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BLUE JAY

Volume 69 Number 4 December 2011

Front cover: *Tracks leading to our next adventure? This issue is our last as Editors, and we would like to thank you for 3 great years. Vicky Kjoss and Chris Somers*

Back cover: *This was a nice find in a friend's yard south of Morse, SK. I was out looking for snow buntings, and at the end of our trip, I discovered this grey-crowned rosy finch* (Leucosticte tephrocotis) *in the yard. I have not seen one of these for about 10+ years.* *Lorelei Wilson*

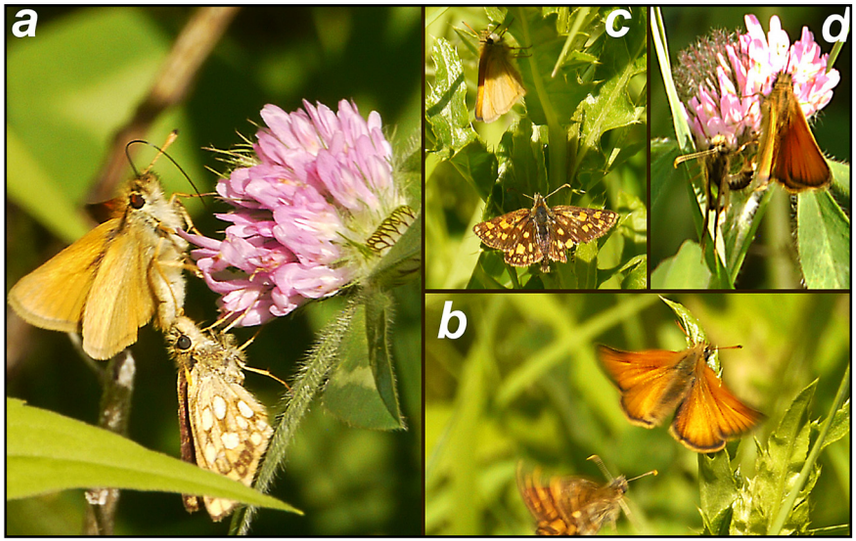
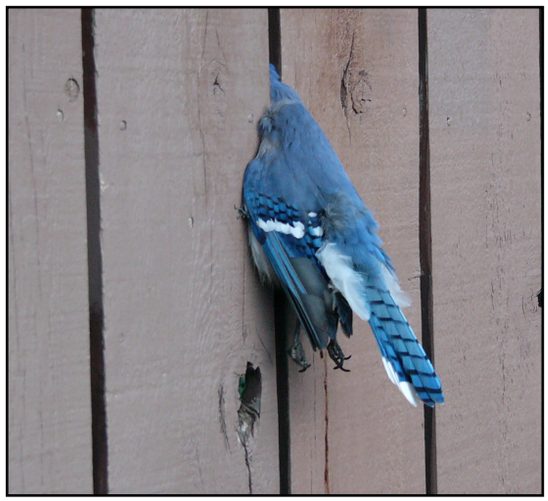


Figure 1. Courtship behaviour by Arctic skipper towards European skipper: (a) close approach to nectaring European skipper; (b) pursuit flight; (c) approach to perched European skipper; (d) attempted copulation. For more on skippers, see article by P. Taylor on p. 178.



The end of blue jay? Well... yes. Literally. This unfortunate individual was found caught between two fence boards, quite close to a bur oak in Trish Santo's yard in Saskatoon, SK. Trish surmises that the bird may have been feeding on the acorns and somehow lost its footing to be caught in the space between the boards. Ouch.

Trish Santo

Gray treefrog (Hyla versicolor), *photographed in 2007 in Onanole, Manitoba. For more on grey treefrogs and other amphibians, see article by K. Kingdon on p. 168.* *Katrien Kingdon*

Northern prairie skink (Eumeces septentrionalis). *See Photo Note by A. McMaster on p. 184.* *Allison Krause Danielsen*

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EDITORS' MESSAGE

The December 2011 issue of *Blue Jay* is our last as Editors. It is hard to believe that a three-year term has already come and gone! *Blue Jay* remains a well-regarded journal and archive of natural history information for the prairie provinces. The quality of submissions is high, and the publication continues to play a valuable role in disseminating natural history information that might otherwise be inaccessible. We are proud of the journal, and thankful to have had the opportunity to captain the ship. However, we certainly did not accomplish all of our goals as Editors during our tenure. We had visions of moving *Blue Jay* forward into the electronic age via an on-line edition linked to major search engines like Google Scholar. We were keen to start a new series within the journal, profiling local experts in natural history. Most of all, we wanted stronger liaisons with the University of Saskatchewan, University of Regina, and Saskatchewan Institute of Applied Science and Technology, so that students, our up and coming natural historians, would be regular contributors of articles on their research. There is also tremendous potential for federal and provincial government scientists to publish their research and monitoring projects in this journal. We continue to believe that these steps will enhance the visibility and quality of *Blue Jay*, and hope that the next Editors will consider them as part of their plan. As always, we urge all Nature Saskatchewan members and other naturalists to continue submitting their personal observations and research projects; *Blue Jay* remains one of the few places where hobbyists can still publish their work.

The above point about post-secondary students submitting their work to *Blue Jay* leads us to the major thrust of our out-going editorial: we need more young natural historians. Atrophy of scientific societies through ageing memberships is a huge concern; the amalgamation of several major ornithology societies and the creation of a new corresponding series of journals is a poignant example. Nature Saskatchewan and other such groups suffer as a result of these same demographic challenges, and we must be proactive if we want change. The problem is simple: not enough young people are joining our societies. The solution is not necessarily so simple – somehow we must inspire young people to join us in our professional and hobby pursuits. How can this be done? We are firm believers that a love of natural history is instilled early in life through outdoor activities during childhood. It is imperative during this period of unprecedented growth and urbanization across the prairie provinces that our children and grandchildren are not divorced entirely from the natural world around them. This problem is so pervasive in North America that Richard Louv coined the term "Nature Deficit Disorder" to describe it.[1] The real danger here is that our future generations will grow up with an urban view of the 'natural' world, leaving them with an inability to identify important environmental changes when they occur ('environmental generational amnesia'[2]).

Our hope is that if young people are engaged early, it will result in a lifetime of passion for the natural world. The children of today are the scientists, policy makers, and outdoor enthusiasts of the future. In fact, our principal reason for resigning from our position as Editors is that we wish to spend more time with our

boys (ages 4½ and 3), teaching them all we can about the natural world around us, in the hopes of sparking a lifelong interest. We are off to make sure that our children get this message loud and clear (Fig. 1). See you out there!

1. Louv R (2008) Last Child in the Woods: Saving our Children from Nature Deficit Disorder. Algonquin Books, Chapel Hill, NC.

2. Kahn PH Jr (1999) The Human Relationship with Nature: Development and Culture. The MIT Press, Cambridge, MA.

- Chris Somers & Vicky Kjoss (Editors), 3426 Clover Place, Regina, SK, S4V 1J1. E-mail:<kjoss@sasktel.net>

Figure 1. The Somers boys (and friend Connor Poulin, top left) aren't afraid to get their hands dirty while exploring the great outdoors.

NEW EDITORS

As of the March 2012 issue, the Editors of *Blue Jay* will be Kerry Hecker and Lowell Strauss. We are excited to pass the editorial reins into their capable hands and wish them all the best in their new role. The new contact information for *Blue Jay* submissions will be as follows:

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Tree swallow (Tachycineta bicolor) *with a freshly caught dragonfly.*
Lowell Strauss

BIRDS

LONG-DISTANCE NATAL DISPERSAL IN TREE SWALLOWS: RECAPTURES OF BIRDS WITH BRITISH COLUMBIA ORIGINS IN ALBERTA

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Documenting the movement of animals from either their natal or breeding site is important for understanding their population biology.[1] For most species of birds, the usual method for detecting dispersal events is to mark (band) individuals on a defined study area, and document recaptures and recoveries locally; long-distance movements can be detected through recoveries and recaptures reported to the banding programs of the Canadian Wildlife Service's Bird Banding Office and the U.S. Bird Banding Laboratory.[2] However, encountering previously banded birds is relatively rare. For example, between 1935 and 2002, of the 610,039 tree swallows (*Tachycineta bicolor*) banded in Canada and the United States, only 4162 (0.68%) were ever reported as recovered or recaptured.[2] In addition, the mean dispersal distances of tree swallows are relatively short, with an average distance of 8.38 km and 2.44 km for females and males, respectively.[3] Given the low probability of recovering or recapturing banded birds, and the fact that the vast majority of dispersal by tree swallows is well under 10 km,[2,3] documenting long-distance dispersal movements in tree swallows is quite rare. Here we describe several recaptures of tree swallows that dispersed long distances from their natal area.

In both 2010 and 2011, tree swallows banded in the interior of British Columbia were recovered in Alberta. In 2010, swallow no. 2221-27598, which was banded as a nestling by R.D.D. in 2007 west of Prince George, BC, was recovered by D.J.S. 21 km east of Didsbury, Alberta. This female bird moved 667 km SE of its banding location (see Fig. 1). In 2011, bird no. 2311-86804, which was banded as a nestling in 2008 by R.D.D. in the Dog Creek area of BC was recovered by Mike Risely on his nest box trail about 2.4 km S of DeWinton, AB. This female moved 586 km ESE, in a pattern similar to the movement of no. 2221-27598, described above (Fig. 1).

R.D.D. has studied tree swallows and mountain bluebirds (*Sialia currucoides*), among other species, in central BC since 2001 and in any given year bands between 1000 and 1500 individuals of these species. The main focus of his research program is to study various aspects of reproductive ecology of birds, including mate choice and parasitism.

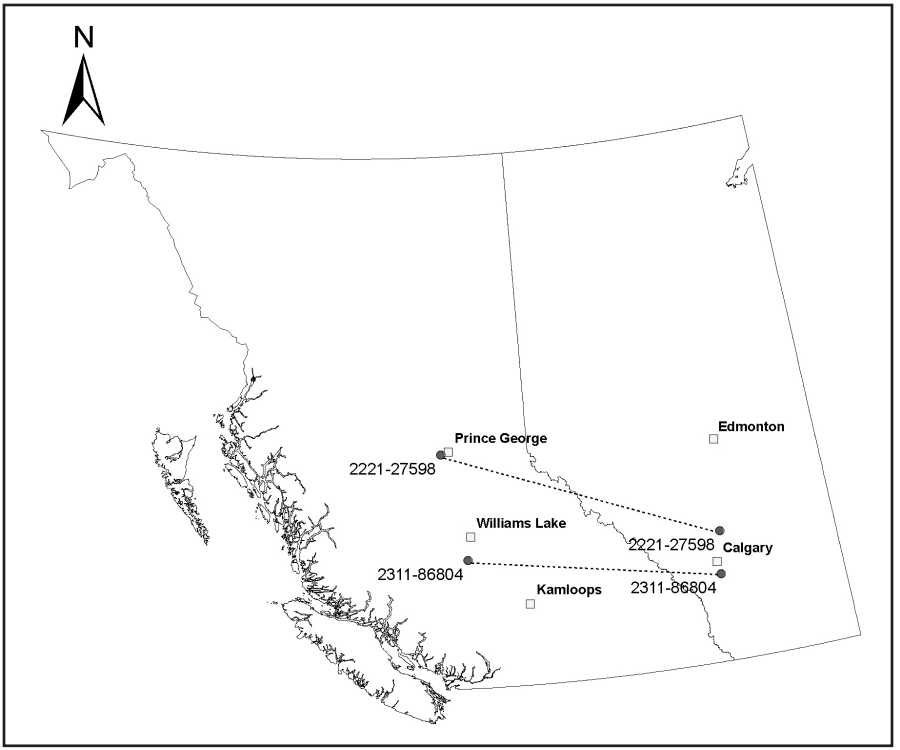

Figure 1. Banding locations of two tree swallows (band nos. 2221-27598 and 2311-86804) in British Columba, and their recapture locations in Alberta.

Tree swallows and mountain bluebirds are used as a study model mainly because they are relatively easy to work on, are accessible because of their use of nest boxes, and are so resilient to investigator disturbance.

The 2010 recovery was banded in a study area approximately 10 km west of Prince George, BC. That study area has 140 boxes on it, and is one of four areas in the vicinity of Prince George with active research on tree swallows. The 2011 recovery was banded in a study area near the community of Dog Creek, about 85 km SW of Williams Lake, BC. Unlike the Prince George study areas, which are in the Sub-Boreal Spruce and Pine-Spruce Biogeoclimatic Zones, the Dog Creek study area is along the Fraser River in the arid Interior Douglas-fir Bunchgrass Zone. This study area contains 190 paired boxes, and the main focus of the study is bluebirds. Generally, each pair of boxes has a pair of bluebirds, with tree swallows arriving later in the season and occupying the adjacent empty box.

D.J.S. and M. Risely are members of the Calgary Area Nestbox Monitors (also known as Calgary Area Bluebird Trail Monitors). This is a group of 58 teams who monitor nest box trails from Nanton south of Calgary to Olds and Sundre north of Calgary. In 2011, they monitored 4724 nest boxes, which fledged 13,911 tree swallows and 5053 mountain bluebirds in their first broods

and 261 bluebirds in second broods. Twenty-four of the monitors are also banders. In the period 2006 to 2010, they banded an average of 3546 tree swallows and 3262 mountain bluebirds per year. In 2011, they recaptured 217 tree swallows and 186 mountain bluebirds that they and others had previously banded.

Previous Recoveries

Over the past decade, one adult tree swallow banded in BC by R.D.D. has been recovered in Texas, and one nestling was subsequently captured breeding near a power plant in Ontario. Details follow:

Band no. 3121-31959: This bird was an adult male banded on 17 June 2003, 20 km SSE of Prince George, BC (53° 45' N, 122° 35' W). This was a breeding bird whose mate laid seven eggs (clutch initiation date 28 May 2003) and hatched six young (hatching date 16 June 2003). The pair successfully fledged five offspring. According to the "Report to Bander", this bird was shot on 26 October 2003, at Spring Lake, Texas (34° 13' N, 102° 1' W), by a resident of Lubbock.

Band no. 2221-27623: This bird hatched on 17 June 2006, 20 km SSE of Prince George, BC (53° 45' N, 122° 35' W). It was in a nest that had seven eggs, all of which hatched and successfully fledged. It was banded on 3 July 2006 when it was 16 days old. The bird was recaptured on 9 July 2009, near Nanticoke, ON (Ontario Power Generation Plant; 42° 48' N, 80° 04' W) by Linda Thrower of Dunnville, ON. The bird was recovered alive and had three nestlings. It had dispersed approximately 3325 km from its natal nest in BC. Thrower and her husband operate 100 nestboxes at the Ontario Power Generation Plant on the North Shore of Lake Erie, as part of the plant's environmental program. Thrower reported that this female has not subsequently been recaptured on her study area.

Previous recoveries of tree swallows banded by D.J.S. in Alberta and Mary Houston in Saskatchewan have previously been reported,[4,5] and are summarized as follows:

Four (two AB, two SK) recovered in Louisiana.

Two AB birds wintered in California (or south of there) – both were captured at a National Wildlife Refuge in northeastern California on spring migration; one was banded there and later recaptured in AB, while the second had previously been banded in AB and was recaptured in California.

Two AB birds recovered on migration in South Dakota and Nebraska.

One SK bird recovered in Michigan.

One AB bird recovered in east Texas

Discussion

Butler (1988)[6] examined migration routes of tree swallows in North America and concluded that birds breeding in the prairie provinces and American midwest tend to migrate southeast and follow the Mississippi drainage to the Gulf coast, with some birds being recovered along the Atlantic coast (see also Brewer et al. 2000[7]). Tree swallows breeding along the eastern slopes of the Rocky Mountains are thought to migrate due south to Mexico,[6] and Brewer et al. (2000)[7] hypothesized that birds west of the Rockies would follow a similar pattern. In contrast, tree swallows in eastern Canada migrate primarily southwest along the Atlantic coast, mainly to Florida.[6] Birds in Ontario seem to be intermediate, with some

birds moving southeast to the Atlantic coast while others take a more south or southwestern direction to the Gulf coast.[7]

The recoveries that we report here, as well as those previously reported,[4,5] suggest that the migration routes of tree swallows may be more variable than previously thought. Both the 2010 and the 2011 recoveries in Alberta were of tree swallows banded as young in BC and recaptured at 3 years old. Assuming they migrated successfully twice and returned, and on the third return stopped in Alberta at distances of 667 km SE and 586 km ESE of their original banding location, both birds at some point crossed the Rocky Mountains. Similarly, while most of the recoveries reported previously[4,5] support the idea that prairie birds follow the Mississippi drainage south, the two Alberta birds recovered in California also suggest that this is not always the case.

The maximum movement of a tree swallow for any encounter type was reported as 3611 km, with a bird banded as a nestling in 1973 near Barrhead, AB, being recovered in Burgess, SC, in October of the same year, presumably on its wintering area.[7] In terms of dispersal from natal sites to future breeding sites, the maximum distance was reported as 2367 km, with a bird banded in 1991 as a nestling in Washington State being recovered in Michigan the following year.[2] The recapture in Ontario of the tree swallow banded by R.D.D. in BC, with a dispersal distance of approximately 3325 km, therefore represents one of the longest, if not the longest, known distance dispersed by a tree swallow between its natal and breeding locations. A previous study also reported that there are only 13 records of tree swallows dispersing more than 500 km.[2] The two BC birds recaptured in Alberta by D.J.S. and M. Risely both exceed 500 km, and so are also relatively unusual in terms of the long distance that they had moved. Regardless, we know little about the factors that determine dispersal distances, or migration routes, even in species such as tree swallows that are well studied; future research and continued banding of these birds will serve to shed additional insight on these issues.

Acknowledgments

We wish to thank all the individuals that have helped with monitoring nest boxes and banding birds over the years, and Theo Mlynowski for making the map. R.D.D.'s work is funded by the Natural Sciences and Engineering Research Council of Canada and the University of Northern British Columbia.

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2. Hosner PA, Winkler DW (2007) Dispersal distances of tree swallows estimated from continent-wide and limited-area data. *Journal of Field Ornithology* 78:290-297.

3. Winkler DW, Wrege PH, Allen PE, Kast TL, Senesac P, Wasson MF, Sullivan PJ (2005) The natal dispersal of tree swallows in a continuous mainland environment. *Journal of Animal Ecology* 74:1080-1090.

4. Stiles DJ, Houston MI (2003) More United States tree swallow recoveries. *Blue Jay* 61:201-203.

5. Stiles DJ (2008) An Alberta banded tree swallow recovered in East Texas. *Blue Jay* 66:52.

6. Butler RW (1988) Population dynamics and migration routes of tree swallows, *Tachycineta bicolor*, in North America. *Journal of Field Ornithology* 59:395-402.

7. Brewer AD, Diamond AW, Woodsworth EJ, Collins BT, Dunn EH (2000) The Atlas of Canadian Bird Banding, 1921-95. Volume 1: Doves, cuckoos and hummingbirds through Passerines. Canadian Wildlife Service Special Publication, Ottawa, ON.

BIRDS ASSOCIATED WITH AMERICAN ELM FORESTS IN NORTHEASTERN SASKATCHEWAN

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Introduction

The American elm (*Ulmus americana*) forms a distinct forest ecosystem along rivers and valleys at the northeastern limit of its range on the Canadian prairies. Never widespread on the prairie landscape, these native elm forests are disappearing rapidly as a result of Dutch elm disease. The disease, caused by the fungus *Ophiostoma ulmi* and transmitted by a native bark beetle, was introduced to North America in the 1930s, and first appeared in Saskatchewan in the 1980s.[1] Despite efforts to control it, the disease front continues to move westwards and threatens both natural and urban elm forests in Saskatchewan and Alberta.

Nature Saskatchewan administers a nature reserve in elm forest obtained from Alex Rendek in 1989*. The Rendek Elm Forest Sanctuary is located about 14 km northeast of the city of Hudson Bay on the banks of the Red Deer River. Tragically, the area was hit by Dutch elm disease beginning around 2001, and today most of the mature wild elms in the region are dead. Harms and Baker (1998)[2] conducted a bioinventory of vascular plants on the site, but there has been no systematic inventory of birds in the elm forests of northeastern Saskatchewan. With the knowledge that the disease front was advancing towards Saskatchewan, in 1998 we established 30 point-count stations in riparian forests dominated by American elm along the Red Deer River, near the border of Saskatchewan and Manitoba. Our goal was to quantify the densities of bird species in elm forests prior to disease, in order to obtain a benchmark that could be compared to potential changes to bird communities in subsequent decades after the infection.

Methods

We placed 10 of the 30 stations within the 15-ha Rendek Elm Forest Nature Reserve operated by Nature Saskatchewan (52° 54' N, 102° 01' W). Eight stations were located on a river oxbow peninsula about 2.5 km to the east of Rendek on a plot named "Tongue" encompassing about 18 ha, and the remaining 12 stations were on another 18-ha oxbow peninsula about 20 km farther east downstream called "Fort". On each of the three sites, stations were a minimum of 100 m apart and spaced on linear transects. At this latitude, elms grow mainly along bottomlands and floodplains, while upslope forests are mixed-wood boreal and dominated by white spruce (*Picea glauca*), black spruce (*P. mariana*), jack pine (*Pinus contorta*), and trembling aspen (*Populus tremuloides*). Briefly, the canopy is dominated by the elm, with Manitoba maple (*Acer negundo*) the second most common tree. The shrub layer is dominated by choke-cherry (*Prunus virginiana*), red-osier dogwood (*Cornus stolonifera*), high-bush cranberry (*Viburnum trilobum*), and red elderberry

(*Sambucus racemosa*). The dominant plant of the forb layer is the ostrich fern (*Matteuccia struthiopteris*).[2]

One observer (K.L.W.) quantified vegetation structure surrounding the point count stations. The species and diameter at breast height (DBH, ca. 1.4 m above ground level) of each tree or standing snag was recorded within a 12-m radius of the station. A tree was defined as having a DBH > 12 cm, and it was classified into decay classes ranging from 1 (completely healthy) to 5 (decayed, broken stub).[3] The number of deadfalls (logs) that were >12 cm diameter was also recorded. At the shrub layer (between 2 and 5 m tall), the percent coverage of the main species in the 12-m radius plot was estimated visually, i.e., percent pin cherry, elder, maple, and elm saplings. At the forb layer, the percent coverage of all forb species combined was recorded, as well as the coverage by the dominant species, the ostrich fern.

Corresponding bird surveys were conducted during three years (1999–2001) prior to disease. Point counts were done in a 50-m fixed-radius plot following standard recommended protocols for such surveys.[4,5] Each station was surveyed three times during the season to encompass the peak singing times of different bird species in the community: end of May, end of June, and third week of July. The same observer (S.S.) conducted the first two rounds of bird counts while K.L.W. did the late July surveys. All birds were censused between 06:00 and 10:00 h on days it was not raining. All species seen or heard during a 5- to 7-min count period were recorded, and their positions and movements were noted on a sheet of paper to avoid double-counting individuals. After an initial 5 min, tape-recorded calls of four woodpeckers were played in sequence (hairy, downy, and pileated woodpeckers and yellow-bellied sapsucker) at alternate stations, and the observer waited an additional 2 min to record any new individuals.

Only observations within the 50-m radius (0.785 ha) were used to calculate bird densities on the plots, ignoring individuals soaring or flying above the plot.[6] For a given breeding season, we used the highest count of individuals of each species in the plot as an index of abundance of the species at that point.[7, 8] The three annual estimates of bird density collected during the three sampling years were then averaged for an estimate of bird abundances for each point count station. We also kept a list of birds seen near the perimeter of the plots, or flying overhead, and report them without abundances.

Results and Discussion

The three study plots did not differ in densities of mature American elm trees, which averaged about 150 trees/ha (Table 1). However, there were more Manitoba maple, trembling aspen, and cottonwood (*Populus balsamifera*) trees in the canopies of the Rendek and Tongue sites compared to the Fort site, so the total density of trees on the former two sites was higher than at the Fort. The average size (and hence probable age) of the elms was greatest on the Fort site, whereas the Tongue site had the greatest number of standing snags compared to the other areas. There was no difference in the amount of deadfall on the ground among the three study plots.

The understory (shrub layer) was significantly denser at the Rendek site compared to the others, and because the shrubs may have shaded the plants below them on the forest floor, there was a negative relationship between the amount of shrub cover and the forb cover on the plots. The Fort site had the sparsest shrub layer, but 91% of the ground was covered by forbs, mainly the dominant ostrich fern. In general, the Fort site was characterized by the largest elms, a canopy most

Table 1. Vegetation structure and composition within three forest sites dominated by American elm *Ulmus americana.* The three study sites are located along the Red Deer River in northeastern Saskatchewan. Vegetation was measured in 1999, prior to infection of the elms by Dutch elm disease. Means and standard deviations of the variables are shown, with sample sizes indicating the number of 0.785-ha plots at each site. Statistics are the *F*- and p-values of an analysis of variance testing for differences across the three sites. Significant differences are assumed for p ≤ 0.05. DBH: diameter at breast height (ca. 1.4 m above ground level).

Variable	Site			*F* (p)
	Rendek (n = 10)	Tongue (n = 8)	Fort (n = 12)	
Live elm density (no./ha)	133 ± 106	166 ± 122	166 ± 130	0.25 (0.78)
Total tree density (no./ha)	280 ± 58	342 ± 145	268 ± 88	4.02 (0.03)
Mean elm DBH (cm)	41 ± 16	33.4 ± 9.3	50 ± 17	3.2 (0.05)
Snag density (no./ha)	16 ± 21	33 ± 21	11 + 18	3.2 (0.05)
Deadfall density (no./ha)	46 ± 35	47 ± 40	55 ± 50	0.14 (0.86)
% shrub cover	66 ± 29	26 ± 19	22 ± 11	14.0 (0.001)
% total forb cover	50 ± 33	76 ± 13	91 ± 14	9.61 (0.001)
% fern cover	43 ± 34	73 ± 13	90 ± 14	12.6 (0.001)

dominated by the elms, and few shrubs but a luxuriant mat of ferns. Rendek had the densest shrub layer, whereas Tongue had a shrub and forb layer intermediate in density between the other two sites.

A total of 72 bird species was seen on or from the three sites (Table 2). Of these, 49 species were tabulated within the point-count circles and could be considered associated with, and probably breeding in, the elm forest. In general, the red-eyed vireo (see Table 2 for scientific names) was the most common bird, ranking first or second in abundance at all three sites (Table 3). Other species that were abundant across all sites were the American redstart, white-throated sparrow, rose-breasted grosbeak, mourning warbler, and ovenbird. Whereas least flycatchers were common at the Rendek and Tongue sites, they were much rarer at the Fort. However, the latter site had the greatest diversity of warblers, including abundant black-throated green and blackburnian (Table 3), and it was the only site with winter wrens, which also occurred in high densities. Black-throated green warblers prefer "middle-aged and mature" forests,[9] and winter wrens also prefer mature forests with large trees and many snags and fallen logs,[10] so the Fort site may have been especially attractive

because of the larger and older trees there. Alternatively, the greater diversity of species at the Fort may have occurred because it was surrounded by more unbroken forest compared to the other sites which were bounded on one side by farmland.

To our knowledge, all the species recorded on our surveys were within previously documented ranges. However, our data are the first to provide estimates of breeding densities of birds in a healthy, native elm forest on the northern prairies. It is our hope that these data will be a valuable historical benchmark as the structure and composition of the elm forest is likely to undergo dramatic changes in the coming years as a consequence of Dutch elm disease.

Table 2. Densities (no. individuals/ha) of birds observed within point count plots in three elm forest sites in Saskatchewan. For each point count station, an average density was calculated based on three years of observations (1999–2001), and then point count stations were averaged within each site. Birds observed from the site (e.g. flying overhead), or at the perimeter of the sites, but not within the count plots are shown without calculated densities. Species are arranged in taxonomic order.

Common name	Latin name	Site name		
		Rendek	Tongue	Fort
American white pelican	*Pelecanus erythrorhynchos*			July
Double-crested cormorant	*Phalacrocorax auritus*			June
Great blue heron	*Ardea herodius*			June
Canada goose	*Branta canadensis*		June	June
Wood duck	*Aix sponsa*	June		
Mallard	*Anas platyrhynchos*	June	July	June
Common goldeneye	*Bucephala clangula*	June	June	June/July
Common merganser	*Mergus merganser*			June
American kestrel	*Falco sparverius*	May		
Broad-winged hawk	*Buteo platypterus*	0	0.053	0
Red-tailed hawk	*Buteo jamaicensis*	July	May, June	
Ruffed grouse	*Bonasa umbellus*	0.29	0.22	0
Sandhill crane	*Grus canadensis*			June
Killdeer	*Charadrius vociferus*			June
Spotted sandpiper	*Actitis macularia*		May	
Common tern	*Sterna hirundo*		June	
Barred owl	*Strix varia*	June		
Common nighthawk	*Chordeiles minor*	June		July
Ruby-throated hummingbird	*Archilochus colubris*	0.063	0	0

Table 2, continued

Belted kingfisher	*Ceryle alcyon*	May/June	June	
Yellow-bellied sapsucker	*Sphyrapicus varius*	0.13	0.05	0.17
Downy woodpecker	*Picoides pubescens*	0.22	0.22	0.32
Hairy woodpecker	*Picoides villosus*	0.29	0	0.27
Northern flicker	*Colaptes cafer*	0.04	0.11	0.22
Pileated woodpecker	*Dryocopus pileatus*	0.17	0.10	0.10
Olive-sided flycatcher	*Contopus cooperi*	June		
Alder flycatcher	*Empidonax alnorum*	0.09	0.05	0.05
Least flycatcher	*Empidonax minimus*	1.31	1.64	0.17
Eastern phoebe	*Sayornis phoebe*	0.04	0	0.05
Great crested flycatcher	*Myiarchus crinitus*	0	0.05	0.10
Bank swallow	*Riparia riparia*	June	June	June
Barn swallow	*Hirundo rustica*	July		
Gray jay	*Perisoreus canadensis*		June	
Blue jay	*Cyanocitta cristata*	0.06	0.08	0.05
American crow	*Corvus brachyrhynchos*	0.13	0.10	0.06
Common raven	*Corvus corax*	0.12	0.11	0.20
Black-billed magpie	*Pica hudsonia*	0.06	0	0
Black-capped chickadee	*Poecile atricapilla*	0.09	0.22	0.05
Red-breasted nuthatch	*Sitta canadensis*	0.09	0	0.05
White-breasted nuthatch	*Sitta carolinensis*	0.55	0.32	0.37
Winter wren	*Troglodytes troglodytes*	0	0	1.01
Veery	*Catharus fuscescens*	0.73	1.22	0.05
Swainson's thrush	*Catharus ustulatus*	0.93	0.22	0.59
American robin	*Turdus migratorius*	0.64	0.54	0
Cedar waxwing	*Bombycilla cedrorum*	0.22	0.22	0.10
Philadelphia vireo	*Vireo philadelphicus*	0.09	0.22	0.22
Red-eyed vireo	*Vireo olivaceus*	1.82	1.86	1.54
Tennessee warbler	*Vermivora peregrina*	0	0.11	0
Yellow warbler	*Dendroica petechia*	0.80	0.64	0
Chestnut-sided warbler	*Dendroica pensylvanica*	0.04	0.22	0.74
Yellow-rumped warbler	*Dendroica coronata*	0	0.05	0
Black-throated green warbler	*Dendroica virens*	0	0	1.44

Table 2, continued

Blackburnian warbler	*Dendroica fusca*	0	0	1.06
Black-and-white warbler	*Mniotilta varia*	0.09	0	0.48
American redstart	*Setophaga ruticilla*	2.42	1.81	0.69
Ovenbird	*Seiurus aurocapillus*	0.89	0.85	0.85
Northern waterthrush	*Seiurus noveboracensis*	0.55	0.59	0.1
Mourning warbler	*Oporornis philadelphia*	0.68	0.69	1.27
Connecticut warbler	*Oporornis agilis*	0	0	0.035
Common yellowthroat	*Geothlypis trichas*	0	0.26	0.05
Wilson's warbler	*Wilsonia pusilla*	0	0	0.05
Canada warbler	*Wilsonia canadensis*	0	0.17	0.22
Rose-breasted grosbeak	*Pheucticus ludovicianus*	0.85	1.64	0.59
Clay-colored sparrow	*Spizella palida*	May		
Chipping sparrow	*Spizella passerina*	0.09	0.10	0
Song sparrow	*Melospiza melodia*	0.38	0.48	0.37
White-throated sparrow	*Zonotrichia albicollis*	1.61	0.69	1.54
White-crowned sparrow	*Zonotrichia leucophrys*		May	
Brown-headed cowbird	*Molothrus ater*	0.13	0.17	0

Table 3. Relative abundances of bird species on three study plots in elm forest of northeastern Saskatchewan. The ten most abundant species on each plot are listed with their density (no./ha) in parentheses, starting with the most abundant. See Table 2 for scientific names.

Rank	Site		
	Rendek	Tongue	Fort
1	American redstart (2.42)	Red-eyed vireo (1.86)	Red-eyed vireo (1.54)
2	Red-eyed vireo (1.82)	American redstart (1.81)	White-throated sparrow (1.54)
3	White-throated sparrow (1.61)	Least flycatcher (1.64)	Black-throated green warbler (1.44)
4	Least flycatcher (1.31)	Rose-breasted grosbeak (1.64)	Mourning warbler (1.27)
5	Swainson's thrush (0.93)	Veery (1.22)	Blackburnian warbler (1.06)
6	Ovenbird (0.89)	Ovenbird (0.85)	Winter wren (1.01)
7	Rose-breasted grosbeak (0.85)	Mourning warbler (0.69)	Ovenbird (0.85)
8	Yellow warbler (0.80)	White-throated sparrow (0.69)	American redstart (0.69)
9	Veery (0.73)	American goldfinch (0.69)	Swainson's thrush (0.59)
10	Mourning warbler (0.68)	Yellow warbler (0.64)	Rose-breasted grosbeak (0.59)

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***EDITORS' NOTE: For more on Alexander Rendek and the Rendek Elm Forest, see: Peschken D (2009) In memoriam: Alexander Rendek (1932–2009).** *Blue Jay* **67:123-124.**

You must teach your children that the ground beneath their feet is the ashes of your grandfathers. So that they will respect the land, tell your children that the earth is rich with the lives of our kin. Teach your children what we have taught our children, that the earth is our mother. Whatever befalls the earth befalls the sons of the earth. If men spit upon the ground, they spit upon themselves.

- Unknown

AMPHIBIANS

RE-EVALUATION OF RELATIVE ABUNDANCE OF FIVE FROG AND TOAD SPECIES IN RIDING MOUNTAIN NATIONAL PARK, MANITOBA

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Introduction

My personal observations have suggested that there may have been several changes in the frog and toad populations and their distribution within Riding Mountain National Park (RMNP), MB. A 1974 checklist identified the following species as occurring in RMNP: Canadian toad (*Anaxyrus hemiophrys*), gray treefrog (*Hyla versicolor*), boreal chorus frog (*Pseudacris maculata*), wood frog (*Lithobates sylvaticus*), and northern leopard frog (*Lithobates pipiens*).[1] According to the Canadian Amphibian and Reptile Conservation Network (CARCNET), this is the generally expected distribution of frogs and toads for the region.[2] However, significant worldwide changes in amphibian populations have been noted for at least 35 years, and regionally, the northern leopard frog has declined in large areas of its original range in North America.[3,4]

The objective of this study was to compare changes in abundance of frog and toad species in RMNP to two previous estimates of relative abundance made in 1974 and 1987.[1,5] Due to large perceived changes in northern leopard frog and gray treefrog populations, special emphasis was placed on changes in these two species. On the other hand, no special measures were made to assess the Canadian toad, as it was believed to be extirpated at least 20 years before the current study. A brief comparison to changes in amphibian populations in other areas around RMNP was also made.

Materials and Methods

Historic information on frog relative densities was gleaned from the RMNP library. To assess current relative abundance of frogs inside RMNP, visual and calling surveys were carried out in a manner set out by Kendell,[4] and the result compared with historic information.[1,5] The survey period was from April to October 2010, which encompassed breeding/reproduction periods, metamorphosis, and movement of frogs to their wintering sites in the fall. Surveys were conducted at different times of day to permit detection during both visual surveys and calling surveys.

Visual Surveys: Two different types of visual surveys were conducted. First, seven permanent routes were established (Fig. 1) to survey areas where leopard frogs had previously been detected in the last 15 years.[6,7] Each of the seven permanent routes was surveyed at least five times, with three of the most accessible routes surveyed nine times. Second, 30 trails/routes were also

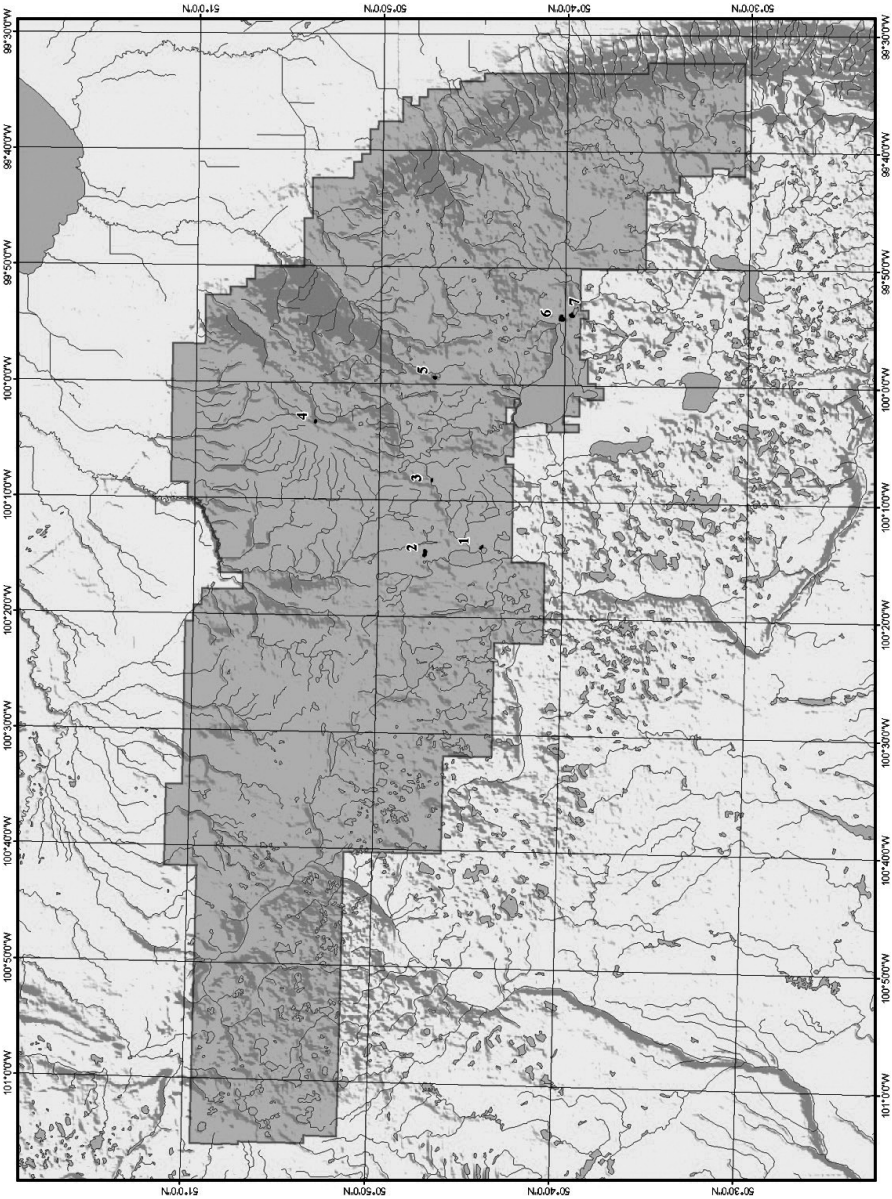

Figure 1. Location of seven permanent survey routes in Riding Mountain National Park, MB.

surveyed opportunistically during the daytime in July, August, and September using the same method.

Surveyors moved slowly around the perimeter of each pond (in the case of permanent routes) or along trails (in the case of opportunistic routes) searching approximately 1 m to each side or in front for frogs visible without moving debris. Both the pond edge and upland areas were surveyed. All egg masses, tadpoles, young-of-the-year, and adults observed were recorded on datasheets. To increase the ability to spot frogs, visual surveys were conducted during the warmest period of the day, usually after noon, when amphibian activity was expected to be greatest.[4] Travel speed was adjusted slightly depending on the terrain so that surveyors were confident that all amphibians in sight were observed. The date, start time, end time, air temperature, transect length, and pond location were recorded for each survey. The survey transect length was calculated by recording the route on a hand-held GPS unit (Garmin 60 Cx). The UTM coordinates were recorded for each pond/route.

Call Surveys: 2010 nocturnal call surveys were also conducted as outlined by Kendell.[4] On each of the permanent routes, an estimate of the abundance of each calling species heard was recorded during a 3-min survey period. The abundance of calling frogs was estimated using four calling codes: no males calling was coded as "0," individual males calling with no overlap were coded as "1," individual males calling with some overlap of calls were coded as "2," and a full chorus, with no discernable individual calls, was coded as "3." The surveys were conducted at least a half hour after sunset and ended before midnight. The call surveys were conducted at several different times during the spring to correspond with expected calling periods of wood frog (April, early May); boreal chorus frog, leopard frog, and Canadian toad (May); and gray treefrog (June). It is recognized that species' calling periods overlap, but the survey was designed to ensure maximum potential to record presence of all five expected species. Call rates were also recorded at other times of the day, and also along opportunistic survey routes where applicable.

Results

Historic Information: The review of the historic information provided a baseline of relative abundance of frog and toad species. While much of the information on how the lists were developed was missing, the definitions used to establish densities were useful, and these definitions were also used to compare the 2010 results to previous surveys. Results of research into historic abundance are presented in Table 1, as a tabular comparison of a previous checklist (1974) and survey (1987).[1,5]

2010 Relative Abundance Surveys: The average length of the permanent surveys was 1.16 km, and the surveyor's average survey speed was 2.06 km/h, while the average length of the opportunistic surveys was 5.77 km and the average survey speed was 4.89 km/h. Wood frogs, boreal chorus frogs, and gray treefrogs were detected at least once on all seven permanent routes, while northern leopard frogs were found on three of the routes, and Canadian toads on 0 routes (Table 2). Gray treefrogs were detected on nearly one-third of the surveys, providing evidence of a large increase in the range and population of this species within RMNP.

Visual sightings of metamorphosed individuals including young-of-the-year, sub-adults, or adults of wood frogs and northern leopard frogs were compared for the seven permanent routes (Table

Table 1. Results of frog and toad abundance from 1974, 1987, and 2010, with (a) a comparison of 2010 survey results to previous 1974 checklist/1987 survey, and (b) newly developed abundance definitions.

(a) Comparison of survey results

Species	1974 abundance[a]	2010 results using 1974 definitions	1987 abundance[b]	2010 results using 1987 definitions	2010 results using new definitions[c]
Canadian toad	Common	?	Rare	?	Extirpated
Gray treefrog	Rare	Common	Uncommon	Common	Common
Boreal chorus frog	Abundant	Abundant	Common	Common	Abundant
Wood frog	Common	Abundant	Common	Common	Abundant
Northern leopard frog	Abundant	Uncommon	Common	Uncommon	Uncommon

(b) Definitions of frog and toad abundance

Term	[a]1974 definition	[b]1987 definition	[c]2010 definition
Abundant	Seen on almost all visits to the preferred habitat during the proper seasons.		Seen or heard daily on all visits to appropriate habitat during the appropriate seasons.
Common	Seen on a majority of visits to the preferred habitat during the proper seasons.	Likely to be seen daily in the park in appropriate habitat during the appropriate season.	Seen or heard on greater than 50% of visits to appropriate habitat during the appropriate seasons.
Uncommon	Present every year in the preferred habitat during the proper seasons, but occurs in low numbers and often difficult to find.	Sparsely distributed. May be seen in appropriate habitat during the appropriate season but not on a daily basis.	Seen or heard on <50%, but >10%, of visits to appropriate habitat during the appropriate seasons; occurs in low numbers, exhibits sparse distribution.
Rare	Present every year but in low numbers at varying locations.	Present in low numbers and/or sparsely distributed. May be seen only occasionally.	Believed to be present in the park, seen or heard on <10% of visits to appropriate habitat during the appropriate seasons. Detected in low numbers and very limited distribution. Not necessarily seen or heard every year.
Extirpated			No longer found in the park.

3). On these seven routes, a total of 315 wood frogs were observed, compared to only seven leopard frogs, suggesting that wood frogs were much more abundant than leopard frogs.

On the opportunistic routes, wood frogs were also the most abundant species observed, followed in order of decreasing abundance by boreal chorus frogs, leopard frogs, and gray treefrogs (Table 4). No Canadian toads were observed. Tables 2 and 4 show consistent detection rates for wood frogs and leopard frogs on both permanent and opportunistic survey routes, while there was a decrease in the detection rate of boreal chorus frogs and gray treefrogs on the opportunistic surveys compared to the permanent routes.

Discussion

Using the methodologies outlined above, it is impossible to make definitive statements about the relative abundance or true abundance of amphibians in RMNP. As discussed in previous studies, there are several weaknesses related to a survey that combines both qualitative and quantitative data, particularly one in which the survey areas were non-randomly selected, and the entire area was not surveyed.[8,9] In addition, the majority of the surveys were conducted in a relatively haphazard manner, which allows the development of a species list, but makes replication for monitoring purposes impossible.[9]

However, there is little doubt that there have been changes in the frog and toad populations within RMNP. When comparing the 2010 results to those from 1974 and 1987, a definite decline in both northern leopard frogs and Canadian toads is evident, while gray treefrog populations have increased. To examine the changes further, the 2010 survey results were compared to the 1974 checklist and the 1987 survey results, using the definitions of abundance used in 1974 and 1987, respectively (Table 2).

As comparisons between the three surveys were conducted, it became apparent that a more quantitative set of definitions was needed. A new set of definitions for frog and toad abundance was created, based on some of the previous definitions used in the 1974 checklist and the 1987 amphibian survey. Even these new definitions create some problems with interpretation of what exactly is meant by "in appropriate habitat in the appropriate season." Thus, while all of RMNP's ecosystems are generally considered to support all expected species (i.e. almost all areas inside the park could be considered appropriate habitat for all species), the appropriate season is more difficult to determine. Enhancement of the definition of "appropriate season" is recommended, based on life cycle/behavioural characteristics of each species (Table 5).[2,10] Table 5 identifies the recommended survey technique and appropriate season by month for each species.

This refinement of the definition of "appropriate season" is also useful as it recognizes differences among the species which affect numbers detected. Gray treefrogs and boreal chorus frogs are difficult to see in visual surveys. Wood frogs and northern leopard frogs are much more terrestrial and larger, making visual observations easier in July and August. Nocturnal call surveys are useful for estimating abundance of wood frogs, but quieter, less vocal species such as leopard frogs are not as effectively found by their calls.[4] Detecting egg masses is also difficult for some species, including gray treefrogs. Thus, an effort was made to determine the abundance of each species by using the appropriate survey methodology. Climate change may

Table 2. Number of surveys of the seven permanent routes on which each species was observed. In total, 48 surveys were conducted in 2010.

Species	No. of surveys (% of all surveys)
Canadian toad	0 (0)
Gray treefrog	15 (31.3)
Boreal chorus frog	20 (41.7)
Wood frog	28 (58.3)
Northern leopard frog	6 (12.5)

Table 3. Comparison of survey results on seven permanent routes for wood frog and northern leopard frog. In total, 48 surveys were conducted.

	Wood frog	Northern leopard frog
Total no. of individuals observed	315	7
No. of routes observed (% of all routes)	25 (52.1)	6 (12.5)
No. of individuals observed/hour	11.62	0.26
No. of individuals observed/km	5.64	0.13

Table 4. Comparison of survey results on 30 opportunistic survey routes for each species observed.

	Canadian toad	Gray treefrog	Boreal chorus frog	Wood frog	Northern leopard frog
No. of individuals	0	3	33	253	23
% of routes detected	0	6.7	33.0	53.3	10
No. of individuals/hour	0	0.09	0.93	7.13	0.65
No. of individuals/km	0	0.02	0.19	1.46	0.13

require further adjustment of "appropriate season" for species where the onset of the breeding season is determined primarily by temperature rather than by photoperiod.

As stated, gray treefrogs were detected on all seven permanent routes during the call surveys. According to both the 1974 checklist and previous work, gray treefrogs were present, but considered uncommon in RMNP.[1,10] According to published maps, treefrogs appeared to be confined to the eastern portion of the Park, and were still considered to be uncommon in 1987.[5,10,11] I first observed gray treefrogs inside RMNP in 1995, in the town of Wasagaming within the central portion of the park, an area at that time considered to be outside the normal range of this species. Since that time, I have detected gray treefrogs in all regions of the park, including in the highest elevations of the eastern portion and in the driest prairie regions. They have also been found in the most westerly areas of the park, approximately 50 km beyond the historic range of the species. This includes a dead specimen that I discovered in a cabin at the Sugarloaf trailhead on 28 October 2010, near the western boundary of RMNP. Taylor

also recorded a possible change in the distribution of gray treefrogs in western Manitoba outside the park, although he indicated that this apparent range extension may be a function of historic under-sampling of these areas.[12,13] However, this is not the case in RMNP, which was well surveyed in the past, yet has shown an increase in population density and distribution from the 1987 survey to the 2010 survey.

The comparison of detection rates of frog species between permanent routes and the opportunistic routes provides some food for thought. Boreal chorus frogs may have been observed less frequently on the opportunistic surveys when compared to the permanent routes due to the relatively faster average speed during the former, making it difficult to observe the small frogs.

As well, the detection rates reported in Table 4 for northern leopard frogs and gray treefrogs are misleading. It would appear that the opportunistic surveys were better at finding leopard frogs, and that these frogs are more common than the treefrogs. It should be noted, however, that 20 of the 23 leopard frog sightings were from one site that I visited as a direct consequence of park staff observations of this group of frogs. As well, as stated above, gray treefrogs are extremely difficult to detect when they are not calling. Most opportunistic surveys were done later in the summer, after the breeding period, and thus detections were primarily visual observations. The only gray treefrog detections were of calling males in August, outside the normal breeding season.

Given the analysis above, there have been definite declines in two species, namely the Canadian toad and the northern leopard frog. Further analysis was done to compare leopard frog and wood frog visual detections on both the seven permanent routes and the opportunistic surveys. As previously stated, the permanent routes were selected based on relatively recent observations of leopard frogs in the immediate area. Therefore, even though the routes were biased towards leopard frog detections, the results in Table 3, supported by the data presented in Table 4, indicate that leopard frogs are currently found less often than wood frogs. Thus, there is solid evidence that the leopard frog population has declined both in abundance relative to wood frogs and, based on the 1974 checklist and 1987 survey definitions, also in actual numbers. The other alarming note is the apparent extirpation of Canadian toads from the park since 1987.

Several possible reasons could account for these changes in leopard frog and Canadian toad populations. Collins and the CARCNET website provide good reviews of possible causes of frog and toad declines around the world, ranging from climate change, changes to water quality, acid rain, and increase in ultraviolet light, to habitat destruction, competition, commercial harvesting, and disease.[2,3] Several of the expected causes do not appear to apply to RMNP. For example, commercial harvesting has never been allowed in the park. Research on the effects of the reintroduction of beavers on the park ecosystem has shown that the area of park surface water has actually increased between1964 and 1996 due to impounded water, suggesting that habitat loss is not a key factor in frog declines.[14]

Whenever discussion occurs regarding fluctuations in populations, climate change is often highlighted as a possible reason for the differences. Amphibians may be particularly sensitive to long-term changes in the weather. It is too

Table 5. Recommended survey time and method for monitoring five species of frogs and toads in Riding Mountain National Park, MB.

	April	May	June	July	August	September
Canadian toad			Nocturnal call survey	Visual search for tadpoles		
Gray treefrog		Nocturnal call survey (mid- to end of month)	Nocturnal call survey	Nocturnal call survey, visual search for tadpoles	Visual search for tadpoles	
Boreal chorus frog	Nocturnal call survey	Nocturnal call survey	Visual search for tadpoles	Visual search for tadpoles & dispersing young of year	Visual search for dispersing frogs to over-wintering areas	
Wood frog	Nocturnal call survey	Nocturnal call survey	Visual search for tadpoles	Visual search for tadpoles dispersing young of year, & adults	Visual search for dispersing frogs to over-wintering areas	
Northern leopard frog	Incidental nocturnal call survey (conducted while surveying other species)	Incidental nocturnal call survey (conducted while surveying other species)		Visual search for tadpoles	Visual search for dispersing young of year & adults	Visual search for dispersing frogs to over-wintering areas

early to determine whether the changes observed in this study can be attributed to a warming climate. However, as in most areas on the prairies, some changes in weather have been noticed in the Riding Mountain area. In particular, weather data from the Environment Canada weather station in Wasagaming does show a slight overall warming in annual temperature since the 1970s.[15] As well, the mean annual minimal temperature also appears to be increasing, indicating a general warming trend. These changes could possibly play a role in the decline of leopard frogs and the disappearance of the toads, as warmer temperatures could result in ponds drying up prior to successful metamorphosis of tadpoles, and thus increased mortality.

The slight increase in mean annual temperatures and an increase in the coldest winter temperature could provide one explanation for the apparent increase of gray treefrogs in the park. This species mates at warmer temperatures and

later in the spring than other resident frogs and toads, and an increase in summer temperatures may provide more opportunities for breeding.[16] The warmer annual minimal temperatures may also mean that more gray treefrogs overwinter successfully, particularly during low-snow years when severe cold would normally penetrate into the leaf litter. Relative humidity and elevation have been suggested as possible limiting factors in the distribution of gray treefrogs.[10,12] However, as stated, this species has now been heard in all areas of the park, including both the highest elevations and the driest areas. This may indicate that the distribution of gray treefrogs is no longer limited by either of these historic factors due to changes in local weather. Whatever the reasons for the changes in RMNP frog and toad populations, their beginnings can likely be dated back to the 1970s, based on much earlier observations near the park and my own subsequent observations. Bird reported that historically, leopard frog densities reached highs of 194 individuals per acre in the Parkland region.[17] His field station was located near Birtle, Manitoba, approximately 50 km from the RMNP boundary. Densities at the field station are expected to have been similar to the surrounding aspen parkland, including similar habitat inside the park.

Anecdotally, as a child raised on a farm in the 1970s in an area approximately 50 km south of the park, I noted a sudden decline in leopard frogs. By 1980, they were rarely found on our farm, while a decade earlier, they had been abundant. They have since become extirpated from the farm. These observations coincide with observations in Alberta, where leopard frogs declined suddenly in the late 1970s and early 1980s.[18] These records point to a widespread and catastrophic decrease in the Canadian prairie populations. This decrease was not uniform, however, and some localized leopard frog populations appear to be able to persist, despite an apparently decreasing regional population.[19,20]

What, then, is the current status of northern leopard frog populations in RMNP? The decline appears to have been slower than observed in areas outside the park, but may be still in progress. Again anecdotally, I observed leopard frogs relatively frequently prior to 2005. Since that time, leopard frogs have been found less often, despite numerous revisits to the areas where they had previously been observed. However, the fact that they can still be found in a variety of areas of the park suggests that the population will persist for the time being.

Conclusion and Recommendations

As discussed above, while the methodologies do not allow us to determine actual population sizes, the information garnered from this survey does allow several conclusions to be drawn.

The first is that this survey has confirmed the trend first observed in 1987, in which it appears that Canadian toad populations have declined such that they are now considered to be extirpated from the park. It also confirms my personal observations that northern leopard frogs have declined in abundance, but these populations do not appear to be imminently threatened with extirpation. Finally, the survey also confirms the expansion of both the range and the abundance of gray treefrogs inside the park since 1987.

The following recommendations are suggested to provide further insight into the findings of this survey:

1. Following the completion of a review of the park's lake water quality, any changes in the physical and chemical makeup of

RMNP water bodies should be examined for their possible negative effects on local frog or toad populations.

2. Following the development of standardized survey methods, amphibians in the park should be monitored every five years, starting in 2015.

3. A multi-jurisdictional study of the current Canadian toad population abundance and distribution across western Canada should be carried out to determine whether the apparent declines in RMNP are reflected in other areas.

Acknowledgments

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INSECTS

ATTEMPTED INTERSPECIFIC MATING BY AN ARCTIC SKIPPER WITH A EUROPEAN SKIPPER

Peter Taylor

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At about 15:15 h on 3 July 2011, I observed a prolonged pursuit of a European skipper (*Thymelicus lineola*) by an Arctic skipper (*Carterocephalus palaemon*). This took place along Alice Chambers Trail (50.17° N, 95.92° W) near the Pinawa Channel, a small branch of the Winnipeg River in southeastern Manitoba. This secluded section of the Trans-Canada Trail passes through moist, mature mixed-wood forest with small, sunlit openings that offer many opportunities to observe and photograph butterflies and dragonflies during the summer months.

The skipper pursuit continued for about four minutes, and I obtained 14 photographs, four of which are reproduced here (Fig. 1, see inside front cover). The behaviour appeared to be attempted courtship, rather than a territorial chase or feeding assembly. Fig. 1a shows the European skipper nectaring on a clover flower, but the Arctic skipper's proboscis is not extended. Whenever the European skipper took flight, the Arctic skipper followed a few centimetres behind (Fig. 1b). Whenever the European skipper landed on flowers or other low vegetation, the Arctic skipper alit just behind or to one side, often approaching within a few millimetres (Fig. 1a,c,d). One image, unfortunately not sharply focused, shows the Arctic skipper's abdomen curved sideways in a J-shape, almost touching the tip of the European skipper's abdomen in what appears to be a copulation attempt (Fig. 1d). Frequent short flights by the European skipper may have been an attempt to discourage its suitor – a known tactic used by unreceptive female butterflies[1] – but it may simply have been disturbed by my close approach. Otherwise, the European skipper showed no obvious response to the Arctic skipper's advances.

These two species are classified in separate subfamilies (Arctic skipper in Heteropterinae, European skipper in Hesperiinae). Both species are only slightly dimorphic, and while the Arctic skipper's behaviour indicates it was a male, it is not certain that the European skipper was a female. The European and Arctic skippers are known in Britain as the Essex and chequered skippers, respectively, the last name being easily confused with the common checkered skipper (*Pyrgus communis*) of the Americas. The European (Essex) skipper is an invasive, introduced species in North America, while the Arctic (chequered) skipper is one of the few skipper species to occur naturally (as different subspecies) in both Eurasia and North America. The Arctic skipper is locally common, and

the European skipper is sometimes abundant in the Pinawa area, but there is little overlap in their flight periods, which usually peak in southern Manitoba in the first halves of June and July, respectively.[2,3] Contact between adults of the two species is thus limited, and this observation involved a late-surviving Arctic and an early-emerging European skipper.

In common with many small butterflies, the Arctic skipper is a territorial perching species. Field studies in Scotland showed that males sought mates by establishing small territories where they perched in low vegetation, typically 40-50 cm above ground, and flew out to intercept passing insects or to inspect the boundaries of their airspace.[4] Interactions with bees or other butterfly species were typically brief – an average of 2.8 s; even with females of the same species, they lasted only 12 s on average and rarely led to mating.[4] The pursuit described here is thus unusual for its long duration (about 250 s), especially when a different species is involved.

It seems odd that the boldly marked Arctic skipper, relatively easy for humans to identify, would not recognize the much plainer European skipper as an inappropriate mate (Fig. 1), but the markings may have no function in mate recognition. Perhaps the European skipper's flight characteristics are similar enough to an Arctic skipper's movements to give a visual miscue. An olfactory miscue is also possible, but I have found no information on pheromone chemistry in either species.

In a previous note on a similar observation involving Milbert's tortoiseshell (*Nymphalis milberti*) and mourning cloak (*N. antiopa*) butterflies, three records were cited of courtship behaviour between butterflies of different families or subfamilies.[5] A brief survey of articles in the *Journal of the Lepidopterists' Society* (accessible online at http://peabody.research.yale.edu//jls/) indicates, however, that actual copulation or hybridization, whether stimulated under laboratory conditions or observed in the wild, usually involves butterflies of the same or closely related genera.

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In seed time learn, in harvest teach, in winter enjoy.

- William Blake

NOTES AND LETTERS

NORTHERN SIGHTING OF A BURROWING OWL IN ALBERTA

Since the 1990s, western burrowing owls (*Athene cunicularia*) have experienced a severe decline in Canada, with a corresponding northern range contraction.[1] Despite their small size (150 g) and seemingly inefficient flight style, they are known to be capable of long-distance migration to Mexico and Texas.[2] Some are also long-distance breeding dispersers, moving large distances between breeding seasons[3,4] (Holroyd and Trefry unpubl.).

Historically, the northern limit of the burrowing owl range was likely linked to the dynamic range conditions created by the interactive roles of bison grazing and fire in maintaining the prairie conditions they prefer. In Alberta, the northern range of burrowing owls extended to Wainwright. In the 1990s, we were shown a burrowing owl nest site at CFB Wainwright in an open prairie area of aspen parkland, but it could not be determined whether the birds nested successfully. The two Alberta breeding bird atlases showed the current northern extent of the burrowing owls at about 52° N, near Hanna.[5] As with all species, vagrants are occasionally reported. Paul Goossen (pers. comm.) observed a burrowing owl on 21 April 1995, during the Snow Goose Festival east of Beaverhill Lake, Alberta, at 53.368 N, 112.483 W, but it was not seen again. This is at about the same latitude as the Wainwright sighting. Here we document

Figure 1. Burrowing owl near Bonanza, Alberta, in May 2002.
Andrew Gregg

an unusual vagrant burrowing owl sighting recently reported to us far north of the known range.

Andrew Gregg, an amateur birder and gas field operator in the Peace River area of Alberta, first noted an unbanded burrowing owl in late May 2002 at one of the gas plants he monitors. During weekly visits, he repeatedly observed the owl and photographed it perched at the opening of an abandoned pipe lying on the ground, covered by gravel in the immediate area with sparse clumps of vegetation, mainly dandelion (Fig. 1). During the day, he witnessed it using horizontal pipes about 1 m above ground as hunting perches. It departed the area in August. A burrowing owl, presumably the same one, returned to the same site in May 2003 but left earlier than in the previous year and was not seen again.

In April 2011, we heard about the unusual sighting and visited Andrew at the burrowing owl site (55.924° N, 119.816° W), 1.2 km north of the Bonanza store and near the British Columbia border, NE of Grande Prairie. The owl's roost was a 20-m pipe with a 3-cm urethane coating and a 10-cm diameter entrance, open at both ends. Vegetation debris (seed husks, litter) clogged one entrance. The pipe was lying in a graveled gas plant site with sparse vegetation, mostly dandelions, with two small buildings connected by large pipes. The gas plant location is in a large field, typically seeded into wheat or canola, but Andrew thought it was fallow in the first year that the owl appeared. The nearest trees and a major gravel road were 600 m from the plant. The site was very similar to wintering sites we have seen in south Texas, where the owls commonly use gas installations with pipes and small culverts as roosts, surrounded by fallow cotton fields.[2]

This sighting is unusual for several reasons. First, it is about 600 km NW of the current known breeding range of burrowing owls.[4] Burrowing owl reintroductions have been taking place 600 km due south in the Kamloops region of British Columbia, but the owl described here is unlikely to have been a captive-released bird or one of their offspring, as they were all color banded (Dawn Brodie pers. comm.). Although 600 km seems like a long-distance movement, we now know from satellite telemetry of burrowing owls that they can move 350 km per night (G. Holroyd and H. Trefry unpubl.). Secondly, unlike many vagrant sightings, this owl returned in the next year, indicating that there was something it found attractive about the site. Although a pair or a breeding attempt was not documented, Andrew's site visits were brief, so we cannot completely discount the possibility of a nesting attempt. At the very least, the sighting represents an example of good documentation of an unusual vagrant and illustrates the dispersal potential of this small owl.

We thank Peter Dolen for making us aware of Andrew's sighting and Andrew Gregg for providing details and photographs of the sighting as well as accompanying us to the site.

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- Helen E. Trefry[1], Geoffrey L. Holroyd
Environment Canada, Room 200, 4999-98 Ave, Edmonton, Alberta, T6B 2X3
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THE ALFRED HUBBARD AND FAMILY ALBERTA WILDLIFE COLLECTION - A UNIQUE SHOWCASE OF THE BIODIVERSITY OF THE CANADIAN PRAIRIES

The Alfred Hubbard and Family Alberta Wildlife Collection was established in 2007 in the ground floor of the Cousins Science Building of Lethbridge College, and is one of the largest museum collections of native wildlife species displays in Western Canada. What started as a small private collection has extended into a noteworthy and prestigious assembly. The collection showcases a wide diversity of mammals of Alberta, and a large collection of avian species including native wild species, game birds, and an impressive collection of raptors. The wild bird species collection includes woodland, boreal forest, and prairie grassland species, as well as representative waterfowl of the province. The Hubbard Wildlife Collection showcases a diverse spectrum of attractive museum displays, such as grizzly bear, black bear, prairie bison, cougar, big horn sheep, mountain goat, badger, beaver (the national animal of Canada and also present in the coat of arms for the province of Alberta), lynx, bobcat, silver fox, coyote, white-tailed deer, mule deer, caribou, elk, moose, pronghorn, wolf, prairie bison, and wolverine. Housed on the ground floor, it attracts a large number of visitors to the galleries, including school children, post-secondary students, university students, wildlife enthusiasts, researchers, and tourists. The collection is also central to the Environmental Science academic program at Lethbridge College.

The Hubbard Wildlife Collection offers regular tours by knowledgeable staff members. Tours can be booked by calling 403-320-3202 Extension 5594. The species collections are also viewable online at http://www.lcvirtualwildlife.com. This site is officially known as the Virtual Wildlife Project, and is the electronic archive of the Hubbard Wildlife Collection. The site contains detailed information about different wildlife species based on peer-reviewed research, several videos, and other related multimedia files associated with wildlife ecology, behavior, habitats and biodiversity, animal tracks and signs for identification, and exciting games. The website is a spectacular interactive and informative tool attractive to K-12 and post-secondary students, a long-term dream and goal of its donor Alfred Hubbard. Well documented, latest taxonomic classifications of individual species from the collection are provided.

Individual species are provided with a three-dimensional image of the specimen and the skull, related videos, audio files, images, tracks and signs, and status maps when information is available. One of the interesting features that attracts online visitors to the site is the portal on learning activities. The learning activities icon covers a diverse range of ecological information on the target wildlife species, which is based on research and peer-reviewed wildlife literature. This unique collection will educate and inspire generations of students (young and old) and will continue to cater not just to Alberta, but to all of Western Canada.

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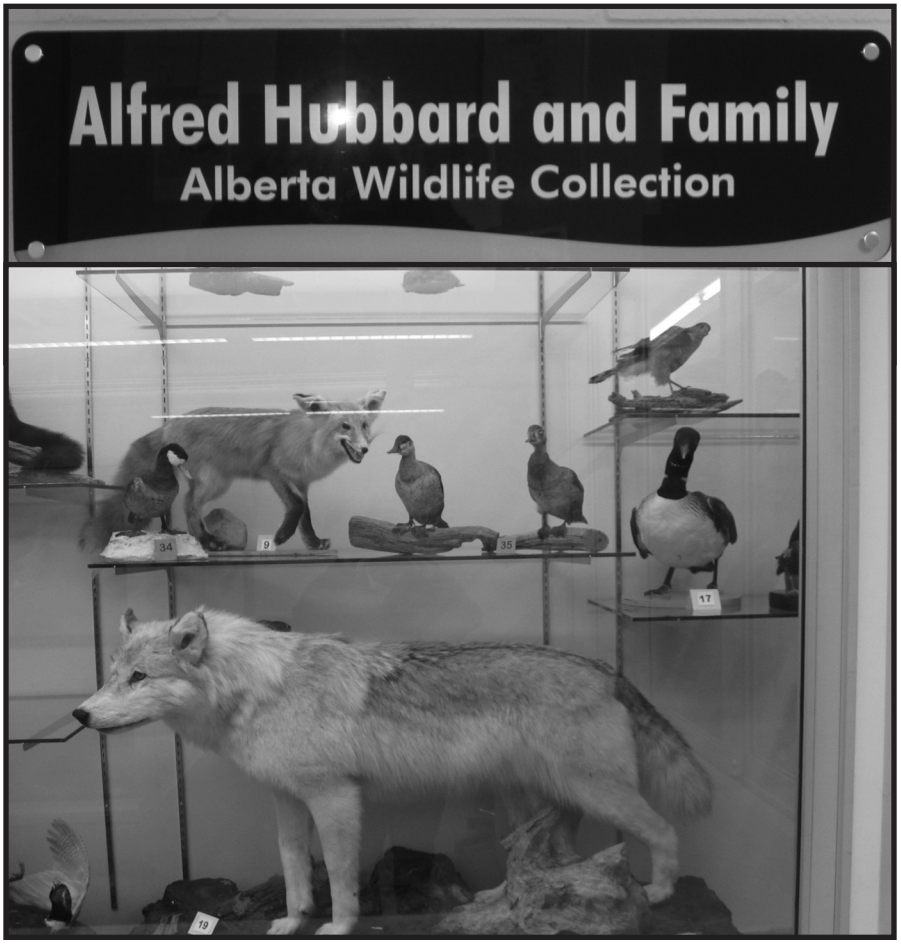


One of the display cases at the Alfred Hubbard and Family Alberta Wildlife Collection, Lethbridge College, illustrating the diversity of specimens displayed at this facility. Photo by Saikat Basu.

PHOTO NOTES

NORTHERN PRAIRIE SKINK

The northern prairie skink (*Eumeces septentrionalis*), Manitoba's only lizard, occurs in Manitoba only in the sandy soils of the Upper Assiniboine Delta in the south-western portion of the province. It is listed as an endangered species in Canada. The main factor limiting its distribution is soil type, as only sandy soils permit the skink to burrow, in order to nest and overwinter.

Where we live, southwest of Portage la Prairie, our sandy soils mean that skinks are relatively common. I frequently see them in my garden or zipping across the yard. One unfortunate individual climbed into my empty watering can and perished there, apparently unable to get out.

We found this one sunbathing one hot June morning on a neighbour's fence post. It was relaxed enough that I had time to rush and bring Allison Krause Danielsen, a Master's student at the University of Manitoba, who luckily happened to be on our property on that day on one of her regular bi-weekly visits to study skinks. Allison took the photo. The skink went on sunbathing!

- Ardythe McMaster, via E-mail: <mcmaster@xplornet.com>

MATING SLUGS

Caught *in flagranti* – no wonder it's been a good year for slugs! These photos show two grey garden slugs (*Deroceras reticulatum*) engaged in a delicate activity. These slugs are simultaneously hermaphroditic, bearing both male and female organs in the same individual. Here, the two participants are intertwined yin-yang-like (top panel), engaged in courtship. The shiny white organ on each slug is the sarcobelum, a penial structure with which the pair mutually stroke each other during the exploratory phase. In the center and bottom panels, one can also see a secretion being transferred from one sarcobelum to the other. The function of this secretion is not well understood, as the sperm are actually transferred in packets extruded from the penial gland, not the sarcobelum, and are transferred externally; there is no intromission. Courtship in this species can last anywhere from 15 minutes to ~2 hours, whereas actual copulation (i.e. entwining of the penes and transfer of ejaculates) generally takes only a few seconds, up to 1 minute.

For more on the reproductive behaviour of *Deroceras* slugs, see the following papers and references therein:

Reise H (2007) A review of mating behavior in slugs of the genus *Deroceras* (Pulmonata: Agriolimacidae). *American Malacological Bulletin* 23:137-156.

Reise H, Visser S, Hutchinson SMC (2007) Mating behaviour in the terrestrial slug *Deroceras gorgonium*: is extreme morphology associated with extreme behaviour? *Animal Biology* 57:197-215.

- Victoria Kjoss, 3426 Clover Place, Regina, SK, S4V 1J1. E-mail: <kjoss@sasktel.net>

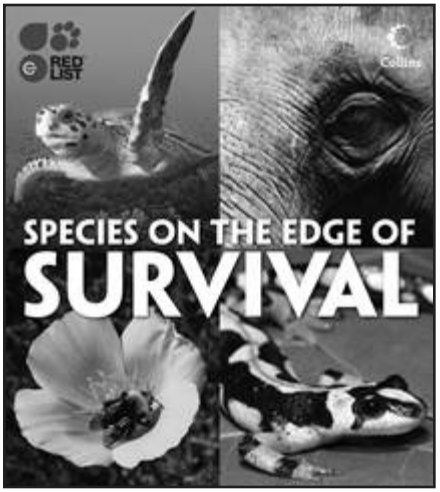
There are always flowers for those who want to see them.

- Henri Matisse

NATURE LIBRARY

SPECIES ON THE EDGE OF SURVIVAL

International Union for Conservation of Nature (IUCN) Red List. 2011. Harper-Collins, UK. $24.99 CDN. Soft cover. ISBN-13: 978-0007419142. 400 pp. 20.8 × 18.5 cm



Species on the Edge of Survival is a unique production by IUCN researchers. This spectacular volume is a sheer delight for wildlife lovers, enthusiasts, and book collectors. The publication captures 365 wildlife species within its covers and is enriched by reader-friendly information and fabulous colored plates of mammals, birds, fishes, reptiles, invertebrates, plants, fungi and lichens.

Of the 365 species presented, eight are found in Canada and are in need of some focused conservation measures to help them survive from threats of extinction. It is encouraging to note these rare Canadian members in a global showcase of diverse life forms. Indeed, this volume is a priceless collection of wild species that require care and attention for their continued survival. Truly spectacular is the presentation style of the volume. Each species has been identified by its English and scientific name, geographic distribution, possible threats it faces in its natural habitat, and an updated conservation status.

The volume highlights or mentions eight Canadian species. Although none of these species is from the prairies, this book is still of significant interest to all Canadians. Following is a brief description of these eight species.

1. **Red wolf** (*Canis rufus*), p. 89: Classified as *Critically Endangered* according to the IUCN Red List of Threatened Species™. Canada is believed to encompass the northern-most range of the historical population, and the red wolf range and comeback in the United States are mainly highlighted. The species was believed to be extinct in the wild in the 1980s. Indiscriminate shooting, trapping, and hybridization with coyotes have accounted for the historical loss of the species. Although encouraging stories of its comeback to nature reserves in North Carolina are highlighted, no information on the Canadian population is provided, most probably due to lack of reliable scientific data.

2. **Barndoor skate** (*Dipturus laevis* Mitchill, 1818), p. 149: Classified as *Endangered* according to the IUCN Red List, this species has been reported along the Atlantic coast of Canada and the USA. Unrestricted commercial fishing has been the major factor affecting the once abundant natural populations of

this skate. Some conservation efforts and legal battles are currently being pursued.

3. **Boreal felt lichen** (*Erioderma pedicellatum* (Hue) P. M. Jørg.), p. 171: Classified as *Critically Endangered* according to the IUCN Red List. Although once widely distributed in its circumpolar habitat, this species is now restricted to only two isolated populations in Canada (Newfoundland and Nova Scotia) and one in Alaska (US). The rapid decline of the lichen populations has been attributed to habit loss due to extensive logging practices and industrial air pollution. Being a highly sensitive species to any modification of its natural habitat, around 80% population loss has been documented to date. Conservation efforts are in progress to prevent further depletion of the population in the boreal forest zones.

4. **North Atlantic right whale** (*Eubalaena glacialis* Müller, 1776), p. 172: Classified as *Endangered* according to the IUCN Red List. The wild population was significantly impacted by the turn of the 20th century due to over exploitation and extensive harvest. Marine pollution, fishing practices, and accidents with marine and fishing vehicles have been documented as other causes of decline. Efforts are underway in both the USA and Canada to protect and conserve this species, which is reported to be one of the rarest among larger whales.

5. **Lined seahorse** (*Hippocampus erectus* Perry, 1810), p. 208: Classified as *Vulnerable* according to the IUCN Red List, this species is reported to be present from Nova Scotia across the east coast of the US and Mexico down to as far south as Brazil in South America. Illegal harvesting and over-exploitation are the main factors contributing to the rapid decline of wild populations. Habitat loss and the illegal trade in aquarium specimens have greatly contributed towards loss of this species in several parts of its range. Although some conservation programs have been implemented, the loss of species is still happening at an alarming rate.

6. **Porbeagle** (*Lamna nasus* Bonnaterre, 1788), p. 220: Classified as *Vulnerable* according to the IUCN Red List. This shark has been declining globally as well as in Canadian waters due to non-sustainable fishing practices and overexploitation. Low reproductive rates have further contributed to serious declines in global populations. Conservation efforts have been implemented in the US and Canada; however, due to lack of coordination at an international level, the species is seriously threatened by further loss of natural wild populations all over the planet.

7. **Vancouver Island marmot** (*Marmota vancouverensis* Swarth, 1911), p. 243: Classified as *Critically Endangered* according to the IUCN Red List, this is one of the rarest mammals in North America, endemic to Vancouver Island. This species is greatly threatened by loss and fragmentation of its habitat due to logging and clearing of forests. Increased predation by several species as a result of human-induced alteration of the natural habitat has been another causal factor for its rapid decline. Although it is a legally protected species and a captive breeding program has been implemented in Canada, limited information is available regarding its population dynamics and ecology.

8. **Reindeer/Caribou** (*Rangifer tarandus* Linnaeus, 1758), p. 326: Classified as *Least Concern* according to the IUCN Red List, this species has a circumpolar distribution including the continents of Europe and North America. It is more threatened in its European habitat compared to the North American

range due to a multitude of factors from habitat loss and environmental pollution to extensive poaching. Mostly conservation challenges and efforts from the European perspective are highlighted.

Overall, this book is an inspiring volume highlighting a wide spectrum of important factors accounting for global loss of wildlife species, including excellent examples from Canada. The factors listed for global loss of wildlife include habitat loss, habitat fragmentation, climate change, environmental pollution, diseases, human encroachment, forest fires, poaching, bush meat and other forms of illegal wildlife trade, human population explosion, accidental and intentional introduction of exotic species, and many more. The design and presentation are spectacular, and the message presented to the readers is engaging and powerful.

- Reviewed by Saikat Kumar Basu, School of Agriculture and Life Sciences, Center for Applied Arts and Sciences, Lethbridge College, 3000 College Drive South, Lethbridge, Alberta T1K 1L6; E-mail: <saikat.basu@lethbridgecollege.ca>

The Buck

The car slowly edged around a curve
And began its descent to the valley floor.

I glanced to the hills on my left
And for a moment our eyes locked.

I braked the car.
I was captured by the eyes
Of a buck standing like a statue while his big eyes and mine ....met.
We stared at each other in wonder.

He was magnificent!
The muscular, copper body glistened in the sun.
His head held high.

May God/Nature keep him safe.

- Georgiaday Hall. E-mail: <Georgiaday_hall@hotmail.com>

IN MEMORIAM

IN MEMORIAM: BOHDAN EWACHA, 1934–2011

Veronica Walsh

President, Conserve Native Plants Society, Inc. E-mail: <vw.reallifelessons@qkstream.com>

In February of 2011, Mother Earth lost a resolute protector of the flowers that she provides as part of her bountiful gifts to all of us. That is when Bohdan (Bud) Ewacha of Winnipeg, MB passed away. He was only 76 and still very committed to saving native plants, especially native orchids.

Many of you may not have heard of Bud, as he went about his business without fanfare and without much recognition except for an occasional picture or magazine article. He was a founding member of both Native Orchid Conservation, Inc. (www.nativeorchid.org) and Conserve Native Plants Society, Inc. (CNPS) in Manitoba. Only a few months before his death, he gave up the reins as president of the CNPS but remained active in the organization.

Bud, as we knew him, used many methods to fulfill his ambition to protect and increase the number of plants that were his passion. He re-established patches of native plants in areas where they had previously existed but had been destroyed. The endangered western prairie fringed orchid was the subject of his research project, which included hand pollination, seed collection, and distribution. He participated in research projects to gain knowledge of conditions or pathogens that were killing other orchids. He collected specimens for display and education purposes for the Manitoba Museum of Man and Nature. When inquiries came from many locations around the world for information about native plants, Bud responded to those with information he had learned or compiled.

Educating and encouraging others to become involved in the protection of the natural environment was a priority for him. He did this via regular newsletters and distribution of pamphlets about plants and the work of the CNPS. He created a beautiful and informational visual display and set up shop at public events and in shopping malls to increase awareness and broaden the membership of CNPS. Field trips to Manitoba wetlands and forests were organized and conducted by him so that anyone interested could learn and enjoy the beauty of nature at the same time.

When CNPS members identified parcels of public land on which native orchids or endangered species were growing, it was Bud who took steps to ensure this area was designed as a protected area from logging or other destructive human activity.

For this work of behalf of the plants that he deeply appreciated, some of us considered Bud to be an everyday hero. In this and in all areas of his life, he demonstrated his determination to succeed, and whenever he encountered an obstacle, he moved over it, around it, or through it.

Not everyone who encountered Bud would consider him a hero and perhaps some would say he is not deserving of

this tribute. One reason for that could be his tendency to allow his passion and concerns to get in the way of tact and diplomacy. However, no one said that heroes have to be perfect. If it is true that heroes need to have "the courage of their convictions" and to use that courage for the betterment of life, then Bohdan Ewacha deserves the title of hero.

The Witness

The young farmer jumped on his tractor
Its bulldozer aimed straight ahead.
He cut down all the trees on his newly acquired land.

The trees fell into a neat row of tangled branches, twigs etc.
Only a lonely windmill remained.
The farmland had once belonged to a pioneer.
He and his family had planted and watered the trees.

The trees had provided shelter for the pioneer home.
They were shelter for the wild animals and homes for the birds.
They were a beacon marking the location of a farmyard—
On the vast prairie.

Then the young farmer headed home.
Proud of the farmland he had attained.
He probably thought of all the wealth he would reap
By removing the trees and planting grain.

I saw the lonely windmill and the tangled trees but soon….

Red and orange flames shot upward into the sky.
Smoke made billows of dark gray towering skyward.
It could be seen for miles.
My back pushed rigidly against the car seat.
I was speechless. I was in shock.
My Grandfather's trees were on fire.
My soul felt the cries of souls beneath the flames.
It was September 24, 2011, at approximately 5 PM.

The next morning the trees continued --to smolder.
Smoke gathered into a long, single plume sweeping westward
Then it formed an arc and returned eastward over the highway and beyond.
Saluting the world and me—the witness.

I could see it would be sometime before the smoldering stopped.
The trees did not go easily.
Sunlight sparkled from a truck near the smoldering trees.

Sometime later I was able to feel a calmness, for I knew
The soul cannot be destroyed.

- Georgiaday Hall

MYSTERY PHOTO

ANSWER TO THE SEPTEMBER 2011 MYSTERY PHOTO

In our last issue, our Mystery Photo dealt with what we termed a "crayfish convention at Wascana Lake." We were mystified by a strange aggregation of thousands of crayfish underneath the Broad St. bridge in Regina, SK. Robert Alvo sent us the following insight:

"Premek Hamr is a crayfish expert whom I met when we were studying at Trent University. Naturally I called him for his thoughts on this one. He told me that crayfish will try to escape from aquaria and that they can survive movements on land as long as they can stay wet (e.g. if it's raining or if the ground is wet). Of course they are usually happy in water, unless oxygen levels dip.

"The crayfish in the photo were young ones, being only 2-4 cm long. In mid-August, water levels in lakes and streams are often at their lowest after the hot summer. Young crayfish will often congregate in the shallows where they can take advantage of the warm temperature to grow more quickly before the onset of winter. When water levels decline during the summer, crayfish and fish may become trapped in pools. Oxygen levels decline because of all the animals in the pool using it, and this might also make the fish and crayfish move closer to the surface where the water is in contact with the air.

"Perhaps what happened at Wascana Lake is that the area under the bridge became an isolated pool during the summer, with many crayfish and fish being trapped after having being attracted to the shallow waters by the warm temperatures. They concentrated at the surface because of the warm temperatures and higher oxygen levels. Many of the fish died due to low oxygen. On August 15 there was a rain event that caused the water level of the lake to rise. The crayfish and dead fish were forced up through the holes of the metal cover. The fish were already dead because they are dependent on water to breathe, but the crayfish survived longer because as long as their gills are moist they can actually get some oxygen from the air and thus survive. Many were seen jumping back into the water."

- Submitted by Robert Alvo (Aspiring Author, Being a Bird in North America: www.babina.ca), 219-140 Mann Avenue, Ottawa, ON, K1N 1E5. E-mail:<robalvo1@gmail.com>

DECEMBER 2011 MYSTERY PHOTO

Who can tell us what this photo shows? Hint: this particular specimen was observed along the shores of Last Mountain Lake, Saskatchewan.

A GOOD YEAR FOR SNOWY OWLS

Top photos: "Christmas Snowy". *Randy McCulloch*

Bottom left: A snowy perched on a pole on Pinkie Road, near the Joanne Goulet golf course in Regina, SK. *Anne Brigham*

Bottom right: Perched on a post in the Last Mountain Lake National Wildlife Area, SK. *Vicky Kjoss*

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Every creature is better
alive than dead,
men and moose and pine-trees,
and he
who understands it aright will
rather
preserve its life than destroy it.

- Henry David Thoreau, "The Maine Woods"

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Common and scientific (Latin) names are used for all species. Common bird names follow the Checklist of North American birds by the American Ornithologists' Union (7th edition, 1998); mammal names: Mammal Species of the World by Wilson & Reeder; butterfly names: The Butterflies of Canada by Layberry et al.;and names of reptiles and amphibians follow Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with comments Regarding Confidence in our Understanding, Sixth Edition, by The Committee on Standard English and Scientific Names (Brian I. Crother, Chair) (2008).

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