Breanne Kamenz, Lyle Morin, Andrea Bilasj, Christie Nairn, and Sukhjinder Singh, Student Hires: Dylan Turchyn and Mohammed Tohibifar, and WMP Final Review and Oversight: Dr. Rick Baydack and Dr. Dave Walker. Thanks to Joro and staff for the completion of many complex tasks related to literature review, data collection, GIS analysis, and reporting. Team members contributing to this report include; Dr. Doug Schindler, Christina Blouw, Sandi Routley, Barry Verbiwski, Tim Verbiwski, Tasha Stasiuk, and Katja Smutny, and AAETech Services Staff: Mark Lowdon, Scott MacKenzie, Daniel Sokal, Meghan MacKinnon, and Cori Kulbaba.

# DEFINITIONS

Amphibian – a cold-blooded animal with a backbone that is born in water, but lives on land as an adult.

Autonomous Recording Unit – a self-contained audio recording device that is deployed in marine or terrestrial environments for bio-acoustical monitoring.

Aviculture – the breeding and rearing of birds.

Beneficial Management Practices - methods or techniques found to be the most effective and practical means in achieving an objective, while making the optimum use of an organization's resources.

Buck – a male deer.

Carnivore – an animal that eats other animals.

Carrion – the dead and decaying body of an animal.

Doe – a female deer.

Endangered – a plant or animal considered locally, nationally and/or internationally to be facing a very high risk of disappearance in the wild.

Exclusion – the act or method of preventing an animal from entering a location or building.

Fawn – a baby deer.

Furbearer – an animal that possesses some form of hair often of commercial value.

Guano – the accumulated excrement of bats and seabirds often used as fertilizer.

Herbivore – an animal that eats only plants.

Indigenous - a plant, animal or person that is native or original to a region or ecosystem.

Insectivorous birds –broadly defined as the total of all bird groups (mainly migratory songbirds) that include a considerable percentage of insects and spiders in their diets.

Invasive Species – a plant or animal that is non-native or introduced to a region or ecosystem.

Invertebrate – an animal lacking a backbone.

Game – an animal hunted for sport or food (e.g. upland bird or ungulate).

Keystone – a plant or animal that has a strong impact on a particular ecosystem relative to its population; i.e. it is critical to the overall structure and function of an ecosystem.

Maternity colony - refers to a temporary association of reproductive female winged animals (e.g. bats) for giving birth to, nursing, and weaning their young.

Murder – the collective term for a group of crows.

Nectarivore – an animal that feeds on nectar.

Nocturnal – an animal characterized by being active during the night and sleeping during the day.

Omnivore – an animal that eats both plants and animals.

Reptile – a cold-blooded animal with a backbone that is born on land and lays eggs.

Riparian - is the boundary area between land and a river or stream.

Roosting – the act of winged animals (e.g. bats or birds) congregating for rest or sleep.

Scavenging – the act of an animal feeding on carrion.

Species at Risk – an indigenous plant or animal that is in danger of disappearing from a province or region and needing human intervention and habitat protection to survive; also a designation under the Federal Species At Risk Act (SARA, S.C. 2002, c. 29) for species listed in Schedule 1 of the Act.

Swarming – a collective behaviour of winged animals (e.g. bats or insects) which aggregate together, milling about the same spot, or moving en masse and/or migrating in some direction.

Tree Snag – a standing, dead, or dying tree.

Ungulate – an animal that possesses hoofs.

Vulnerable – an indigenous plant or animal that has been categorized internationally as likely to become endangered unless the circumstances that are threatening its survival and reproduction improve.

WAV – a format for storing uncompressed audio files.

White Nose Syndrome – is an emerging disease in North American bats caused by a fungus which by 2018 has killed millions of bats in the United States and Canada.



# ACRONYMS

ARU – Autonomous Recording Unit

BCSPCA – British Columbia Society for the Prevention of Cruelty to Animals

BMP – Beneficial Management Practices

COSEWIC – Committee on the Status of Endangered Wildlife in Canada

ECCC – Environment and Climate Change Canada

MBCDC – Manitoba Conservation Data Centre

MESEA – Manitoba Endangered Species and Ecosystems Act

MPFRP – Manitoba Peregrine Falcon Recovery Project

MBCA – Migratory Birds Convention Act

O&M – Operations & Maintenance

SARA – Species at Risk Act

UM – University of Manitoba

US – United States

UW – University of Winnipeg

WMP – Wildlife Management Plan

# UNITS OF MEASURE ABBREVIATIONS

ac – acres

ft<sup>2</sup> – feet square

ha – hectares

kg – kilograms

gm – grams

km – kilometres

lb – pounds

m<sup>2</sup> – metres square

cm – centimetres

mi – miles

## 1.0 INTRODUCTION

Wildlife species that can thrive in urban environments (e.g. cities or densely human-populated areas) are known as “urban wildlife”. The presence of many urban species, including large and small mammals, songbirds, raptors, and waterfowl, provide much benefits to residents for aesthetic enjoyment, passive observation, and photographic capture, to name but a few. However, it is also known that proximity of urban wildlife with human inhabitants also creates many management challenges (i.e. opportunities for human-wildlife conflict) for municipal officials and community planners. As characterized in a suburban wildlife ecology review paper by DeStefano and DeGraaf (2003), “While many wild creatures can enrich the lives of suburban dwellers, large increases in the populations of species such as deer, beaver, and coyotes can lead to a change in status from resource to pest”.

The City of Winnipeg, Manitoba, and specifically, the City’s largest University – the University of Manitoba (UM), are home to a diversity of urban wildlife. UM is comprised of two Campuses, Fort Garry and Bannatyne (Map 1) and has an overall population of approximately 29,500 students. Collectively, the UM lands provide important habitat for local populations of indigenous wildlife and the potential to support species of interest such as keystone, vulnerable, or endangered species. However, they also attract species that pose challenges in and near buildings and infrastructure, staff, students and visitors on Campus. Seasonal influxes of wildlife and permanent populations have the potential to interact negatively with students, staff, and faculty.

This Wildlife Management Plan (WMP) was initiated to assist UM in providing a framework/strategy to manage its urban wildlife population, and to help to minimize and/or address the challenges (i.e. conflicts) occurring between people and wildlife on each of the two Campuses. A literature review was performed to determine wildlife policies or management plans, and Beneficial Management Practices (BMPs) available for other university/college campuses in North America that could be applied to the UM. Examples of general health and safety information available to respond to concerns about Campus problem wildlife (such as raccoons and mice), and injured, sick or dead animals was found for several campuses including the University of Washington (2018) and University of Alberta (2019) along with initiatives to promote environmental sustainability and planting native vegetation (Bosci et al. 2018; University of Washington 2019). Available information specific to formal wildlife BMPs for North American Campuses is limited, however BMPs for other political jurisdictions (e.g. local, regional, and global – city/municipal, state/province and country/continent) provided examples of appropriate approaches relevant to the UM WMP.

Overall, this WMP confirms that the UM conforms to established BMPs and identifies practical management strategies that consider the humane management of wildlife species of interest and assists the university in adapting to changes in species populations and usage over time. University Animal Care Committee and associated protocols were reviewed however considered not applicable for wildlife and habitat management. Animal care protocols would be applicable to new research.

It also considers opportunities for wildlife habitat enhancement. The species of interest covered in the WMP include several bird species, furbearers, ungulates, amphibians, and reptiles, with attention devoted to specific human/wildlife conflict species and species of conservation concern/at risk.



Map 1: University of Manitoba Campus Locations in the City of Winnipeg



## 1.1 Site Description

### *Fort Garry Campus*

The UM Fort Garry Campus is located on an upland terrestrial peninsula west of the Red River (Map 1). It encompasses more than 260 ha (641 ac) of land with over 60 major buildings and 13 km (8 mi) of roads; this does not include pedestrian infrastructure such as walking trails and sidewalks located throughout. Significant riparian forests, agricultural tracks, water ponds, and urban landscaping exists that is utilized by a variety of resident and migratory wildlife species including the following species observed: Canada goose (*Branta canadensis*), ducks, white-tailed deer (*Odocoileus virginianus*), rabbits/hares (*Sylvilagus floridanus*, *Lepus townsendii*), raccoons (*Procyon lotor*), and many songbirds (e.g. chestnut-sided warbler (*Setophaga pensylvanica*), cape may warbler (*Setophaga tigrine*), brown-headed cowbird (*Molothrus ater*), American goldfinch (*Spinus tristis*), house sparrow (*Passer domesticus*), red-eyed vireo (*Vireo olivaceus*), and American crow (*Corvus brachyrhynchos*) as described in Section 4.6. Geese are abundant, widespread, and one of the most recognizable wildlife species on Campus (Photo 1). Thus, they have been integrated into this plan to represent a broad overview of urban wildlife habitat management and the challenges that occur. A detailed and focused UM Goose Management Plan can be found in Appendix A.



**Photo 1: Canada geese crossing Research Road on Fort Garry Campus (Credit: Joro)**

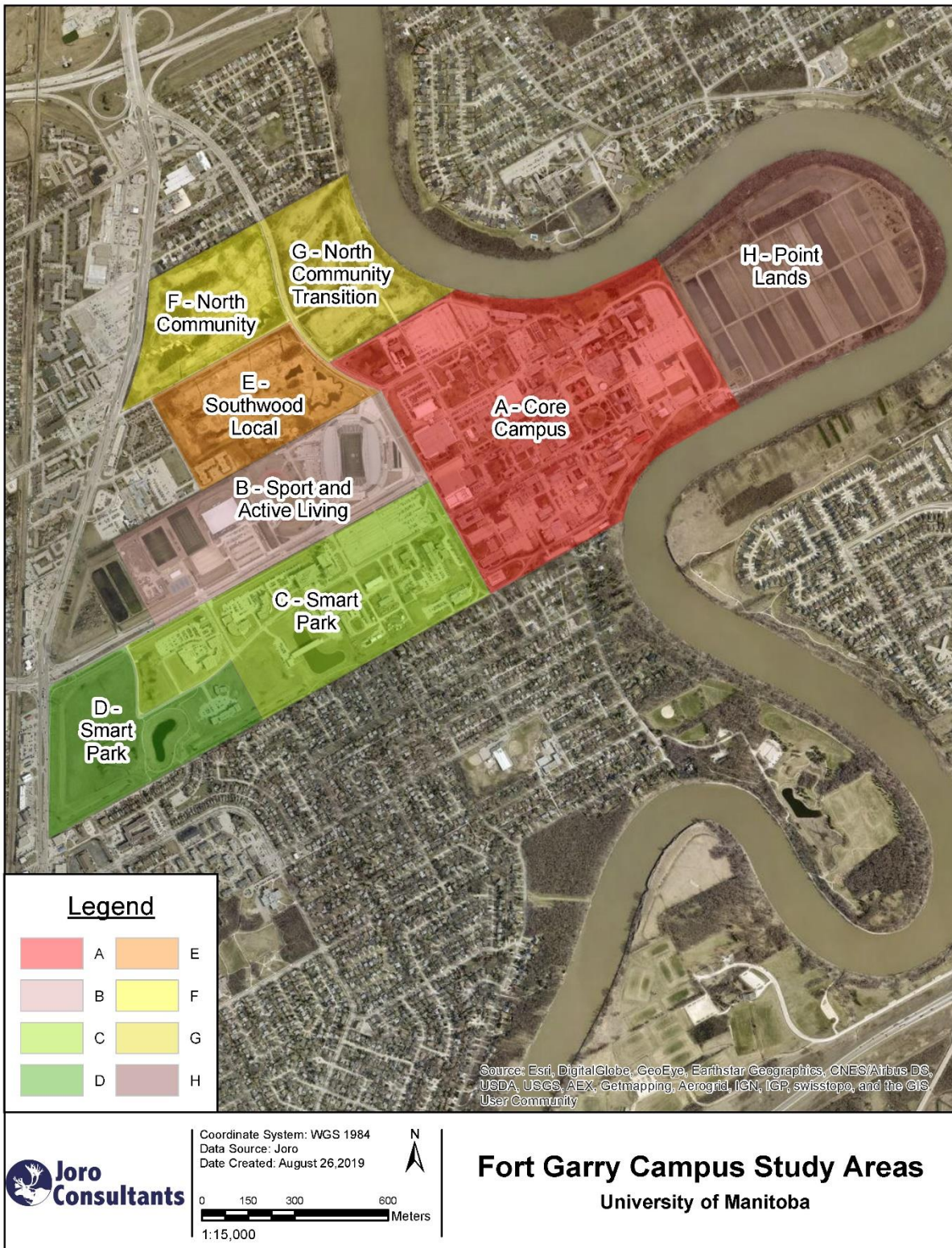
The Campus has been divided into eight geographic zones (Map 2). These include:

- A. Core Campus – Primary Nesting Area;
- B. Sport and Active Living – Primary Nesting Area;
- C. Smart Park – Innovation Drive;
- D. Smart Park – Industrial Technology Centre;
- E. Southwood Local – Brood Rearing Area;
- F. North Community - Brood Rearing Area;
- G. North Community Transition; and
- H. Point Lands – Foraging by non-breeders.

Two other extremely important areas for Canada goose management are located in the Smart Park Zone Innovation Drive and the Industrial Technology Center and have been marked as C (Innovation Drive) and D (Industrial Technology Center). The Smart Park Zone is one of the two primary brood rearing areas on the Fort Garry Campus.

A significant portion of the aquatic habitat on the Campus is comprised of riparian ecosystems of the Red River (Map 2). In addition, six small man-made ponds are located within the Southwood Lands (former Golf Course) (Photo 2), and two larger ponds are located within the Smart Park (Commercial office area) (Photo 3). The riparian zone and areas around the man-made ponds represent the majority of ideal amphibian habitat within the bounds of the Campus.





Map 2: Fort Garry Campus with 6 geographic zones





**Photo 2: Small pond surrounded by wetland vegetation in Southwood Local - Fort Garry Campus (Credit: Joro)**



**Photo 3: Small pond surrounded by wetland vegetation in Smart Park - Fort Garry Campus (Credit: Joro)**



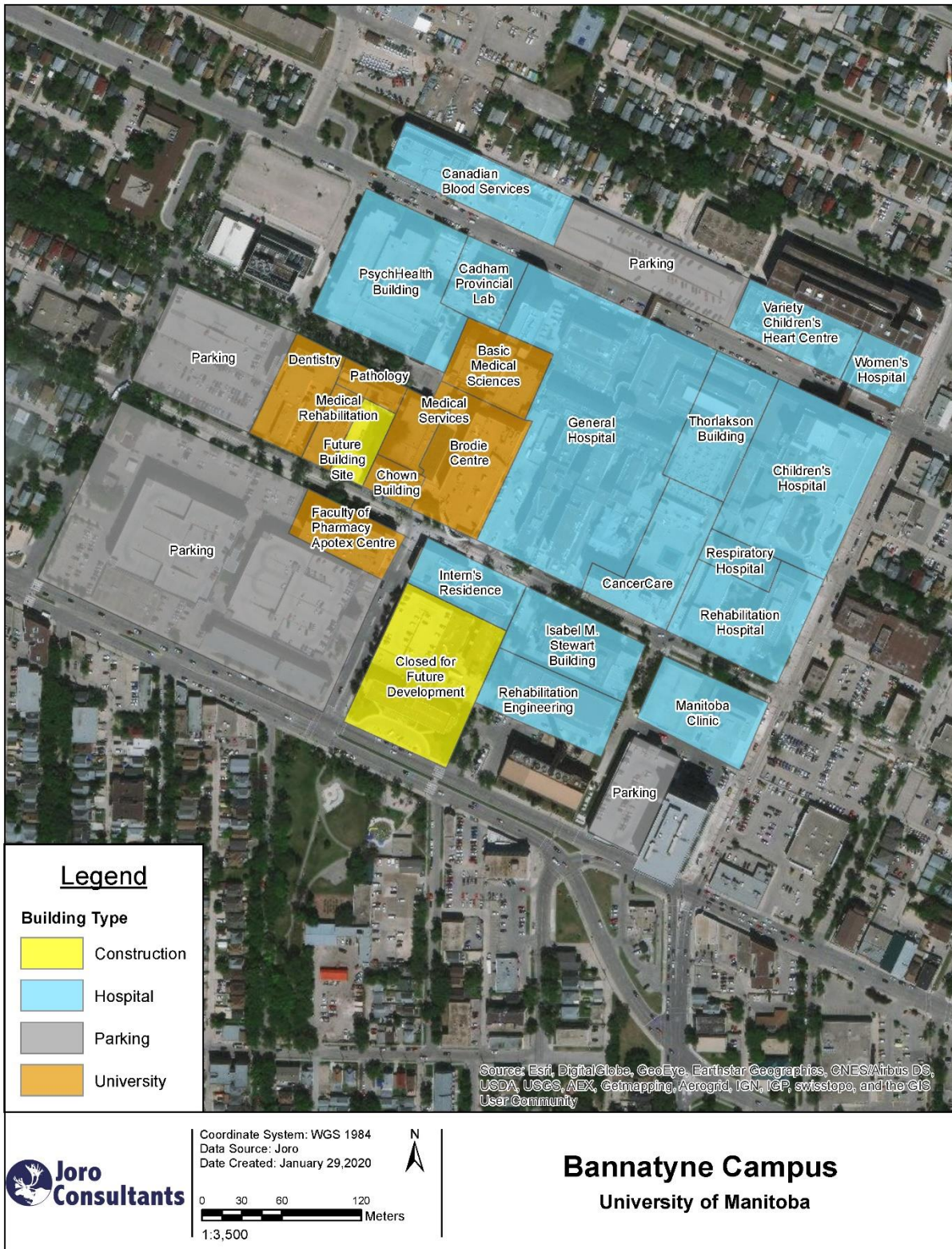
***Bannatyne Campus***

Bannatyne Campus is situated in the heart of Winnipeg within a high-density urban environment (Map 3). The Campus occupies 3.5 ha (8.65 ac) of contiguous land, thirty percent of which is used for surface parking with 10 buildings occupying approximately 830,000 ft<sup>2</sup> (77,110 m<sup>2</sup>) of building floor area (UM 2014). There is limited greenspace in the form of manicured grass and shrubs around buildings and on street boulevards, and a mixture of deciduous trees throughout (Photo 4). Temporary water sources occur with rainfall that collects in parking lots and low laying areas. Local wildlife habitat supports birds; mainly pigeons, raptors, peregrine falcons (*Falco peregrinus*), songbirds (e.g. sparrows), and crows were observed on ledges and overhangs of the tall buildings on the Campus (Photo 4).



**Photo 4: Example of tall buildings with ledge and overhangs mixed with urban residential neighborhood, streets and boulevards on the Bannatyne Campus (Credit: Joro)**





Map 3: Bannatyne Campus

## 2.0 UNIVERSITY OF MANITOBA POLICY

As described in Section 1.1, the UM is home to many diverse wildlife habitats and urban wildlife species. To promote safe cohabitation between the University community and wildlife, this WMP has been developed inclusive of all wildlife on both Campuses including (but not limited to) several bird species, furbearers, ungulates, amphibians and reptiles, and human/wildlife conflict species and species of conservation concern/at risk.

The majority of UM's wildlife management policy was created before this WMP was developed to address geese on the Fort Garry Campus. The Operations and Maintenance (O&M) Customer Service Desk is the conduit for support of all facilities at both UM Campuses, including requests for maintenance and repair work, minor renovations, materials handling and delivery, and caretaking services.

The current policies and practices have evolved mainly from issues arising with nesting Canada geese on the Fort Garry Campus with this plan expanding on all wildlife related issues at the UM. The current goose policy involves the use of non-invasive techniques to ensure a safe environment for students and staff, while maintaining a "goose friendly" environment. Specifically, the UM has undertaken strategies and mitigation activities to minimize potential for goose-human conflicts. It previously established the *Goose Education and Awareness Committee*, made up of stakeholders from within the university, with occasional input from Manitoba Agriculture and Resource Development (formerly Manitoba Sustainable Development [MSD]) and Environment Canada, for the purpose of communication, education and mitigation of human-goose conflicts on campus. Although the degree of liability associated with personal injury caused by a defensive and aggressive Canada goose is uncertain, the current efforts of O&M and the Goose Education and Awareness Committee have been largely successful and are summarized in Section 4.1 and detailed in Appendix A.

## 3.0 WILDLIFE REGULATIONS

### ***Migratory Birds Convention Act***

Migratory birds are afforded protection under the *Canada Migratory Birds Convention Act 1994* (MBCA). The Act prohibits “killing, capturing, injuring, taking or disturbing of migratory birds or the damaging, destroying, removing or disturbing of nests” except by permit as provided under the Act regulations (MBCA 2019). A listing of birds (migratory and non-migratory species) with potential to occur on the UM Campuses are provided in Section 4.3 and 4.6 and Appendix B.

### ***Manitoba Wildlife Act***

The *Manitoba Wildlife Act 1987* provides the regulatory framework for the protection and management of non-migratory birds, mammals, amphibians, and reptiles in Manitoba (Manitoba Wildlife Act 2019). Regulations governing- the designation of wildlife lands, wildlife offences, hunting and trapping, wildlife possession, and licensing, exist for species designated in Schedule A of the Act. Species covered under Schedule A include “Big Game” (e.g. moose, white-tailed deer, and black bear), “Fur Bearing Animals” (e.g. beaver, fox, and raccoon), “Small Game Animals”, “Game Birds” (e.g. ruffed- and sharp-tailed grouse and wild turkey), “Amphibians and Reptiles”, and “Protected Species” (e.g. all eagles, hawks and owls, and cougar), and “Plus Migratory Game Birds...[and]...Migratory Non-Game Birds and Migratory Insectivorous Birds protected in Canada under the MBCA”. All wildlife species known to occur on the UM Campuses are provided in Sections 4.1 to 4.8.

### ***Species at Risk Act***

The objective of the *Canada Species at Risk Act 2002* (SARA) is to ensure that indigenous populations and subpopulations of wildlife are prevented from becoming extirpated or extinct and to provide a framework for species recovery through the development of Recovery Plans (SARA 2019a). Species are classified as “Extinct”, “Extirpated”, “Endangered”, “Threatened”, or ‘Special Concern” under the Act. The Government of Canada maintains a current public registry of SARA species including the status of populations and recovery planning processes (SARA 2019b). Scheduled species and their habitat are protected under this Act. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) serves as an independent body in the assessment of species at risk in Canada (COSEWIC 2019). A listing of species at risk with potential to occur on both UM Campuses is provided in Section 4.8 and Appendix C. Definitions for the species at risk category of classification are further included in Appendix D.

### ***Manitoba Endangered Species and Ecosystems Act***

The *Manitoba Endangered Species and Ecosystems Act 1990* (MESEA) recognizes “(a) plant and animal species and ecosystems are of ecological, educational, esthetic, historical, medical, recreational, and scientific value to Manitoba and the residents of Manitoba, and, (b) it is critical that coordinated efforts be made to protect plant and animal species and ecosystems that are at risk and to promote their recovery (MESEA 2019). The purpose of the Act is to; (a) to ensure the protection and to enhance the survival of endangered and threatened species and species of special concern in the province and (b) to enable the reintroduction of extirpated species into the province; and (c) to conserve and protect endangered and threatened ecosystems in the province and promote the recovery of those ecosystems.” This Act identifies species that are “Extirpated”, “Endangered”, or “Threatened”. The Threatened, Endangered, and Extirpated Species Regulation provides a listing of all species covered under the Act. Manitoba’s species at risk are also ranked by the Manitoba Conservation Data Centre (MBCDC) based on provincial, national, and international significance (MBCDC 2019). Several species have the



potential to occur within the boundaries of the UM. Currently the chimney swift (*Chaetura pelagica*) and barn swallow (*Hirundo rustica*) are known to occur at the Fort Garry Campus, and the peregrine falcon is present at both Campuses (see Section 4.8; Appendix B). A listing of MESEA species with potential to occur on the UM Campuses and similar to those listed under SARA are provided in Section 4.8 and Appendix C. Definitions for the species at risk category of classification are further included in Appendix D

#### ***Other Laws and Bylaws***

The *Firearms By-Law 2890/81* (City of Winnipeg 2019) states: “Excepting with the permission of Chief of Police...no person shall discharge any gun, or other firearm, within the City of Winnipeg”.

Hunting and trapping of wildlife are generally not permitted within the Winnipeg Game Hunting Area (GHA) 38 (Manitoba Agriculture and Resource Development; formerly MSD 2018a, 2018b). However, Manitoba Agriculture and Resource Development, with support of the local Rural Municipalities (RM) of Rosser and Macdonald (part of GHA 38), has recently allowed the hunting of geese within those two RMs during the provincial hunting season dates of September 1-23, as a mitigation to reduce high goose numbers within the City during the spring and fall migration and staging period (MSD 2018a). Trapping of problem wildlife in GHA 38 is allowed under special permit by the Minister of Agriculture and Resource Development (MSD 2018b) and is typically conducted through a licensed pest control company. Removal of rodents (e.g. mice and rats) and other small mammals (e.g. raccoons) occurs throughout the City including the UM Campuses when required. Human/wildlife conflicts for specific small mammals are detailed in Section 4.4.

#### ***Human/Wildlife Conflicts***

Issues related to rare occurrences of large and potentially dangerous wildlife species (e.g. bears, moose, elk, cougar and white-tailed deer) are the responsibility of Manitoba Agriculture and Resource Development and/or the City of Winnipeg Police Service. Human/wildlife conflicts for large mammals are detailed in Section 4.5 and small mammals in Section 4.2.

## 4.0 WILDLIFE MANAGEMENT PLAN

For the purpose of this WMP, focal wildlife species and species groupings were identified collectively by the UM and project team based on experience dealing with wildlife issues on each Campus. For each species or species group, various desktop research was undertaken to review BMPs from other Campus and urban-based jurisdictions. A limited field program was undertaken to characterize habitat and wildlife use of the Campus lands. UM students were also engaged in some field work such as Canada goose, bird, and amphibian baseline data collection.

The WMP includes a description of the species or species group, urban wildlife management challenges, BMPs, UM Management by Campus, and a number of monitoring, research, and habitat enhancement/modification recommendations. The following provides an overview of the species and species groups that have been addressed in this WMP:

- Canada geese;
- Human/Wildlife Conflicts – White-tailed deer;
- Human/Wildlife Conflicts – Birds (crows, pigeons, starlings);
- Human/Wildlife Conflicts – Small mammals (raccoons, skunks, groundhogs, squirrels);
- Human/Wildlife Conflicts – Large Mammals (moose, elk, bear, cougar);
- Birds (Songbirds, Raptors, Waterbirds, Upland Game Birds);
- Amphibians and Reptiles; and
- Species at Risk.

### 4.1 Canada Geese

The Canada goose management plan, Appendix A, provides a framework for the implementation of ongoing strategies and actions to minimize human-goose conflicts on the UM Fort Garry Campus. Current strategies are the result of ongoing awareness, education and application of successful mitigation techniques employed by the O&M Department. O&M works closely with the UM Goose Education and Awareness Committee and is seeking to identify acceptable or reasonable methods to manage Canada geese on campus while ensuring the safety of students and staff. The current policy involves non-invasive methods to ensure a safe environment for students and staff, while maintaining a “goose friendly” environment. Strategies described in the Canada goose management plan, Appendix A, considers current issues with urban geese and BMPs that are being employed locally, as well as within other urban environments and other university campuses. This plan identifies management strategies and beneficial practices for the university campus that consider the humane management of Canada geese through various site-specific mitigation during the nesting period and habitat modification across the Fort Garry Campus to reduce overall attractiveness during nesting, molting and fall staging. Invasive and lethal control measures are currently not being considered to address Canada goose problems. The UM is aware of the regulatory requirements and processes required if this option were considered in the future (EC 2010).

Canada geese are a migratory bird and are afforded protection under the MBCA and its Regulations. The Act prohibits the “killing, capturing, damaging, destroying, removing, or disturbing their nests except by permit”.

Urban wildlife, including Canada geese, provide many benefits to society. Conover (2002) identified the following value to humans: physical utility (i.e. for food), economic (i.e. monetary), recreational (i.e. viewing and hunting), scientific (i.e. advancement of science), ecological (i.e. maintaining ecosystems), historic values, and Indigenous people’s reliance upon wildlife for food and ceremony, etc. Most residents enjoy seeing Canada geese and other wildlife within the City limits.



**Photo 5: Geese present in the Point Lands Agricultural field (see Map 2) on Fort Garry Campus (Credit: Joro)**

There have been increasing number of reports to O&M at UM Fort Garry Campus over the past few years of aggressive geese along with incidents with nesting geese near various Core Campus buildings and research spaces. Several injuries and attacks by geese have been reported by staff; e.g. two maintenance staff working in Duff Roblin Building were attacked and injured entering mechanical rooms and another employee was knocked down and dropped their keys while entering the Richardson Centre. Specific incidents with nesting geese include a female goose that became agitated and aggressive with staff and students near the Administration Building entrance after the goose was blocked from using the same planter as previous years for nesting. Photo 5 shows Canada geese present in the agriculture fields on Fort Garry Campus in the Point Lands zone (Map 2). Furthermore, two geese and six goslings were unable to exit the enclosed courtyards of Tache Building for a few days and a pest control company was quickly contacted to assist with humanely relocating the geese to outside the walls of the Building.

A number of BMPs have been implemented by O&M to ensure goose and human safety, and to address some of the issues mentioned above, including non-invasive techniques such as covering or removing planters in high traffic areas that are known to be used by nesting geese, and isolation of nests from pedestrians by erecting fences and posting warning signs in the proximity of a goose nest. In response to ongoing potential goose-human

conflicts, they have been very successful in adapting to the number of unique situations that arise on an annual and ongoing basis. The overall objective of the current approach to managing geese is to minimize or eliminate conflicts through separating geese and people. This has been achieved to date, in part by the following tactics, which have proven successful:

- Signage placed near nests where there are defensive and aggressive geese (Photo 6).



**Photo 6: Example of sign used to avoid nesting geese on the UM Fort Garry Campus**

- Fencing erected around nest sites to isolate the goose from pedestrians.
- Removal of potential nesting locations in areas where experience indicates geese are attracted to, including removal of planters and vegetation build up in flower beds, etc.
- Placement of stones/rocks or wire domes on planters that cannot be moved.
- Use of coyote urine as a deterrent.
- Providing information on goose population management and community safety strategies.
- Deterring nesting in high traffic areas.
- Placing signs to warn pedestrians of nest proximity.
- Ensuring community and goose safety for nesting on roof tops.
- Reducing grassy/lawn areas.



- Planting shrubs and trees around stormwater retention basins and water trap hazard areas on the former golf course (Southwood Lands).
- Removing/draining water from water trap areas.
- Developing a broader willow area around the wetland ponds.
- Reducing sight lines by establishing long grasses, shrubs or other dense tall plants along shorelines.
- Continuing effort towards providing education/communication with staff and students regarding the ongoing management of the Canada goose population.
- Providing online information and interactive map on UM's website.
- Installing signage to stop any type of feeding of the geese and other waterfowl.
- Supporting efforts to attract birds of prey, eagles, hawks etc. to deter geese on Campus.
- Use of eagle effigies, owl and fox silhouettes.
- Supporting on-going student research project opportunities for coexistence of humans and wildlife on Campus.

See Appendix A: University of Manitoba Canada Goose Management Plan for more detail on urban management challenges and opportunities, beneficial practices, and management.

## 4.2 Human/Wildlife Conflicts – White-tailed deer

White-tailed deer have successfully adapted to urban environments including residential neighborhoods, city parks, riverbanks, prairie parklands, deciduous forests, and transition-edge areas throughout their North American range (Banfield 1974; DeNicola et al. 2000; Curtis and Sullivan 2001). They are characteristically nocturnal animals and most active during the periods of dawn and dusk (Banfield 1974). Mating season, known as rutting, occurs in mid-October through December, peaking in mid-November in Manitoba (Goulden 1981). Female deer (or does) are highly fertile and commonly produce fawn twins or occasionally triplets; adults can live up to 12 years in un-hunted populations (DeNicola et al. 2000). The average doe home range size is generally small compared to males (or bucks) and changes little between seasons; likewise, white-tailed deer in urban environments have smaller home ranges than their rural counterparts due to having an established area they seldom leave- or usually return to within a few days- and there is enough habitat diversity and available food source to fulfill their needs year-round (Boulanger et al. 2014; McCance 2014; McCance and Baydack 2018).

As a result of several factors, primarily hunting restrictions, ample food source (i.e. landscape plantings and feeding by residents) and safety from predators (DeNicola et al. 2000; Boulanger et al. 2014), large numbers of White-tailed deer are present in urban residential areas including the City of Winnipeg (McCance 2014; McCance and Baydack 2018). This is a concern for regional wildlife managers and city planners as it is causing higher numbers of negative human-deer interactions and urban management challenges.

The urban deer population within the perimeter of Winnipeg is estimated to be approximately 1800; the highest concentrations are in the southwest corner of the City, particularly in the Assiniboine Forest and areas near Fort Whyte (Hagglund 2006). Central Winnipeg, where the Bannatyne Campus is located, is known to have nil deer numbers. The population is modest on Fort Garry Campus (south-central area), based on local observations and a limited trail camera survey conducted in 2018; three trail cameras were deployed between June and October to

record species presence within the Campus fringe areas (Map 4). The cameras recorded a large abundance of white-tailed deer on Campus, mainly during the evening, nighttime, and early morning periods, but they were recorded throughout the 24-hour period and likely the same deer recurring. White-tailed deer have been observed in the riparian forests adjacent to the agricultural lands (Photo 7) and Southwood Lands (former golf course area) and occasionally in and around the Campus including Smart Park (Map 2).



**Photo 7: A doe and fawn recorded on a trail camera at Fort Garry Campus (Credit: Joro)**





Map 4: Fort Garry Campus trail camera and Autonomous Recording Unit locations 2018



## 4.2.1 Urban Management Challenges and Opportunities

Urban white-tailed deer can be a challenge to manage due to a complexity of issues. Concerns of deer overabundance are frequently related to animal health, behaviour, and human public health and safety. These primarily include: (1) collisions with motor vehicles- potentially causing injury or death to the animal itself or the human(s) involved and/or vehicle damage, particularly when most active at dusk or dawn, (2) transmission of diseases such as bovine tuberculosis- potentially infecting humans and livestock, and chronic wasting disease- potentially infecting other ungulates, and serving as a host for the black-legged tick that causes Lyme disease, and (3) aggressive buck behaviour during fall rutting season when they are on the lookout for other does to breed with and primed to battle with other bucks encountered (DeNicola et al. 2000; Hesse 2010) (Photo 8).



**Photo 8: A buck observed on a trail camera on Fort Garry Campus (Credit: Joro)**

White-tailed deer in large numbers are also known to cause negative ecological impacts via habitat degradation and property damage. They are noted to frequently over browse natural forest ecosystems, consuming up to 5 kg (11 lb) of forage per day, and this may create change in indigenous species composition (DeNicola et al. 2000, Hesse 2010). Farmers in rural jurisdictions indicate they cause more crop damage than any other wildlife species (DeNicola et al. 2000). In urban yards and public spaces, white-tailed deer usually cause the greatest damage to garden or landscape plants and ornamentals (e.g. trees and shrubs), during late winter to early spring when natural food source is uncommon (New York State Department of Environmental Conservation [date unknown]).

To date, white-tailed deer issues in the City of Winnipeg largely include vehicle collisions and property damage; these issues are mainly associated with higher deer concentration in southwest Winnipeg, particularly near the

Assiniboine Forest. Roadways with higher deer numbers and collision rates include Kenaston Boulevard, South Route 90, Grant and Wilkes Avenues, and Roblin Boulevard (McCance 2014).

## 4.2.2 Beneficial Practices

Should there become a need to mitigate for an increasing white-tailed deer population in an urban environment like UM Fort Garry Campus, quick-fix solutions are unlikely to be effective (DeNicola et al. 2000). Thus, it is recognized that concerns should be addressed at both site-specific (i.e. problem areas on Campus) and landscape levels (i.e. the entire Campus extent). No single technique or strategy would be appropriate for all situations, as resolving conflicts associated with urban deer should be a community-based, co-management process rather than an authoritative wildlife management solution (Hesse 2010).

Non-invasive strategies to minimize urban white-tailed deer and human conflict have been studied or recommended for use in the City of Winnipeg (McCance 2014), the Cornell University Campus (Boulanger et al. 2014), and the State of Washington (Hadidian et al. 2007) and typically include general public education on white-tailed deer issues: e.g. presentations, media campaigns, and bans on deer feeding. Roadside deterrents (e.g. reflectors, deer whistles, signage, fencing, and vegetation management), landscaping/habitat management (e.g. selecting plants less palatable to deer “i.e. browse-resistant” according to local garden centers), odour-based repellants (e.g. hot sauce, rotten eggs, soap, garlic, bloodmeal, and predator urine), exclusion fencing (e.g. mesh barrier and electric), and hazing (e.g. pyrotechnics, audible devices, scarecrows, alarms, lights, and water sprinklers) are additional types of non-invasive techniques implemented to some success by the Cornell University Campus and the State of Washington (Hadidian et al. 2007; Boulanger et al. 2014).

Translocation and trapping of white-tailed deer has further been studied in the City of Winnipeg (Bulloch 1987), as well as Riding Mountain National Park (McCance 2014) and the Cornell University Campus (Boulanger et al. 2014), but with limited or unknown effectiveness.

Overall, white-tailed deer BMP’s for the Fort Garry Campus should be part of a community solution, in conjunction with Manitoba Agriculture and Resource Development and the City of Winnipeg. Ongoing communication with Manitoba Agriculture and Resource Development regarding deer population status in the City would also provide baseline data regarding potential increase in deer issues on the Fort Garry Campus. Examples of population assessment and monitoring techniques to assist in acquiring baseline white-tailed deer population data can be found for the City of Winnipeg: e.g. GPS-collaring studies (McCance and Baydack 2018), Cornell University Campus: e.g. helicopter and spotlight surveys, pellet group counts, and mortality and reproductive rate studies (Boulanger et al. 2014), and suburban areas of New York; e.g. infrared cameras (Curtis et al. 2009).

## 4.2.3 Management

White-tailed deer on the Fort Garry and Bannatyne Campuses historically and currently are not considered an issue due to a low to modest deer population. The local Fort Garry population does have the capacity to increase with mild winters, and in combination with their high reproductive capacity they could potentially evolve into a human/wildlife conflict species. However, the availability of natural and artificial forage within the outlying riparian forest, agriculture lands, and former golf course has led to white-tailed deer preference for these areas, rather than foraging on the maintained landscapes and ornamentals within the core Campus area. Additionally, the peripheral roadways are a potential source for vehicle collisions where white-tailed deer may cross in areas of low visibility, but only during the hours of sunrise and sunset when they are most active and when the least amount of traffic would occur on Campus. During the fall “rut”, there is potential for bucks to become less fearful of humans

and increase the possibility of negative white-tailed deer-human interactions, but this is considered a low risk overall.

Based on these low- to no-risk factors for deer-human conflict, there has been no need to mitigate for white-tailed deer or deliver public awareness campaigns on either Campus. If future issues do arise with this species on the Fort Garry Campus, several BMP's could be considered and are outlined below.

#### 4.2.4 Summary of Management

White-tailed deer are not an issue on either campus and it is anticipated that there will be little change to this status in the near future. Ongoing awareness and documentation of white-tailed deer issues if encountered is ongoing by O&M.

Additional practices that could be utilized (all points of specific importance to Fort Garry Campus):

- If local population of white-tailed deer increases and there is a risk for deer-vehicle collisions, consider deer-crossing signs, reduced speed limits, and reflectors for areas of concern on roadways.
  - Considering the majority of UM campus is already 30 km/hr, this would likely apply to University Crescent and Chancellor Matheson Drive.
- If aggressive or tame white-tailed deer are observed on campus, initiate public awareness campaigns through student bulletins and media.
- Ban feeding of white-tailed deer, including bird feeders.
- If white-tailed deer are found feeding on ornamental plantings or in proximity to buildings, consider alternative plantings not favorable to deer.
- Install exclusion fencing around impacted flora.

### 4.3 Human/Wildlife Conflicts – Birds (Crows, Pigeons, and Starlings)

#### *American crow*

Most American crows breed in the spring and summer months in Canada, including southern Manitoba, and migrate south to the United States during winter (Hadidian et al. 2007; Cornell 2015a). However, increasing numbers are remaining year-round in urban centers as they adapt to viable food sources and general habitat containing perch trees and building infrastructure (Brittingham 2011; Koes 2018). Crows are also highly social and form large roosts or “murders”, with hundreds to thousands of birds congregating in well-lit, urban areas during late fall to winter. Throughout the spring/summer breeding season, crows are more territorial and typically found in pairs or small family groups.

Crows are omnivores and will eat almost anything; they are skilled to hunt, steal, or scavenge with a diet that includes approximately 600 different food items (Johnson 1994). They are a typical part of the human environment and provide a beneficial service by eating insects causing plant damage and roadkill decaying by the wayside (Brittingham 2011; Robinson 2014).

Increasing year-round populations of crows and large winter roosts in urban settings have become problematic and further detail is found in Section 4.3.1.

***Rock pigeon***

Rock pigeons, also known as rock doves, feral pigeons, city doves, city pigeons, or street pigeons were introduced to North America in the 1600s by Europeans. They descend from the wild rock dove, a species which inhabits rocky cliffs throughout its indigenous range in Europe, North Africa, the Middle East, and South Asia (Cornell 2015b; Outerbridge 2016; Parker and Poole 2018). Species introduction was intended to serve various obsolete human domestic purposes (e.g. as a food source of eggs and meat, to carry messages, and for racing and show aviculture or breeding) (Outerbridge 2016; Parker and Poole 2018).

Pigeons today are an abundant species that have largely adapted to urban life throughout the world (Photo 9); they are commonly found in or on buildings, window ledges, bridges, yards, caves, and natural cliffs. They are primarily herbivores, feeding on seeds, fruits, littered breadcrumbs (as part of active human feeding), and other food left by humans (Cornell 2015; Outerbridge 2016). Pigeons can breed throughout the year, but typically most broods are raised in spring and summer (BCSPCA 2018b). They are also nearly identical to crows in behaviour; they are ubiquitous in urban areas, form large, noisy social roosting groups (especially in winter), and produce copious amounts of fecal droppings (Outerbridge 2016).

Arguments have been made regarding the benefit of pigeons in scientific studies because of the ease in identifying, capturing, and tracking individuals. Capoccia et al. (2018) promote this species as an asset to research since pigeons are a diverse species with a wide-ranging distribution, useful for comparative studies, and require little effort to obtain scientific study permits. The researchers suggest using them as an indicator species to understand certain ecological and societal issues, such as effect of environmental contaminants on humans and associated effect of fluctuations in environmental conditions. The presence of pigeons in cities like Winnipeg has also likely benefited recovery efforts for the peregrine falcon (a species at risk) by providing an abundant prey source near nesting sites. They may be an important source of food for a recently active nesting pair of peregrines on the Bannatyne Campus.

Increasing year-round populations of pigeons and large winter roosts in urban settings have become problematic and further detail is found in Section 4.3.1.





**Photo 9: Pigeon flying near a building on Bannatyne Campus (Credit: Joro)**

### ***European Starling***

European starling (*Sturnus vulgaris*) were brought to North America (New York) from Europe in the 19th century by Shakespeare enthusiasts desiring to have America populated by all birds mentioned in literature of the English playwright (Cornell 2015c). Since their introduction, they have spread across the continental United States (US), north into Alaska and the southern half of Canada, and south into northern Mexico (Johnson and Glahn 1994). Starling are common today in North American cities and towns and typically do not migrate in winter but remain in the same general location throughout the year. They prefer open habitats, with grassy areas to forage (e.g. manicured lawns) and a water source, and nest in any holes or cavities within trees, buildings, and/or other structures (e.g. birdhouses). Starling, like crows and pigeons, are common in urban areas, form large winter social roosts and create an overabundance of unwanted feces (Adeney 2001).

Starlings are omnivores and will eat nearly anything, but they focus specifically on fruits, seeds, insects, and other invertebrates (Johnson and Glahn 1994; Cornell 2015c). This can be beneficial to gardeners and farmers, as common prey consumed are plant pests including grasshoppers, beetles, flies, caterpillars, snails, earthworms, millipedes, and spiders (Johnson and Glahn 1994; Adeney 2001). Along with pigeons, they are a valuable source of food for birds of prey (BCSPCA 2018c), and possibly for peregrine falcon as mentioned above.

## **4.3.1 Urban Management Challenges and Opportunities**

As described previously, crows, pigeons, and starlings are well-known to form large roosts in winter and ubiquitous in high-density urban areas (Adeney 2001; Brittingham 2011; Outerbridge 2016). These sizable concentrations of birds in populated areas can lead to human health concerns such as high quantity and odour of fecal droppings, spread of disease to humans and other animals (e.g. West Nile Virus, Salmonellosis, Histoplasmosis,



Taxoplasmosis, and several avian pathogens), noise (e.g. loud calling), aggression (e.g. dive-bombing people that get too close to fledgling young), and damage to roost trees or rooftop material and surrounding agricultural crops (e.g. fruit orchards and grain crops) and gardens/lawns that they tend to feed on (Johnson and Glahn 1994; Adeney 2001; Brittingham 2011; BCSPCA 2018a, 2018b, 2018c).

Crows are quick learners and problem-solvers, which can lead to issues with mess in garbage disposal areas by looting garbage cans and scavenging on food containers and scraps (Brittingham 2011). Pigeons also rely heavily on humans for sources of food such as improperly stored or spilled- grain, garbage, or compost, and in some urban areas (e.g. public parks or other meeting places) the feeding of pigeons is considered a form of recreation (Williams and Corrigan 1994). Starlings easily compete with indigenous birds for resources (i.e. food and nesting sites) and cause building maintenance issues when they nest in chimney, rafters, and oven or dryer vents (Johnson and Glahn 1994; Adeney 2001; BCSCPA 2018c).

Pigeons likewise cause building infrastructure issues when they nest in the rooftop heating, ventilation, and air cooling (i.e. HVAC) units of city buildings to seek shelter from the elements, particularly in cold weather (Ductwork Inc. 2010). They frequently enter the HVAC units through the fresh air intake vents and cause damage to the filter, fan, air conditioner coil, and insulation components of the unit, along with creating indoor air quality issues and human health risks through the act of nesting (e.g. nesting material) and creating pigeon debris (e.g. fecal droppings and loose feathers). Additionally, the build-up of pigeon feces on buildings is acidic and can erode metal and stonework, potentially leading to major infrastructure damage (Williams and Corrigan 1994; BCSPCA 2018b).

All three species have become common and challenging residents at the inner-city Bannatyne Campus over the past several years (Photo 9). In particular, crows and pigeons have been observed roosting in large numbers on the large heating and cooling (HACR) units at the Central Energy Plant 2 of the Health Sciences Centre during recent winters, and a murder of crows was noted roosting on the ledges of the Brodie Centre throughout the winters of 2017 and 2018. Continuous crow and pigeon presence are thought to be the result of the abundant and reliable source of spilled grain from rail cars in the Canadian Pacific Rail (CPR) yard located less than 1 km from the Campus.

Other food sources which have attracted them to the area include household garbage, food scraps, and summer vegetable gardens found within the residential neighborhoods near the Campus. Pigeons are also reliant on the winter shelter provided by the nearby Salter Street Bridge, and all three species have taken advantage of the various Bannatyne Campus building infrastructure offered such as heating and cooling units, chimneys, and open vents. Starlings have specifically been nesting throughout the Bannatyne Campus in various building ventilation systems and microsites providing shelter from weather elements and this requires removal after nesting is completed on a regular basis.

### **4.3.2 Beneficial Practices**

Overall, BMPs for dealing with roosting pigeons, crows, and starlings in a non-invasive manner requires actions that encourage birds to move away from the identified problem area (roosting areas) to other less problematic areas. A common issue with this tactic is that the problem is simply moved to a different location. An urban environment contains many options for bird occupation, and it is important to coordinate efforts with others that may be impacted by the control methods. Coordination on the application of bird BMPs requires a minimum level of planning with the various Campus staff and students that may be impacted.

Human/wildlife “conflict” bird populations and human/animal health-risks (spread of disease) management begins with limiting local food for birds (e.g. by prohibiting intentional feeding, securing grain, garbage and compost bins, and covering fruit trees and garden crops with strong netting) (BCSPCA 2018a, 2018b, 2018c). To specifically discourage starling nesting in buildings and other structures, physical exclusion in the form of nylon or plastic netting has been recommended in British Columbia (BCSPCA 2018c) and parts of the US: New York (Adeney 2001) and Nebraska (Johnson and Glahn 1994) to block access to openings larger than 2.5 cm. This includes installation over vents, soffits, chimneys, and rafters and regular maintenance to ensure no re-access.

Other general management practices for conflict birds involve utilizing hazing methods or visual and auditory repellents (i.e. using professionally trained raptors or dogs, spraying birds and nests with water, or implementing reflectors, distress calls, pyrotechnics, Mylar, and balloons), and effigies. These approaches have been used in many jurisdictions such as British Columbia (BCSPCA 2018a, 2018b, 2018c), Bermuda (Outerbridge 2016), the University of Nebraska-Lincoln (Johnson 1994; Williams and Corrigan 1994; Johnson and Glahn 1994) and throughout the US (Hadidian 2007; Brittingham 2011; Eagleton 2016; Humane Society of the United States 2019), with little long-term effectiveness. Physical repellents have also been used in the above listed jurisdictions, as well as at UW (2018; see below), and have been shown to have higher success. Examples of these repellents include bird spikes, shock sticks, chemical repellents (i.e. Atrivol, 4 The Birds, Hotfoot, Tanglefoot, Naphthalene, Methyl-andranalite fog), porcupine wire, and Irritape.

As conflict birds are a global issue, there are hundreds of companies in Canada that specialize in bird and animal deterrent systems and services and a variety of scare and repellent products are available on the market, with many being used by O&M. A summary of these products includes:

- Zon Scare Cannons – considered not acceptable under City of Winnipeg noise-by-laws, general annoyance to public, and impacts to birds beyond the target area.
- Scare Cartridges and Launchers – similar to Scare Cannons and considered not acceptable for use for the same reasons as listed above.
- Electronic Bird Repellants – replicates the sounds of predatory birds but can also illicit fright responses in people.
- Lasers – produce a wide green spot that birds perceive as a physical danger, causing them to fly away; however, this requires a human to operate and is time consuming.
- Visual Scare Products (i.e. raptor kites, eagle and owl decoys, dead bird decoys, flash tape) – work in many situations as a part of a suite of methods.
- Netting Repellants – used to cover roosting sites and work effectively in many urban settings, including the Bannatyne Campus as described in Section 4.3.3.2 below.

Exclusion management practices, such as incorporating netting, bird wire, door curtains, fabric row covers, modification of perch areas, blocking of building openings or open doorways, barrier coil, and hardware cloth have been studied or recommended in Winnipeg (University of, [UW] 2018; see below), British Columbia (BCSPCA 2018a, 2018b, 2018c), Bermuda (Outerbridge 2016), and throughout the United States (Johnson 1994; Johnson and Glahn 1994; Williams and Corrigan 1994; Hadidian 2007; Humane Society of the United States 2019).

Non-chemical pigeon control BMPs in urban areas foremost involve standard practices that use physical repellants and exclusion management as described previously. However, despite best efforts, infestations have occurred, and the use of pesticides has been deemed necessary to protect human health. A target pesticide known as Avitrol has

been applied in these situations and recommended for use only during the non-nesting season (October to March), to avoid potential impacts to other nesting birds such as peregrine falcons (Williams and Corrigan 1994). Avitrol is mixed with corn, placed in bait trays, and typically used in roosting areas on building rooftops, mitigating impact and exposure on non-target (ground-living) species.

The following non-chemical measures have been implemented on the UW Campus as a means of pigeon control to various levels of effectiveness:

- Spikes in roosting sites (Photo 9) – this has had some success and is currently being used in Riddell, Ashdown, and Manitoba Hall Building locations on the UW Campus (note: these can be difficult to install in some areas and is therefore not used everywhere on the Campus).
- Owl statues – they have been deemed ineffective over time as they are stationary and pigeons learn they are not a threat and continue to roost where they are located.
- Netting in roosting sites – there has been concern over birds getting trapped in the netting.



**Photo 10: Closeup of spikes used to deter birds in urban roosting areas (Credit: Joro)**

Due to the high breeding rates of pigeons in urban and industrial environments, poisoning or trapping of birds has proven to be ineffective in controlling populations. Use of barriers (spikes, nets, etc.) as a barrier on industrial facilities or throughout large urban building complexes is typically not practical. Successful non-lethal methods to control local populations include the use of oral contraceptives. Ovocontrol-P is bird contraceptive that is fed to birds on rooftops near problem areas to reduce nesting success. This product is federally approved for use in Canada and is readily available through many licensed bird control companies. It has proven successful in British Columbia (BCSPCA 2018b), Bermuda (Outerbridge 2016), and through the United States (Hadidian 2007).

### **4.3.3 Management**

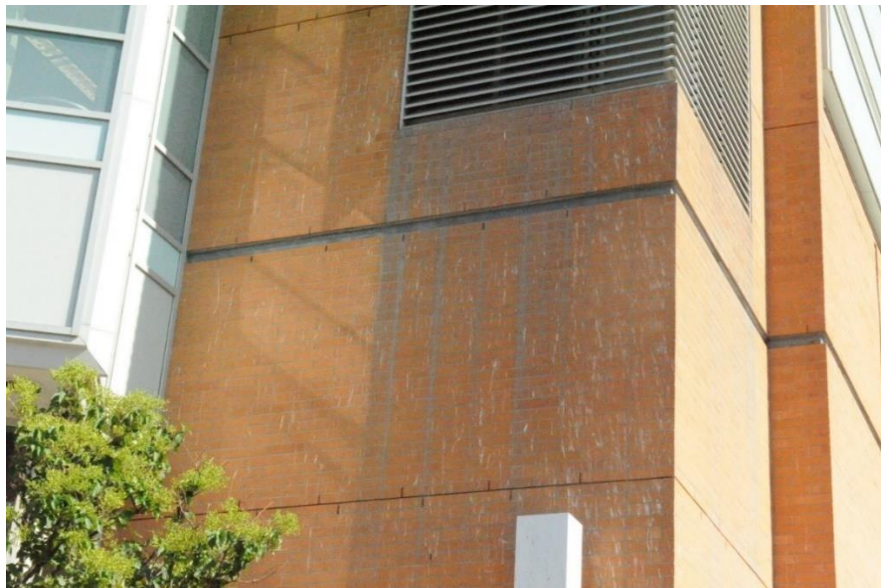
The issue of conflict birds including crow, pigeons, and starlings at UM has mainly been identified for Bannatyne Campus (see Section 4.3.1). As mentioned previously, O&M has extensive experience dealing with these bird species and has deployed numerous tactics to minimize or eliminate problem situations. Example include the use noise generators and trimming of trees to reduce problematic roosting locations; a local nesting peregrine falcon is also a natural deterrent. Each occurrence is often unique, and staff have adapted through innovation and persistence in resolving most problem bird issues.

Sticky bird deterrents such as Transparent Bird Gel and Bird-Off Gel have been applied previously to windowsills in problem buildings on Campus to discourage pigeon roosting (

Photo 11). Excrement from the birds naturally accumulates throughout the winter on the Bannatyne Campus windows, resulting in large volumes accumulating along building foundations, as well as staining walls and windows (Photo 12). Built up excrement creates a risk to human health through the feces that can be tracked into the Campus, various laboratories, and classrooms or into the residential homes nearby. Annual bird excrement removal and cleanup of walls and windows is an ongoing and costly maintenance task that will need to be carried out by O&M as required.



**Photo 11: Sticky bird deterrents applied to windowsills on Bannatyne Campus (Credit: Joro)**



**Photo 12: Pigeon excrement staining on a Bannatyne Campus building (Credit: Joro)**



In the winter of 2018-2019, utility netting (0.75-inch size) was installed over the HACR units at Health Sciences Centre where crows were identified as a problem. Crow counts were also coincidentally done in November and December of 2018 in that area and results indicated zero to six crows were observed roosting. It appeared that the netting successfully reduced the number of individuals roosting in the HACR area.

#### **4.3.3.1 Summary of Management**

Conflicts with rock pigeons, starlings, and crows are found mainly on the Bannatyne campus and include buildup of bird feces on building exteriors, windows, and ledges. O&M has had success with various exclusion techniques and continues to attend to problem areas when encountered.

Exclusion measures currently being implemented include installation of utility netting over HACR units (Health Sciences Centre).

Additional practices that could be utilized:

- Limit food sources through removal of access and implementation of feeding bans.
- Repellents including bird spikes, shock sticks, and chemical repellents.
- Effigies and hazing (have only limited success as birds are easily habituated to these methods).

## **4.4 Human/Wildlife Conflicts - Small Mammals (Raccoons, Skunks, Groundhogs, and Squirrels)**

### ***Raccoons***

Raccoons are found throughout Canada, and in Manitoba throughout the southern half of the province, (Banfield 1974) and common within urban areas (Craven and Drake 2012; BSCPCA 2018d). They prefer wooded areas near streams, rivers, or other water sources and as an omnivore, raccoons will eat a variety of foods such as small animals (e.g. crayfish, clams, small fish, frogs, snails, and small mammals and birds), insects, and fruit (Banfield 1974; Lee 1992). Raccoons seek shelter (dens) in the coldest part of winter, and during the warmer periods (spring to fall) are nocturnal and typically sleep during the day in a den or tree base (Banfield 1974) (Photo 13). Dens occur in natural habitats such as tree hollows, logs, caves, overturned stumps, and old animal burrows; or artificial settings including culverts, drainpipes, and abandoned barrels. The presence of raccoons can be advantageous to homeowners and beneficial to ecology since they will eat a variety of unwanted plants and animals such as wasp larvae, mice, and weeds to help remove undesirable species from yards and maintain the natural landscape (Craven and Drake 2012, Damask 2018). Additionally, they are prey for larger mammals in the food chain (Craven and Drake 2012).



**Photo 13: A raccoon captured at night on a trail camera on Fort Garry Campus (Credit: Joro)**

Detail on the problems with raccoons in urban settings is found in Section 4.4.1.

### **Skunks**

Striped skunks (*Mephitis mephitis*) are found throughout Canada and Manitoba (Banfield 1974). They are habitat generalists found in natural settings consisting of a mix of woods and open areas (i.e. forests and fields), but also located in agricultural and urban areas (Behrens et al. 2013). Like raccoons, skunks are nocturnal and reside in dens during the coldest period of winter, usually December to March. Den sites are found in wood or rock piles, ground burrows, or beneath buildings. The main advantage of skunks to home- and land- owners is their ability to control common problem species like mice, moles, and insects (Behrens et al. 2013, BCSPCA 2018e). They also serve as food for larger predators and assist with plant propagation by spreading seeds through their scat (Behrens et al. 2013).

Detail on the problems with skunks in urban settings is found in Section 4.4.1.

### **Groundhogs**

Groundhogs (*Marmota monax*), a rodent and largest member of the ground squirrel family, are also known as woodchuck or whistle pig (Drake et al. 2012, Thurston et al. 2014) and are found throughout Canada and Manitoba (Banfield 1974) (Photo 14). They are most active during the day in the warmer months of the year, fully hibernating from October to April (Drake et al. 2012). When startled, groundhogs emit a shrill whistle alarm call, followed by a low warble that sounds like “tchuck, tchuck”. They prefer to construct their burrows in open fields and pasture, wooded brushy areas adjacent to open land, or along roadsides, but are also found in urban areas

where the combination of food and cover provides satisfactory habitat such as parks, gardens, and golf courses (Drake et al. 2012, Thurston et. al 2014).

Burrow materials may include stone walls, building foundations, or the base of trees. Groundhogs are most beneficial to humans and ecosystems mainly due to their burrowing nature; their burrows create habitat for other local animals including foxes, allow nutrients and rainwater to seep deep into the ground where needed, and aerate (mix) the soil with oxygen (Whalen 2018). Groundhogs also assist with insect control for gardeners and homeowners by having a voracious appetite for tiny pest species and keeping their populations under control.



**Photo 14: Groundhog observed on a trail camera (bottom left corner) at Fort Garry Campus**

Detail on the problems with groundhogs in urban settings is found in Section 4.4.1.

### ***Squirrels***

A number of species of squirrels occur in Manitoba, including the tree squirrels: Eastern gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), and northern flying squirrel (*Glaucomys sabrinus*); and the ground squirrels: Richardson's ground squirrel (*Spermophilus richardsonii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), and Franklin's ground squirrel (*Spermophilus franklinii*). All with the exception of the northern flying squirrel are considered diurnal species, active during the day (Banfield 1974). Tree squirrels, as their name implies, inhabit trees and build nests in branches or tree hollows; many have adapted to be exclusively urban dwellers, e.g. the gray squirrel, and stock up on nuts and seeds for the winter as they do not hibernate (Banfield 1974, Kimmitt 2017; BCSPCA 2018f). Ground squirrels prefer deciduous forest or the edges of woods and can climb trees, but readily adapt to urban garden landscaping and dig below-ground burrows to inhabit around rock or wood piles, retaining walls, and fallen logs; unlike tree squirrels, they do hibernate in winter (Banfield 1974;

Hadidian et al. 2007). Squirrels in general are beneficial to nature through their ability to bury or hide nuts and seeds (and forget about them) in a variety of places and consume them as well, which assists in seed dispersal and allows new trees or plants to sprout while also aerating the soil (Garden Experiments 2016; BCSPCA 2018f). They also eat mushrooms and disperse the spores of fungi through their fecal pellets and are of ecological benefit by serving as a food source for other mammals, raptors, and snakes.

#### **4.4.1 Urban Management Challenges and Opportunities**

Human/wildlife conflict species such as raccoons, skunks, groundhogs, and squirrels are of primary concern as host for various pathogens some of which can be transmitted to other animals, humans, and their pets (Hadidian et al. 2007). Rabies, for example, is carried by any mammal species but often has major outbreaks in skunks and raccoons which are reservoirs for the disease.

Raccoons and skunks are opportunistic feeders and become an issue in urban areas where a year-round food source is available, such as pet food, garbage, birdfeeder food, and garden produce (Lee 1992; Behrens et al. 2013). Raccoons also take residence in chimneys, attics and other places where they are unwanted and cause damage (Craven and Drake 2012), while skunks dig underneath decks and sheds to den (BCSPCA 2018e).

Groundhogs are problematic in urban settings by causing damage to private and public property, particularly in the spring and summer, as a result of their feeding and burrowing habits (Drake et al. 2012). They enjoy flowers, ornamental shrubs, fruit trees, and vegetables (like beans, squash, and peas), causing damage in orchards, nurseries, and home gardens. They have been known to gnaw on underground power cables, which can cause electrical outages, and even rubber hoses in vehicles, such as those used for vacuum and fuel lines. Groundhog burrow tunnels can cause driveways and parking lots to cave in and rock walls to collapse, and along building foundations, can cause damage that undermines the whole structure, resulting in costly repairs.

Squirrels cause problems in urban areas year-round due to eating garbage, birdfeeder food, and supplemental food scraps (e.g. bread and other food crumbs thrown on the ground in public parks), acting unafraid of the presence of humans, and building nests in chimneys, attics, or walls in homes and buildings (BCSPCA 2018f). To build nests, they chew through wood, roof shingles, insulation, and even aluminum to get inside attics, garages, and storage nooks, causing much damage and expense for homeowners and public administrators.

#### **4.4.2 Beneficial Practices**

BMPs, in general, for dealing with raccoons, skunks, groundhogs, and squirrels in a non-invasive manner, requires tactics that make identified problem areas less attractive and to remove access entirely to these areas, but sometimes this means that the human/wildlife conflict is simply moved to a different location. Urban environments provide many food and shelter opportunities for these species, and it is important to coordinate efforts with others that may be impacted by the control methods. Coordination on the application of small mammal deterrents requires a minimum level of planning with the various Campus staff and students that may be impacted.

The population and human/wildlife conflict management of these species begins with limiting local food and other attractants (e.g. by prohibiting intentional feeding, securing garbage, and compost bins) (BCSPCA 2018d, 2018e, 2018f). However, raccoons and squirrels are extremely capable at accessing food sources even if they are properly stored and may require additional measures as described below.



A common and effective control tactic for raccoons, skunks, groundhogs, and squirrels is exclusion from problem areas. Some jurisdictions that practice or have studied exclusion methods for these species include British Columbia (BCSPCA 2018d, 2018e, 2018f), Pennsylvania (Thurston et al. 2014), Washington (Hadidian 2007), and Wisconsin (Drake et al. 2012; Craven and Drake 2012; Behrens et al. 2013). Practices that can be applied to all species include the use of wire mesh screens with L-shaped footers with mesh, caulking, sheet metal and/or hardware cloth to block all possible entrances into buildings. Window-well coverings were also recommended as an exclusion practice specific to skunks, while electric fencing can be applicable to any larger ground-dwelling species (raccoons, skunks, or groundhogs). For the more adept raccoons and squirrels that can climb, chimney caps have been suggested to restrict access to building rooftops.

In addition to exclusion, repellents and effigies were studied or utilized for the above jurisdictions to deter these species from certain areas (Hadidian 2007; Drake et al. 2012; Craven and Drake 2012; Behrens et al. 2013; Thurston et al. 2014; BCSPCA 2018d, 2018e, 2018f). As with most other BMPs, a common recommendation is to use multiple management practices in tandem. Some methods studied included chemical repellents (Thiram-based; a fungicide), noise deterrents, and bright lights for all species. Cat litter, predator urine, and castor oil can be applied specifically for skunk deterrence, while groundhogs may react to Mylar and scarecrow effigies.

If a combination of exclusion and deterrence through repellents and effigies is ineffective, species may have to be evicted and relocated. Recommended methods are one-way doors, live trapping, and relocation to an area where the animal will no longer be a cause for concern (BCSPCA 2018d, 2018e, 2018f).

In other local jurisdictions such as the UW downtown Campus, the standard practice is to use non-chemical methods for dealing with rodents including rats and mice (but could be applied to large rodents like groundhogs). Though infestations sometimes occur, the use of pesticides is necessary to reduce human health risks, but priority is to investigate non-toxic chemical means (UW 2019b). The chemical products that have been approved to control rodents on Campus include bait blocks like Fastrac, Final Blox, Contrac Blox, and Generations Mini Blocks, and soft bait like First Strike and Resolv. These bait products are placed in 'Protecta' (RTU) tamper proof containers and monitored until the problem has been appropriately controlled.

### **4.4.3 Management**

The occurrence of conflict small mammal species such as raccoons, skunks, groundhogs, and squirrels has been identified at both the Bannatyne and Fort Garry Campuses. O&M at UM Fort Garry Campus has noted numerous student and staff encounters with raccoons inside and outside the Campus buildings. Raccoons are occasionally observed gaining access to exterior recycling and garbage bins (both metal and concrete types), as these bins have special holes for accessibility to persons with visual disabilities, but also make them easily accessible to raccoons to forage. The use of inaccessible recycling and garbage bins is not an option at the UM.

Raccoons were also found in a vending machine in one of the Campus buildings and have gained access into the University College and the Parker and Armes Buildings. Raccoons are thought to enter the buildings through doors that are open and unattended for short periods of time, or other access points using their inherent curiosity and dexterity to “break in” occasionally.

The primary management method undertaken by O&M in dealing with raccoon conflicts is to ensure exclusion measures such as repairing or closing potential access points on buildings (i.e. under roof eaves, along external walls, doorways, etc.) is undertaken when first identified by staff. In the event of a building intrusion, O&M staff immediately identify how the problem species is gaining entry and use whatever measures are necessary to

prevent access. Should they be encountered inside a building, it is desirable to allow the animal to leave on its own and immediately undertake exclusion measures once they have exited. If animals are not leaving the building, O&M will contact an appropriate pest management service to undertake live trapping and relocation to an area of suitable natural habitat outside of the city.

As described previously in the BMPs in Section 4.4.2, should a raccoon give birth to a young in any buildings on either Campus, bright lights and/or loud noises can be utilized to encourage the mother to exit the building. If these control tactics fail, the animals should be captured and relocated by a licensed pest control service company and separation from the mother avoided at all cost.

Issues relating to skunks, groundhogs, and squirrels are rare and exclusion measures followed by live trapping and relocation should be undertaken and are recommended.

#### **4.4.3.1 Summary of Management**

Issues related to conflicts with raccoons, skunks and squirrels is limited. Ingress of raccoons has been the main source of conflict as they occasionally gain entrance into various buildings and garbage containers.

Exclusion measures currently being implemented:

- Closing off and repairing potential access points when identified by staff or upon accidental entry.
- Upon accidental entry, allow animals to leave on their own where applicable. Otherwise, contact the appropriate pest management service to trap and relocate animals.

Additional practices that could be utilized:

- Exclusion from the larger area using wire mesh screens with L-shaped footers, sheet metal, hardware cloth, and window well guards with covers.
- Chemical, auditory, and visual repellents (thiram-based products, radio playing loud music, bright lights at potential entry sites).
- Installation of one-way doors where applicable.

## **4.5 Human/Wildlife Conflicts – Large Mammals (Moose, Elk, Bear, and Cougar)**

Moose (*Alces alces*) are widely distributed throughout every province and territory in Canada (MSD 2019a). In Manitoba, their range extends from the US border in the southeast through the boreal forest and up to the far north (Nunavut Territory); however, they have recently established localized populations in agricultural areas of the southwest prairie region. Preferred habitat generally includes secondary shrubby growth and late successional aspen-birch parkland forest over mature coniferous regions, with swampy lowlands and lakeshores present (Banfield 1974). Moose are a culturally important species and food source to indigenous people who harvest animals for sustenance and sharing the meat with their families (MSD 2019a). Recreational hunters also enjoying obtaining moose meat to eat and are a highly prized big-game trophy (Banfield 1974).

Elk (*Cervus elaphus*) were formerly distributed across much of central North America but are now restricted to isolated pockets due to conversion of their habitat for agriculture and land settlement (Banfield 1974; Patterson 2014). In Manitoba, larger populations are found in the south central third of the province, mostly in the Interlake

and western regions, with smaller pockets of satellite herds including southeast Manitoba (Patterson 2014; MSD 2019b).

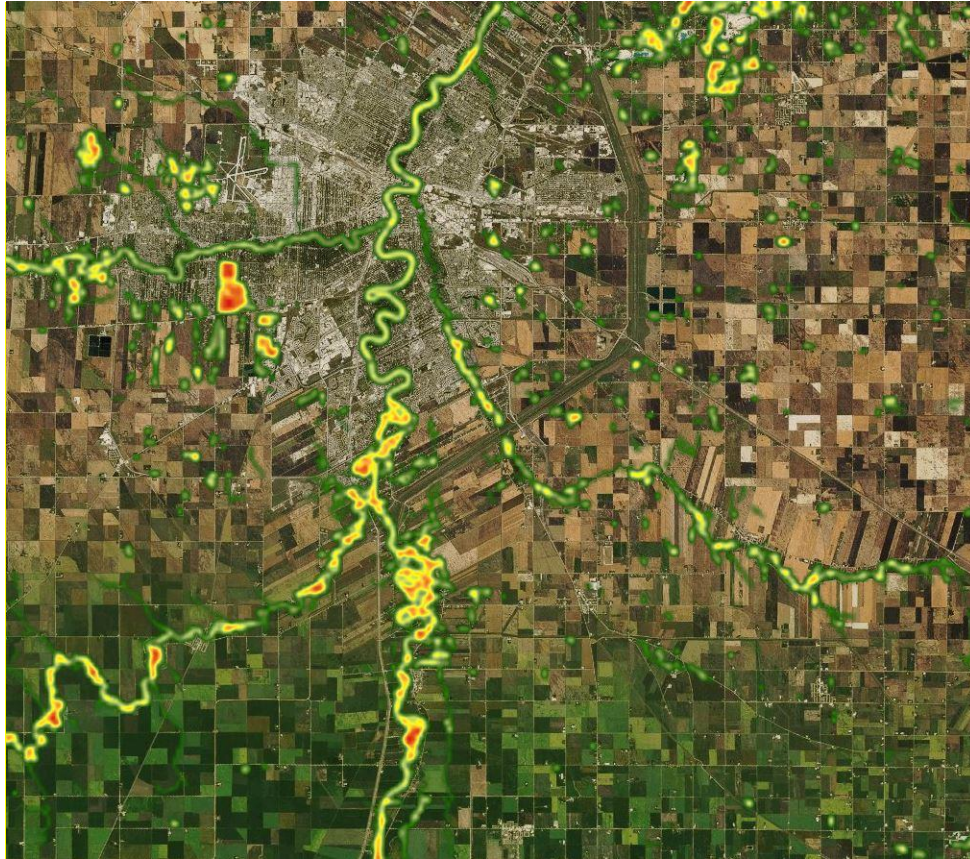
The range of American black bear (*Ursus americanus*) extends through much of North America, across forested areas from the east- to west shores of Canada (Banfield 1974). They inhabit both coniferous and deciduous forests and swamp and berry patch areas. This includes most areas of Manitoba, but black bears only occur occasionally in the major agricultural areas of the southwest portion (MSD 2019c).

Elk and bear also provide great value as wildlife species for nature enjoyment, photographic capture, and hunting by licensed and rights-based hunters (MSD 2019b, 2019c).

Pre-European settlement, cougars (*Puma concolor*) were common in the Americas, widely distributed in the southern extent of Canada, and throughout the US, Mexico, and South America; today the range in Canada is greatly reduced and they regularly occur only in the mountainous terrain and rocky foothills of British Columbia and Alberta, with the occasional sighting in river valleys and wooded hills of Saskatchewan (Banfield 1974). In Manitoba, however, cougars have become more common in recent years and it is suspected there is now a small breeding population in the province (Hornocker and Negri 2010). Cougars are primarily nocturnal, searching for prey over large distances. They are thought to play an important ecological role by regulating the size of ungulate populations such as elk and deer, indirectly affecting the impacts of ungulates on plant communities (Western Wildlife Outreach 2019)

#### **4.5.1 Urban Management Challenges and Opportunities**

Large mammal conflict species occasionally occur within urban areas and typically enter following specific wildlife corridors along river courses. Moose and bear have been sporadically reported in the City of Winnipeg limits, including Fort Garry and Transcona areas of the city (CBC 2017; Thorpe 2018). In the case of a young moose occurring on the UM Fort Garry Campus (CBC 2017), it likely travelled into the City along the Red River corridor in the south-central end of the city (Figure 1). Figure 1 illustrates potential large mammal travel corridors and these areas may be used by ungulates or bear to access areas of specific habitat or resources; corridors are illustrated in a green-red heat map format, with red areas indicating highest potential use.



**Figure 1: Large Mammal Potential Corridors in the City of Winnipeg**

## 4.5.2 Beneficial Practices

BMPs for dealing with large mammal conflict species such as moose, elk, bears, or cougars in a non-invasive manner requires actions that reduce opportunities for interactions between these species and humans. Following human development, these species may unintentionally find themselves trapped in urban areas or residing in natural areas frequented by people for recreational opportunities, particularly along riverbank corridors. These environments often provide easy food sources for these species, which may then become habituated. The application of large mammal deterrents should be a follow-up to population monitoring and public education by government wildlife officials, particularly in conjunction with O&M to advise UM staff and students on the potential risks with encountering these species on Campus.

Population monitoring is commonly practiced by provincial governments for game species which encompasses moose, elk, and bears. Data acquired through population monitoring can be used to identify areas where public education through wildlife road crossing and reduced vehicle speed signage will be most effective in reducing animal-vehicle collisions (Hesse 2010). Studying these species also allows for wildlife managers to maintain healthy wild populations while educating the public about removing attractants, the consequences of feeding wildlife, how to react when encountered, and habitat modification practices to discourage conflicts in urban settings (Hesse 2010; Hadidian 2007).

In instances where population management and public education are insufficient, an alternative BMP for moose, elk, bear, and cougar is to attempt exclusion from problem areas. Some jurisdictions that practice or study



exclusion methods for these species include British Columbia (Hesse 2010) and the state of Washington (Hadidian 2007). These practices are limited to ungulate species (moose and elk) and bear, as exclusion is generally found to be ineffective for cougars. Woven wire and electrical fencing have been applied for ungulates and bears, while bear-specific practices include ensuring that all compost, recycling, and garbage containers are secured in a manner that bears cannot access them.

In addition to exclusion, repellents and effigies were studied/utilized for the above jurisdictions (Hadidian 2007; Hesse 2010). As with most other BMPs, a common recommendation is to use multiple management practices in tandem. Scent and visual repellents are commonly used for moose and elk, and include rotten eggs, soap, predator urine, blood meal, chemicals (e.g. Deer-Away and Thiram), hot sauce, scarecrows, lights, and balloons. Noise deterrents can be used for bear and cougar, as well as ungulates, and include sirens, fireworks, bangers, and propane cannons. Specific to cougars and bears, rubber bullets, pyrotechnics, and pepper spray products can be used at opportune times to reinforce their natural caution of humans.

If a combination of the above practices is deemed ineffective, species may have to be captured and relocated. Recommended translocation methods involve net guns, drive nets, drop nets, immobilization drugs, and various enclosed traps (Hesse 2010). Animals should be released in an area of appropriate habitat where they will not be a human-conflict concern.

### **4.5.3 Management**

As mentioned in Section 4.5.1, there was a documented case of a moose within the Fort Garry residential area and UM Campus near the Investor's Group Football Stadium on Sept. 9, 2017 (CBC 2017; Photo 15); Manitoba Conservation Officers repeatedly attempted to capture it over many hours and then later tranquilized the animal for translocation. In this instance the animal died, because of stress and exertion, although heat and the combined effects of the tranquilizer may have been a factor. There has been no reported occurrence of any large mammal conflict species on the Bannatyne Campus to date and due to location in the inner-city, the chance of encounter is unlikely.



**Photo 15: The young moose that was on the loose near Fort Garry Campus in 2017 (Credit: CBC)**

If a large mammal conflict species is encountered at either Campus, it should be reported immediately by UM staff or students to Security Services at #555 (Cell Phone), 555 (from any Campus Phone), or 204-474-9341 (from all other phones), and/or O&M (Emergency Line) at Fort Garry Campus: 204-474-6281 / Bannatyne Campus: 204-789-3636. Security Services or O&M should then contact local Conservation Officers (Winnipeg District Office: 204-945-7273; Winnipeg Residents Portal 204-675-2327; Emergency Response 24-hr toll-free (TIP Line): 1-800-782-0076) or the Winnipeg Police Service via an Emergency Call to 911 before attempting to utilize any BMPs detailed in Section 4.5.2.

### **4.5.3.1 Summary of Management**

Currently being implemented:

- Currently not an issue at either campus.
- In event of a problem large mammal, the appropriate authority should be contacted (Security Services/Emergency O&M Line) and Winnipeg Conservation Officers or Police Services 911).

Additional practices that could be utilized:

- Public education to students and staff to inform in the event of an encounter.
- If large mammals become a problem on nearby roadways, crossing and reduced speed signage may be appropriate.
- Wire mesh and/or electric fencing at areas of access.
- If bears become a problem, remove access to garbage, compost, and recycling.

## 4.6 Birds (Songbirds, Raptors, Waterbirds, Upland Game Birds)

Birds are migratory and are protected MBCA and its Regulations. The Act prohibits the “killing, capturing, damaging, destroying, removing, or disturbing their nests except by permit. Overall, birds are a common and conspicuous element of almost all natural and urban ecosystems. Manitoba supports approximately 308 species of birds of which nearly half of these are found in the City of Winnipeg as breeding, winter residents, migrants and vagrants (Appendix B: Table 1). Birds are aesthetically, scientifically, economically and ecologically important to ecosystems and are highly valued by society (Photo 16; Whelan et al. 2015; Sekercioglu 2016). Nearly half of the bird species are insectivores and contribute to the control of insects across all environments and Birds of Prey (including owls) are also effective in reducing small mammals’ populations (Whelan et al. 2015). Waterbirds, including waterfowl also provide valued ecosystem and economic services and are highly valued by society including students, staff and visitors to both the UM Campuses.



**Photo 16: Birdfeeders on building windows to attract songbirds on Fort Garry Campus (Credit: Joro)**

### ***Nesting zones and periods of migratory birds***

Timing of bird breeding in the Winnipeg area can be variable depending on weather but typically commences from mid-April and can last to late August. Owls are the exception with great horned owl (*Bubo virginianus*) breeding documented in mid-January (Artuso et al. 2019). Peak breeding for owls is known to occur during the third week of May to third week of July.

### ***Overview of birds group***

#### ***Songbirds***

Half of all bird species are Passeriformes and they are the most abundant group of birds on a global scale (Dorrestein 2009). As vocal communication is vital for many species in this group, they are colloquially called songbirds. It should be noted that crows and starlings are members of this group but are treated separately in Section 4.3 of the WMP. This group has a wide dietary range from carnivores (shrikes), omnivores (magpies), to granivores (goldfinches) and frugivores (waxwings) or can switch from insectivorous to nectarivorous diets between breeding and overwintering locations (warblers). They utilize multiple natural and urban landscapes though some of them are chiefly associated with a human-made structure (e.g. purple martin; *Progne subis*). Almost all Nearctic migrant passerines overwinter in Southern US, Latin America, or well South in neotropical region. Two exceptions are the wheatear (*Oenanthe Oenanthe*) that nests in Northeast Canada (including one breeding record from Churchill Manitoba) and surprisingly winters in west-central Africa, and Eastern yellow wagtail (*Motacilla tschutschensis*) that breeds in Alaska and Yukon territory and winters in Indonesia and Northern Australia (Newton 2008).

Together with other birds, most Passeriformes in Manitoba are migrant species with over wintering locations ranging from the southern United States, to Central- or South America. A few (e.g. black-capped chickadee; *Poecile atricapillus*) are resident, dwelling year-round and show minimal movement. Breeding period is also diverse in this group, ranging from late February (e.g. black-billed magpie; *Pica hudsonia*) to early June (e.g. Dickcissel; *Spiza americana*) but for most species in Manitoba, it coincides with the fourth week of April onward.

Most Passeriformes occupy specific habitats for nesting but are found in different landscapes during migration. On the Fort Garry Campus, songbirds occur in all landscapes, including grassland, riverine woodlands, agricultural fields, small ponds, and marshes west of Campus and also within the built environment. For the latter, trees, small patches of shrubbery and grass near buildings, as well as the buildings themselves, provide refuge and nesting habitat for birds.

#### ***Species diversity recorded in June 2018 (Using acoustic ambience)***

Few systematic bird studies have been conducted on either Campus except for ongoing bird monitoring and research on bird/window collisions. During 14-21 June 2018, six SongMeter® Autonomous Recording Units (ARU's) were deployed to record bird calls on the Fort Garry Campus to provide data to characterize common species observed (Map 4; Photo 17). Vocalizations were clustered in 30 seconds WAV files (2360 files, 1180 min) and sorted on a daily base. All files were reviewed by the UM Bird Lab and all bird calls recorded were identified.





**Photo 17: An ARU deployed to record birds in forested areas on Fort Garry Campus (Credit: Joro)**

#### *Results and discussion*

Twenty-nine (29) species were recognized (including one unknown hawk and one unknown gull) on Fort Garry Campus during the monitoring period. The highest number noted was in Station 06 (19 species) with the lowest in SM 23 (7 Species). Appendix B: Table 2 provides a summary of species recorded and their total number. Chestnut-sided warbler, cape may warbler, brown-headed cowbird, American goldfinch and house sparrow were all recorded only in one station while red-eyed vireo and American crow were present in all stations. Two species listed under SARA and MESEA were also recorded: barn swallow and peregrine falcon and further details on each is found in Section 4.8.

As described above, the ARU monitoring was not intended to identify all breeding birds on Campus, however, the number of species recorded provides evidence of species occurrence and diversity. Sampling over a longer period and in other areas such as the ponds in smart park and north of stadium would yield additional species. Also, early breeders such as nuthatches (breeding starts on first or second week of April) and some other common birds including common grackle (*Quiscalus quiscula*) and brewer's blackbird (*Euphagus cyanocephalus*) are less vocal during nesting.

#### ***Raptors & Upland Birds***

Raptors are predatory bird and include eagles, osprey, vultures, hawks, falcons, and owls that hunt and kill their prey or scavenge (Guidelines for Raptor Conservation 2013). Raptor species potentially located on UM Fort Garry Campus include a large group in the Order Accipitriformes such as osprey (*Pandion haliaetus*), turkey vulture (*Cathartes aura*), bald eagle (*Haliaeetus leucocephalus*), Northern harrier (*Circus cyaneus*), hawks like sharp-shinned (*Accipiter striatus*), Cooper's (*Accipiter cooperii*), Northern goshawk (*Accipiter gentilis*), broad-winged (*Buteo platypterus*), red-tailed (*Buteo jamaicensis*) and Swainson's (*Buteo swainsoni*), falcons including American

kestrel (*Falco sparverius*), merlin (*Falco columbarius*), gyrfalcon (*Falco rusticolus*), and peregrine. As well as owls in the Order Strigiformes including the great gray (*Strix nebulosa*), burrowing (*Athene cunicularia*), and short-eared owls (*Asio flammeus*) (Manitoba Avian Research Committee 2003).

Most raptors are active during daylight hours, except for owls, which are mainly active at night. Raptors play an important role in ecosystems and are valued by society in the following ways: for aesthetic purpose and are important to indigenous cultures (particularly eagles). Typical Fort Garry Campus landscapes utilized by raptors include woodlands, riparian forests, and open areas and agricultural fields located east of Campus. Of known breeding raptors, a pair of osprey nests nearby the football stadium and Cooper's Hawk may also do so (2019 conversation with K. Fraser; unreferenced). Red-tailed hawk (*Buteo jamaicensis*), turkey vulture, and bald eagle have been recorded during fall migration on the Fort Garry Campus (2019 conversation with M. Tohidifar; unreferenced). Peregrine falcons have also been released on Campus as part of the MPFRP (see Section 4.8.2).

Upland (game) birds fall under the Order Galliformes and there is potential for a few species to occur in the forested edges of Fort Garry Campus including gray partridge (*Perdix perdix*), wild turkey (*Meleagris gallopavo*) and ruffed (Bonasa umbellus) and sharp-tailed grouse (*Tympanuchus phasianellus*).

### ***Waterbirds***

Waterbirds occurring in Manitoba are entirely migrant as almost all water bodies are subject to freezing during winter, providing zero suitable habitats for them. Habitat for waterbirds is limited to the ponds at Smart Park and along the Red River riparian zone on the east border of the Campus where mudflats provide refuge and potential breeding habitat for gulls, terns, grebes and waterfowl. The prominent species include Canada goose, mallard (*Anas platyrhynchos*) (Photo 18), ring-billed gull (*Larus delawarensis*), and Franklin's gull (*Leucophaeus pipixcan*). Killdeers (*Charadrius vociferous*) are also known to nest opportunistically near wetlands where gravel or other rocky cobble exists (Photo 19).



**Photo 18: Adult Mallard and juveniles in a pond on Fort Garry Campus (Credit: Joro)**





**Photo 19: Juvenile Killdeer located in Smart Park on Fort Garry Campus (Credit: Joro)**

#### **4.6.1 Urban Management Challenges and Opportunities**

A few bird species including house sparrow, barn swallow (and eastern populations of purple martin) are heavily dependent on the built environment (Murgui and Hedblom 2017). Most songbirds are perching species and utilize trees and forests. Removal of large numbers of American Elm (*Ulmus americana*) due to Dutch Elm Disease (Scatliff et al. 2018) has likely resulted in reduced songbird habitat particularly on the Fort Garry Campus. In addition, the secondary and shrub canopy along the river has nearly been completely lost. This is likely due to frequent spring and summer flooding along the river, specifically between 1997 and 2011. Regardless of cause, a large fraction of nesting habitat has been lost along the river. Recovery appears to have been slowest in areas with relatively unbroken continuous canopy. Invasive species such as Canada thistle (*Cirsium arvense*) has also been observed to encroached into canopy openings which affects forest health and wildlife habitat (Scatliff et al. 2018).

A major conservation concern for birds residing within cities is mortality resulting from window strikes. Studies have been undertaken on the frequency and condition influencing the rate of window strikes. A study conducted in Philadelphia found window strikes affected more than 75 different species (Hounsell 2019). Methods of reducing window strikes in urban environments includes novel approaches such as demonstrated in the City of Milwaukee which boasts the world's first bird friendly arena. This structure features thin ceramic patterns (called fritting) in the window glass and downcast lighting (Hounsell 2019).

Studies also show that urban wildlife tend to be less shy to humans compared to birds and mammals occupying natural areas. As is the case with raptors, species such as peregrine falcon (nesting in Warsaw), Northern Goshawk (Nesting in Köln) and other raptors (Murgui and Hedblom 2017) provide opportunities to control fast growing populations of human/bird conflict species such as rock pigeon, European starling and to a lesser extent Canada



goose (via creating a landscape of fear). Similar measures have been utilized by managers of landfills and airports to deter the unwanted gathering of birds. Construction of artificial nesting platforms has also proven effective in attracting raptors in near urban areas.

Habitat protection and restoration of forested lands on the Fort Garry Campus is challenging due to several factors including ice scouring and flooding along the river bottom forest lands. Potential for further disease in trees could impact wildlife habitat in the future. Details regarding potential for habitat management and restoration are found in Scatliff et al. (2018).

## 4.6.2 Beneficial Practices

Habitat modification can include tree removal or enhancement through plantings and can benefit many species of birds. Maintaining natural landscapes will support habitat for birds including forested areas where understory habitat supports populations of invertebrates which is a fundamental source of food for songbirds (Murgui and Hedblom 2017).

BMPs for dealing with all bird species that potentially may occur in urban areas, particularly raptors, songbirds, should center around conservation practices and avoidance of accidental mortality (i.e. window strikes). Following human development, bird species may unintentionally find themselves trapped in urban areas. These environments have limited nesting habitat and pose hazards such as window strikes, vehicle strikes, and encounters with domestic animals.

Where window strikes cannot be avoided or the required engineering and building modification is not an option, exclusion or repellent techniques may be used to remove access to areas that may result in bird mortality. Netting, porcupine wire, bird-B-gone, wire, bird balls, noise, vehicles, pyrotechnics, and various chemical and tactile repellents have been studied in Canada for songbirds, raptors, and waterbirds with varying effectiveness (Transport Canada 2002). Studies in Washington and Arkansas tailored to waterbirds include fencing, predator decoys, and chemical taste repellents in their methods (Hadidian et al. 2007; Howard and Nelson 2018).

Population monitoring has been used to track bird populations in order to engage the public to help design and implement conservation plans in Arkansas (Howard and Nelson 2018) as well as to study the frequency and severity of bird/aircraft strikes throughout Canada (Transport Canada 2002). Examples of jurisdictions that implement public education methods are British Columbia, Arkansas, Washington, and federally throughout Canada and the United States. Public education includes signage and brochures for nesting sites, prohibiting feeding, attractant removal, and tolerance (Transport Canada 2002; Hadidian et al. 2007; Caskey and Chutter 2013; Howard and Nelson 2018).

Once population monitoring and public education measures have been put in place, appropriate steps towards conservation can be taken. In British Columbia, a call for improved urban development planning has been issued (Caskey and Chutter 2013), which recommends the following practices during urban development:

- Retain existing habitats and minimize loss of natural vegetation.
- Protect nest sites, roosting/perching sites, and foraging areas.
- Avoid disturbance, during and after development.
- Manage, restore, or enhance existing habitat.
- Avoid the use of pesticides and herbicides.

Migratory birds are federally protected within Canada. Migratory bird nests may not be destroyed or disturbed and guidelines to follow in order to avoid disturbing migratory birds are especially important when conducting activities that may incidentally harm birds (e.g. tree clearing, draining/flooding land, and using fishing gear). These guidelines include being aware of breeding, migration, and molting periods, and locations of nesting and feeding areas, weather conditions, and structure design (if it is a construction-related activity). Point counts and sweeps are recommended where active nest surveys are appropriate and should result in established buffer zones and set back distances for work (Government of Canada 2019). “Safe Dates” also provides a very good guide to minimize disturbance during reproduction season (Appendix E), especially for forestry treatments.

### **4.6.3 Management**

#### **4.6.3.1 Fort Garry Campus**

##### ***Songbirds***

Following approval from O&M, mitigation measures were incorporated in the fall of 2017 (coinciding with peak songbird migration) by the Avian Behaviour and Conservation Lab at the Fort Garry Campus to reduce risk to birds of window collisions with low-rise buildings on Campus and provide education and outreach to the Campus community on the issue. Measures involve temporarily placing aesthetic vinyl decals on the front doors and surrounding windows of the Wallace building and Biological Sciences buildings (6-8 windows specifically) during September to October 2017 to minimize songbird collisions and potential death (Photo 20). In addition, systematic subsample surveys of individual buildings on Campus were completed to determine where most birds were colliding with windows, the number of birds killed, and the species. The overall purpose of this ongoing program is to enable the research groups to identify any window songbird kill hotspots on Campus and to target long-term mitigative measures (i.e. permanent window treatments) to reduce future kills and enable UM to become a bird-friendly campus in Canada. This program is expected to be continued through the efforts of the university’s Avian Behaviour and Conservation Lab.



**Photo 20: Vinyl decal artwork applied to Wallace Building windows to reduce bird collisions at Fort Garry Campus (Credit: University of Manitoba)**

***Raptors & Upland Birds***

As described in Section 4.8.2, the Manitoba Peregrine Falcon Recovery Project (MPFRP) in cooperation with the UM, has been releasing rehabilitated Peregrine falcons on Fort Garry Campus and maintaining a nest box on the roof of the southwest corner of Mary Speechly Building to encourage peregrine nesting and assist with population recovery efforts since the early 1990s.

***General Bird Issues and Management***

The primary BMP for birds is to ensure any construction, clearing or renovations do not result in destruction of nests or mortality to birds. This is best accomplished by avoiding any tree clearing or major grounds work during the breeding and nesting window (generally May – August). If tree clearing or other grounds clearing is required, it will be necessary to conduct appropriate nest sweeps seven days in advance of any clearing or construction. Buildings should be inspected for nesting activity for all species identified in this report.

Other considerations include the following:

Habitat issues:

- Invasive species are the largest threat forest health due to their ability to outcompete native species and tendency to result in reduced biodiversity. Species of concern on Campus include:
  - Canada thistle, European buckthorn, leafy spurge, common burdock; and
  - Disease (Dutch elm disease).

Opportunities to address bird and habitat issues were identified by the UM faculty and include:

- Expand the Point Lands to connect terrace forest remnant and existing Point Lands riparian forest to provide more habitat and greater biological diversity.
- Establish forest erosion plantings in the Point Lands and Southwood Lands.
- Maintain contiguous forest to provide more valuable habitat to wildlife species.
- Provide public education and engagement with the Campus population.
- Establish forest habitat conservation areas and implement a monitoring and maintenance program to allow early identification of and response to invasive species, disease, and pests.
- Complete minimum monitoring of once per year.
- Use an aggressive approach towards weed control; the important maintenance activity.
- Expand habitat through reforestation plantings.

Vegetation:

- Limit clearing whenever possible.
- Protect trees from injury where possible.

Soils:

- Preserve and stockpile topsoil.
- Avoid erosion and revegetate erosion-prone sites.
- Schedule heavy equipment use and site clearing for winter months to minimize soil compaction.
- Do not operate equipment during wet conditions.
- Implement spill control measures.

#### **4.6.3.2 Bannatyne Campus**

As indicated previously in Section 4.3.3, O&M at Bannatyne Campus has implemented some control tactics for human/bird conflict species such as pigeons and crows. Sticky bird deterrents have been applied to windowsills in problem buildings on Campus to discourage pigeon roosting and netting has been installed over HACR vents to deter crows. Additionally, noise generators have been used as deterrents, a known raptor roosting location is protected/enhanced, and trees have been trimmed along Bannatyne Ave to reduce roosting locations.



### 4.6.3.3 Summary of Management

Currently being implemented:

- Continuation of bird window collision research and reducing window strike incidents by applying temporary vinyl decals on doors and windows.
- Cooperate with the MPFRP by releasing rehabilitated peregrine falcons on Fort Garry Campus and maintaining a nesting box.

Additional practices that could be utilized:

- Provide public education regarding sensitive periods for birds (nesting, migration, molting) and steps to take to avoid disturbance during these times
- Install windows with permanent fritting or refurbish existing windows with an equivalent.
- Establish downcast lighting to avoid window strikes.
- Where physical building modification cannot be made, make use of exclusion and repellent techniques (netting, bird spikes, chemical repellents) to keep birds away from potentially dangerous areas.
- Manage, restore, and enhance existing habitat for songbirds, raptors, and waterbirds of special concern.

## 4.7 Amphibians & Reptiles

Amphibians and reptiles play essential roles in resilient ecosystems, and the health of their populations is a good indicator of the health of the environment (Canadian Wildlife Federation 2019). Additionally, they are important to home gardeners to keep insect pest populations under control. Most are carnivores that consume rodents or insects; e.g. garter snakes are one of the major predators on slugs and one toad can eat well over 1,000 earwigs in a summer. Some species, like turtles, may also eat plant matter and return valuable nutrients to the environment.

Amphibian and reptile species can be found in the various aquatic or riparian habitats contained within the Fort Garry Campus (described in Section 1.1), with fifteen species listed to potentially occur. During separate auditory surveys conducted in June 2018 and May 2019, only three species of frog were heard calling: boreal chorus frog (*Pseudacris maculate*), wood frog (*Lithobates sylvaticus*), and spring peeper (*Pseudacris crucifer*) and species information for these three frogs is found below.

### ***Boreal Chorus Frog***

Boreal chorus frog is a small frog (3.5 cm long) and can vary in colouration (from light to rusty brown, gray to bright green, and dark patches and stripes in combinations of gray, green, or brown, with a light gray or cream-coloured underside). The species are found within grassy wooded areas near water and overwintering frozen on land. Breeding occurs between congregating adults within small ponds. Males call from mid-April to early June. Calls last approximately 1 second in a long series rising in pitch and sound which sound like a finger running up the teeth of a comb, repeated with 2 to 3 seconds of rest between series. Transformation of froglets laid in April concludes by late June or early July.

### ***Wood Frog***

Wood frog is a medium sized frog (5 cm long) and dark brown to light tan in colour, with a white belly and a darker brown patch at base of upper jaw to the eye. The species can be found within wetlands, moist grasslands, and forests, and overwintering frozen on land in forests or grasslands. Breeding occurs between congregating adults within nearly any small water body, with preference for ephemeral snow melt pools. Males call from mid-April to mid-May with mating usually completed by early May. Calls are high pitched, relatively soft, with low intensity, sounding almost duck like ca-ha-ha-ca, ca-ha-ha-ca, ca-ha-ha-ca at times in a rolling series. Transformation of froglets spans approximately 8 weeks, generally completing by late June.

### ***Spring Peeper***

Spring peeper is a small sized frog (3.5 cm long) and tan to light rusty brown in colouration featuring a darker cross shaped 'X' on its back. The species can be found within forested areas near wetlands and overwintering frozen on the on the forest floor. Breeding occurs within breeding ponds. Males call from early May to early June, predominantly in the evening. Calls are high pitched whistles or peeping sounds. Transformation of froglets laid in late May concludes by mid-July.

## **4.7.1 Urban Management Challenges and Opportunities**

In Manitoba there are 16 resident amphibian species; and of these, only 10 species are considered secure (Wild Species 2010). Habitat loss, alteration, and fragmentation are likely the leading causes of amphibian population decline. In the settled parts of Canada, 70 percent of wetlands have been drained, degraded, or otherwise destroyed (Ducks Unlimited Canada 2008). These wetlands previously served as crucial habitat for amphibian populations. The issue of habitat loss is further compounded by habitat fragmentation, resulting in a loss of genetic diversity and reducing species fitness. Additional pressures on amphibians exist within remaining wetlands located in agricultural or urban areas. These include reduced water quality directly attributed to pollutants, for which evidence exists showing greatly increased tadpole mortality and frog developmental deformities. Other factors that have had negative impacts on amphibian populations include disease, climate change, UV-B radiation, introduced species, and overexploitation (Government of Yukon 2013).

The rapid decline of amphibian and reptile populations in urban areas will continue as human populations and associated developments expand (Habitat Management Guidelines for Amphibians and Reptiles of the Midwestern United States 2017). However, applying BMPs across urban landscapes such as those identified below in Section 4.7.2 will promote conservation of these animals by helping to:

- Keep common species common.
- Guide the restoration of amphibian and reptile habitats while benefiting many other wildlife species.
- Reduce the likelihood that additional species will be added to endangered species lists.

## **4.7.2 Beneficial Practices**

Protection and maintenance of amphibian/reptile habitats in proximity to discrete water locations for egg-laying and tadpole development is crucial for the survival of amphibians and should be taken into consideration during land-use planning and environmental assessments (Government of Yukon 2013).

Limiting exposure to chemicals including pesticides, herbicides, and fertilizers that may leech into water containing known amphibian populations should be avoided whenever possible. The reliance of amphibians on both water

and land, along with their permeable skin, means that they are highly susceptible to chemical contamination. Fertilizer runoff can also lead to algal blooms in water bodies, which can hinder successful reproduction (Habitat Management Guidelines 2017). If the use of any of these products is absolutely necessary, steps can be taken to mitigate their effects on amphibians. Products should be selected carefully and assessed for the potential effects on aquatic environments and used during times when amphibians are least active (Habitat Management Guidelines 2017).

Establishment of buffer zones from mowing of vegetation to prevent injuries and mortality and to improve habitat and moisture levels is beneficial to amphibians. Vegetation can be cut in the late fall when amphibians/reptiles are inactive if needed. If mowing near these areas is absolutely necessary in the late spring and summer, limit mowing to sunny, hot days (>31°C) with a minimum blade height of 8 inches, and limit the size of the area being mowed whenever possible (Habitat Management Guidelines for Amphibians and Reptiles of the Midwestern United States 2017).

Public awareness is also considered a beneficial practice in promoting a “hands off” ethic as amphibians are highly sensitive to external pressures. An increase in public awareness can provide adequate protection of amphibians and amphibian habitat (Government of Yukon 2013).

### 4.7.3 Management

Following amphibian surveys on Campus in spring 2017 and 2018, three amphibian species were observed calling on the UM Fort Garry Campus. However, it is expected that several other species may have not been heard due to the variation in amphibian calling seasons and a full list of potential species is detailed in Appendix C: Table 3. Potential management options are provided below.

#### 4.7.3.1 Summary of Management

Although specific amphibian and reptile management is not conducted on the Fort Garry Campus, there are a number of recommendations that could be implemented.

- Protect and maintain existing habitat, particularly near ponds located at Smart Park.
- Zones of protection around ponds could be integrated with Canada goose habitat objectives such as no mowing or establishment of native vegetation.
- Avoid use of chemicals (pesticides, herbicides, fertilizers).
- Provide public education about the sensitivity of these species and encouraging a hands-off approach (flyers and signage).
- Implement ongoing population monitoring program through activities such as large-scale surveys (visual and auditory) and dip netting.

## 4.8 Species at Risk

Species at risk in Manitoba are protected provincially under MESEA (1990) and federally under SARA (2002) as described in Section 3.0. Additionally, it was described previously that migratory birds under the MBCA (1994), including their nests and eggs are protected; COSEWIC (2019) conducts periodic scientific based assessments of species to determine their conservation status which are utilized by provincial and federal agencies in their

respective species at risk listings; and Manitoba's species at risk are ranked by the MBCDC (2019) based on provincial, national, and international significance.

Evaluation of these information sources generated a list of 32 potential species at risk that could possibly be observed in urban areas and specifically on either UM Campus (primarily Fort Garry Campus; 28 species are birds, two are mammals, and two are amphibians and reptiles) (Appendix C: Tables 1-3). The legislation under which each species is listed, and whether a recovery strategy or management plan exists can be found in Appendix C: Tables 1-3. Active bird nest sites for species listed in Appendix C: Table 1 may occur on Fort Garry Campus during mid-April to late August. Mammals (bats species) listed in Appendix C: Table 2 may occur in forested areas on Fort Garry Campus during April to October. Amphibians and reptiles listed in Appendix C: Table 3 may occur on Fort Garry Campus in wetlands and riparian areas during spring (late April) to fall months (prior to air temperatures dropping below freezing).

Although 32 potential species at risk could be found in The City of Winnipeg, most of the species are unlikely to be observed. Seven species that have been reported on Campus or confirmed breeding in the City of Winnipeg (Artuso et al. 2019) include chimney swift, peregrine falcon, barn swallow, little brown (*Myotis lucifugus*)- and northern- (*Myotis septentrionalis*) myotis, northern leopard frog (*Lithobates pipiens*), and common snapping turtle (*Chelydra serpentina*) and are summarized below. Two other bird species at risk that may potentially occur on Campus during periods of migration but have not been confirmed breeding in the City of Winnipeg, include olive-sided flycatcher (*Contopus cooperi*) and Canada warbler (*Cardellina canadensis*) (Appendix C: Table 1).

### 4.8.1 Chimney Swift

Chimney swift is listed as *Threatened* in Canada under SARA and MESEA (Appendix C: Table 1) and a nesting pair has been identified on UM Fort Garry Campus for a number of years, but also has potential to occur on Bannatyne Campus. They breed with only one mate at a time and this first occurs at two years of age (COSEWIC 2018). Nests are made of small twigs in a half-saucer shape and held together with the bird's sticky saliva; four eggs are laid on average once per nesting season. Before the arrival of European settlers in North America, it is assumed that chimney swift mainly used large hollow trees for nesting and roosting. Due to increased logging, however, these trees became rare and the species adopted chimneys for both nesting and roosting. Chimney swifts are mainly associated with urban and rural areas where chimneys and similar structures are available, and where winged insects are abundant to eat. Winter habitat extends from riparian forest to farmland and suburban and central city areas.

Manitoba Agriculture and Resource Development notified UM in recent years that one Chimney swift was observed entering the chimney of Chancellor's Hall at Fort Garry Campus during the summer months and pattern of entry/exit suggested it was both a roosting and nesting site. Following this report, O&M advised staff of policy developed that Manitoba Agriculture and Resource Development would need to be consulted before any action is taken to cap or seal the chimney or any other future building work is to be completed at Chancellor's Hall.

COSEWIC's Status Report (2018) on chimney swift highlights the need for further monitoring of this species in order to better understand population trends. BMPs within the report include the use of artificial nesting towers (although it is noted that they have had limited success in Canada), avoiding chimney cleaning and capping during sensitive periods (i.e. from the beginning of breeding in April until fledglings leave the nest in August), and enlisting the help of local volunteers via stewardship agreements to protect well-known roosting sites. However, declining food source abundance may be more of a limiting factor on the chimney swift population than the loss of roosting



sites. Practices to maintain food abundance include avoiding the use of pesticides and maintaining insect-providing habitat, such as uncovered water sources where possible.

### 4.8.2 Peregrine Falcon

Peregrine falcon is listed as *Special Concern* in Canada under SARA and *Endangered* under MESEA (Appendix C: Table 1) and has nested previously on the UM Fort Garry Campus, with potential to occur in the tall-building infrastructure on Bannatyne Campus. The peregrine falcon has a flexible diet, but only breeds where there is access to enough food supplies and this typically occurs in the same location each year; breeding generally occurs at 2-3 years of age. Nest sites are primarily located on cliffs along large river systems, but urban habitats have become increasingly used by this species in southern Canada in recent decades, with buildings, bridges, and other structures being used. The proportion of individuals nesting on cliffs versus urban habitats varies substantially across Canada. Alternate nest sites, which are not used every year, are often located within a nesting territory. Wintering habitat for this species varies widely, but typically contains wetland areas, and increasingly, urban areas. Northern-nesting birds generally migrate the farthest, to Central and South America, while more southern-nesting birds may not migrate as far and some even overwinter on their nesting territories.

The MPFRP began as a recovery initiative in 1981 for the peregrine falcon, an endangered species under MESEA and special concern under SARA, in cooperation with Manitoba Sustainable Development (formerly Manitoba Conservation) (MPFRP 2019). The research team has been releasing captive-bred or rehabilitated birds, on city buildings or natural cliffs, primarily in Winnipeg, Portage La Prairie, Brandon and Gimli, helping to increase local breeding populations. Since the 1990s there have been active nesting sites in the City of Winnipeg and on the UM Fort Garry Campus in particular.

As mentioned in Section 4.3, rock pigeons are a favourite food source of the peregrine falcon, particularly for the urban-dwelling peregrines, and they make up 60% of their diet in Manitoba along with waterfowl, shorebirds, and songbirds (MPFRP 2019); peregrine recovery efforts therefore may be an indirect benefit for both UM Campuses by assisting with pigeon control. Since the early 2000's, the MPFRP in cooperation with the UM, has been releasing rehabilitated Peregrine falcons in the agricultural fields at the southeast end of Fort Garry Campus and along Kings Drive near the Red River. They have also been maintaining a nest box on the roof of the southwest corner of Mary Speechly Building since the early 1990s; the nest box, however, has not been occupied since they had a breeding pair for a few years in those early years.

COSEWIC's Status Report (2017) on peregrine falcon highlights the need for additional format nesting surveys, specifically in Manitoba. BMPs within the report include avoiding the use of toxic chemicals and heavy metals in areas where peregrine falcons roost or feed and providing suitable nest sites. Where nest sites are provided, it is recommended to have alternative nest site options along alternate ledges of the same building as reproduction productivity increases where alternate nesting sites are available. Only captively-bred birds, or those which have previously nested in artificial nest sites on buildings, will typically choose to return to an artificial nest in an urban setting.

### 4.8.3 Barn Swallow

Barn swallow is listed as *Threatened* in Canada under SARA and MESEA (Appendix C: Table 1) and has potential to occur on either UM Campus. Barn swallow feed almost entirely on the wing of flying insects (COSEWIC 2011). Following expansion of human populations since European settlement in North America, nesting habitat of this species has shifted from natural features (i.e. cliff faces, caves, holes, ledges, and crevices) to artificial sites (i.e.

overhangs, ledges, or vertical faces of open barns, garages, sheds, road culverts, bridges, and wharfs) It often nests solitarily but frequently in colonies; compiling cup-shaped nests made of mud pellets lined with grasses and feathers.

While the cause for sudden population declines are unclear, COSEWIC's Status Report (2011) on barn swallow highlights the need to conserve nesting and foraging habitat. BMPs within the Report include enlisting landowner support to preserve areas of nesting and foraging habitat, avoiding intentional destruction of nests, and preserving existing nests. Practices to maintain food abundance include avoiding the use of pesticides and maintaining insect-providing habitat, such as uncovered water sources and wetlands.

#### **4.8.4 Bats**

Two species of bats listed as *Endangered* in Canada under SARA and MESEA have the potential to occur on both UM Campuses (Appendix C: Table 2): little brown myotis/bat and Northern myotis/long eared bat, which overlap in habitat location (ECCC 2018). Little brown and northern myotis prefer to roost in older forest stands with tree snags during spring and summer, and females give birth and raise their young in separate or mixed maternity colonies comprised of large trees to roost. They congregate in swarming habitat in the late summer and early fall, and swarming sites may function as mating sites, stopover locations during migration, social sites for information transfer, and/or allow individuals to assess potential sites for overwintering. Following swarming, both species hibernate during the coldest months of winter (i.e. November to March) in hibernacula sites that are generally located in underground openings, including caves, abandoned mines, wells, and tunnels, but at some sites only specific sections will be used for hibernation. Further detail on each species is found below.

##### ***Little Brown Myotis***

Little brown myotis, also known as little brown bat, is a small brown bat (7-9 gm) with black ears, black wings, and a black tail membrane. Its wingspan is approximately 22-27 cm (ECCC 2018). Females tend to be slightly larger than males. Compared to other mammals, little brown myotis has a long lifespan; some individuals live more than 30 years. When acoustically recorded in treed or otherwise cluttered environments, little brown and northern myotis produce echolocation calls that are very similar and can be confused with other myotis species.

##### ***Northern Myotis***

Northern myotis, also known as Northern long-eared bat, is a small bat (5-8 gm) similar in size and colouration to little brown myotis, but is generally distinguishable by its longer ears that extend beyond the nose when pressed forward, longer tail, and larger wing area (ECCC 2018). It can also be distinguished by its distinct ear shape, which is long and thin with a pointed tip. Northern myotis has similar life history characteristics to little Brown myotis with longevity in the wild up to 18.5 years.

The SARA Recovery Strategy (ECCC 2018) for these two bat species highlights the need for monitoring and surveying bats to gain knowledge of population trends and to identify occurrences of White Nose Syndrome. BMPs within the Strategy include public education regarding the importance of maintaining bat habitat and the consequences of White Nose Syndrome, conserving and enhancing available habitat, reducing mortality (aside from those related to White Nose Syndrome) when able, and installing bat boxes with community participation to monitor occupancy.

If buildings are suspected to contain bats, surveys should be undertaken to determine whether roosting or maternal colonies are present (Mitchell-Jones 2004; Haliburton 2018; Craig 2019 in Appendix F). The methods

include: 1. building inspections during daylight hours to detect potential access sites; 2. evening emergence surveys; and 3. the identification of potential mitigation options to exclude bats.

1. Building Inspections (Daylight):

- a. Visual inspection of all buildings during daylight hours is necessary to identify potential access points including holes, cracks, openings, etc. Ladders and/or binoculars can be utilized depending on the configuration of the building being surveyed and accessed for inspection.
- b. The perimeter of all buildings should be inspected for bat droppings (i.e. guano) to assist in identifying potential bat access points.
- c. Entry points should be identified, where possible, through internal access by identifying points where light is entering the building.
- d. External examination of buildings should include the identification of staining, presence of guano on walls or on the ground or foundation of the building.
- e. The interior of each building should be inspected to identify potential roosting areas including any attics or possible habitats that can be identified such as soffits, roof overhangs, etc. where accessible.

2. Evening Emergence Surveys:

- a. Where bats are suspected, evening emergence surveys should be conducted to identify primary access and exit points, as well as to estimate approximate numbers of roosting/maternal bats if present.

3. Exclusion Measures and Reporting:

- a. Information on bats and exclusion techniques is widely available in many formats to assist property owners, governments, and industry in managing and protecting bats. The specific condition relative to bat access/habitat relates to building structure materials, microsite details, and the modifications associated with building. A preliminary listing of documents and publications related to bat exclusion and extraction measures and detection techniques is found in Appendix F.

## 4.8.5 Amphibians and Reptiles

Two amphibian and reptile species listed as species at risk that could potentially occur on UM Fort Garry Campus are common snapping turtle and northern leopard frog, and further detail on each is found below and in Appendix C: Table 3. The likelihood of encountering these species at Bannatyne Campus is low due to less suitable habitat present.

### ***Common snapping turtle***

Common snapping turtle (*Chelydra serpentina*) is listed under COSEWIC and SARA as *Special Concern*. This species is a large sized turtle approximately 50 cm in maximum shell length although can be twice as long in total length due to its protruding tail and head. It is dark brown in colouration with a shell serrated along the rear edge. The species can be found near permanent water bodies, and overwintering at the bottom of larger, permanent water bodies. Mating most commonly occurs in May and up to 80 eggs are laid within loose or sandy soil in June. Hatchlings emerge in September. Migration can occur between bodies of water prior to this period. The species

can be found basking along the edge of water bodies, although can be difficult to spot due to its rock-like appearance but can be lured with the use of carrion.

The SARA Management Plan (ECCC 2016) for snapping turtle lists habitat conservation as a key aspect to the preservation of this species, as it is especially susceptible to the effects of habitat loss. BMPs within the Strategy include public education for school groups and stakeholders, enlisting landowner involvement to help conserve existing habitat, and population monitoring through targeted surveys.

***Northern leopard frog***

Northern leopard frog (*Lithobates pipiens*) is listed under COSEWIC and SARA as *Special Concern*. This species is a large frog approximately 10 cm in maximum body length. It is green to khaki in colour, being overlaid with large dark spots, with a white belly. Northern leopard frog can be found at the edges of wetlands, moist grasslands, and forests, and overwintering at the bottom of permanent water bodies. Breeding occurs in small bodies of water, which may be ephemeral, with adults potentially migrating considerable distances from overwintering sites to breed. Males call between late April to mid-May with mating usually completed by mid-May. Calls are a drawn-out rattling snore lasting greater than three seconds, followed by soft grunts or chuckled notes, sounding like the rubbing of a wet balloon – repeated 3 or more times followed by interspersed grunting and chuckling sounds. Transformation of froglets spans approximately 10 weeks, generally completing by the end of July.

The SARA Management Plan (EC 2013) for northern leopard frog highlights the importance of identifying and conserving areas of key habitat. BMPs suggested for the conservation of habitat include the use of legal and administrative tools to regulate snapping turtle harvest and habitat degradation, public education and involvement for habitat conservation and population monitoring, stewardship agreements, and habitat restoration through various stakeholder groups. Road construction is an activity of special concern and planners must consider habitat needs when designing or upgrading roads. Designated crossing areas, additional signage, and reduced speeds can be implemented. Further research is needed to fully identify and understand all threats to populations of snapping turtles.

General recommendations for BMPs and management summaries that applies to amphibian/reptile species at risk at UM Fort Garry Campus is also detailed in Section 4.7.2.



## **5.0 SUSTAINABILITY AND CAMPUS ECOSYSTEMS**

The implementation of this WMP provides a framework for ensuring wildlife values are treated with the social and economic dynamics required in the operation and maintenance of the Fort Garry and Bannatyne Campuses in a non-invasive manner. A previous report outlining a biodiversity baseline study and assessment (Scatliff et al. 2018) provides additional context in the protection and management of trees and other ecosystems on the Fort Garry Campus, which are critical to wildlife that are either year-round residents, migrants, or incidental visitors. Management of wildlife habitat and human interactions will require integrating the management systems identified in this report of which, many are currently being successfully implemented.

Issues related to urban wildlife and human interactions are complex, and often controversial, and require unique and adaptive measures to ensure their co-existence. The O&M department has significant experience in successfully dealing with the challenges associated with wildlife related issues.

Canada goose management is likely the most challenging issue facing the UM now and in the future. To date, the measures implemented have evolved resulting in acceptable outcomes for the geese, staff, faculties, and students. Habitat manipulation and non-invasive exclusion techniques are currently providing the best option for the UM. Habitat alteration such as reducing nesting habitat for geese (Smart Park Ponds) and providing alternative resting and brood rearing areas (Southwood Lands) provide some options for shifting goose activity away from core campus areas. Habituation of geese to people and infrastructure is likely to evolve and will require ongoing monitoring and documentation of those techniques which are effective. The role of the UM Goose Awareness and Education Committee and the ongoing management activities being implemented by the O&M Department is critical to the ongoing success of goose management on the Fort Garry Campus.

## 6.0 RESEARCH AND COLLABORATION OPPORTUNITIES

Possible research study opportunities:

- UM is dedicated to the development of a university-wide approach that advances their commitment to Indigenous Engagement, promotes reconciliation and helps address anti-Indigenous racism. Opportunities for meaningful Indigenous engagement and input should be considered and play a role in future wildlife management and planning. Integration of Indigenous perspectives into wildlife management planning at the UM could serve as a precedent for other Universities to also consider this approach to their planning.
- Develop stronger partnerships for management that could be achieved through enhanced cooperation between the UM, the City of Winnipeg, the Province of Manitoba, the Federal Government, and possibly some additional Non-government Organizations (Ducks Unlimited, Nature Conservancy Canada, etc.). Cooperative management of university lands between these agencies would likely be more efficient as municipal, regulatory and special interest groups off-set some UM responsibilities and potentially financial commitments.
- Continue to build on partnerships and opportunities that O&M currently pursues with the various university academic units that focus on wildlife and habitats in their curricula. This could lead to further innovative approaches to linking Operations issues and concerns with potential academic solutions. The approach would build on the new Sustainable Development Goals set by the United Nations that the University has been embracing, as Goal 17 relates to 'Partnerships for Sustainability'. The Canadian University Sustainability Professionals and the Canadian Colleges and Universities Environmental Network are co-hosting a National Conference in May 2020 that is focused on the theme of Partnerships. Christie Nairn from the Office of Sustainability and Rick Baydack from the Canadian College and University Environmental Network are Co-Chairs and would welcome the team to organize a session at the Conference that speaks to this type of initiative. Development of this initiative could lead to the creation of a new network for university wildlife planners to share ideas and solutions for management issues.
- University Animal Care Committee and associated protocols were reviewed however considered not applicable for wildlife management. Animal care protocols would be applicable to new research.
- Additional research opportunities include:
  - Window strike assessment UM program continuation.
    - Expansion to Bannatyne Campus if applicable.
  - Canada geese (banding, nest counts, ongoing monitoring etc.)
  - Breeding bird surveys to validate ARU data.

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# **APPENDIX A: UNIVERSITY OF MANITOBA CANADA GOOSE MANAGEMENT PLAN**

## APPENDIX B: BIRDS OF WINNIPEG AND UNIVERSITY OF MANITOBA FORT GARRY CAMPUS

Appendix B Table 1: Breeding Birds of Winnipeg Area (Artuso et al. 2019) (C=Confirmed, P=Probable)

Species	Breeding Evidence
Canada Goose <i>Branta canadensis</i>	C
Wood Duck <i>Aix sponsa</i>	C
Gadwall <i>Mareca strepera</i>	P
American Wigeon <i>Mareca americana</i>	P
Mallard <i>Anas platyrhynchos</i>	C
Blue-winged Teal <i>Spatula discors</i>	C
Northern Shoveler <i>Spatula clypeata</i>	C
Green-winged Teal <i>Anas crecca</i>	P
Canvasback <i>Aythya valisineria</i>	C
Redhead <i>Aythya americana</i>	C
Ring-necked Duck <i>Aythya collaris</i>	P
Lesser Scaup <i>Aythya affinis</i>	C
Common Goldeneye <i>Bucephala clangula</i>	C
Hooded Merganser <i>Lophodytes cucullatus</i>	C
Ruddy Duck <i>Oxyura jamaicensis</i>	C
Gray Partridge <i>Perdix</i>	P
Ruffed Grouse <i>Bonasa umbellus</i>	P
Sharp-tailed Grouse <i>Tympanuchus phasianellus</i>	P
Wild Turkey <i>Meleagris gallopavo</i>	C
Common Loon <i>Gavia immer</i>	P
Pied-billed Grebe <i>Podilymbus podiceps</i>	C
Horned Grebe <i>Podiceps auritus</i>	P
Red-necked Grebe <i>Podiceps grisegena</i>	P
Eared Grebe <i>Podiceps nigricollis</i>	P
American Bittern <i>Botaurus lentiginosus</i>	P
Great Blue Heron <i>Ardea herodias</i>	P
Green Heron <i>Butorides virescens</i>	P
Turkey Vulture <i>Cathartes aura</i>	P
Osprey <i>Pandion haliaetus</i>	C
Mississippi Kite <i>Ictinia mississippiensis</i>	C
Bald Eagle <i>Haliaeetus leucocephalus</i>	C
Northern Harrier <i>Circus hudsonius</i>	C
Cooper's Hawk <i>Accipiter cooperii</i>	C
Broad-winged Hawk <i>Buteo platypterus</i>	C
Swainson's Hawk <i>Buteo swainsoni</i>	C



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Red-tailed Hawk <i>Buteo jamaicensis</i>	C
American Kestrel <i>Falco sparverius</i>	C
Merlin <i>Falco columbarius</i>	C
Peregrine Falcon <i>Falco peregrinus</i>	C
Yellow Rail <i>Coturnicops noveboracensis</i>	P
Virginia Rail <i>Rallus limicola</i>	C
Sora <i>Porzana carolina</i>	C
American Coot <i>Fulica americana</i>	C
Killdeer <i>Charadrius vociferus</i>	C
American Avocet <i>Recurvirostra americana</i>	P
Spotted Sandpiper <i>Actitis macularius</i>	C
Willet <i>Tringa semipalmata</i>	P
Upland Sandpiper <i>Bartramia longicauda</i>	P
Wilson's Snipe <i>Gallinago delicata</i>	C
Wilson's Phalarope <i>Phalaropus tricolor</i>	C
Forster's Tern <i>Sterna forsteri</i>	P
Rock Pigeon <i>Columba livia</i>	C
Mourning Dove <i>Zenaida macroura</i>	C
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i>	P
Eastern Screech-Owl <i>Megascops asio</i>	C
Great Horned Owl <i>Bubo virginianus</i>	C
Barred Owl <i>Strix varia</i>	P
Long-eared Owl <i>Asio otus</i>	C
Short-eared Owl <i>Asio flammeus</i>	C
Northern Saw-whet Owl <i>Aegolius acadicus</i>	P
Common Nighthawk <i>Chordeiles minor</i>	P
Chimney Swift <i>Chaetura pelagica</i>	C
Ruby-throated Hummingbird <i>Archilochus colubris</i>	P
Belted Kingfisher <i>Megaceryle alcyon</i>	C
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i>	P
Red-bellied Woodpecker <i>Melanerpes carolinus</i>	P
Yellow-bellied Sapsucker <i>Sphyrapicus varius</i>	C
Downy Woodpecker <i>Picoides pubescens</i>	C
Hairy Woodpecker <i>Picoides villosus</i>	C
Northern Flicker <i>Colaptes auratus</i>	C
Pileated Woodpecker <i>Dryocopus pileatus</i>	C
Eastern Wood-Pewee <i>Contopus virens</i>	P
Alder Flycatcher <i>Empidonax alnorum</i>	C
Least Flycatcher <i>Empidonax minimus</i>	C
Eastern Phoebe <i>Sayornis phoebe</i>	C
Great Crested Flycatcher <i>Myiarchus crinitus</i>	C
Western Kingbird <i>Tyrannus verticalis</i>	C
Eastern Kingbird <i>Tyrannus tyrannus</i>	C

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Yellow-throated Vireo <i>Vireo flavifrons</i>	C
Warbling Vireo <i>Vireo gilvus</i>	C
Philadelphia Vireo <i>Vireo philadelphicus</i>	C
Red-eyed Vireo <i>Vireo olivaceus</i>	C
Blue Jay <i>Cyanocitta cristata</i>	C
Black-billed Magpie <i>Pica hudsonia</i>	C
American Crow <i>Corvus brachyrhynchos</i>	C
Common Raven <i>Corvus corax</i>	C
Horned Lark <i>Eremophila alpestris</i>	C
Purple Martin <i>Progne subis</i>	C
Tree Swallow <i>Tachycineta bicolor</i>	C
Northern Rough-winged Swallow <i>Stelgidopteryx serripennis</i>	P
Bank Swallow <i>Riparia riparia</i>	C
Cliff Swallow <i>Petrochelidon pyrrhonota</i>	C
Barn Swallow <i>Hirundo rustica</i>	C
Black-capped Chickadee <i>Poecile atricapillus</i>	C
Red-breasted Nuthatch <i>Sitta canadensis</i>	C
White-breasted Nuthatch <i>Sitta carolinensis</i>	C
Carolina Wren <i>Thryothorus ludovicianus</i>	P
House Wren <i>Troglodytes aedon</i>	C
Sedge Wren <i>Cistothorus platensis</i>	C
Marsh Wren <i>Cistothorus palustris</i>	P
Ruby-crowned Kinglet <i>Regulus calendula</i>	C
Eastern Bluebird <i>Sialia sialis</i>	C
Swainson's Thrush <i>Catharus ustulatus</i>	P
American Robin <i>Turdus migratorius</i>	C
Gray Catbird <i>Dumetella carolinensis</i>	C
Brown Thrasher <i>Toxostoma rufum</i>	C
European Starling <i>Sturnus vulgaris</i>	C
Cedar Waxwing <i>Bombycilla cedrorum</i>	C
Tennessee Warbler <i>Oreothlypis peregrina</i>	P
Yellow Warbler <i>Setophaga petechia</i>	C
Chestnut-sided Warbler <i>Setophaga pensylvanica</i>	C
Yellow-rumped Warbler <i>Setophaga coronata</i>	P
Black-and-white Warbler <i>Mniotilta varia</i>	P
American Redstart <i>Setophaga ruticilla</i>	P
Ovenbird <i>Seiurus aurocapilla</i>	P
Common Yellowthroat <i>Geothlypis trichas</i>	C
Chipping Sparrow <i>Spizella passerina</i>	C
Clay-colored Sparrow <i>Spizella pallida</i>	C
Vesper Sparrow <i>Pooecetes gramineus</i>	P
Lark Sparrow <i>Chondestes grammacus</i>	C
Savannah Sparrow <i>Passerculus sandwichensis</i>	C

LeConte's Sparrow <i>Ammodramus leconteii</i>	P
Nelson's Sparrow <i>Ammodramus nelsoni</i>	P
Song Sparrow <i>Melospiza melodia</i>	C
Swamp Sparrow <i>Melospiza georgiana</i>	P
White-throated Sparrow <i>Zonotrichia albicollis</i>	C
Dark eyed Junco <i>Junco hyemalis</i>	P
Scarlet Tanager <i>Piranga olivacea</i>	P
Northern Cardinal <i>Cardinalis cardinalis</i>	C
Rose-breasted Grosbeak <i>Pheucticus ludovicianus</i>	P
Indigo Bunting <i>Passerina cyanea</i>	C
Dickcissel <i>Spiza americana</i>	P
Bobolink <i>Dolichonyx oryzivorus</i>	P
Red-winged Blackbird <i>Agelaius phoeniceus</i>	C
Western Meadowlark <i>Sturnella neglecta</i>	C
Yellow-headed Blackbird <i>Xanthocephalus xanthocephalus</i>	C
Brewer's Blackbird <i>Euphagus cyanocephalus</i>	C
Common Grackle <i>Quiscalus quiscula</i>	C
Brown-headed Cowbird <i>Molothrus ater</i>	C
Orchard Oriole <i>Icterus spurius</i>	C
Baltimore Oriole <i>Icterus galbula</i>	C
Purple Finch <i>Haemorhous purpureus</i>	P
House Finch <i>Haemorhous mexicanus</i>	C
Red Crossbill <i>Loxia curvirostra</i>	P
White-winged Crossbill <i>Loxia leucoptera</i>	P
Pine Siskin <i>Spinus pinus</i>	C
American Goldfinch <i>Spinus tristis</i>	C
House Sparrow <i>Passer domesticus</i>	C
<b>Confirmed Breeding Species</b>	<b>99</b>
<b>Probable Breeding Species</b>	<b>49</b>
<b>Total</b>	<b>148</b>

**Appendix A Table 2: Species diversity recorded at University of Manitoba Fort Garry Campus, June 2018  
(Autonomous Recording Units)**

<b>Species</b>	<b>SM 6</b>	<b>SM 9</b>	<b>SM 15</b>	<b>SM 18</b>	<b>SM 21</b>	<b>SM 23</b>
Canada Goose <i>Branta canadensis</i>	***	√	√	√	√	√
Ring-Billed Gull <i>Larus delawarensis</i>	***	***	√	***	***	***
Downy Woodpecker <i>Picoides pubescens</i>	√	***	√	***	√	***
Hairy Woodpecker <i>Picoides villosus</i>	√	***	√	***	√	√
Eastern Phoebe <i>Sayornis phoebe</i>	√	***	***	***	***	***
Great Crested Flycatcher <i>Myiarchus crinitus</i>	√	√	***	√	***	√
Red-eyed Vireo <i>Vireo olivaceus</i>	√	√	√	√	√	√
Blue Jay <i>Cyanocitta cristata</i>	√	√	***	***	***	***
American Crow <i>Corvus brachyrhynchos</i>	√	√	√	√	√	√
Barn Swallow <i>Hirundo rustica</i>	***	***	√	***	***	***
Black-capped Chickadee <i>Poecile atricapillus</i>	√	***	√	√	***	√
Brown Creeper <i>Certhia americana</i>	***	√	***	***	***	***
American Robin <i>Turdus migratorius</i>	√	√	***	√	***	***
Cedar Waxwing <i>Bombycilla cedrorum</i>	√	√	***	√	***	***
Yellow Warbler <i>Setophaga petechia</i>	√	√	√	√	√	***
Chestnut-sided Warbler <i>Setophaga pensylvanica</i>	***	***	***	***	√	***
Cape May Warbler <i>Setophaga tigrina</i>	***	***	√	***	***	***
Common Yellowthroat <i>Geothlypis trichas</i>	***	***	√	√	***	***
Chipping Sparrow <i>Spizella passerina</i>	√	√	***	√	√	√
Clay-colored Sparrow <i>Spizella pallida</i>	√	***	√	√	√	***
Savannah Sparrow <i>Passerculus sandwichensis</i>	√	√	√	√	√	***
Song Sparrow <i>Melospiza melodia</i>	√	√	√	√	√	***
Indigo Bunting <i>Passerina cyanea</i>	√	***	√	√	√	***
Red-winged Blackbird <i>Agelaius phoeniceus</i>	√	√	***	√	√	***
Brown-headed Cowbird <i>Molothrus ater</i>	***	√	***	***	***	***
American Goldfinch <i>Spinus tristis</i>	√	***	***	***	***	***
House Sparrow <i>Passer domesticus</i>	√	***	***	***	***	***
Unidentified hawk	***	√	***	***	***	***
Unidentified gull	***	***	***	***	√	***
<b>Number of species</b>	<b>19</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>14</b>	<b>7</b>



## APPENDIX C: UNIVERSITY OF MANITOBA POTENTIAL SPECIES AT RISK LISTING

Appendix C Table 1: Birds Species at Risk Listing

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA	Recovery Strategy or Management Plan? (Y/N)
Bank swallow	<i>Riparia riparia</i>	THR	THR	S5B	Not listed	N - COSEWIC Status Report (2013)
Barn swallow	<i>Hirundo rustica</i>	THR	THR	S4B	Not listed	N - COSEWIC Status Report (2011)
Bobolink	<i>Dolichonyx oryzivorus</i>	THR	THR	S4B	Not listed	N - COSEWIC Status Report (2010)
Buff-breasted sandpiper*	<i>Tryngites subruficollis</i>	SC	SC	Not listed	Not listed	N - COSEWIC Status Report (2012)
Burrowing owl*	<i>Athene cunicularia</i>	END	END	S1B	END	Y - Recovery Strategy (2012)
Canada warbler*	<i>Cardellina canadensis</i>	THR	THR	S3B	THR	Y - Recovery Strategy (2016)
Chimney swift	<i>Chaetura pelagica</i>	THR	THR	S2B	THR	N - COSEWIC Status Report (2018)
Common nighthawk	<i>Chordeiles minor</i>	THR	SC	S3B	THR	Y - Recovery Strategy (2016)
Eastern whip-poor-will*	<i>Antrostomus vociferus</i>	THR	THR	S3B	THR	Y - Recovery Strategy (2018)
Eastern wood-peewee	<i>Contopus virens</i>	SC	SC	S4B	Not listed	N - COSEWIC Status Report (2012)
Evening grosbeak	<i>Coccothraustes vespertinus</i>	No schedule, no status	SC	S3	Not listed	N - COSEWIC Status Report (2016)

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA	Recovery Strategy or Management Plan? (Y/N)
Golden-winged warbler	<i>Vermivora chrysoptera</i>	THR	THR	S3B	THR	Y - Recovery Strategy (2014)
Harris's sparrow*	<i>Zonotrichia querula</i>	No schedule, no status	SC	Not listed	Not listed	N - COSEWIC Status Report (2017)
Horned grebe, Western pop.	<i>Podiceps auritus</i>	SC	SC	S4B	Not listed	N - COSEWIC Status Report (2009)
Least bittern*	<i>Ixobrychus exilis</i>	THR	THR	S2B	END	Y - Recovery Strategy (2014)
Loggerhead shrike, migrans subsp.	<i>Lanius ludovicianus migrans</i>	THR	THR	S1B	END	Y - Recovery Strategy (2015)
Olive-sided flycatcher*	<i>Contopus cooperi</i>	THR	SC	S3B	THR	Y - Recovery Strategy (2016)
Peregrine falcon*, anatum/tundrius subsp.	<i>Falco peregrinus anatum/tundrius</i>	SC	NAR	S1B	END	N - COSEWIC Status Report (2017)
Piping Plover*, circumcinctus subsp.	<i>Charadrius melodus circumcinctus</i>	END	END	S1B	END	Y - Recovery Strategy (2006/2007)
Red knot*, rufa subsp.	<i>Calidris canutus rufa</i>	END	END	Not listed	END	Y - Recovery Strategy (2017)
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	THR	END	S3B	THR	Y - Recovery Strategy (2019)
Red-necked phalarope*	<i>Phalaropus lobatus</i>	No schedule, no status	SC	S4B SUM	Not listed	N - COSEWIC Status Report (2014)
Rusty blackbird*	<i>Euphagus carolinus</i>	SC	SC	S4B	Not listed	N - COSEWIC Status Report (2017)
Short-eared owl	<i>Asio flammeus</i>	SC	SC	S2S3B	THR	Y - Management Plan (2018)
Trumpeter swan	<i>Cygnus buccinator</i>	No schedule, no status	NAR	S1B	END	N - not applicable

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA	Recovery Strategy or Management Plan? (Y/N)
Western grebe*	<i>Aechmophorus occidentalis</i>	SC	SC	S4B	Not listed	N - COSEWIC Status Report (2014)
Whooping crane*	<i>Grus americana</i>	END	END	Not listed	END	Y - Recovery Strategy (2007)
Yellow rail	<i>Coturnicops noveboracensis</i>	SC	SC	S3B	Not listed	Y - Management Plan (2013)

\*Considered a potential migrant to the greater Winnipeg area; low likelihood of observation

Sources: Manitoba Avian Research Committee 2003; Artuso et al. 2019; COSEWIC 2019; iNaturalist 2019; MBCDC 2018; MESEA 2019; SARA 2019b.

Acronyms are defined as THR – Threatened, SC – Special Concern, END – Endangered; NAR – Not at Risk. See Appendix D for MBCDC Species Rankings Definitions (e.g. S1B).

**Appendix C Table 2: Mammal Species at Risk Listing**

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA	Recovery Strategy or Management Plan? (Y/N)
Little brown myotis	<i>Myotis lucifugus</i>	END	END	S2N,S5B	END	Y - Recovery Strategy for Little brown myotis, Northern myotis and Tri-colored bat (2018)
Northern myotis/long-eared bat	<i>Myotis septentrionalis</i>	END	END	S3S4N,S4B	END	Y - Recovery Strategy for Little brown myotis, Northern myotis and Tri-colored bat (2018)

Sources: Banfield 1974; COSEWIC 2019; iNaturalist 2019; MBCDC 2018; MESEA 2019; SARA 2019b.

Acronyms are defined as THR – Threatened, SC – Special Concern, END – Endangered; NAR – Not at Risk. See Appendix D for MBCDC Species Rankings Definitions (e.g. S1B).



**Appendix C Table 3: Amphibians & Reptiles Species at Risk Listing**

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA	Recovery Strategy or Management Plan? (Y/N)
Northern leopard frog, Western boreal/PrCampus airie pop.	<i>Lithobates pipiens</i>	SC	SC	S4	Not listed	Y - Management Plan (2013)
Snapping Turtle	<i>Chelydra serpentina</i>	SC	SC	S3	Not listed	Y - Management Plan (2016)

Sources: COSEWIC 2019; iNaturalist 2019; MBCDC 2018; MESEA 2019; SARA 2019b.

Acronyms are defined as THR – Threatened, SC – Special Concern, END – Endangered; NAR – Not at Risk. See Appendix D for MBCDC Species Rankings Definitions (e.g. S1B).

## APPENDIX D: MANITOBA CONSERVATION DATA CENTRE SPECIES RANKING DEFINITIONS

- S1 Critically Imperiled**— At very high risk of extirpation in Manitoba due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
- S2 Imperiled**— At high risk of extirpation in Manitoba due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
- S3 Vulnerable**— At moderate risk of extirpation in Manitoba due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
- S4 Apparently Secure**— At a fairly low risk of extirpation in Manitoba due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
- S5 Secure**— At very low or no risk of extirpation in Manitoba due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
- SX Presumed Extirpated**— Species or ecosystem is believed to be extirpated from Manitoba. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
- SH Possibly Extirpated**— Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in Manitoba, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in Manitoba..
- S# Range Rank**— A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than two ranks (e.g., SU is used rather than S1S4).
- SU Unrankable**— Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
- SNR Unranked**— Manitoba conservation status not yet assessed.
- SNA Not Applicable**— A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., long distance aerial and aquatic migrants, hybrids without conservation value, and non-native species or ecosystems).

## **APPENDIX E: BIRD NESTING DATES**

DRAFT

Manitoba Breeding Bird Atlas - Safe Dates

This document provides guidelines to help you determine whether a bird can be considered as a possible or probable breeder for the atlas. **Early br** is breeding is most likely to start in your region. **Last migr** provides the date until which you can still expect to see late spring migrants. Observations made before the end of the normal migration, and after the start of the normal breeding period, should only be reported if there is reasonable chance that the bird will breed there. **Late br** is the date at which late breeders can still actively be maintaining a breeding territory.

SPECIES	SOUTH (1 to 8)			CENTRAL (9 to 12)			NORTH (13 to 14)			COMMENTS
	Early br	Last mig	Late br	Early br	Last mig	Late br	Early br	Last mig	Late br	
Snow Goose							May-01	Jun-06	Aug-06	
Ross's Goose							May-01	Jun-06	Aug-06	
Cackling Goose							May-06	Jun-06	Aug-06	
Canada Goose	Mar-25	May-11	Aug-16	Apr-01	May-11	Aug-16	May-06	Jun-01	Aug-06	moult migration in June complicates picture
Trumpeter Swan	Apr-01	May-16	Sep-01	Apr-01	May-16	Sep-01				
Tundra Swan							May-25	Jun-06	Sep-01	
Wood Duck	Apr-10	May-01	Sep-16	Apr-06	May-06	Sep-16				<i>Ducks – in general, "last migration" is not a reliable concept because of long-distance molt migration by post-breeding males &amp; non-breeders</i>
Gadwall	Apr-16	May-16	Aug-06	Apr-16	May-16	Aug-06	?	?	?	No actual nests found in north, but undoubtedly breeds.
American Wigeon	Apr-16	May-16	Aug-06	Apr-16	May-16	Aug-06	Jun-06	Jun-11	Aug-01	
American Black Duck	Apr-11	May-16	Aug-11	Apr-11	May-16	Aug-11	Jun-06	Jun-11	Aug-01	Probably same as Mallard in north
Mallard	Apr-11	May-11	Sep-16	Apr-11	May-11	Sep-16	Jun-01	Jun-11	Aug-06	
Blue-winged Teal	Apr-16	May-16	Aug-16	Apr-16	May-16	Aug-16				
Northern Shoveler	Apr-16	May-16	Aug-06	Apr-16	May-16	Aug-06	Jun-01	Jun-11	Aug-06	
Northern Pintail	Apr-06	May-16	Aug-06	Apr-06	May-16	Aug-06	May-25	Jun-11	Sep-01	
Green-winged Teal	Apr-11	May-16	Aug-06	Apr-11	May-16	Aug-06	May-25	Jun-11	Aug-06	
Canvasback	Apr-25	May-21	Sep-06	Apr-25	May-21	Sep-06				
Redhead	Apr-25	May-21	Sep-06	Apr-25	May-21	Sep-06				
Ring-necked Duck	Apr-25	May-21	Sep-25	May-01	May-21	Sep-25				
Greater Scaup				May-25	Jun-01	Aug-01	Jun-01	Jun-11	Aug-06	
Lesser Scaup	Apr-25	May-21		Apr-25	May-21		Jun-01	Jun-11	Aug-06	
Common Eider							Jun-01	Jun-11	Aug-06	
Surf Scoter				May-21	?	Aug-06	Jun-01	?	Aug-06	Many molting or non-breeding scoters of all 3 sp. in Churchill River
White-winged Scoter				May-21	?	Aug-06	Jun-01	?	Aug-06	Many molting or non-breeding scoters of all 3 sp. in Churchill River
Long-tailed Duck							Jun-01	Jun-11	Aug-06	
Bufflehead	May-01	May-21	Aug-01	May-06	May-25	Aug-01	May-25	Jun-06	Aug-06	
Common Goldeneye	Apr-25	May-16	Aug-01	Apr-25	May-16	Aug-01	May-16	?	?	No nests found in Churchill area so far
Hooded Merganser	Apr-25	May-16	Aug-01	Apr-25	May-16	Aug-01	May-16	?	?	No nests found in Churchill area so far
Common Merganser	Apr-25	May-16	Aug-01	Apr-25	May-16	Aug-01	May-16	Jun-11	?	No nests found in Churchill area so far
Red-breasted Merganser				May-01	May-25	Aug-01	May-25	Jun-11	Aug-11	
Ruddy Duck	Apr-25	May-16	Oct-06	May-01	May-16	Oct-06				
Gray Partridge	Mar-21	N/A	Sep-01							
Ring-necked Pheasant	Apr-06	N/A	Sep-01							
Ruffed Grouse	Mar-16	N/A	Aug-01	Mar-25	N/A	Aug-06	Apr-01	N/A	Aug-16	remain in breeding areas in winter - sightings outside this period worth considering - will drum in fall
Spruce Grouse	Apr-11	N/A	Aug-01	Apr-16	N/A	Aug-01	May-25	N/A	Jul-25	remain in breeding areas in winter - sightings outside this period worth considering
Willow Ptarmigan				May-21	N/A	Aug-16	May-21	N/A	Aug-16	

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	Early br	Last mig	Late br	Early br	Last mig	Late br	Early br	Last mig	Late br	
Sharp-tailed Grouse	Mar-16	N/A	Sep-01	Mar-25	N/A	Sep-01				will dance even in late winter and fall
Wild Turkey	Mar-21	N/A	Aug-11							
Red-throated Loon							Jun-06	Jun-16	Aug-25	Migrants/failed breeders are present late June/July
Pacific Loon							Jun-01	Jun-16	Sep-01	
Common Loon	May-01	May-16	Sep-01	May-06	May-16	Sep-01	May-16	Jun-11	Sep-01	
Pied-billed Grebe	May-01	May-16	Sep-11	May-01	May-16	Sep-11				
Horned Grebe	May-06	May-21	Sep-11	May-06	May-21	Sep-11	May-25	Jun-06	Sep-01	
Red-necked Grebe	May-01	May-21	Sep-11	May-06	May-25	Sep-11				
Eared Grebe	May-06	May-21	Sep-06	May-11	May-21	Sep-06				
Western Grebe	May-01	May-21	Sep-11	May-06	May-21	Sep-11				
Clark's Grebe	May-01	May-21	Sep-11							
American White Pelican	Apr-11	May-25	Aug-25	Apr-25	Jun-11	Sep-06				
Double-crested Cormorant	Apr-16	May-25	Aug-25	Apr-25	Jun-11	Sep-06				
American Bittern	Apr-16	May-16	Aug-25	Apr-26	May-26	Aug-26	May-21	Jun-06	Aug-25	
Least Bittern	May-11	Jun-01	Aug-16							
Great Blue Heron	Apr-06	May-21	Aug-06	Apr-21	Jun-01	Aug-16				
Great Egret	May-01	May-21	Aug-11							
Cattle Egret	May-16	May-26	Aug-11	?	?	?				
Black-crowned Night-Heron	May-01	May-26	Jul-26							
White-faced Ibis	May-16	May-26	Aug-01							
Turkey Vulture	Apr-11	May-11	Sep-06	Apr-21	May-21	Sep-06				
Osprey	Apr-21	May-26	Aug-11	May-01	Jun-06	Aug-21	Jun-01	Jun-01	Aug-06	
Bald Eagle	Mar-21	Apr-21	Jul-16	Apr-06	May-06	Aug-01	Apr-11	May-11	Aug-06	
Northern Harrier	Apr-06	May-06	Aug-06	Apr-16	May-16	Aug-06	May-21	Jun-06	Aug-06	southern birds may reneest, hence later breeding possible than in north
Sharp-shinned Hawk	Apr-21	May-11	Jul-26	May-06	May-21	Aug-06				
Cooper's Hawk	Apr-21	May-11	Jul-26							
Northern Goshawk	Apr-11	Apr-11	Jul-26	Apr-26	Apr-21	Aug-01				
Broad-winged Hawk	May-01	May-11	Aug-06	May-11	May-21	Aug-21				
Swainson's Hawk	Apr-21	May-06	Aug-11	Apr-21	May-06	Aug-11				
Red-tailed Hawk	Apr-01	Apr-11	Aug-01				?	?	?	Needs safe dates in Central
Ferruginous Hawk	Mar-21	Apr-16	Jul-21							
Rough-legged Hawk							May-21	Jun-11	Aug-06	
American Kestrel	Mar-16	May-01	Aug-06	Mar-21	May-11	Aug-16	Jun-06	Jun-11	Aug-06	
Merlin	Apr-06	Apr-16	Jul-06	Apr-16	Apr-26	Jul-16	May-26	Jul-06	Aug-06	
Peregrine Falcon	Apr-06	May-26	Jul-06							
Yellow Rail	May-16	Jun-01	Aug-06	May-26	Jun-11	Aug-16	Jun-26	Jul-06	Aug-26	note will "sing" at stop-over sites
Virginia Rail	May-11	May-26	Aug-11	May-21	Jun-06	Aug-21				
Sora	May-06	May-21	Sep-06	May-16	Jun-01	Sep-01	Jun-01	Jun-11	Aug-25	note will "sing" at stop-over sites
American Coot	Apr-26	May-21	Jul-16	May-06	Jun-01	Jul-26				
Sandhill Crane	May-01	May-21	Aug-11	May-11	Jun-01	Aug-11	May-01	Jun-01	Aug-11	



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	Early br	Last mig	Late br	Early br	Last mig	Late br	Early br	Last mig	Late br	
Piping Plover	May-06	May-21	Jul-26	May-06	May-21	Aug-01				
Am. Golden-Plover							Jun-01	Jun-16	Aug-01	Fall migrants start arriving July p1
Semipalmated Plover							Jun-01	Jun-16	Aug-01	Fall migrants start arriving July p1
Killdeer	Apr-06	May-16	Aug-21	Apr-06	May-16	Aug-21	May-16	Jun-06	Aug-01	arrive end March BUT are these on territory? renesting efforts into August, at least in south
American Avocet	May-06	May-21	Aug-01							
Spotted Sandpiper	May-16	Jun-01	Jul-26	May-16	Jun-06	Aug-01	Jun-11	Jun-16	Aug-06	
Solitary Sandpiper	May-16	Jun-01	Jul-26	May-16	Jun-01	Aug-01	Jun-01	Jun-16	Aug-11	
Greater Yellowlegs	May-06	May-21	Jul-26	May-06	May-21	Aug-01	May-16	Jun-06	Aug-01	Fall migrants start arriving throughout by late June
Willet	May-06	May-21	Jul-26	May-06	May-21	Aug-01				
Lesser Yellowlegs	TBC	TBC	TBC	May-11	Jun-06	Aug-11	May-25	Jun-11	Aug-01	TBC = to be confirmed - some breeding in zone 8 and possibly north of zone 6
Upland Sandpiper	May-06	May-21	Jul-26							
Marbled Godwit	Apr-21	May-16	Jul-26	Apr-21	May-16	Aug-06				
Whimbrel							May-25	Jun-11	Aug-01	
Hudsonian Godwit							May-25	Jun-16	Aug-01	
Semipalmated Sandpiper							Jun-01	Jun-16	Aug-01	
Least Sandpiper				May-21	Jun-06	Aug-01	May-25	Jun-16	Aug-01	
Dunlin							May-25	Jun-11	Aug-01	
Stilt Sandpiper							May-25	Jun-16	Aug-01	
Short-billed Dowitcher				May-21	Jun-11	Aug-01	May-25	Jun-16	Aug-01	
Wilson's Snipe	Apr-06	May-11	Aug-01	Apr-11	May-16	Aug-11	May-25	Jun-06	Aug-11	
American Woodcock	Mar-25	Apr-25	Jul-25	Apr-01	Apr-25	Jul-25				
Wilson's Phalarope	May-06	May-25	Jul-26	May-11	May-25	Aug-01				
Red-necked Phalarope							Jun-01	Jun-16	Aug-01	
Bonaparte's Gull	May-06	May-21	Aug-11	May-06	May-21	Aug-11	Jun-01	Jun-16	Aug-11	Some non-breeders linger through summer south of breeding range
Little Gull							Jun-06	Jun-16	Aug-06	
Ross's Gull							Jun-01	Jun-11	Aug-06	
Franklin's Gull	Apr-25	May-11	Aug-06	May-01	May-11	Aug-06				
Mew Gull				?	?	?				
Ring-billed Gull	Apr-21	N/A	Aug-06	May-01	N/A	Aug-06	Jun-01	N/A	Aug-06	
California Gull	Apr-16	N/A	Aug-06	Apr-21	N/A	Aug-06				
Herring Gull	Apr-01	N/A	Aug-11	Apr-01	N/A	Aug-11	May-16	N/A	Aug-11	
Caspian Tern	May-21	Jun-01	Aug-11	May-21	Jun-01	Aug-11				
Black Tern	May-21	May-25	Aug-11	May-21	May-25	Aug-11				
Common Tern	May-21	Jun-01	Aug-11	May-21	Jun-01	Aug-11				
Arctic Tern							Jun-01	Jun-16	Aug-01	
Forster's Tern	May-11	May-21	Aug-25	May-11	May-21	Aug-21				
Parasitic Jaeger							May-25	Jun-16	Aug-06	
Rock Pigeon	N/A	N/A	N/A	N/A	N/A	N/A				May breed at any time of the year.

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	Early br	Last migr	Late br	Early br	Last migr	Late br	Early br	Last migr	Late br	
Eurasian Collared-Dove	?	?	?							
Mourning Dove	Apr-21	May-06	Sep-25	Apr-21	May-06	Sep-25				
Black-billed Cuckoo	May-16	Jun-06	Sep-01	May-21	Jun-06	Sep-01				
Eastern Screech-Owl	Mar-25	N/A	Jul-21							
Great Horned Owl	Jan-11	N/A	Aug-11	Feb-06	N/A	Aug-01	Mar-25	N/A	Aug-01	possible renesting after failed nests into August
Northern Hawk Owl	Feb-16	N/A	Jul-06	Mar-01	N/A	Jul-06	?	N/A	?	
Burrowing Owl	Apr-25	May-06	Aug-25							
Barred Owl	Mar-21	N/A	Jul-16	Apr-01	N/A	Jul-11				
Great Gray Owl	Feb-21	N/A	Jul-16	Mar-06	N/A	Jul-01	May-06	N/A	Jul-06	
Long-eared Owl	Mar-25	May-06	Jul-16	Apr-01	May-16	Jul-21	?	?	?	
Short-eared Owl	Apr-11	Apr-16	Jul-06	Apr-16	Apr-21	Jul-11	May-16	Jun-01	Jul-16	
Boreal Owl	Feb-11	N/A	Jul-01	Feb-16	N/A	Jul-01	Mar-01	N/A	Jul-11	
Northern Saw-whet Owl	Mar-11	Apr-16	Jul-01	Mar-16	Apr-21	Jul-01				
Common Nighthawk	Jun-01	Jun-11	Aug-01	Jun-06	Jun-11	Aug-01				
Whip-poor-will	May-25	Jun-06	Jul-16	Jun-01	Jun-11	Jul-16				
Chimney Swift	May-11	May-21	Aug-06							
Ruby-throated Hummingbird	May-21	Jun-01	Aug-25	May-21	Jun-06	Aug-25				
Belted Kingfisher	May-11	May-11	Jul-25	May-11	May-16	Jul-25	?	?	?	Early br may be too late but limited data
Red-headed Woodpecker	May-21	Jun-01	Jul-21							Family groups stay together to September but may move
Yellow-bellied Sapsucker	May-11	May-06	Jul-16	May-11	May-11	Jul-16				Much drumming during migration, potential for falso +ve
Downy Woodpecker	Apr-21	N/A	Jul-06	Apr-21	N/A	Jul-06				Possibly partial migrant
Hairy Woodpecker	Mar-21?	N/A	Jul-06		N/A	Jul-06	May-25	N/A	Jul-16	drum in winter, likely permanent residents; context? some movement in north
Am. Three-toed Woodpecker	Apr-01	Apr-011?	Jun-21	Apr-01		Jun-21	May-16	N/A	Jul-16	Probably fairly early nester & partial migrant
Black-backed Woodpecker	Apr-01?	Apr-011?	Jul-06	Apr-01		Jul-06	May-16	N/A	Jul-16	Possible partial migrant; little info on nest excavation
Northern Flicker	Apr-16	May-06	Jul-16	Apr-16	May-11	Jul-16	May-16	Jun-01	Jul-11	
Pileated Woodpecker	Mar-01	N/A?	Jul-11	Mar-01	N/A	Jul-11				Some winter wandering; territorial drumming in early Mar
Olive-sided Flycatcher	May-21	Jun-11	Jul-16	May-21	Jun-11	Jul-16				
Western Wood-Pewee	Jun-01	Jun-11	Aug-16							Worth flagging all records except perhaps in Riding-Duck-Porc
Eastern Wood-Pewee	May-25	Jun-11	Aug-25	May-25	Jun-11	Aug-25				Late nests seem frequent
Yellow-bellied Flycatcher	May-21	Jun-06	Jul-21	May-21	Jun-06	Jul-21	Jun-01	Jun-16	Jul-25	Very little info; chebunk call = territorial? Pur-wee more often on migration?
Alder Flycatcher	May-21	Jun-06	Aug-06	May-21	Jun-06	Aug-06	Jun-01	Jun-16	Aug-06	
Willow Flycatcher	Jun-01?	Jun-11?	Jul-21?							Occasional extralimital spring records but no obvious passage (as expected given limited MB range)
Least Flycatcher	May-21	Jun-01	Aug-16	May-21	Jun-01	Aug-16				Incessant chebecking probably territorial -- limited calling in migration
Eastern Phoebe	Apr-11	May-06	Aug-16	Apr-16	May-16	Aug-21				double brooded
Say's Phoebe	May-01	?	Jul-16							Some extralimital wandering in late spring & summer
Great Crested Flycatcher	May-16	Jun-06	Aug-01							

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Western Kingbird	May-21	Jun-06	Aug-06							
Eastern Kingbird	May-21	Jun-06	Aug-21	May-25	Jun-06	Aug-21				
Loggerhead Shrike	May-11	May-21?	Jul-25							Check with Ken
Northern Shrike				May-01	?	Jul-25	May-11	May-16	Jul-25	Limited data from Jehl & BoM; suggest similar period to LOSH in south
Yellow-throated Vireo	May-21	Jun-01	Jul-21							Some singing by overshooting migrants
Blue-headed Vireo	May-21	May-25	Jul-16	May-21	May-25	Jul-16				Frequent singing during migration, spring & fall
Warbling Vireo	May-21	Jun-01	Aug-01							
Philadelphia Vireo	May-21	Jun-06	Jul-11	May-25	Jun-06	Jul-16				
Red-eyed Vireo	May-21	Jun-06	Jul-25	May-25	Jun-06	Jul-25				Dependent young sometimes into September but no nestling dates after late July
Gray Jay	Feb-21	N/A	May-16	Mar-01	N/A	May-26	Apr-01	N/A	Jun-01	reputed to nest much earlier in north
Blue Jay	Apr-21	May-21	Aug-06	Apr-21	May-21	Aug-06				Conspicuous partial migrant; flocks sometimes well into May; inconspicuous when nesting
Black-billed Magpie	Feb-21	N/A	Jul-16	Mar-06	N/A	Jul-21				Some nest refurbishing in late winter; short-range migrant at forest edge, with occasional longer-range irruptions
American Crow	Apr-11	May-16	Jul-06	Apr-11	May-16	Jul-06	May-01?	Jun-01?	Jul-21	Some flocks into May in south -- migrants or non-breeders?
Common Raven	Mar-01	Apr-11	Jun-06	Mar-11	Apr-21?	Jun-16	Mar-16	May-01?	Jul-06	Conspicuous partial migrant
Horned Lark	Mar-11	May-06	Aug-16	Mar-16	May-06	Aug-16	Jun-01	Jun-01	Aug-06	Passage of northern breeders in south is uncertain
Purple Martin	May-01	May-16	Aug-06	May-01	May-16	Aug-06				Mainly scouting/courting in May?
Tree Swallow	Apr-21	May-16	Jul-16	Apr-21	May-16	Jul-16	Jun-01	Jun-01?	Jul-16	Mostly courting & prospecting, interspersed with cold-weather flocking, in May; single brooded but will re-nest
N. Rough-winged Swallow	May-01	May-16	Jul-11							
Bank Swallow	May-16	May-25	Aug-06	May-21	Jun-01	Aug-06	May-25	Jun-06	Aug-06	Colonies distinctive enough to document even when abandoned
Cliff Swallow	May-01	May-21	Sep-01	May-06	May-21	Sep-01	May-25	May-25	Sep-01	Colonies distinctive enough to document even when abandoned
Barn Swallow	May-16	May-21	Sep-25	May-16	May-21	Sep-25	May-25	Jun-06	?	Nests distinctive enough to document even when abandoned
Black-capped Chickadee	Apr-06	?	Jul-11	Apr-06	?	Jul-11				"Spring" song sometimes in dead of winter. Quiet while nesting; most easily detected when excavating
Boreal Chickadee	May-01?	N/A	Jun-25?	May-01	N/A	Jul-01	May-21?	N/A	Jul-11	Inconspicuous in breeding season as compared with most passerines
Red-breasted Nuthatch	Apr-11	May-16?	Jul-06	Apr-11	May-21	Jul-06	?	?	?	Migration difficult to pin down
White-breasted Nuthatch	Apr-11	N/A	Jul-06							Often appear to occupy territories as pairs year-round
Brown Creeper	Apr-16	May-16	Jul-11	Apr-21	May-16	Jul-11	?	?	?	Little breeding info, much guesswork!
House Wren	May-11	May-21	Aug-25	May-11	May-21	Aug-25				
Winter Wren	Apr-11	May-11	Jul-25	Apr-16	May-11	Jul-25				Territorial singing early Apr to late Jul
Sedge Wren	May-21	Jun-11	Aug-21	May-25	Jun-11	Aug-21				Spring arrival sometimes delayed or drawn-out



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Marsh Wren	May-21	Jun-01	Jul-25	May-21	Jun-01	Jul-25				With this & other wrens, frequent dummy nests = prob breeding?
Golden-crowned Kinglet	May-01	May-11	Jul-25	May-01	May-11	Aug-01				
Ruby-crowned Kinglet	Apr-25	May-21	Jul-25	May-01	May-25	Aug-01	May-25	Jun-06	Aug-01	
Eastern Bluebird	Apr-11	May-16	Aug-21	Apr-11	May-16	Aug-25				
Mountain Bluebird	Apr-01	May-06	Aug-21	Apr-01	May-06	Aug-25				
Veery	May-21	Jun-01	Jul-21	May-25	Jun-01	Aug-01				
Gray-checked Thrush				May-21	Jun-01	Aug-01	Jun-01	Jun-06	Aug-01	
Swainson's Thrush	May-16	Jun-01	Jul-21	May-21	Jun-01	Aug-01	Jun-01	Jun-06	Aug-01	
Hermit Thrush	Apr-25	May-11	Jul-21	May-01	May-11	Jul-25	May-21	Jun-06	Jul-25	some double brooding possible but not recorded in MB - would produce later breeding
American Robin	Mar-25	May-16	Sep-21	Apr-01	May-16	Sep-25	May-21	Jun-01	Sep-01	
Gray Catbird	May-16	Jun-01	Aug-21	May-16	Jun-01	Aug-21				
Brown Thrasher	May-01	May-21	Aug-11	May-01	May-21	Aug-11				
European Starling	Mar-21	?	Jul-21	Mar-21	?	Jul-21	May-01	?	Jul-21	
American Pipit							Jun-01	Jun-11	Aug-01	
Sprague's Pipit	Apr-21	May-11	Aug-25							
Bohemian Waxwing				?	N/A	?	Jun-01	N/A	Aug-06	
Cedar Waxwing	May-21	Jun-06	Sep-01	May-21	Jun-06	Sep-01				
Golden-winged Warbler	May-21	Jun-01	Aug-06							GWWA brood splits and one adult feeding young are recorded in early August; however, these may already have left the breeding territory will sing in migration
Tennessee Warbler	May-21	Jun-11	Jul-11	May-25	Jun-11	Jul-11	Jun-11	Jun-21	Jul-21	
Orange-crowned Warbler	May-11	May-21	Aug-01	May-16	May-21	Aug-01	May-25	Jun-06	Aug-01	
Nashville Warbler	May-11	May-25	Jul-11	May-16	May-25	Jul-11	May-25	?	?	
Northern Parula	May-16	May-25	Jul-09	May-21	May-25	Jul-25				
Yellow Warbler	May-11	Jun-01	Jul-09	May-11	Jun-01	Jul-25	May-25	Jun-06	Aug-01	
Chestnut-sided Warbler	May-16	Jun-01	Jul-09	May-21	Jun-01	Jul-25				
Magnolia Warbler	May-16	Jun-01	Jul-09	May-21	Jun-01	Jul-25	May-25	?	?	
Cape May Warbler	May-11	Jun-01	Jul-25	May-16	Jun-01	Jul-25	May-21	?	?	
Yellow-rumped Warbler	May-01	May-21	Jul-25	May-01	May-21	Jul-25	May-16	Jun-01	Aug-01	
Black-throated Green Warbler	May-16	Jun-01	Jul-25	May-21	Jun-01	Jul-25				
Blackburnian Warbler	May-16	Jun-01	Jul-25	May-21	Jun-01	Jul-25				
Pine Warbler	May-06	May-21	Jul-25							
Palm Warbler	May-06	May-21	Jul-25	May-06	May-21	Jul-25	May-21	Jun-01	Aug-01	
Bay-breasted Warbler	May-16	Jun-01	Jul-25	May-21	Jun-01	Jul-25	May-25	?	?	
Blackpoll Warbler				May-21	Jun-01	Jul-25	May-25	Jun-06	Aug-06	
Black-and-white Warbler	May-11	May-25	Jul-25	May-16	May-25	Jul-25	May-21	?	?	
American Redstart	May-16	Jun-06	Jul-25	May-21	Jun-06	Jul-25	May-21	?	?	
Ovenbird	May-11	May-25	Jul-25	May-16	May-25	Jul-25	May-21	?	?	
Northern Waterthrush	May-11	May-25	Jul-25	May-11	May-25	Jul-25	May-25	Jun-06	Aug-01	

Manitoba Breeding Bird Atlas - Safe Dates

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SPECIES	SOUTH (1 to 8)			CENTRAL (9 to 12)			NORTH (13 to 14)			COMMENTS
	Early br	Last migr	Late br	Early br	Last migr	Late br	Early br	Last migr	Late br	
Connecticut Warbler	May-21	Jun-06	Jul-25	May-21	Jun-06	Aug-01				
Mourning Warbler	May-21	Jun-06	Jul-16	May-21	Jun-06	Jul-16				
Common Yellowthroat	May-11	May-25	Jul-25	May-11	May-25	Jul-25	May-21	?	?	Nests with young found up to early July, but sings much later.
Wilson's Warbler	May-16	Jun-01	Jul-25	May-21	Jun-01	Jul-25	May-25	Jun-11	Aug-01	
Canada Warbler	May-16	Jun-01	Jul-25	May-21	Jun-01	Jul-25				
Scarlet Tanager	May-21	Jun-01	Jul-16							
Eastern Towhee	May-11	Jun-11	Jul-16							
American Tree Sparrow				?	?	?	May-25	Jun-16	Jul-16	
Chipping Sparrow	Apr-25	May-16	Sep-01	May-01	May-16	Sep-01	?	?	?	
Clay-colored Sparrow	May-01	May-16	Aug-11	May-01	May-21	Aug-11				
Vesper Sparrow	Apr-25	May-16	Aug-11	May-01	May-21	Aug-11				
Lark Sparrow	Apr-25	May-11	Aug-06							
Savannah Sparrow	Apr-16	May-16	Aug-21	Apr-21	May-16	Aug-21	May-25	Jun-16	Jul-25	
Grasshopper Sparrow	May-16	May-21	Aug-21							
Baird's Sparrow	May-11	May-21	Aug-25							
Le Conte's Sparrow	May-16	May-21	Aug-11	May-21	Jun-01	Jul-16				
Nelson's Sharp-tailed Sparrow	May-21	Jun-06	Aug-11	May-21	Jun-06	Jul-11	Jun-01	Jun-11	Jul-16	
Fox Sparrow				May-16	May-25	Jul-21	May-25	Jun-06	Jul-21	
Song Sparrow	Apr-11	May-16	Aug-21	Apr-16	May-16	Aug-21	May-25	Jun-06	Aug-16	
Lincoln's Sparrow	May-11	Jun-06	Aug-06	May-21	Jun-06	Aug-06	Jun-01	Jun-11	Jul-25	
Swamp Sparrow	May-01	May-21	Aug-06	May-01	May-21	Jul-25	Jun-01	Jun-11	Jul-25	
White-throated Sparrow	Apr-25	Jun-01	Jul-25	May-01	Jun-01	Jul-25	Jun-01	Jun-11	Jul-25	
Harris's Sparrow				May-21	Jun-06	Aug-01	May-25	Jun-11	Aug-01	
White-crowned Sparrow				May-21	Jun-06	Aug-01	May-25	Jun-11	Aug-01	
Dark-eyed Junco	Apr-25	May-11	Aug-16	May-01	May-16	Aug-16	May-21	May-21	Aug-01	
Lapland Longspur							May-25	Jun-16	Jul-21	
Smith's Longspur							Jun-01	Jun-16	Jul-25	
Chestnut-collared Longspur	Apr-21	May-06	Aug-01							
Rose-breasted Grosbeak	May-16	May-25	Jul-21	May-21	May-25	Jul-21				
Indigo Bunting	May-25	Jun-11	Aug-06	Jun-01	Jun-11	Aug-06				
Dickcissel	Jun-01	Jun-16	?							
Bobolink	May-16	May-21	Jul-21							
Red-winged Blackbird	Apr-11	May-21	Aug-06	Apr-16	May-21	Aug-06				
Western Meadowlark	Apr-06	Apr-16	Aug-11							
Yellow-headed Blackbird	Apr-25	May-16	Jul-06	May-01	May-16	Jul-06				
Rusty Blackbird	?	May-11	?	?	May-16	?	May-25	Jun-06	Jul-06	
Brewer's Blackbird	Apr-25	May-01	Jul-16	May-01	May-06	Jul-16				
Common Grackle	Apr-21	May-11	Jul-21	Apr-25	May-11	Jul-21				
Brown-headed Cowbird	May-06	May-16	Jul-16	May-11	May-16	Jul-16				
Orchard Oriole	May-25	Jun-06	Aug-06							



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SPECIES	SOUTH (1 to 8)			CENTRAL (9 to 12)			NORTH (13 to 14)			COMMENTS
	Early br	Last mig	Late br	Early br	Last mig	Late br	Early br	Last mig	Late br	
Baltimore Oriole	May-25	May-25	Aug-01							
Pine Grosbeak				?	N/A	?	Jun-01	N/A	Jul-25	
Purple Finch	May-01	May-11	Jul-16	May-01	May-16	Jul-16				
House Finch	May-11	N/A	Aug-11							
Red Crossbill	?	?	?	?	?	?				May breed at any time of year - emphasize difference between breeding incursions (spreading out & singing) and roaming flocks
White-winged Crossbill	?	?	?	?	?	?	?	?	?	May breed at any time of year - emphasize difference between breeding incursions (spreading out & singing) and roaming flocks
Common Redpoll				Apr-25	May-21	Sep-06	May-01	May-25	Sep-06	
Hoary Redpoll							May-25	Jun-01	Aug-06	
Pine Siskin	Apr-06	May-11	Jul-21	Apr-11	May-16	Jul-21				
American Goldfinch	May-25	May-25	Sep-16	Jun-01	Jun-01	Sep-16				
Evening Grosbeak	Jun-01	?	Jul-30	Jun-01	?	Jul-30				Very few data available
House Sparrow	Apr-16	N/A	Aug-06	Apr-16	N/A	Aug-06	?	N/A	?	

## APPENDIX F: BMPS FOR BATS REFERENCES

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