

NATURE ALBERTA

MAGAZINE

SUMMER 2022
VOLUME 52 | NUMBER 2



A COMMUNITY
CONNECTED BY A
LOVE OF NATURE



**Common
Nighthawks**
Feel the Noise

**Geology
and Wildlife
Distribution**

**At Home with
Ronald Lake
Wood Bison**

**The Disappearance
of Wolverines in
the Eastern Slopes**



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CONTENTS

SUMMER 2022

- 2** Citizen Science Spotlight
- 3** Nature Alberta News
- 4** Seeing Red Over Red Tape Reduction
- 5** Your Shot
- 6** Jaw-Dropping Bird:
The Common Nighthawk
- 8** How Geology Affects
Wildlife Distribution
- 12** The Invasive Northern Crayfish
- 14** The Ronald Lake
Wood Bison Herd
- 18** Death by “Data Deficient”:
The Disappearance of
Wolverines in Alberta’s
Eastern Slopes
- 23** Book Review:
The Ecological Buffalo
- 24** The Implications of Shifting
Baselines on Nature
Conservation
- 29** Small but Mite-y:
Soil Invertebrates and
Land Reclamation
- 32** Nature Kids
- 36** Kingfishers
- 37** Meet a Member Club



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About Nature Alberta

Alberta is home to incredible natural spaces comprised of beautiful and varied landscapes, and rich biodiversity reflected in our abundant and diverse flora and fauna. Across the province, natural history clubs and their members are engaging Albertans in the conservation and appreciation of this natural heritage. Nature Alberta represents a network of these natural history organizations in Alberta.



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CITIZEN SCIENCE SPOTLIGHT

Observe, investigate, and share nature with iNaturalist!

Investigating nature can be a fun treasure hunt when you use iNaturalist to record and share your observations. Experts will help identify all your treasured finds! Follow these easy steps to get started:

Step 1: Install the iNaturalist app on your mobile device through the **App Store** or **Google Play**, or via inaturalist.org.

Step 2: Create an account.

Step 3: Head outside to explore nature and find species of interest: plant, fungi, insect, bird, mammal, or any living thing!

Step 4: Tap "OBSERVE" to take a photo of your neat nature find. Review your photo and hit "NEXT" if it looks good.

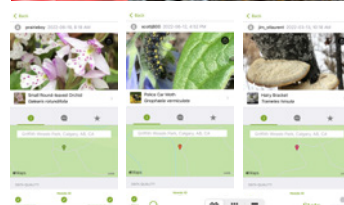
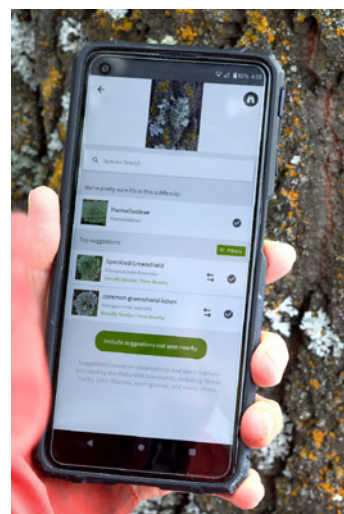
Step 5: Identify it by clicking on "WHAT DID YOU SEE?" Options will populate based on species that look like your photo. You can select one of these or look up a species name if you know what it is.

Step 6: Optional: You can add more photos, or a note, and review other set options.

Step 7: Hit "SHARE."

It's that easy!

Challenge yourself to see how many species you can record within an 8-km radius of your house. And head over to naturealberta.ca/citizen-science to learn about projects and events you can participate in with your new tool and skill.



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Nature Alberta News



50th Anniversary Event

Get your tickets to celebrate 50 years of “A Community Connected by a Love of Nature” — and help us secure the next 50 years! Nature Alberta’s **50th Anniversary and Fundraiser** is being held on Saturday, September 10 in Edmonton. Check out all the exciting details at naturealberta.ca/50th-celebration.

Citizen Science

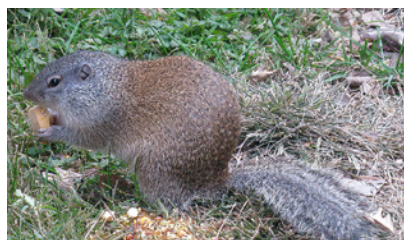
Nature Alberta has been busy raising awareness of citizen science initiatives. In April we promoted the **City Nature Challenge**, in May we coordinated the **May Species Count**, and in June we led the **BiodiverCity Challenge**. All of these initiatives encouraged individuals to spend time outdoors exploring and learning more about nature, while contributing to observation data.

We have revamped and improved our Citizen Science web page to include important information about what citizen science is, how to get started, and the many projects and events people can contribute to. Have a look at naturealberta.ca/citizen-science.

All of this work is made possible through financial support from **Alberta Conservation Association** and **TD Friends of the Environment Foundation**.

Franklin’s Ground Squirrel Project

Franklin’s ground squirrel was once common in central Alberta but is now rarely seen. Nature Alberta believes this animal needs to be listed as a threatened species. The first step is to gather more information about its current population size and distribution, and to do this we need your help. If you spot this squirrel on your travels, please submit a photo to iNaturalist — easy to do with the iNaturalist smartphone app (see page 2). We are also interested in historical observations. Further information, including tips on identifying the squirrel, can be found at naturealberta.ca/ground-squirrel.



New Nature Alberta Volunteer Team Official Launch

Looking for meaningful new ways to share your love of nature? Join the Volunteer Team! Receive monthly email updates about all kinds of upcoming volunteer opportunities everywhere in the province by emailing Abigail at naturekids@naturealberta.ca.

Nature Alberta is currently looking for Casino Volunteers to help raise crucial funds for our outreach initiatives and Nature Kids programs. Find out more about how you can help by visiting our Nature Alberta Volunteer & Job Board at naturealberta.ca/volunteer.

Family Nature Nights

Select Wednesday evenings this summer. Most events run first-come-first-served registration that opens at 6:00 p.m., and run 6:30–8:30 p.m., with the exception of **Wetland Champions**, where we will be running our first “Festival Style” event — complete your passport by visiting all activity stations and earn a prize!



Seeing Red Over Red Tape Reduction

Founded in political ideology, the provincial government's current red tape reduction efforts have created a boondoggle of confusion, weakened protections, and, ironically, more red tape. Admittedly, some bureaucratic procedures and forms seem petty and unnecessary, and it's easy to see the appeal of some reduction. But eliminating essential rules, regulations, and legislation, especially related to the protection of our public lands and parks, is something else.

Bill 21, the *Red Tape Reduction Statutes Amendment Act*, is an omnibus bill that hides more than it reveals. It proposes amendments to 15 pieces of legislation, including the *Public Lands Act* and the *Provincial Parks Act*. In both of these instances, the red tape being "reduced" hobbles land-use protection on public land, the land held in trust for Albertans.

Our politicians would have us think that all forms of red tape reduction are the same. Moreover, the changes are portrayed as relatively minor bureaucratic procedures. However, the removal of inconsequential irritants is not what red tape reduction means in the legislation currently being debated. The real intent is to promote business through the relaxation or elimination of important rules on how development occurs. In the words of Associate Minister of Red Tape Reduction Tanya Fir, "the more red tape we cut, the more

we ensure Alberta is the destination of choice for investors."

Red tape reduction is a smooth term, fine-tuned by marketing specialists to disguise a process of undermining environmental protection. This legislation targets mechanisms in place to keep ill-advised and inappropriate developments at bay, so they do not degrade or destroy public resources. The Alberta public — the majority of whom are concerned about the natural environment, water quality, biodiversity, and open space — should view proposed changes to the rules governing development with alarm.

The amendments would give the minister of Environment and Parks and senior managers the opportunity to side-step land-use plans, which were created with extensive public involvement, and unilaterally approve a variety of end uses on a site-by-site basis. Because this would occur site by site, this actually increases red tape through inconsistent and muddled application of rules across the board.

It is also unclear if any of these changes would be subject to environmental impact assessments, cumulative effects implications, public input (including Indigenous concerns), or prevailing public opinion about the uses to which our public lands should be put. Red tape reduction is an attempt to avoid the messy, "onerous" business of

adhering to the conditions Albertans want imposed on land uses for the long-term good of public lands and resources.

We need strong regulatory rules in place to define the boundaries of acceptable behaviour and standards. Legislation to protect public land wasn't developed on a whim — it evolved to create certainty. Bill 21 will reduce certainty and, like a teenager lashing out against parental rules, is an attempt to avoid having restrictions that constrain ministerial or bureaucratic "freedom."

Albertans should see red over the watering down of legislation protecting public lands under the guise of red tape reduction. Prosperity and environmental quality need not be strangers, but the government's focus on the former comes at the expense of the latter. It seems like a one-way street to an ecologically impoverished province. Please write to Associate Minister of Red Tape Tanya Fir (associateminister-rtr@gov.ab.ca) and Minister of Environment and Parks Whitney Issik (aep.minister@gov.ab.ca) to voice your concerns about the progressive weakening of environmental protection in Alberta and how Bill 21 contributes to it. ■

YOUR SHOT

Images of Alberta's Natural Heritage



WATCHFUL BOBCAT

"I was extremely fortunate to come across this bobcat mother in Fish Creek Provincial Park. Mum took this lookout position in a tree to keep an eye on her two kittens and watch for potential predators. Her kittens love to tease her by running back and forth, but her demeanor was very relaxed the entire time."

—Susan Heaven



SPRUCE SYMPHONY

"This image of Twin Lakes at sunset, framed by the surrounding spruce trees, with the reflected colours in the absolutely still water, stirs in me a feeling of peace. Moments like this are very special, when the busy day-to-day world is forgotten, and I am totally at peace, uplifted by the serenity and beauty of nature."

— Jack Bawden

Your Shot celebrates the amazing work of Alberta photographers and the special places and species they encounter. Photos are selected from submissions to the Nature Alberta image library, which we draw on to create the magazine and other outreach materials. If you have a special photo you would like to contribute to the image library, and possibly have published in the magazine, please send it as an email attachment, at full resolution, to images@naturealberta.ca. Photos of all native species and natural landscapes within Alberta are welcome.



Jaw-Dropping Bird

The Common Nighthawk

BY DORIS MAY AND STEPH WEIZENBACH

BOOM! The first time I heard this loud, unnerving sound, it reverberated through the ravine where my prairie home lies nestled along a meandering creek. The sound was ominous, like a sound effect you might expect in a tense scene from a *Jurassic Park* movie. I was even more alarmed when I saw the reaction of our small flock of sheep, who were frozen in place with their heads fixated in the direction of the sound. They looked as startled as I felt. For years, I heard this mysterious sound on midsummer eves, without any visual clues as to the source.

Decades later, I finally solved this spooky mystery while hiking through a riparian woodland, following a game trail to higher ground. I was abruptly stopped in my tracks by a tremendous BOOM just above my head. I recognized that unmistakable sound, closer than ever. My heart raced but I gathered my nerve and carried on to find the mysterious culprit perched on a branch of a coniferous tree. I immediately recognized it as a common nighthawk.

The common nighthawk is an extraordinary bird. At first glance, it looks like an unremarkable, mottled brown bird with a tiny beak. But if you are lucky enough to see it open its mouth, your jaw will drop almost as far as this bird's beak can open. Its enormous gape serves as an adaptation for catching bugs in flight. Its wide

mouth is surrounded by bristles that help knock flying insects into its wide sweeping face. Its face effectively turns into a bug net while it feeds on the wing at dusk and at dawn. It also sports a set of wide eyes that help it spot moths, mayflies, grasshoppers, beetles, wasps, and caddisflies in low light. Sometimes it can be seen feeding on clouds of insects attracted to bright lights in urban environments. The nighthawk's jerky flight resembles a bat in flight more than a typical bird, although it is easily distinguished from below by bright white patches on its long, pointed wings.

The mystery sound the nighthawk makes does not, as you might expect, come from its gaping mouth. It's actually a type of "sonic boom" made by male birds to impress the ladies during a daredevil stunt. In the middle of a feeding sweep, the male will suddenly plunge to the ground, swinging back up at the last moment for a dramatic finish. The impressive sound is created by air rushing through the bird's feathers as the wings sweep into a braking position. Recent research in Alberta has determined that this wing boom marks the nighthawk's exclusive territory.¹

Another bizarre behaviour of the common nighthawk involves nesting. Rather than hiding their nests or making them inaccessible like most birds, nighthawks typically lay two eggs

on a bare patch of ground. I was lucky to find a nest site close to the game trail I followed that fateful day when I solved my decades-old mystery. Curiosity brought me back to the area and my heart raced once again when I spotted a nighthawk on the ground with her mouth gaping widely open, hissing at me, performing the injured wing act. I knew there was a nest nearby. I carefully tiptoed around and spotted two creamy white, lightly speckled eggs on a bare spot of ground.

Common nighthawks incubate their eggs for 19 days before semi-precocial, downy nestlings hatch. The awkward fluffballs are tended by both parents, with the female keeping them warm and the male bringing food. They fledge and attempt short flights at 23 days and become entirely independent by 30 days old. What an incredible transformation!

I was very careful not to disturb the eggs and only stayed in the area long enough to snap a couple photos. I return to the area each year and found a nest in the exact same location four years in a row. Over a three-year span, I photographed the full life cycle. I found the nest disturbed in the fourth year, with one egg gone and the other egg several feet away, broken. I still hear them every year, but they have relocated to a different nesting spot.

Common nighthawks are listed as Threatened under the federal *Species*

at Risk Act. *The Atlas of Breeding Birds of Alberta: A Second Look* reported a decline in nighthawk abundance in Alberta,² which is consistent with declines in abundance across Canada reported by the Breeding Bird Survey. Their decline has been associated with habitat loss, reduced food availability because of increasing pesticide use, and increased predation.

Additional information on nighthawk distribution, abundance, and population trends is needed to support conservation efforts. If you have good hearing, a vehicle, and an inclination to wake up before the sun rises, you can participate in the Canadian Nightjar Survey in Alberta. Nightjar surveyors are assigned a route where you listen carefully for the common nighthawk's "peent" call. This is a very distinctive call that a novice birder can quickly learn by listening to recordings online. Your survey begins 30 minutes before sunrise and can be done any day between June 15 and July 15. At each of the 12 roadside stops, you quietly listen for the telltale "peent" call. Visit naturealberta.ca/citizen-science to learn more about contributing important data to conserve this amazing, jaw-dropping species. ■

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1. Elly C. Knight, R. Mark Bringham, Erin M Bayne. 2022. The Big Boom Theory: The Common Nighthawk wing-boom display delineates exclusive nesting territories. *Ornithology*, Volume 139, Issue 1. <https://academic.oup.com/auk/article/139/1/ukab066/6408601>
2. Federation of Alberta Naturalists. 2007. *The Atlas of Breeding Birds of Alberta: A Second Look*. 286-287. Edmonton: Federation of Alberta Naturalists.

Doris May is a lifelong amateur nature photographer and naturalist who inspired her daughter, Steph Weizenbach, to pursue a degree and career in Conservation Biology. Steph is the Program Director for Nature Alberta.



Preceding page: The nighthawk can open its mouth amazingly wide — an adaptation for catching insects in flight. BOB BOWHAY

This page, top: At first glance, the common nighthawk is an unremarkable, mottled brown bird, but your jaw will drop when you uncover their extraordinary adaptations. DORIS MAY

Above: Common nighthawks lay two creamy white, speckled eggs on bare ground or gravel rooftops. DORIS MAY

Above, right: Nighthawk nestlings hatch semi-precocial (capable of some independent activity), sparsely covered in down, with their eyes open. DORIS MAY

Right: Fully feathered fledglings with mom, ready to leave the nest at just over three weeks of age. It takes them one week to learn how to fly and catch their own food. DORIS MAY

Bottom: Common nighthawk performing a diversion by opening its wide gape, hissing, spreading its wings out, and hopping around to lure me away from its nest. DORIS MAY



How Geology Affects Wildlife Distribution — From Eroding Mountains to Glacial Rivers

BY DALE LECKIE

The distribution of plants and animals in Alberta is closely tied to the landscapes in which they live. Though there are some generalists, like coyotes, most species are adapted to specific landscape types. The development of these landscapes is in turn intimately related to Alberta's geological history, together with ongoing geological processes. Here we will explore several important examples, including eroding mountain peaks, glaciated landscapes, deeply entrenched river valleys, and arid interior plains located in the rain shadow of the mountains.

Rugged Mountain Terrain

The Rocky Mountains and Foothills did not always exist in the form they are now. What we see today is the result of nearly 60 million years of erosion whereby kilometres of sediment were eroded from the mountains. Mountaintop ridges are made of erosion-resistant Mississippian and Devonian dolomite, limestone, and quartzite. Intervening valleys have been cut by rivers

flowing through more easily eroded Triassic to Cretaceous shales and sandstones. Erosion is still ongoing, with debris flows, landslides, rock falls, and talus accumulations creating alpine habitat.

A wide variety of animals are uniquely adapted to mountainous terrain. For example, mountain goats can survive literally hanging onto the edges of steep, rugged alpine slopes. Mountain goat adaptations include large, powerful forequarters to pull themselves up steep rocky precipices. In addition, their hooves have protruding soft pads to provide better traction on the rocks.



Crowsnest Mountain, in its isolated splendour, is a rugged peak that is an erosional remnant of a much more extensive mountain range. DALE LECKIE



Mountain goats have adapted to thrive on steep, rugged alpine terrain where they can safely feed on nearby mountain meadows yet easily escape from potential predators. RICK PRICE

These adaptations allow the goats to forage for vegetation on exposed windswept ledges and nearby alpine meadows, largely immune to predation.

To find and observe mountain goats in the Canadian Rockies, it's best to first check out the local geology. Mountain goats require salt for nutrition, and they travel far during summer to get it. The Mount Kerkeslin Goat Lick in Jasper National Park is perhaps the best place in Canada to view mountain goats. The origin of the lick is tied to the geological history of this area.



Mineral salts in deposits of a now-drained glacial lake at Mount Kerkeslin Goat Lick in Jasper National Park provide valuable nutrients for the animals. Minerals such as phosphorous, sodium, and sulphur ingested by the goats were derived from glacial erosion of the surrounding mountains. DALE LECKIE

It is a deposit of light-coloured silt, called rock flour, that accumulated in a now-drained glacial lake. Minerals in the silts such as phosphorus, sodium, and sulphur were eroded by valley glaciers in the Athabasca River valley from limestone and dolomites in the surrounding mountains.

Even the debris from mountain erosion is important habitat for some species. For example, eroded talus and rock falls close



Pikas are high-altitude farmers that harvest and store hay crops during the summer in the debris of eroding mountains. Pikas do not hibernate and the hay is stored under boulders for winter consumption. TONY LEPRIEUR

to patches of mountain meadows represent prime habitat for pikas. Pikas depend on landslides, rockfalls, and scree deposits for protection from predators. All summer long, pikas gather, pile up, and dry out grass, twigs, and flowers to be stored as hay piles on the talus surface. These are later tucked under rocks for winter consumption. Talus and rock piles also provide protection from predators.

Mountain Updrafts and Migratory Pathways

Every spring and fall, thousands of golden eagles make their way to and from their Arctic summer breeding grounds to winter in the United States and northern Mexico. Their migratory route takes full advantage of wind patterns created by the thrust sheets of the Rocky Mountain Front Ranges.



Golden eagles use wind patterns created by the orientation of the mountain ranges to preserve their energy during their annual migrations. IMRAN SHAH

Individual thrust sheets are oriented such that the prevailing westerly and southwesterly winds rise up the slopes, creating updrafts above and in the lee of mountain ridges. During times of strong westerly winds, a standing wave develops, which provides lift for soaring golden eagles.

When the winds are not strong but the weather is warm, eagles soar on thermals over the peaks. Thermals are masses of warm air that rise convectively above the ridges. Eagles take advantage of the rising air masses to gain elevation with minimal energy expenditure. It is not uncommon to see several eagles circling

around in a thermal, gaining elevation and then gliding gently downwards to the next thermal to begin another circular rise.

From the right vantage points, it is possible to see hundreds of golden eagles migrating in a single day. Peak spring golden eagle migration is mid-March to early April. In the fall, peak migration is from late September to late October. Classic eagle viewing sites are found along ridges of the eastern Rocky Mountain Front Ranges in Jasper National Park, Kananaskis Provincial Park, and the Crowsnest Pass.

Hot Springs and the Endangered Banff Springs Snail

The evolution and survival of the Banff Springs snail is all about a unique set of geological conditions. The snails thrive in the thermal springs of the Cave and Basin National Historic Site and surrounding area at the base of Sulphur Mountain in Banff National Park.

Sulphur Mountain was named for the sulphur-laden hot springs that flow from its base. The hot spring water is derived from snowmelt and rain falling at elevations above 2,200 metres on nearby Mount Rundle. Water circulates downward through permeable carbonate rock to a depth of 3.2 km, where it is heated geothermally. The hot water then returns to the surface

by hydrostatic pressure. Some of the carbonate rocks the water percolates through are rich in gypsum, and this gives the springs their high calcium and sulphate content. Anaerobic bacteria convert dissolved sulphur into hydrogen sulphide, creating the springs' characteristic rotten-egg smell.



Southern Alberta's deeply entrenched river valleys provide good habitat for prairie rattlesnakes. RICK SCHNEIDER

This combination of temperature range and geochemistry at the thermal springs have created a unique habitat for the endangered Banff Springs snail to thrive. This half-centimetre-long snail lives nowhere else on Earth, thriving in the 30–36°C water temperatures and the dissolved minerals in the water.

Deeply Entrenched River Valleys

During the last ice age, the ice was so thick that its enormous weight depressed the ground below. As the ice receded, the land rebounded upward, forcing rivers to cut deep to maintain their gradients. The resulting deep river valleys are today a prominent and important feature of Alberta's plains, and several species have adaptations allowing them to thrive in these areas.

A good example is the prairie rattlesnake, found in southeastern Alberta mostly along the drainages of the deeply entrenched South Saskatchewan, Red Deer, Bow, Oldman, and Milk Rivers. Its preferred habitat is mixed-grass



Dry Island Buffalo Jump Provincial Park is a deeply entrenched river valley carved by the Red Deer River when the prairies uplifted after the last glaciation. Cottonwood forests lining the river bottom provide ideal habitat for prairie wildlife to escape otherwise extreme prairie weather. RICK SCHNEIDER

prairie associated with river and coulee bottoms, badlands, and sage flats. Wintering dens, called hibernacula, are usually in south and southeast-facing slopes offering wind protection. Hibernacula are typically found in slump blocks, meandering river scarps, badlands piping features, rocky outcrops, and mammal burrows. Temperatures in the hibernacula stay just above freezing. In the spring, females may find small burrows at the rims of entrenched valley escarpments for birthing of young, a setting that provides good sun-basking conditions and allows escape from predators.

Arid Grasslands

Southern Alberta is situated in the rain shadow formed in the lee of the Rocky Mountains, a setting that has existed for tens of millions of years. Warm, dry winds descend eastwards onto the prairies, resulting in an arid to semi-arid climate. The great distance from large water bodies also gives the climate a continental influence, contributing to major seasonal temperature variation. As a result of these climatic influences, open grasslands began to appear about 30 million years ago. Fauna composition changed in response, with fewer browsers



Pronghorn antelope have adapted well on the semi-arid, rolling, and flat glaciated landscape located in the rain shadow of the Rocky Mountains. TOM KOERNER

and more grazing and mixed grazing/browsing mammals.

Pronghorn antelope thrive in rolling prairie grasslands. Much of their preferred terrain is glacial in origin, including proglacial lake sediments and moraines created under the ice sheet or as the ice melted. Antelope have adapted to living in open habitats, with relatively long legs that allow them to run at high speeds to evade predators. In fact, they are the fastest land animal in North America. Though they live on the open prairies, forbs and shrubs are their preferred forage rather than grasses. Burrowing owl habitat is also located in the glacial-origin terrain of open prairie grasslands. The owls typically occupy the burrows of

Richardson's ground squirrels, avoiding rocky soil, hilly terrain, and lowlands that may flood. They require open areas with short and tall grasses containing mice, voles, and grasshoppers. Open landscapes also help them spot approaching predators. Unfortunately, there are only a few hundred pairs of burrowing owls left in Alberta. The remaining birds can be found in southern Alberta near Hanna, Brooks, and Suffield in areas of flat

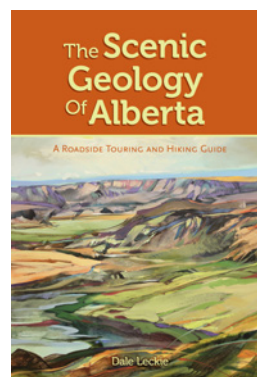


Burrowing owls live in someone else's burrow on the treeless glaciated terrain of the southern prairies. The owls require wide open spaces containing their prey and to be able to watch for approaching predators. ASHLEY TUBBS

to undulating, lightly grazed pasture. Burrows must be present.

In conclusion, if you want to find and view Alberta's diverse wildlife in spectacular landscapes, it helps to know a bit about the geology of where these animals live. From mountains, to the rain shadow of the prairies, to deeply entrenched rivers, geology and geomorphology have a strong impact on the distribution of much of the province's biodiversity. ■

Dale Leckie, PhD, P.Geol., has written two best-selling books on the geology and landscapes of Alberta. *The Scenic Geology of Alberta: A Roadside Touring and Hiking Guide* (2021) encourages people to get out and explore the natural beauty of the province.



The Invasive Northern Crayfish:

An Unwelcome Visitor to Alberta's Watersheds

BY VICTORIA VAN MIERLO



Most well-known invasive species come from distant countries, often hitching a ride with humans as we travel about the world. Headlines about the mass die-off of ash trees at the hands of the emerald ash borer or the zebra mussel's terrible impact on the Great Lakes come to mind. The invasiveness of these species is often the result of having no natural predators in their new ecosystem.

In a country as vast as Canada, encompassing so many distinct ecosystems, it's also possible for native species to become invasive without ever leaving their country of origin. This is the case with the northern crayfish (*Faxonius virilis*), which is native to Canada from

Saskatchewan to Quebec. The crayfish has now made the jump to Alberta watersheds, where it has become an invasive species capable of negatively affecting river ecosystems.

To understand the distribution of the northern crayfish in Canada, we have to travel back to the end of the last Ice Age, about 12,000 years ago. During this time, the massive melting ice sheets determined the patterns of water flow, and hence the dispersal routes for aquatic species returning to Canada as the ice retreated.¹ As a result of the specific dispersion routes available, Alberta ended up with the lowest number of fish species in

western Canada and the only western province with no native crayfish species.

Because of this dispersal process, Saskatchewan's river ecosystems have had millennia to develop stable food webs that included the northern crayfish. Meanwhile, the rivers of Alberta developed stable ecosystems without crayfish. Sometime in the 1990s, anglers transported live northern crayfish from Saskatchewan to Alberta to use as fish bait. The result was an accidental introduction of crayfish into an ecosystem that was not prepared for them.²

Following their release into Alberta's watersheds, the northern crayfish population exploded. Today, these small, omnivorous creatures have spread into six Alberta river drainages, including at least 14 tributaries of the North Saskatchewan River basin. Because this crayfish has negatively impacted watersheds in other parts of the world where



Top: A close-up view of a northern crayfish. Note the small yellow bumps on the claws, a key characteristic of this species. SAM STUKEL

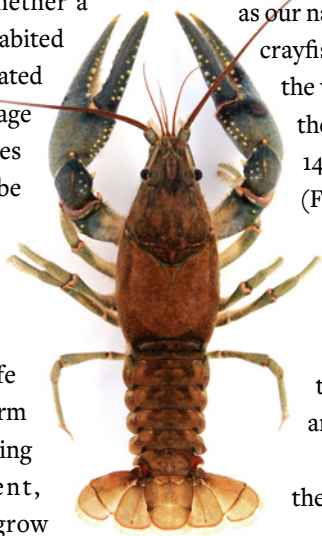
Aerial photo of a North Saskatchewan River tributary. These were the kinds of tributaries sampled for northern crayfish throughout the river basin. SAIRAFI BAZAN

The author holding one of the many northern crayfish that were successfully trapped in the Blackmud Creek. A very happy scientist acquiring data for her project! JESSE SHIRTON

it invaded, the Alberta government has declared the crayfish to be an invasive species in the province and manages it as such. To limit further population increases and spread, northern crayfish can be legally captured in any quantity without a fishing license throughout the province. In addition, all captured crayfish must be killed on site, and their use as fishing bait is strictly prohibited.

When the northern crayfish first arrived in Alberta, little was known about what the actual impacts on native Alberta fish might be. This is where my graduate studies at the University of Alberta came in. My aim was to determine if and how the northern crayfish was competing for food with native fish of the North Saskatchewan River basin. I also wanted to identify the tributaries of the basin that were at highest risk for future invasion. I set out in the summer of 2020 to collect fish, crayfish, and relevant environmental data in 43 tributaries of the basin. After three long months of crayfish trapping, electrofishing, and soggy feet from topping my waders on multiple occasions, I had the data I needed to answer my research questions!

Through statistical modeling it became clear that water temperature is the most important water-related factor in determining whether a given tributary will be inhabited by crayfish. Tributaries located in the prairies, with average summer water temperatures over 18°C, were found to be the most suitable for the crayfish, making them the most vulnerable to invasion. This is because all aspects of the crayfish's life cycle are optimized in warm water. In warm water, molting becomes more efficient, allowing individuals to grow



IAN GARDINER

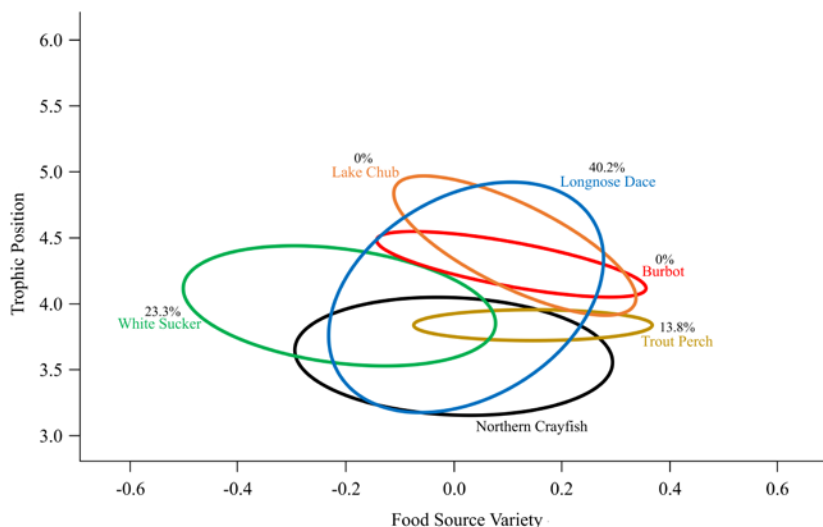


Figure 1. This graph illustrates the level of food competition between the northern crayfish and several native fish species. Each oval represents a species' niche in the local food web. When ovals overlap it means the species are eating the same food sources, and competing for them if the food source is limited. Except for lake chub and burbot, all the fish species studied overlap to some degree with crayfish, suggesting that negative effects could occur from crayfish introduction.

faster and reach sexual maturity at a younger age, leading to a larger invasive population. Conversely, western tributaries, in the foothills and alpine regions, may be resistant to crayfish establishment due to their colder average water temperatures, below 15 °C. As water temperature drops, the juvenile mortality rate of the crayfish increases and molting slows or stops completely.

To determine if northern crayfish are competing with our native fish species for food, I used stable isotope analysis, which reveals food web relationships. I found that crayfish, being omnivores, consume many of the same food sources as our native fish. For example, the crayfish's diet included 23% of the white sucker's diet, 40% of the longnose dace's diet, and 14% of the trout-perch's diet (Figure 1). This competition with the crayfish may cause native fish to shift to less-preferred food types, potentially leading to reduced energy intake and reduced reproduction.

My research suggests that the invasion of Alberta waters

by the northern crayfish is indeed a cause for concern. In addition, the finding that water temperature is a key determinant of invasiveness should help managers prioritize their efforts. Much more is left to be done — my initial work is just the tip of the iceberg! You can help in the fight against this invasive species too, by reporting any northern crayfish sightings using the EDDMapS App (eddmapp.org) and by keeping up to date on recent invasive species research. ■

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Victoria Van Mierlo recently completed her MSc at the University of Alberta in Aquatic Conservation Biology. She has a special passion for nature conservation and plans to pursue a PhD with hopes of heading up a research group of her own one day.

The Ronald Lake Wood Bison Herd: Observations From Their Home

BY GARRETT RAWLEIGH AND LEE HECKER

A small group of juvenile wood bison.
RICK SCHNEIDER

When people think of bison, they often picture the vast herds of plains bison that once roamed the Great Plains of North America. These massive herds, and the story of their demise, are well known. But how many people are familiar with their larger northern cousin?

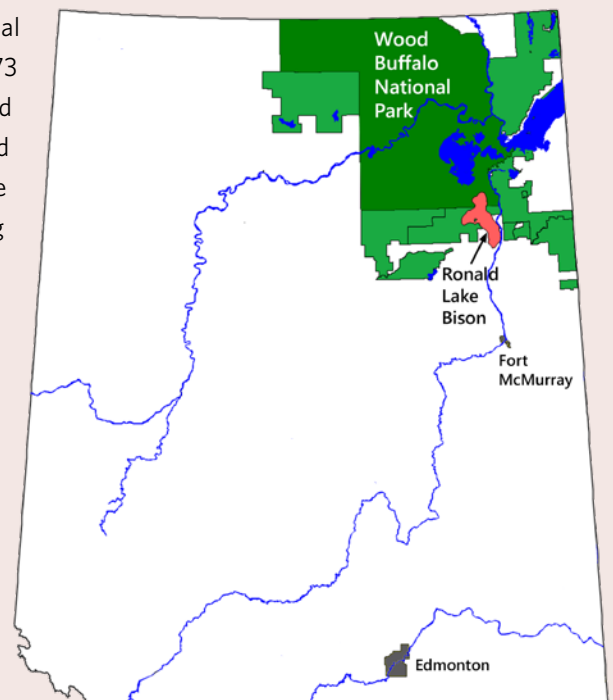
Wood bison are a distinct subspecies of American bison. Their historical range included Alaska and much of northwestern Canada, including the northern parts of the prairie provinces. Compared with plains bison, they are heavier, taller, darker coloured, and have a larger hump, all of which are adaptations that help them thrive in their northern homes. Wood bison were never as numerous as plains bison because there is much less forage available in their boreal habitat. The total Canadian population is estimated to have been less than 200,000 animals at their peak.¹

Like the plains bison, wood bison were decimated over the course of the 1800s. However, while plains bison were entirely extirpated from Canada by 1900, a few small herds of wood bison remained in remote northern regions.¹ Wood Buffalo National Park was established in 1922 to protect one of these remnant herds.

In the 1920s, a controversial decision was made to ship 6,673 plains bison from a captive herd in central Alberta to Wood Buffalo National Park.¹ The primary motivation for shipping the animals north seems to have been that the captive herd had expanded beyond the capacity of its facility near Wainwright. Wood bison

acquired tuberculosis and brucellosis from the translocated plains bison, who had themselves been infected through contact with cattle. In addition, the gene pools of these two subspecies became intermixed. For many years, it was thought that no pure wood bison stock remained. However, in the late 1950s a

Map 1. The Ronald Lake bison herd, shown in red, ranges along the Athabasca River immediately south of Wood Buffalo National Park.





Measuring the density of snow at a winter foraging location. DARREN EPPERSON

herd of 200 animals was found in the far northern portion of the park, and this herd became the foundation for wood bison reintroductions all around the world.

Today, there are approximately 3,000 bison in Wood Buffalo National Park and there are several free-ranging herds adjacent to the park. One of the satellite herds, located immediately south of the park and west of the Athabasca River, is called the Ronald Lake herd (see Map 1). This herd of approximately 300 animals has been the focus of our studies at the University of Alberta.

It was initially assumed that the Ronald Lake herd was a breakaway population of the Wood Buffalo National Park herd. However, local First Nations and Métis communities insisted the herd had always been separate from the park herds. Testing revealed that the Ronald Lake herd was disease-free and genetically distinct from all



A crater in the snow left behind by foraging bison. DARREN EPPERSON

other Alberta herds, supporting the community's position. As a result, the herd was assigned a unique conservation designation, protecting it from all hunting besides Indigenous harvest for sustenance.

In 2011, an oil company acquired a lease to develop an oilsands mine within the range of the Ronald Lake herd. This prompted additional study of the herd, overseen by a multi-agency committee. We, along with other ecologists from

*We would not know
how uniquely special
this herd is without
the outspoken
voices of Indigenous
communities.*

the University of Alberta and Royal Alberta Museum, have served as scientific advisers to this committee, and we have been studying the herd's ecology since 2017. Our experiences in the field led to some fascinating revelations about this remarkable herd.

In prairie habitats, there is an abundance of the graminoids (grasses and other grass-like plants such as

sedges) that bison prefer to eat. But the Ronald Lake herd's range is a mosaic of mostly deciduous and jack pine forests with scattered pockets of graminoid-dominated wetlands. This is a challenging habitat for grazers.

The herd has adapted to its environment by changing its foraging behaviour throughout the year. In the spring, they target graminoids, especially wetland sedges, which are high in energy. This allows them to replenish their stores, which are depleted after eating plants that are low in energy and protein all winter. In the summer, they switch to eating more herbaceous and woody plants such as fireweed, prickly rose, and red-osier dogwood, which are loaded with protein and help the bison add mass. When winter comes around they are stuck eating dead graminoids again, the only leafy vegetation available. Subsequently they lose weight, and the cycle restarts.

An interesting characteristic of bison foraging behaviour is their selectivity during winter. Bison use their massive heads to plow through snow-covered wetland meadows to access the buried sedge. These plowed areas are referred to as craters. We observed a great variety in crater size and a surprising degree of selectivity in the plant species



Wet meadows are a favoured foraging site of wood bison. LEE HECKER

consumed. We regularly found larger craters in wetlands dominated by one species in particular: wheat sedge. Bison devoured this species down to the frozen ground and left other graminoid species right next to these plants untouched.

Travelling between the scattered wetlands that contain their preferred forage is challenging for bison. To minimize energy loss and predation risk, bison tend to travel along well-established trails they help to create. These trails take advantage of ridges and other natural features that minimize the amount of time spent slogging through wetlands. Our trail cameras have captured images of dozens of bison travelling along these trails in single file. Bison use these trails so consistently that fallen trees on the trail have their bark rubbed off from recurrent bison-belly friction.

The bison trail system functions as a wildlife highway, opening clear paths through the forest for black bears, moose, wolves, deer, lynx, foxes, and even otters. This is an example of how bison engineer their environment in ways that benefit other species. In addition, during winter, wood bison



Open grasslands are uncommon in the boreal forest; therefore, wood bison feed extensively on sedges in wet meadows. LEE HECKER

act as nature's snowplows, cutting deep, wide paths through the drifts. We regularly observed tracks of other animals, particularly moose and wolves, using these prepared paths.

Perhaps the most interesting aspect of the Ronald Lake herd's movement is its annual migration. Each spring, over a period of approximately ten days, females from across the range gather in an upland meadow at the base of the Birch Mountains. Some females travel up to 40 km to meet others at this location. Initially, we thought that bison congregated at the meadow to have their calves. However, images from trail cameras on the migration corridors show that at least some females are travelling with calves in tow. Therefore, we now believe the meadow serves as a nursery ground. The openness of the meadow allows adults to keep

an eye out for predators and the solid ground allows for easy escape if pursued. Furthermore, the timing of the migration coincides with the green-up of vegetation in the meadow, allowing the bison to replenish themselves with nutrient-rich and easily digestible plants after a long, hard winter. This migration to a nursery ground is something unique to the Ronald Lake herd and has not been observed in other groups of wood bison.

When we encountered bison in the field, they were typically in sub-herds of 20 to 30 individuals composed of adult females and mixed-sex juveniles and calves. The response of these herds to our presence revealed a variety of anti-predator behaviours. These behaviours depended on where the bison were and what they were doing. While wallowing, the herd generally



A female bison and her calf. LEE HECKER

gave us their full attention but did not immediately bolt. Rather, the older females formed a woolly wall between us and the young. If we did not move away, an adult bison would break away from the wall and take a few hurried steps towards us, sending a clear message to get going. We also observed herds use a double-ringed structure in the winter when bedded. The adults formed a protective outer wall and the young ones lay together in the centre. If we encountered a herd foraging in a wetland, they would immediately take off running. But they generally did not go far. Instead, they would run five to ten metres into the adjacent forest and then form their defensive lines on stable ground. After a while, they slowly advanced back toward their feeding area, unwilling to expend unnecessary energy travelling to a new wetland.

Our research into the Ronald Lake herd's ecology contributes to the latest chapter in the history of this herd. But there is still much more to learn about them. Moving forward, it will be important to get the local communities more involved to expand our knowledge of the herd. We would not know how uniquely special this herd is without the outspoken voices of Indigenous communities. Coupling our modern scientific approach with traditional ecological knowledge will provide invaluable insight into the

factors motivating the herd's behaviour. Managing a population like this takes a community to figure out not just where, but why the buffalo roam. ■

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Garrett Rawleigh was born and raised in southern Alberta and has been interested in wildlife since he was young. After finishing a bachelor's degree in environmental science, he joined the Ronald Lake Bison Project at the U of A and hopes to continue working with the herd in the future.

Lee Hecker came out west from Maine to study rattlesnakes, but instead earned his PhD at the University of Alberta studying bison. Lee intends to pursue a career in ecology and conservation research.

Death by “Data Deficient”

The Disappearance of Wolverines in Alberta’s Eastern Slopes

BY GILLIAN CHOW-FRASER

Olaus Murie once wrote, “I wonder if there is another inhabitant of northern wilderness that so excites the imagination.”¹ The species he was referring to? None other than the wolverine.

More than 60 years later, the same thought ran through my mind as I tracked through the foothills of Alberta’s Rocky Mountains. Would this be the day? Would I be able to catch even a brief glimpse of a wolverine’s bushy tail in the distance?

I was out in the field to help with a research program monitoring wildlife in

the Rockies. The program was designed to collect data on a wide variety of species, but a potential wolverine sighting was at the top of my “most anticipated moment” list.

As I moved from sites in the foothills to higher-altitude areas in the mountains, I imagined spotting a dark blur on the top of the mountainous scree. It would likely take a second to figure out exactly what I was looking at. Then, with a gasp, I would realize it was, in fact, the “lifer” at the top of my list.

Unfortunately, my dream of encountering a wolverine did not materialize that day. Though I was not surprised.

Wolverines are known for being elusive, with naturally low densities and massive home ranges. So the chances of crossing paths with one are extremely low.

On top of that, the Eastern Slopes have changed dramatically over

the past century. The intact rolling forests that once characterized this region have been fragmented and transformed by industrial activities and roads, all to the detriment of the wolverine. As a result, the range of the wolverine has been contracting in southern areas, reducing my chances of ever seeing one in the wild.

Getting to Know the Wolverine

Wolverines have inspired and thrilled backcountry enthusiasts for ages. They are secretive and tough, short but fierce. Some have described them as “skunk bears,” but they are actually the largest terrestrial member of the weasel family (Mustelidae). The likeness to a skunk comes from the two characteristic stripes running down their backs leading to a thick tail, while the likeness to a bear comes from their stocky frame — adult males weigh 13–18 kg, females 7.5–12.5 kg.

As large-bodied carnivores, they prey on small mammals such as snowshoe hares and rodents. But they are also effective scavengers of much larger animals, such as moose and caribou.

Wolverines are found in forested, alpine, and tundra ecosystems. A key requirement is snow, and lots of it.



CLAUDINE LAMOTHE

Females den in snow-covered areas where they give birth to their kits — on average, two kits per litter — and they also require snow for food storage.

Wolverines have extremely large territories. The home range of a female wolverine can be between 50 to 400 km², but nearly five times that for males, whose ranges can vary between 230 to 1,580 km². With some overlap in home ranges, wolverines exist at quite low densities with only five to ten individuals per 1,000 km².

Their dependence on vast, connected wilderness makes them a useful indicator for ecosystem health and biodiversity. It is suggested the wolverines need intact spaces as large as 20,000 km² to maintain a secure population.² This would be about four times the size of Willmore Wilderness Park.



Wolverines are the largest terrestrial member of the weasel family, weighing up to 18 kg. BARNEY MOSS



An example of an intact foothills landscape; all too rare in Alberta's Eastern Slopes. GILLIAN CHOW-FRASER

A heavily impacted foothills landscape north of Hinton. The abundance of wolverines is reduced in disturbed landscapes like this one. GOOGLE MAPS



Declining Southern Populations

The wolverine's historical range extended across the boreal, Arctic, and mountainous regions of the Northern Hemisphere. Sadly, wolverines have lost considerable portions of their range in North America and are now only found in about 40% of their historical range.³ Across Canada, whole wolverine subpopulations have been lost from New Brunswick and southern Ontario, and from parts of Manitoba, Saskatchewan and Alberta. However, some subpopulations appear to be increasing, primarily in the northern regions, such as the Northwest Territories and northern Ontario.

In Alberta, wolverines were once found across the province but are now relegated to the northern boreal forest and the mountains and foothills of the Rockies. A decades-old provincial estimate states there are likely fewer

than 1,000 wolverines left in the province.⁴

Research suggests that wolverine declines are the result of several factors working in combination:

- Wolverines are sensitive to cumulative impacts from human disturbances and are less likely to be found in places where industrial development is more pervasive.
- Wolverines, especially females, are sensitive to backcountry recreation during the winter and will stop using areas that are busy with winter activities, such as snowmobiling or skiing.
- Steep declines in mountain caribou, a primary prey species, may also be negatively impacting wolverines.
- Climate will progressively reduce the snowpack, broadly impacting female wolverines that need deep snow to successfully den while pregnant.



Wolverines are fierce predators, but much of their diet comes from scavenging. MAIA C.

Researchers believe that the implications of these factors can still be better understood and efforts are underway to fill in the missing pieces.

Studying a Secretive Beast

Compared to many other species at risk, gathering data on wolverines is very difficult. They exist in sparse numbers and are extremely elusive. Historical estimates are largely based on trapping records, which do not always reflect true abundance. Trapping efforts can vary year-to-year and it is nearly impossible to account for the level of unreported harvest. This is why researchers have become creative in their monitoring techniques.

My colleagues and I have relied heavily on motion-triggered cameras



Coyote range has been expanding as a result of human development in the boreal forest. Competition with coyotes has been a significant factor in the decline of wolverines. TONY LEPRIEUR

placed throughout the wolverine's range in the Alberta's Eastern Slopes. Hundreds of cameras have been deployed over the years, addressing monitoring gaps in different areas and chipping away at the puzzle of why

wolverines are disappearing from the foothills.

Research from Alberta's Eastern Slopes has revealed several interesting findings. The key insight is that wolverine distribution and occurrence



Top left: The author at work placing remote cameras in wolverine range. ERIN TATTERSALL

Left: Motion-triggered cameras, like this one, are used to study wildlife in remote locations. GILLIAN CHOW-FRASER

Above: A wolverine photographed using a remote camera. Wolverines are enticed to visit the camera location using bait affixed to a tree. ALBERTA ENVIRONMENT AND PARKS

are generally negatively related to human footprint — i.e., roads, pipelines, seismic lines, and recreational trails.⁵

But what is it about highly developed areas that is so unappealing to wolverines? What is driving them away? As an eager grad student, this is the piece of the puzzle that I chose to tackle. I addressed this gap in knowledge by combining all the data we had, from the Willmore Wilderness Park down to Kananaskis.

It was already known that wolverines are affected by the presence of other carnivores. As a scavenger, wolverines must compete with other carnivores to find resources, like carcasses, and monopolize their finds. Knowing that

the diverse mammal community in the Rockies responded differently to landscape change, I tested to see if competitive pressures between wolverines and other carnivores were impacted by development.

My research revealed one particular culprit: the coyote. Coyotes have been expanding their range in North America and they generally respond positively to human development. Development brings in more coyotes, which means more overlap with wolverines. I found that for every unit increase in industrial features, wolverines and coyotes are three times more likely to co-occur.⁶ It is reasonable to conclude that increased competition with coyotes

is part of the reason why wolverines decline in the face of development.

A Complicated Conservation Future

Despite all this recent research and significant advances in understanding wolverine ecology, Alberta does not currently provide protection for wolverines. In fact, trapping of wolverines is still allowed. A status assessment was produced in 2000; however, wolverines are still classified by the Alberta government as “Data Deficient” rather than classified as a species at risk. Compare this to how the federal government views wolverines: they were first listed as “Special Concern” (a level below “Threatened”) in 1982, a designation the species still holds today.

The classification of “Data Deficient” is only supposed to be used when the available data are insufficient to determine the degree of threat faced by the species. But it seems clear to me that, given all the research done over the past 20 years, the threats are sufficiently clear. And there is certainly no doubt about the contraction of the wolverine’s range across all of Alberta — a hallmark for identifying species at risk.

Perhaps the Alberta government is reluctant to list the wolverine because only southern populations are in decline and northern populations appear stable. However, a range contraction of any degree is evidence of a significant threat to the species. It indicates a local decline in abundance, which reduces the

population's chance of persistence. It also points to a potential loss of genetic diversity because wolverines living in the foothills and mountains likely carry unique genetic adaptations not found in the northern populations. This means the impact of range contraction in the Rockies is more than a loss of numbers.

I believe the available evidence is sufficient to warrant immediate protective measures for the southern wolverine population. I fear that while we wait to gather more data, wolverines will continue to experience mounting pressures from industrial development and continue to decline. Let's not forget about the government's recent proposal to expand mining in the Eastern Slopes. A lack of complete data should no longer be an excuse for inaction.

A Call on Alberta to Protect These Wilderness Icons

I believe Alberta has a responsibility to conserve wolverines throughout their historical range. If you share my concerns, I encourage you to send a message to Minister of Environment and Parks Whitney Issik (aep.minister@gov.ab.ca) and tell her to re-assess the protective status of the wolverine in Alberta. It should be emphasized that:

- Wolverines have undergone range contractions and numerical declines in Alberta. The threat to the southern population requires action, even if populations are stable farther north.

- If the province concludes there are still significant data gaps that prevent listing, then Alberta should fund research projects that can address them.
- It should also be recognized that Indigenous Traditional Knowledge can also help fill in historical gaps in knowledge about trends in distribution or population changes.

My thoughts return to Murie's sentimental words about wolverines exciting the imagination. These days, instead of picturing an amazing encounter with a wolverine in the mountains, I am a little more sombre. I wonder if in 50 years, some young woman will have those same wistful thoughts about spotting a wolverine, or if her thoughts will be of a different kind. Will she instead wonder why no one did anything as wolverines disappeared from the mountains? I try not to dwell on those thoughts. Instead, I think of all the passionate and dedicated people that care so much about Alberta's wildlife. And I know that they will not let wolverines become another bygone beast. ■

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Gillian Chow-Fraser is a Director At Large with Nature Alberta. She is also the Boreal Program Manager at the Canadian Parks and Wilderness Society (CPAWS) Northern Alberta where she leads on conservation work in the boreal forests of Alberta to protect their wilderness and the wildlife that depend on it.

Book Review

REVIEW BY LU CARBYN

My first reaction after finishing *The Ecological Buffalo* was, quite simply, “Wow!” It left me breathless. I thought I knew a lot about bison, but the authors opened my eyes to a new world. The book is well written, carefully researched, beautifully illustrated, highly insightful and informative. Wes Olson speaks with a voice of authority, always keeping close to the theme: with the loss of bison from the North American landscape, much more than one species was lost. So many elements in the web of life were impacted by the presence — and the absence — of this large herbivore. Co-author Johane Janelle (they are a husband-and-wife team) is a skilled photographer. The text and photographs complement each other well.

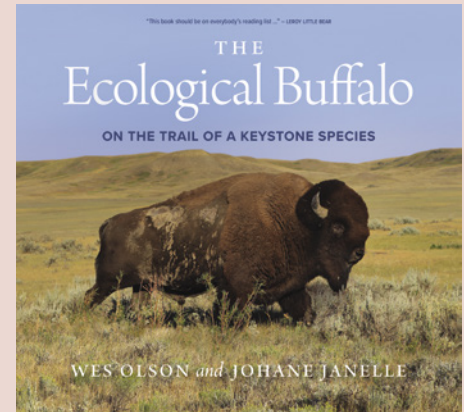
I could find nothing to fault in this book, though from an academic perspective, I noticed some small compromise of precision. Case in point: it is not precise to state that the lowest number of wood bison on the continent was 250 individuals. The historic record does not offer a precise number; estimates varied between 150 and 600 (Olgilvie, Preble, Raup, Hornaday and others). Our modern ways of counting animals across the vast northern landscape did not exist in those days. Records came from estimates provided by explorers, trappers, and law enforcement officers. So, a figure of 250 animals is not incorrect, but at the same time it is not precise. However, this is understandable; this work is intended for a wide audience, and sometimes a bit of precision needs to be compromised to

avoid overwhelming the reader with too many extraneous details.

Olson does a superb job of unfurling the story of how cattle became a modern surrogate for bison over time. Cattle have become a major conservation problem in some parts of the world where riparian areas have been trampled and polluted by bovine hooves and fecal (patty) pollution. In Alberta the well-known Cows and Fish program evolved to deal with problems relating to pollution of aquatic systems and regeneration of wetland tree species. Bison are always attracted to wetlands for shelter, food, and water. Olson does mention in passing the problems of potential trampling and grazing competition with other ungulates but minimizes the impact as generally being a minor intrusion of no consequence. Having seen first-hand the situation in Wood Buffalo National Park, I would question that, and suggest that the ecological consequences of millions of hooves and the celebrated bison patties (each adult produces 10 to 12 a day) to wetlands should not be trivialized.

Olson’s writing often leans into hyperbole. “Vast tracks of the prairie lay silent by the late 1870s; crawling, buzzing, biting, flying multitudinous hordes of dung- and flesh-eating insects had vanished and the songs of countless insectivorous birds that depended on them also faded away.” However, again, I cannot fault his tone of voice, as it makes the book more entertaining and emphasizes the theme.

None of my above comments should be construed as being critical of the



The Ecological Buffalo: On the Trail of a Keystone Species

By Wes Olson and Johane Janelle

**University of Regina Press, 2022,
304 pp.**

Available at uofrpress.ca/books

book. These are my own reflections on some of the implications of the loss of this charismatic species within the North American setting. Details presented in this book are correct and very relevant. Olson is meticulous and careful with his facts. I often use his information in my lectures. His practical, up-close handling of bison and his long-standing dedication to the preservation of the species have been exemplary. Janelle’s photographs bring the world of the bison right into your living room. *The Ecological Buffalo* is both informative and entertaining, and I highly recommend this book to anyone interested in wildlife conservation. ■

Lu Carbyn is an adjunct professor at the University of Alberta, a retired Canadian Wildlife Service biologist, and Vice-President of Nature Alberta.

The Implications of Shifting Baselines on Nature Conservation

BY LU CARBYN

Ecosystems change over time without any tampering by humankind. Human impacts, however, have caused massive changes over a short period of time that have resulted in serious environmental concerns, including loss of biodiversity.¹ We are all aware of the global issues of habitat loss and wildlife extinction around the world, which call for intervention and leadership from governments, academics, and researchers. However, we do not need to look so far as the destruction of tropical forests of Brazil or Borneo; we can see these issues right here in Alberta.

Anyone who has lived in Alberta for 50 years or so will have witnessed extensive declines in biodiversity and abundance of wildlife in our province. I came to Alberta in 1964 and was only away for a short interval (1972-1974) to complete my PhD in Toronto. My five-plus decades in central Alberta gave me ample opportunities to explore the outdoors in and around the Edmonton area. I have witnessed great changes. Some of the declines I have observed over the years are deeply troubling.

Younger people who have not experienced the abundance of yesteryear generally tend to be accepting of what we have today. The new normal is, quite simply, normal. If one does not know what was, one has no reason to fret over what is. This continual resetting of what is considered normal is known as benchmark shifting, or a shifting baseline, as coined by Daniel Pauly in

1995.² Even some veteran biologists are inclined to accept these changes. Many accomplished biologists (who inspire generations of students), and some nature enthusiasts, consider Aldo Leopold, the widely respected icon of conservation, to have been “off-track” when he mused about valuing pristine wilderness settings. They feel that advocacy detracts from their enjoyment



Alberta is at the western edge of the migration route of the buff-breasted sandpiper. Once frequently seen at Beaverhill Lake, it has now been absent for many years. Like all shorebirds, this species has been impacted by cumulative threats related to loss of wintering areas and staging areas on migration routes and the widespread use of agricultural chemicals worldwide. GERALD ROMANCHUK



Migrating snow bunting flocks in central Alberta once numbered in the tens to hundreds of thousands of individual birds. In recent years it is rare to see as many as 1,000 at a time.
BOB BOWHAY

of that nature which remains. I am of a decidedly different opinion.

In the 1960s, spring was a time when every large waterbody around Edmonton was teeming with waterfowl and a multitude of other aquatic birds.

*This continual
resetting of what is
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baseline.*

Urban sprawl has destroyed much of that. Great blue herons once nested near the town of Tofield, but no longer. At Beaverhill Lake (itself mostly gone), eared grebes would breed in huge colonies, and shorebirds filled the sky in May and then again in mid- to late summer. Buff-breasted sandpipers were common every spring at the south end of the lake; I remember marveling at the courtship display of these colorful

little birds. But no longer. Buff-breasted sandpipers now only make a rare appearance in the Edmonton area while migrating to their arctic breeding grounds. This species is threatened worldwide and could soon join the passenger pigeon on the extinct list.

Olive-sided flycatcher, rusty blackbird, and common nighthawk numbers have plummeted to near extinction in central Alberta. Local birding experts say they used to see flocks of migrating snow buntings numbering half a million or so winging their way to their arctic breeding grounds; now these experts say they are lucky if they see a thousand. Annual Christmas Bird Counts have recorded a 64% decline in snow buntings over 40 years.

Some 44% of migratory bird species that breed in the boreal forests, and winter in South America, have experienced declines in numbers.^{3,4} The thick-billed longspur is down by 90% from its 1996 numbers in Alberta's mixed grass ecosystems.⁵ Some species that nest in the mixed



Olive-sided flycatchers were once locally common in the boreal forests. It is well known by its emphatic "quick three beers" song. Numbers have plummeted since 1976, when the first May Species Count took place. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) lists the species as Threatened. LU CARBYN

grasslands of the Canadian prairies have undergone even greater losses in the last 40 years. To quote retired Alberta Fish and Wildlife biologist Lorne Fitch, "yesterday's abundant species can become tomorrow's imperiled ones." We have refused an ounce of prevention and now the situation calls for well more than a pound of cure, as we struggle with recovery efforts of endangered species.

Sharp-tailed grouse were once found throughout Alberta. They have become almost extirpated (a few seen here and there) in vast areas of the central portion of the province, resulting in

recent hunting closures in some regions. My wife and I took our grandchildren on a trip some time ago to Wainwright, where we watched sharp-tailed grouse at a lek. My grandkids got to witness something that most modern kids never will. The distribution of this grouse species has been relegated, by default, to southern and northern corners of the province, where it is able to survive, well away from intensive industrial agricultural practices.

Agricultural areas have been heavily impacted through large-scale industrial farming. Modern agricultural chemicals (especially neonicotinoids) further impact survival of grouse and many other bird (especially shorebird) and invertebrate species. Grouse still existing on private lands are more vulnerable to habitat losses than those on public lands. Traditional farming practices had



Richardson's ground squirrels have undergone massive reductions in both numbers and distribution in central Alberta, resulting in the loss of an important prey species for a number of avian and mammalian predators, such as red-tailed hawks and long-tailed weasels. Modern agricultural practices have been the major reason for these declines. TONY LEPRIEUR

been much more favourable to these birds. In previous decades, small fields with cover along fence lines, hedges, copses of woodlands, and wetlands provided habitat. Barn swallows once nested in buildings on every family farm, but these have been mostly taken over by commercial farming operations.

Drive in any direction from Edmonton and you are unlikely to find the once ubiquitous Richardson's ground squirrel, a.k.a. gophers. Until recently you could walk into almost any county administrative office and be eagerly provided with strychnine to exterminate ground squirrels. I understand that rodents can be a headache for rural residents, particularly at high densities, and we cannot always be protectionist in all places and at all times. However, should there not be limits to large-scale use of poisons, shooting, drowning, and habitat destruction of these animals? A question frequently asked by those who destroy the archaically designated "vermin" is, "Why not kill them all?" Hardy Pletz, a longtime hawk specialist, can explain the consequences. He used to see dozens of nesting pairs of red-tailed hawks while driving from Edmonton to Wetaskiwin; now he claims to be lucky to see one or two individuals. One rarely sees a long-tailed weasel in agricultural areas



As a result of changing agricultural practices, sharp-tailed grouse have become rare in central Alberta. The last record of a sharp-tailed grouse in the annual May Species Count was documented in 1992. TONY LEPRIEUR

any more. Gophers are at the base of the food chain for many other avian and mammalian predators, and that makes them an important element in healthy ecosystems.

In contrast, introduced, opportunistic birds have increased in numbers, which is another outcome of the new-normal paradigm. These species include urbanized crows, ravens, and seagulls, and European introduced species, such as Eurasian collared doves, starlings, and house sparrows.

Lest I risk losing you to despair, I must identify some positive stories as well. Given all the damage that has been done over the years, habitat restoration, along with habitat protection, is critical. Groups like Ducks Unlimited have been at the forefront of habitat restoration efforts. Since 1938, Ducks Unlimited has been working with landowners to restore wetlands across Canada. It is no coincidence that waterfowl are one of the few groups of birds that have shown increasing population trends (after initial major declines) over the past 50 years. Driving these efforts is the duck-hunting community, whose financial support for conservation is unparalleled. It makes me wonder what could be accomplished if we could harness similar levels of financial and political support for conservation from the birdwatching community.

We also need to redouble efforts to directly support species, especially those that are threatened. In past decades, we've had great success in reintroducing species that had been



Despite losses of wetlands, some duck numbers, such as the ring-necked duck, have increased. Ducks Unlimited has been effective in promoting waterfowl conservation in western Canada. LU CARBYN

lost from Alberta, such as the swift fox and peregrine falcon. Such conservation efforts are critical, and the public should be demanding that they occur, because

*The protection
of biodiversity
requires proactive
management and
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issue all the time,
not just when
a crisis arises.*

some species recovery efforts at the provincial level, woodland caribou for example, have waned over the years.

The recent creation of several new parks adjacent to Wood Buffalo National Park, resulting in the world's largest boreal protected area, is something to be celebrated. Will these areas be

protected from logging in the future? Habitat protection in the grasslands and parkland regions is much more challenging because most of the land is privately owned.⁶ Here, the efforts of the Nature Conservancy and other land trusts have been invaluable and need to be supported. Each year, these groups protect a bit more of our prairie landscapes through landowner bequests, conservation easements, and land purchases.

It was heartening to see tens of thousands of Albertans write to the UCP government last year, opposing ill-conceived plans to allow coal mining in previously protected parts of the Eastern Slopes and to remove parks from the provincial parks system. The protection of biodiversity requires proactive management and must be a top-of-mind issue all the time, not just when a crisis arises. Maintaining public support for biodiversity conservation is critical.

In my opinion, leaders in today's academic community are often disinclined to step out of the comfort zones of peer recognition, citation indices, and high-profile, high-dollar research grants. Instead of emphasizing rapid fibre production in forests, tree genetics, and high-yield silviculture practices in order to squeeze every possible dollar out of our natural resources, university departments need to motivate the next generation to have a more balanced approach to resource management.

There are some good initiatives in place. For example, the Ecosystem Management Emulating Natural Disturbance (EMEND) Project is a large-scale, variable retention harvest experiment designed to test effects of residual forest structure on ecosystem integrity and forest regeneration. It is a long-term project that began in 1998 and is forecast to run for one stand rotation, or approximately 80 to 100 years. The project is centred at the University of Alberta and is a collaboration between numerous research agencies, governments, and industry. Education is important. We need conservation training at university levels to promote qualified science teachers who are committed to conservation education at every level of learning, from early school years to post-secondary.

Positive stories can be traced to the efforts of passionate people, whom I call "shin kickers." My generation of shin kickers is disappearing; now passed are Douglas Pimlott (1920-1978), a founder

of the environmental movement in Canada; William Fuller (1924-2009), prominent Canadian ecologist and my mentor; David Schindler (1940-2021), whose groundbreaking research linking industry to water pollution placed him in the Order of Canada and awarded him many international accolades; Stan Rowe (1918-2004), founding member of the Canadian Council on Ecological Areas and author of many books on ethics and conservation; and so many others from their era. Are new people stepping up to replace these leaders from the past? Will you be among the ranks of the next generation of passionate shin kickers?

Baselines continue to shift when conservation objectives are reset with each passing generation based on existing conditions, locking in losses that have already occurred. To prevent shifting baselines, new value systems must evolve. I believe that it is not only critical for a new generation of shin kickers to take up the torch and carry on the fight, but they must also ensure that the history, the documentation, the stories and anecdotes, the memories of the way things were do not get tucked away into dusty archives or lost altogether. ■

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Dr. Lu Carbyn, Past President and current Vice-President of Nature Alberta, is a retired research scientist from the Canadian Wildlife Service. He has written six books, one of which, *The Buffalo Wolf*, won the Canadian National Geographic Society's Best Wildlife Book of the Year award in 2004. He is currently an adjunct professor at the University of Alberta. Lu thanks Erin McCloskey for her assistance with adapting this article from *The Life and Times of Grandpa Lu, A Biography*, Volume 6.



SMALL BUT MITE-Y

Soil Invertebrates and Land Reclamation

BY STEPHANIE CHUTE-IBSEN AND CELINE IBSEN

Alberta is home to six major ecosystem types and more than 60,000 known species.¹ Unfortunately, this biodiversity is under threat from a growing human footprint that now occupies 29% of the province.² Human activities — mainly agriculture, forestry, and the energy sector — are transforming Alberta's ecosystems. This stress on the land and the diverse life it sustains is intensified by climate change.

To address these threats, we need to take responsibility for the disturbances we create and repair the damage done. In industrial settings, this repair process is referred to as reclamation and it is required under provincial law for most large disturbances. In practical terms, it means returning the land to a useful state. But reclamation is only as strong as the process that supports it.

Land managers determine whether sites have been adequately reclaimed through ongoing environmental monitoring. This entails measuring indicators such as the drainage and stability of the landscape, the diversity and quality of plant communities, and physical and chemical characteristics of the soil. The intent is to ensure that companies do a good enough job of cleaning up contaminated land, putting back disturbed soil, and helping plants grow again.

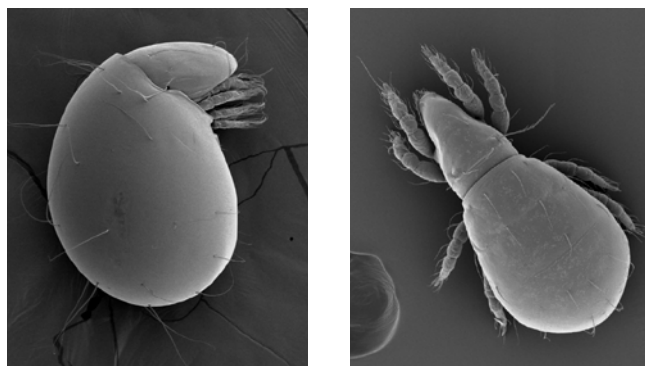
A drawback of the current approach to monitoring is that it only looks at components rather than the entire system. If plants appear to be growing and soil properties are within acceptable bounds, the site is marked as reclaimed. But ecosystems are more than the sum of their parts. The diverse elements comprising an ecosystem are all linked together through ecological processes, such as nutrient cycling. These ecological processes are vital to maintaining biodiversity and ensuring the integrity of the system. If we want to know whether a reclaimed system is functioning and healthy, we need to expand our monitoring toolbox.

Top of page: Microscope view of soil invertebrates extracted from soil samples from the Spruce and Aspen Reclamation Sites. Soil invertebrate groups include collembolans (springtails) and oribatid, mesostigmatid, and prostigmatid mites. STEPHANIE CHUTE-IBSEN

Through my PhD research I am proposing a new type of organism to observe: soil invertebrates. Soil invertebrates reflect ecosystem processes and can provide what we are currently missing in our monitoring practices: an integrative approach.

The World Under Our Feet

Soil is the foundation of life, and it is filled with tiny invertebrates: creatures without a backbone ranging from one-tenth of a millimetre to 2 millimetres in size. Pick up a handful of soil and you have a tiny food web in your hand, complete with predators, prey, and decomposers. Together these worms, slugs, and bugs (such as insects, mites, spiders, and springtails) make up a world just beneath our feet that serves as the foundation for the one we live in.



Under the scanning electron microscope we can see the detail of the smooth shield with setae and the legs. ALBERTA BIODIVERSITY MONITORING INSTITUTE

Invertebrates have several characteristics that make them ideal candidates for monitoring. Besides representing a whole food web, they are highly sensitive to changes in soil attributes, even more so than plants. They also have a short lifespan, which is a useful trait from a monitoring perspective. By monitoring invertebrates, we acquire a more complete picture of ecosystem health, habitat disturbance, and climate change. And because invertebrates are so small and abundant, monitoring them is relatively efficient and cost-effective.

My research at the University of Alberta has focused on two specific groups of invertebrates: springtails and mites. Springtails, or collembolans, are often mistaken for insects because they have six legs and antennae; however, they are actually in a taxonomic group called hexapods. They are named “springtails” because many species in this group have a special forked appendage known as a furcula, which acts as a spring to help them jump several body lengths — talk about a speedy exit! They are omnivores; some feed on decaying vegetation, some eat small worms, while others feed on plants and fungi. Springtails are found in every land-based ecosystem, from desert to tundra. They are abundant and uniquely beautiful.

The other group I studied, soil mites, are related to spiders and they have eight legs. In many soil types, they are the most abundant soil invertebrate. But even though they are so common, there is still much we don’t know about these mites. Only about 30% of the estimated 15,000 mite species in Canada have been formally identified.³ There is a whole world under our feet that remains unexplored. Maybe we should consider soil, and not space, the final frontier. The fact that most mite species remain unidentified presents a challenge for using mites for soil monitoring. Thankfully, new resources for mite identification and ongoing DNA research will help address this challenge.

Of Mites and... More Mites

Soil mites are incredibly diverse and have many different ways of feeding, reproducing, and dispersal. They are divided into four general groups: oribatid, prostigmatid, mesostigmatid, and astigmatid mites.



Some mites have intricate and detailed dorsal shields. Pictured here is a female mesostigmatid mite. The small hairs all over the shield are called setae, and often provide helpful tiny details for determining different species. ALBERTA BIODIVERSITY MONITORING INSTITUTE

Oribatid mites, also referred to as beetle or armoured mites, are the most abundant group of soil mites. Oribatid mites eat fungi and decomposing organic matter, putting nutrients back into the soil as they go. I like to refer to these mites as “little tanks” because they are heavily armoured and move slowly. The hard outer cuticle layer of adult oribatid mites provides protection but limits their speed and movement. When conditions in the soil become inhospitable, oribatid mites have to make a slow retreat — unlike, for instance, the speedy springtails. Oribatid mites live longer and reproduce more slowly compared to the other mite groups, so it takes them more time to establish a community.

Prostigmatid mites vary greatly in appearance and colours. Perhaps as a gardener you have heard of spider mites or velvet mites? These are prostigmatid mites, as are all major plant pest mites. In contrast to the oribatid group, most prostigmatid mites are soft-bodied, and they generally make up a smaller percentage of the overall soil mite population. However, some prostigmatid mites are opportunistic and can reproduce quickly when resources change or there is a disturbance.

Mesostigmatid mites are not as abundant as other soil mite groups, but play an important role as predators of smaller soft-bodied soil invertebrates. Certain species even have modified front legs to feel for prey and guide dinner towards their mouthparts.

Astigmatid mites are the least common of the soil mite groups. They are often found in high-nutrient soils, such as an agricultural field using manure as a fertilizer.

Choosing an Indicator

An ideal indicator has the right level of sensitivity to environmental changes, is easy and cost-effective to measure, is available year-round, and does not go through big population changes as the seasons shift. Some species are very sensitive to chemical, physical, and biological conditions and can only tolerate change within a narrow range, whereas others can tolerate a broad range and are less sensitive. Just like in the story of Goldilocks and the Three Bears, an effective indicator has to be just right — sensitive, but not too sensitive. One way that invertebrates demonstrate their sensitivity is by how quickly they are able to move in and establish at a reclamation site, or, conversely, pick up and leave if the going gets rough (also not unlike Goldilocks).

Through my research, three out of the four mite groups were ruled out as indicators. Prostigmatid mites were numerous, but difficult and time consuming to assess. Mesostigmatid mites



Collecting litter and soil samples for soil invertebrate extraction at a reclamation site at the Genesee Generating Station.
STEPHANIE CHUTE-IBSEN

established quickly, but lacked sensitivity. Astigmatid mites were highly variable and lacked consistency. Based on my findings, oribatid mites and springtails are the front-runners for a new reclamation indicator. Both groups provided consistent sampling and reflected environmental changes, though they differed in important ways. Springtails were easier to identify than oribatid mites, but oribatid mites had better sensitivity.

In addition to providing recommendations about which soil invertebrates are best for reclamation monitoring, my research will provide best practices for how and when samples should be collected. It will also determine whether soil invertebrates can improve the overall assessment process.

The science of land reclamation in Alberta has grown and changed over time, leading to changes in the criteria used for

reclamation assessment, most recently in 2010. It's time for further refinement of these criteria, incorporating indicators that are sensitive to environmental change, reflect ecosystem function and health, and above all provide confidence in our reclamation practices. Soil invertebrates, specifically oribatid mites and to some extent springtails, meet the criteria of a good indicator, and should be considered in reclamation assessment and monitoring. We owe it to future generations to safeguard the long-term sustainability and resiliency of Alberta's ecosystems.

If you're curious about the science of land reclamation, there are outreach programs, along with online content, offered through the Land Reclamation International Graduate School (lrigs.ualberta.ca) and the Canadian Land Reclamation Association (clra.ca). The reclamation scientists of LRIGS have even developed a game called *Become An Earth Doctor* (bit.ly/lrigs-earthdoc) that you can play to learn about the processes involved in reclamation. ■

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Stephanie Chute-Ibsen is a PhD candidate at the University of Alberta, working with Dr. M Anne Naeth in the department of Renewable Resources. When they're not in the River Valley gathering critters with their "bugpack," Stephanie collects stamps and preaches about the power of soil to anyone willing to listen.

Celine Ibsen is a writer and editor turned outdoor educator who works at Upstream Forest School in Calgary. She loves learning about everything she encounters outside, and is especially fascinated by bugs and trees.

Nature Kids



My BIG Alberta Backyard

BY NICK CARTER

Alberta is a great place to live. It's a big, beautiful province full of all kinds of natural wonders. In My Big Alberta Backyard, we introduce you to the unique and interesting wild spaces, and the diversity of wildlife that live there, that you can find in your province. This time, let's explore **Kleskun Hill Natural Area.**

What Are the Kleskun Hills?

Have you ever been to the badlands near Drumheller or Dinosaur Provincial Park? Badlands are a dry, rugged landscape where prehistoric rocks erode out from the hillsides. In Alberta, the most famous badlands are along the Red Deer River. There's another, smaller area of badlands up north near Grande Prairie: the Kleskun Hills.

Most of this land is protected by Alberta Parks as a designated Natural Area. With walking trails around the site plus a campground and historical village run by the County of Grande Prairie, you'll find plenty to do here.

What Lives in the Kleskun Hills?

73 million years ago, the Kleskun Hills were a swampy forest, home to dinosaurs and other prehistoric creatures. Nowadays, you can still find some pretty neat living things. Did you know that cactuses grow here? It's true! You can look for prickly pear cactuses on dry slopes around the badlands, but be careful not to touch or step on them!

All sorts of neat bugs enjoy the Kleskun Hills. Beetles hunt for food

and grasshoppers sunbathe on the warm rocky slopes, while butterflies dance between the purple prairie crocus flowers. Frogs sing their springtime songs in the reedy ponds while garter snakes bask among the rocks.

While there are no small ground squirrels with underground tunnel networks this far north, a big grey woodchuck will occasionally peek out from underneath the old buildings.



Once upon a time, the Kleskun Hill grasslands were home to vast herds of bison. They're gone from the area now, and today mule deer are the most common hoofed animal you'll see at the park. Look for their hoofprints and droppings along your walking trail.

The Kleskun Hills are also a wonderful place for birdwatching. Forest birds like woodpeckers and chickadees live in the trees, and



The Kleskun Hills are beautiful and unique, home to many cool creatures both present and prehistoric. NICK CARTER



In the spring, prairie crocus flowers add a dash of colour to the green and brown landscape. NICK CARTER

many prairie species that love open grasslands and rocky canyons live here as well. Vesper sparrows with their little red shoulder patches sit on fence posts, while red-tailed hawks soar above. Watch for a peach-coloured songbird called the Say's phoebe perching on the old farm equipment.

Why the Kleskun Hills Are Important

Kleskun Hill Natural Area preserves some of the last wild grassland in northern Alberta. This makes it home to all sorts of plants and animals that are hard to find in this part of the province. Palaeontologists look for fossils in the hills, and archaeologists study tools left behind by the Indigenous peoples who consider this place sacred. This means that

anything you find here should be left where it is. With our respect and protection, the Kleskun Hills will remain a wonderful place for people to enjoy for years to come. ■

Nick Carter is a writer, photographer, and naturalist from Edmonton. He enjoys travelling the province and finding cool new places and creatures to learn about.

Say's phoebes are a species of small bird who prefer dry, open places like canyons and badlands just like these. NICK CARTER

Scientists who study dinosaurs are interested in the fossils that can be found at the Kleskun Hills, which play a part in understanding prehistoric Alberta. NICK CARTER



Out and About

BY STEPH WEIZENBACH, PROGRAM DIRECTOR

What you need:

- ✓ Recycled cardboard such as an empty cereal box
- ✓ Scissors
- ✓ Sharpened pencil or pen
- ✓ Local flower or plant identification guide

Heart-Shaped Wildflower Bouquet

Going on a scavenger hunt for flowers is a fun way to spend a day. And it's a great way to learn more about the flower species that grow in your local area!

What to do:

- 1 Using your pen or pencil, draw a heart shape on your recycled cardboard.
- 2 Follow the lines with your scissors to cut out the heart shape.
- 3 Using your pen or pencil, carefully poke holes through the cardboard. Space the holes out and cover the entire shape.
- 4 Go outside for a walk and look for flowers. Anywhere you see a patch of 10 or more flowers growing, pick one.
- 5 Feed the flower stem through one of the holes in your cardboard heart. Keep looking until you have filled the entire heart!
- 6 Take your heart-shaped flower bouquet home and find the flowers in your flower or plant identification guide. ■



A beautiful, blooming, heart-shaped bouquet! STEPH WEIZENBACH

All different types of flowers grow along trails. Native flowers in the bouquet pictured here include **wild rose**, **Canada violet**, and **tufted fleabane**. Look these species up in your identification guide and see if you can point them out! The most brilliant flower in this bouquet is **oxeye daisy**, which is actually a noxious weed in Alberta. This means that this beautiful flower is not naturally occurring in Alberta and can cause damage to our ecosystems by reducing biodiversity when it grows wild. In Alberta, we are not allowed to plant oxeye daisy in our gardens and if it grows in your yard, you are required to remove it (pulling it out by the roots before it goes to seed is best for small areas of growth). There are ornamental types of daisies that are okay to grow, so don't go pulling daisies out of your garden just yet! Learn what the oxeye's leaves and stems look like to help you identify this noxious weed.

Ask Stuart

BY MYRNA PEARMAN



Welcome to Ask Stuart, a regular feature in which Stuart, our Nature Kids mascot (who just happens to be a swift fox) responds to questions asked by kids across Alberta. From time to time Stuart will also ask local experts to help him answer these questions. If you have a question you would like to ask Stuart, send it along to our Nature Network Assistant at naturekids@naturealberta.ca and it may be featured in a future issue. Today's questions are answered by our friend Myrna Pearman, retired biologist, nature writer, photographer, and author of several books.

Q What is a cavity-nesting bird?

Close your eyes and imagine a bird nest. Chances are you envision a bowl-like nest made out of sticks, grass, and mud. Many birds make this type of nest, called an open-cup nest. Some other bird species are cavity-nesting birds. Instead of building a typical cup nest, cavity-nesting birds lay their eggs inside a cavity, which is another word for hole. For birds, a nesting cavity is a hole that they can find in a tree, riverbank, cliff, or human-made structure (nestbox, hole in a building, mailbox, equipment, or even inside an old rubber boot!). Cavities offer extra protection from predators and weather.

There are primary cavity-nesting birds and secondary cavity-nesting birds. A primary cavity-nesting bird is one that can excavate (dig out) its own nest site. Woodpeckers, nuthatches, and chickadees all excavate cavities in trees; kingfishers and some species of swallows will use their feet to dig cavities in clay or sand banks. Secondary cavity-nesting birds also need to nest in a cavity, but do not have the adaptations to create their own nest. So they need to find an existing natural cavity (like a hole in a sandstone cliff), a human-made cavity, or a cavity left behind by a primary cavity-nester. Mountain bluebirds, tree swallows, house wrens, common goldeneyes, buffleheads, American kestrels, and northern saw-whet owls are some examples of secondary cavity-nesting species. ■



This pileated woodpecker is a cavity-nesting bird, living in hollowed out tree cavities. GERALD ROMANCHUK

These blue robin eggs are in a bowl-like open-cup nest. RICK SCHNEIDER



A colourful mountain bluebird.
MYRNA PEARMAN

Q Why are bluebirds blue?

Unlike other plumage colours, the blue colour of bluebird feathers is not due to a pigment. Rather, it is produced by the unique structure of the feathers themselves and the way they refract the light spectrum. If you take a bluebird feather and crush it, it turns dull gray. Adult bluebirds look different to each other than they do to us because birds' eyes can detect colour in the ultraviolet (UV) light spectrum. UV waves are invisible to the human eye. This UV coloration may play an important role when it comes to how the birds see each other. ■

Learn all about bluebirds and how to become a bluebird, including starting your very own bluebird trail, in this great new resource! naturealberta.ca/bluebird

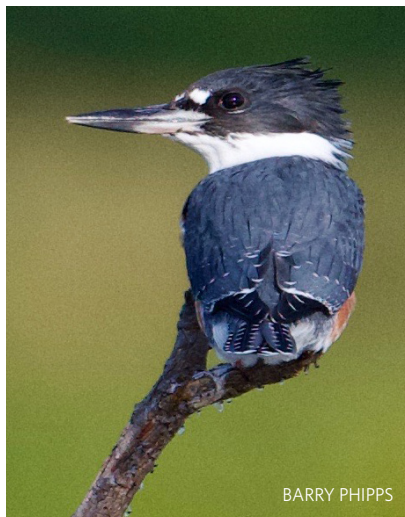


Kingfishers: Keeping a Watchful Eye on the Water

BY MARGOT HERVIEUX

If you spend time along rivers or small lakes this summer, you may be lucky enough to spot a kingfisher. There are many kinds of kingfishers in other parts of the world but in Canada we only have one species: the belted kingfisher.

The belted kingfisher is a striking bird with a blue back and head and a white breast broken by a blue collar. Their large heads have a distinctive ragged crest and a long, thick bill. The females have red in



the neck band and along their sides. The kingfisher call is a repeated rattle that they use when both flying and perching.

You will most often see kingfishers hovering over the water or sitting on a shoreline perch. When they spot a small fish, they plunge down to grab it and then return to the perch. There they whack the fish against a branch before swallowing it head first. In addition to fish, kingfishers also eat frogs and large aquatic insects.

Kingfishers are one of only a few birds that actually nest in burrows. The nest cavity is an enlarged space at the end of a one- to eight-foot-long tunnel in a steep bank. Most often they nest along rivers, but they will also use banks along roads and even in gravel pits. Kingfishers are very territorial and the nesting pair will defend both stream and bank for as much as a kilometre.

By June, five to eight white eggs are laid in the burrow on the bare ground. Once they hatch, chicks are fed by both parents for a month before leaving the nest. It isn't easy diving for your dinner, so the youngsters spend another few weeks with their parents learning the tricks of the trade.



Like most birds that feed in the water, kingfishers stay in Alberta until around the middle of October. Some may over-winter in areas where the water stays open. Migrating birds travel as far as Central America to spend the cold months either along the coast or on inland rivers and lakes.

The biggest threat facing kingfishers is loss of shoreline habitat, but populations seem to be stable. They are also sensitive to disturbance and avoid areas with lots of human activity. Kingfishers don't have many predators, but hawks do kill some young birds and minks occasionally make their way into nest burrows.

The next time you visit a riverbank, listen for the rattle of the kingfisher. It is always a pleasure to watch a real master catching fish. ■

Margot Hervieux is a founding member of the Peace Parkland Naturalists, an honorary member of Nature Alberta, and a longtime Nature Alberta board member. A version of this article originally appeared in her "Naturally Yours" column in the *Peace Country Sun*, which she has been writing for 15 years. You can read more of her archived columns at peacecountrysun.com.



MEET A MEMBER CLUB

EDITH MACKENZIE

BY PATTI CAMPSALL

Lesser Slave Lake Bird Observatory

Nestled along the eastern shores of one of Alberta's largest lakes, the **Lesser Slave Lake Bird Observatory (LSLBO)** is the perfect spot to study birds migrating to the Boreal Forest. Lesser Slave Lake and Marten Mountain form natural barriers that funnel migratory birds along the shoreline. Designated as an Important Bird Area, Lesser Slave Lake Provincial Park also provides important stopover and breeding habitats for over 255 bird species. Inspired by these incredible birding opportunities, local volunteers established the LSLBO in 1994 to "promote bird conservation through research and education."

Summer is short in the boreal forest. The LSLBO starts Spring Migration Monitoring in mid-April before the ice is even off the lake, but early migrant species such as juncos and American tree sparrows are already moving north. Most warbler species arrive in mid-May; peak migration comes in late May with the arrival of the Canada warblers. By early June, the birds are nesting and taking advantage of the long days, abundant food, and diverse breeding habitats found in the boreal forest. By mid-July, Fall Migration Monitoring starts as the long-distance migrants begin departing for their wintering grounds. After a

wave of juvenile warblers, sparrows, and thrushes passes through in early August, migration will slowly taper off until the end of September.

During migration monitoring, the LSLBO uses visual counts, a daily census, and bird banding to gain a better understanding of the health and population status of bird species. As part of the bird banding process, passive



mist nets are set up at sunrise to capture migrating songbirds. Each bird receives a uniquely numbered lightweight aluminum band and important scientific data is collected including species, age, sex, size, and overall health. The banding process takes less than a minute and then the bird is quickly released to continue on its way. All data is shared with the Canadian Migration Monitoring Network to provide a better understanding of bird populations across

Canada. The LSLBO also participates in the Monitoring Avian Productivity and Survivorship program, Owl Fall Migration Monitoring, and collaborative research projects.

With the growth of the education and research programs at the station, the LSLBO partnered with Alberta Parks to establish the Boreal Centre for Bird Conservation in Lesser Slave Lake Provincial Park. This year-round education and research facility provides hands-on exhibits, interpretive trails, education programs, collaborative research opportunities, and special events including the Annual Songbird Festival, which takes place on the last weekend of May. During migration, the LSLBO is also open for tours and school field trips. These interactive programs are a compelling and effective way to connect visitors of all ages with the challenges facing boreal birds.

For more information on the Lesser Slave Lake Bird Observatory, visit lslbo.org. ■

Patti Campsall is the Executive Director of the Lesser Slave Lake Bird Observatory and Boreal Centre for Bird Conservation.

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