

# NATURE ALBERTA

MAGAZINE

SPRING 2022  
VOLUME 52 | NUMBER 1



A COMMUNITY  
CONNECTED BY A  
LOVE OF NATURE

## Western Roots

In Search of Alberta Alpine Plants  
on the Shore of Lake Superior

PM40015475

**Paddling  
with  
Mark Lund**

**Irrigation Plan  
Drains  
River Health**

**Making  
Citizen Science  
Count**



**Boulder Lake**  
Conservation Site



**It's an Alberta thing.**



Alberta Conservation  
Association

1997 - 2022



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# NATURE ALBERTA MAGAZINE

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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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[NATUREALBERTA.CA](http://naturealberta.ca)

## BEHIND THE SCENES AT NATURE ALBERTA

For my first President's Message, I would like to start by saying thank you to Liz Watts for her service and for continuing to provide the Board with her insight and experience as Past President. Now, let's pull back the curtain and talk about what Nature Alberta is working on as an organization — recent successes, ongoing initiatives, and future plans.

Last year's fundraising campaign surpassed expectations and the Nature Alberta Endowment Fund now sits at nearly \$250,000. A big thank you to all our generous donors. Our current focus is on increasing regular monthly donations to support day-to-day sustainability. Please visit [naturealberta.ca/donate](http://naturealberta.ca/donate) for details.

The Member Club Nature Network is going strong. We have multiple events scheduled every week, including some offered exclusively to Nature Alberta members. If you have not already, make sure to sign up for a \$15 Lifetime Membership to access these events and receive a discount on Nature Alberta publications and merchandise. Get yours at [naturealberta.ca/membership](http://naturealberta.ca/membership).

Family Nature Nights are returning to parks across Alberta this summer. And fun activities for Nature Kids are always being added to [naturealberta.ca/nature-kids](http://naturealberta.ca/nature-kids).

Our volunteer Board of Directors meets four times a year. We are currently seeking someone from Alberta's southern region to provide their perspective on the Board. If you're interested, please contact me at [president@naturealberta.ca](mailto:president@naturealberta.ca).

Board members and additional volunteers support Nature Alberta's various committees, which make up the foundation of our organizational work. These include the Executive, Strategic Planning, Issues and Advocacy, Board Governance, Citizen Science, Fundraising, and Magazine Editorial Committees. Current committee work includes:

- Finalizing Nature Alberta's three-year Strategic Plan.
- Integrating citizen science events such as PlantWatch and the May Species Count with new technology.
- Our Issues Committee meeting with government representatives to discuss reclamation at sand and gravel extraction projects provincewide.

Nature Alberta is also a voting member of the Endangered Species Conservation Committee, which provides recommendations to government regarding regulatory status and recovery planning for at-risk species in Alberta. Thank you to Lu Carbyn for his long service as our representative on this committee.

Volunteer capacity is critical for these committees. Please consider volunteering — your unique input can help us fulfil Nature Alberta's mission to champion Alberta's natural spaces and species.

KIM MACKENZIE

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# Nature Alberta News



## You Came Through, Our Fund Grew!

In 2021, through a series of donation-matching programs, every dollar contributed to the Nature Alberta Endowment Fund was multiplied several times over. And you really stepped up! Donating in person at Family Nature Nights. Donating directly online. Giving gifts of dedicated contributions to loved ones, and requesting they do the same for you. Bidding generously in our first-ever Online Auction.

You came through to help us surpass our 2021 fundraising goal with over \$30,000 in donations! Through those matching programs, this figure grew. All told, the Endowment Fund was bolstered an incredible \$149,932!

Thank you to the Edmonton Community Foundation for their partnership and donation-matching, and to everyone who contributed! You helped set Nature Alberta up for a bright future.



## May Species Count

Citizen science volunteers have gathered data for the May Species Count since 1976! With today's smartphone apps, participating has never been easier or more fun! Head outdoors during the last weekend in May to contribute. Join May Plant Count volunteers on a scavenger hunt for flowering plants. Connect with your local bird count circle and contribute your findings to eBird. Post any other species you spot, from mammals to insects, on iNaturalist. Visit [naturealberta.ca/may-species-count](https://naturealberta.ca/may-species-count) to find out more!

## UPCOMING EVENTS:

### Migratory Bird Day

Saturday, May 14, 10 a.m.–4 p.m. at Lois Hole Provincial Park.

### Family Nature Nights

Select Wednesday evenings this summer, 6–8:30 p.m. New themes and locations each week!

**RED DEER**  
Incredible Ecosystems  
GAETZ LAKES SANCTUARY  
JULY 13

**EDMONTON**  
Fur & Feathers  
WHITEMUD PARK  
JULY 20

**EDMONTON**  
Water Wonders  
GOLD BAR PARK  
JULY 27

**CALGARY**  
Brilliant Birds  
INGLEWOOD MIGRATORY BIRD SANCTUARY  
AUG. 3

**EDMONTON**  
Wetland Champions  
LOIS HOLE CENTENNIAL PROVINCIAL PARK  
AUG. 10

**EDMONTON**  
Fantastic Forests  
SIR WILFRID LAURIER PARK  
AUG. 17

**EDMONTON**  
Healthy Planet  
RUNDLE PARK  
AUG. 24



# The View From the Water

BY MARK LUND



Kayakers capturing close-up photos of flowering aquatic plants along Jarvis Creek just downstream of Gregg Lake. MARK LUND

Imagine an early morning on a quiet Alberta lake. You silently glide along, listening to the morning calls of a loon and the squawks of a flock of Franklin gulls, and then you see the graceful swoop of a flock of pelicans landing on the water near you. As you drift along watching the pelicans feed you soon realize that they are paddling in formation, herding the fish towards each other. These moments are unique to the experience of paddling on Alberta's waterways.

I went on my first overnight canoe trip on the Red Deer River as a teenager in 1966. A group of friends from the Red Deer College Canoe Club and I were given an Opportunities for Youth grant to explore the rivers of Alberta and write the first canoe guide for the province, published in 1972. Since then I've been involved in most every subsequent paddling guide written for Alberta, and I began publishing my own series of guides for

Alberta's rivers and lakes in 1996. I have paddled on every major watershed in the province, but each year I still find a new reach or two to explore. For more than 50 years, paddling has been part of my occupation, my recreation, and my favourite way to enjoy the scenery and natural diversity of Alberta.

## Why Paddle?

Surprisingly for a land-locked province, much of Alberta is only easily accessible by water. Paddling offers views of wildlife, native plants, and spectacular scenery that even backcountry hikers or cyclists don't get to see. In calm conditions, a canoe or kayak can provide the stable platform necessary for good photography. And the slow, quiet stalk of a boat moving through water can get you some close encounters without disturbing wildlife or the landscape.



On the practical side, one can drag along more gear and provisions in a canoe or kayak than one can comfortably pack for a hike or bike trip. A canoe of an appropriate size is great for families, hauling the whole crew and keeping everyone safely together. Paddling also opens up opportunities for people with mobility challenges to get close to nature where hiking trails are not accessible.

### Places to Paddle

Alberta is comprised of at least four major ecological zones, each offering wonderful opportunities for paddlers to view wildlife, native plants, great scenery, and cultural resources. Your local paddling club is the place to start accessing these opportunities. Most canoe and kayak clubs organize day, weekend, or longer trips, and offer learning programs for new members. Visit [paddlealberta.org](http://paddlealberta.org) to find a club near you.

The prairies of southern Alberta offer some of the best wildlife viewing opportunities in the province. Wildlife is concentrated in the river valleys in this region. One trip I return to every few years is the Milk River, through Writing-on-Stone Provincial Park. This valley has it all: wildlife, scenery, interesting plant life, and great historical Indigenous and settler resources.

The accompanying photo of a great horned owl was taken on a very hot day a few years ago on the Milk River. Our group of boats quietly drifted by in the centre of the stream as the owl rested in the shade of the undercut riverbank. Great shots, no disturbance.

If the Milk River is just too far away, consider the middle reaches of the Red Deer River between Content Bridge (Highway 21 southwest of Stettler) and Dinosaur Provincial Park (northeast of Brooks).

Alberta's mountains and foothills offer fine paddling opportunities. Bear in mind that downhill-running streams with strong

Milk River Sandstones near Writing-on-Stone Provincial Park with the Ceyana Canoe Club, where we spotted this well-camouflaged great horned owl. MARK LUND



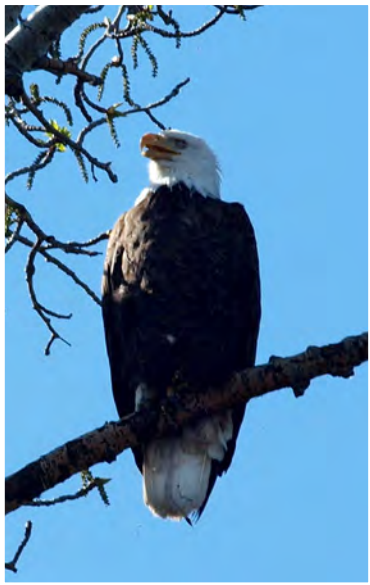
currents require appropriate skill levels. One of my favorite places to take new club members is William Switzer Park north of Hinton. Within the park's series of lakes connected by Jarvis Creek, you'll find great campsites and always a variety of wildlife and plant life to inspect. Jarvis Creek, particularly between Jarvis and Graveyard Lakes, makes for a fine first stream for a new moving-water paddler.

The big rivers of central Alberta and the Parkland Region, like the North Saskatchewan, are perfect for day, evening, or weekend trips. Generally, the further upstream one goes, the faster the current, and the greater the number of risks such as log jams and sweepers (fallen trees that partially or completely block passage). When water levels aren't running too high, the reaches below Devon through to Saskatchewan and beyond are excellent for new moving-water paddlers with good flatwater skills.

For Edmontonians, a day trip to Astotin Lake in Elk Island National Park is the classic birding trip. Islet Lake in the Blackfoot-Cooking Provincial Recreation Area is an excellent alternative, east of Edmonton and south of Elk Island National Park.

Another central region alternative is Big Lake just west of St. Albert. With the recently established boat launch in Riel Recreation Park, this has become a very popular site for an early-season half-day or evening paddle.





Bald Eagle on Big Lake, Spring 2020. MARK LUND

You don't necessarily have to venture into the deep back-country for a rewarding experience. You may be pleasantly surprised by all these close-to-home locales have to offer. Many moons ago my wife Lois and I spent three days on Maligne Lake, nestled in the mountains of Jasper National Park. A few days after returning home, we took a three-day trip down to Victoria Settlement from Edmonton. We saw more wildlife — beaver, fox, whitetail deer, and numerous waterfowl — in the first couple hours paddling out of Edmonton than we had in three days on Maligne Lake!

Northern Alberta offers excellent nature viewing opportunities for the novice paddler. There are easy river runs, after the spring monsoon flows settle down in mid-July, on the big rivers like the Peace River down to Fort Vermillion, or the Athabasca River from Fort Assiniboine through to the town of Athabasca. A few years ago on an overnight paddle to Fort Assiniboine in early spring, a bald eagle gave us a fishing demonstration right off our beach — quite a show to go with our morning coffee!

If you are not quite ready for river paddling, just east of Lac la Biche is Lake Land Provincial Park with the Jackson Lake circuit.

If the 3.5-km portage into Jackson Lake seems daunting (carts are provided), Lac la Biche and Beaver Lakes, on each side of the townsite, also offer excellent birding and wildlife viewing.

### **Hone Your Skills**

There's a segment of the Canadian population that seems to think paddling abilities are "in their genes" and they hit the water without instruction. These folks' paddling careers often tend to be short and scary. But they do perform a service for the community by providing a source of cheap, lightly used gear.

The basics are not difficult to pick up, but the skills you need to navigate moving water are a step up from flatwater techniques, and more challenging rapids call for even more practice.

Most of the paddling clubs in Alberta offer instruction to members, and membership is open to the public and is inexpensive. Several commercial outfitters throughout the province also offer lessons, as well as guiding for new paddlers — or even experienced paddlers who want the convenience of someone else looking after trip arrangements and logistics. The skill, confidence, and peace of mind you'll get from proper instruction is well worth the time and investment.





Three kayaks: inflatable in the background, thermoform in the middle, polyethylene up front. MARK LUND  
Birding by canoe on Astotin Lake, Elk Island National Park. MARK LUND



### Canoe or Kayak?

What is the difference between a canoe and a kayak? Which is better for your nature-viewing trip?

Canoes are open-topped boats with hulls that extend well above the water and bench-style seating for sitting or kneeling (for more stability and power). Kayaks are closed craft with a low, sleek profile and you sit on or near the bottom of the kayak. Canoes are propelled with single-bladed paddles (not oars!) and kayaks with double-bladed paddles.

Most canoes are larger than kayaks and are able to hold two paddlers plus a passenger or two and plenty of gear. Beginners will enjoy the greater stability of most canoes. Of course, that extra size means extra weight; something to consider if you're going to be transporting your craft to your destination or will be portaging overland between waterways. If the plan is to take the whole family, especially little ones and pets, out for a trip, you'll be well served with a canoe.

The majority of kayaks sold seat one person, meaning each member of your party will be paddling their own. This is fine for adults and even younger teens with proper instruction, but probably not suitable for the littlest crew members (and there's no place for pets). Double kayaks are available for couples or a parent-and-child combo. Kayaks tend to be lighter and easier to transport.

A kayak's lower, unobtrusive profile offers some significant advantages to birders. I've found it much easier to approach wildlife in a kayak compared to the higher profile of a canoe. However, a skilled canoeist has the advantage of an in-water paddle recover technique that allows for more silent movement.

If you've reached the stage of purchasing your own craft, a rule of thumb for both canoes and kayaks is that there is an

inverse relationship between cost and weight. I recommend choosing the lightest boat you can afford that meets your needs.

Beyond just the craft, paddling in our variable Canadian climate requires considerable additional gear for a safe and enjoyable trip. Boating regulations require: lifejackets for all, a spare paddle, throw-bags for rescue, a bailer, a whistle, and if night paddling a white 360° light. Weather-appropriate clothing, spare dry clothes, footwear, drinks and snacks, a first aid kit, sunscreen, toilet tissue, and a camera in a dry bag are all among the essentials I take along, even on short half-day trips.

Viewing Alberta's natural wonders from our ponds, rivers, and lakes can provide an entirely different perspective on places you've seen before and paddling opens opportunities to see things you may never have. Paddling reminds us of the connections between the land, the water, and ourselves. The social experiences with other paddlers, the wildlife, and the natural environment all keep paddlers coming back to repeat favourite trips and to explore new reaches. I hope your future nature adventures include many paddle-powered excursions! ■

Mark Lund is a retired physical and outdoor educator who taught at the University of Alberta and MacEwan University for over 30 years. Mark still paddles and guides trips out of his home base in Edmonton with the Ceyana Canoe Club ([ceyana.ca](http://ceyana.ca)) and his family. His comprehensive guidebook, *Mark's Guide for Alberta Paddlers*, is the definitive guide to Alberta's waterways, essential reading for beginning paddlers looking for sound advice and experienced paddlers looking to expand their horizons.





# SCANNING FOR LIFE FORMS

## Using Environmental DNA to Identify Species, Science Fiction Becomes Reality

BY JAY WHITE

Growing up in the 1970s, all I wanted was a *Star Trek* communicator and a tricorder. Remarkably, today most of us carry a communicator in our pocket far more powerful and versatile than Captain Kirk's version ever was. But a tricorder? Well, not quite, but we're getting there. Technological advances in recent years have made devices available to ecologists that previously existed only in the realm of science fiction. Examples include automated remote cameras and sound recorders, GPS tracking tools, and aerial drones. And now we have the precursor to Mr. Spock's tricorder: environmental DNA analysis, which is revolutionizing how ecological surveys are done.

### What is Environmental DNA?

Your genes, encoded in DNA, carry the instructions for your development and growth. Each of us is unique because of small differences in our DNA code, and because of this, we can be identified by a DNA sample. This is not only useful to police seeking to link criminals to a crime scene; it also provides a way for ecologists to determine which species live in a given area without ever seeing them.

Because DNA normally resides within cells, you may wonder how ecologists manage to obtain samples for testing. If they had to capture each animal to do a mouth swab there wouldn't be much point to the whole exercise. The answer is that they use "environmental" DNA (eDNA), which is genetic material released into the environment from sloughed cells, feces, mucous, and so on. Just as household dust is mostly made up of our sloughed-off skin cells, species leave traces just by existing in their environment.

Once released into the environment, DNA is fragmented and degraded by bacteria and physical processes. Fortunately, it is not necessary to have the entire DNA sequence to make an identification. The objective is simply to identify which species are present, not to identify specific individuals. For this, even small fragments of DNA will do.

The first step is to greatly amplify the small amounts of DNA that are present in environmental samples using a process called polymerase chain reaction. Because of technological advances, this can be done with great fidelity and at low cost. Once sufficient DNA is available it is then possible to search for code sequences that are unique to the species of interest. It's really not that different from identifying a bird by its song — you don't need the entire bird in front of you to know what it is. Any unique feature of the bird, be it a song or a unique sequence of DNA, will do.



## Benefits of the eDNA Approach

The technology underpinning eDNA analysis has evolved at an astounding pace. Analyses that used to be expensive and time-consuming and could only be done in a large research laboratory can now be done on a relatively inexpensive portable device that produces quick, accurate results (not unlike Spock's tricorder!). Place a sample in the machine and in under an hour you will know whether a given species resides within the sampling area. A wide spectrum of species can be explored, from plants and animals to bacteria and viruses.

To be clear, there does have to be eDNA in the sample for a species to be identified. Therefore, the simple passage of an animal through the study site may not be detected. To be certain if a given species is present it helps to understand its biology, and then sample at a time and location where cells are actively being sloughed off.



Tiger salamanders are generally silent and spend most of their time underground. This makes them difficult to monitor using conventional methods, but they are readily detected using eDNA. IAN KANDA



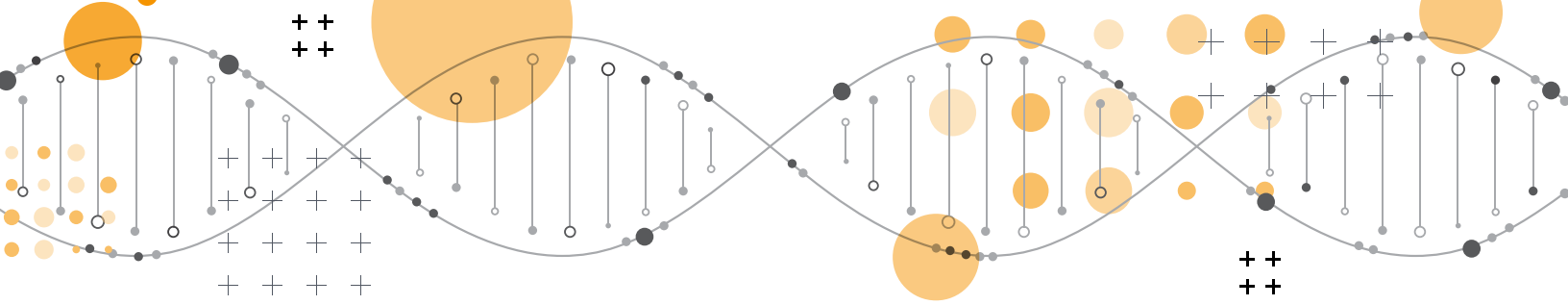
Devices that perform eDNA analysis are now portable and affordable. Shown here is the tabletop device used by my team.

One of the best features of the eDNA approach is that it is non-lethal and non-invasive. It can replace conventional monitoring approaches that were potentially harmful. For example, Alberta Environment and Parks protocols require killing up to 160 trout per site to collect a large enough sample size to determine if whirling disease is found at a particular location. When dealing with sensitive populations of bull trout, this loss of population is particularly undesirable, and a non-lethal monitoring method is preferred.

Another benefit of eDNA is that it can be used for monitoring rare and endangered species, which can be challenging to do using traditional sampling methods. For example, non-vocal populations of amphibians, such as salamanders, may be missed entirely by field biologists who normally rely on listening for calls during critical periods. With eDNA, a water sample carries the telltale evidence of their presence. Tiger salamanders have recently been identified in Edmonton wetlands using this approach.<sup>1</sup> The sensitivity of eDNA is so high that, under appropriate conditions, the presence of even one or two individuals residing in an area can be detected. And of course, eDNA sampling is non-invasive, which is essential for preserving rare and endangered species.

The decision to choose eDNA over conventional survey methods is also motivated by the increased sensitivity of eDNA surveys and the time and cost savings. This is especially true for aquatic sampling. What would have taken weeks to accomplish with an expensive field crew and equipment can be done in hours by one person collecting one litre of water.





## Case Study: Invasive Species and Biomonitoring

Early detection of invasive species is essential to preventing their establishment, thereby preserving Alberta's native populations. My company, eDNA Metagenomics Inc., was contracted by the Alberta Irrigation Projects Association to monitor several irrigation reservoirs in 2017 and 2018 for zebra mussels, which are extremely invasive. Zebra mussels have already been detected in the Tiber Reservoir in northern Montana, in Lake Winnipeg, and in some Saskatchewan lakes. The Alberta study involved a two-pronged approach, where water samples were physically analyzed for mussel larval forms and for the presence of mussel eDNA. The good news was that no zebra mussels were found in these reservoirs.



Zebra mussels are a highly invasive species that is spreading westward. eDNA provides a cost-effective method of monitoring for their presence. LAMIOT

## A Major Breakthrough for Public Health Monitoring and Reporting

Alberta's surface water bodies can contain toxic cyanobacteria, fecal bacteria, and even organisms that cause swimmer's itch, which pose a public health concern and threaten recreational activities. Traditional watershed monitoring involves beach sampling and it takes a week or more for results to be obtained. Using the eDNA approach, results are available in under an hour, providing critical health information in a timely manner. Alberta Health has embraced the use of this approach as it is much faster, less expensive, and requires less labour.

The eDNA approach also lends itself to community-based water monitoring. The Hanington labs at the University of Alberta has made great strides in getting eDNA

devices into the hands of lake managers and public health professionals. I was also part of a research study conducted by the Hanington labs showing assessments by non-expert users of eDNA devices were comparable to results performed in laboratories by experts.<sup>2</sup> Therefore, the prospects for using eDNA in community-based monitoring look good, as long as its limitations are understood.

While there are incredible benefits to the use of eDNA technology, there are some limitations to be aware of. For example, the results obtained can only show presence or absence of a species; they cannot provide estimates of population sizes. Also, as previously noted, there needs to be a sufficient amount of eDNA material to be detectable,

and this often requires filtering large amounts of water to capture adequate material. A comprehensive understanding of sampling protocols is necessary, as well as biological knowledge about the target species, which is essential for sampling eDNA during peak outputs. Finally, like any monitoring program, there are risks of false positives and false negatives. For example, there is some risk of cross-reaction between closely related species, such as between zebra mussels and Alberta's native mussels.

Going forward, we can expect that sampling techniques will continue to be improved and refined. And the machines that do the analysis are likely to continue to shrink in size while becoming cheaper and more powerful. The future of eDNA looks bright, adding an important new tool to the biodiversity monitoring toolbox. ■

### References:

1. Adrienne Lamb, 2021. Elusive tiger salamanders live in Edmonton-area wetlands — and environmental DNA proves it. CBC online news article. <https://www.cbc.ca/news/canada/edmonton/tiger-salamander-sydney-toni-brian-eaton-amanda-schmidt-abmi-innotech-alberta-1.6194102>
2. Rudko, S., R.R. Reimink, B. Peter, J. White, and P.C. Hanington. 2020. Democratizing water monitoring: Implementation of a community-based qPCR monitoring program for recreation water hazards. bioRxiv. doi: <https://doi.org/10.1101/2020.02.13.947259>

Jay White, P.Biol., is the scientific advisor of eDNA Metagenomics Inc. in Edmonton (e-dna.ca). He got his first tricorder in 2017 when he partnered with the Hanington labs at the University of Alberta.



## Coal Mining Update: Kicking the Can Down the Road (Again)

Two years ago, the Kenney government rescinded Alberta's long-standing Coal Policy, reflecting a political ideology that prioritized industrial development over environmental protection. While the creation of the Coal Policy involved extensive public consultation, the decision to rescind it was done without any consultation at all.

The coal industry saw the government's decision as a green light for expanding coal mining into areas that had previously been off limits. A frenzy of exploration activity ensued in sensitive parts of the Eastern Slopes, including the construction of roads into pristine regions.

The government's pro-development agenda was wildly out of step with current public values and priorities, and was met with a massive public backlash. Thousands of Albertans wrote or called the government to voice their opposition to the policy change. As a result, the government was forced to backtrack. It paused further coal development and initiated an overdue public consultation, led by an arm's-length committee.

The committee completed its report in December 2021, but it was kept under wraps until March 2022 while the government considered its next steps. The committee's report incorporated more than 25,000 survey responses and other submissions, and it revealed several important insights about public attitudes towards coal mining:

- In terms of priorities, the public is most concerned with the environmental impacts of coal development and least concerned with potential economic benefits — the exact reverse of current government ideology.
- More than 90% of respondents felt that there are areas of the province that are not appropriate for development, reflecting strong support for protection of the Eastern Slopes.
- More than 85% of respondents said they were not at all confident that coal development in Alberta is regulated to ensure it is environmentally responsible.

In response to the committee's report, Energy Minister Sonya Savage said, "We have heard the concerns of Albertans loud and clear." The Coal Policy has been reinstated, and exploration and development across the entire region covered by the policy has been halted. This is indeed good news. But don't break out the champagne just yet; this is a temporary reprieve.

Rather than closing the door to new coal mines in the Eastern Slopes, the government is deferring decisions about future projects to a land-use planning exercise. Moreover, four mining proposals already in review are exempted from the ban on new developments.

In principle, land-use planning is the right approach to take. The trouble is, the Alberta government is very bad at it. A regional plan for southern Alberta was released in 2014 but has had little practical effect. The promised limits on cumulative impacts were never implemented. The promised biodiversity framework was never released. And when the government decided to rescind the protections afforded by the Coal Policy, the regional plan was simply ignored. The same thing is happening now, with a proposal to massively expand irrigation in southern Alberta, without regard to aquatic biodiversity (see Lorne Fitch's article on page 26). It's no wonder that 85% of Albertans do not trust the government's ability to manage lands appropriately.

The message from the year-long public consultation is crystal clear. Albertans do not want more coal mining in the Eastern Slopes. They want this special region to be protected. If you agree, please write to Minister Savage and urge her to take meaningful action now: [minister.energy@gov.ab.ca](mailto:minister.energy@gov.ab.ca). The government should enact legislation that provides permanent protection for all ecologically important lands within the Eastern Slopes. Kicking the can down the road is not a reasonable alternative. ■



# Adventures in Wildlife Photography

BY RICK PRICE



**W**e've all seen amazing wildlife photos — the ones that make you sit back and say, "Wow!" But what's the secret to capturing those images? There are probably as many approaches as there are wildlife photographers. My approach involves spending as much time as possible in wilderness areas. I'm on the road, from Wyoming to Alaska, up to 250 days a year. So "being there" is a big part of the equation. But of course, there is more to it than that.

## **The Elements of a Great Photo**

Someone once asked me what I most like to photograph. I thought for a while and said, "Rarity." What gives me the greatest rush is catching animals doing something rarely seen, something difficult to capture. Accomplished photographers will say that, in addition to being unique, a great photo should also have impact, story, and emotion.

I'm always trying to capture animals doing something, particularly if it's something a little bit silly, like a child might do. Everyone has seen the perfect wild horse photo, the stallion standing there majestically. Impressive, but after seeing the same pose a dozen times it can become a bit boring. I want to get that stallion running, kicking, jumping, splashing through water, fighting with other stallions, and so on.

## **Finding Your Subjects**

If there are any tricks to my trade, it's knowing where and when wildlife is likely to be found, and then waiting, sometimes for hours, for photo opportunities to arise. It's always a chancy business.

Animals will almost always allow your vehicle to get closer to them than you can if you are on foot. Therefore, using your vehicle as an animal blind can work well. For example, if I come

across a coyote den I will park as far away as my telephoto lens will allow. Then I'll rig up a dark cloth with a hole cut in it for my lens to poke through and wait. I always keep the sound down to an absolute minimum. Some people talk to the animals, make animal sounds, or play apps on their phone. I find this irritating, and I feel it also irritates and frightens the animals.

Wildlife photography, at least the way I do it, takes patience. For example, I was recently on a back road east of the mountain parks and came upon a grizzly digging up roots in the snow. I spent three days sitting in my warm, comfortable vehicle watching him. He was there for six hours each day. If you sit around long enough, that bear will do something interesting, like stand up, run, or meet another bear. It's a great way to spend a day.



Preceding page: Great grey owl in a snowstorm. At 33 inches head to tail, a female great grey is the tallest owl in North America, but it weighs only 2.5 pounds. A 24-inch great horned owl weighs 4.5 pounds and they have been known to attack and kill great greys. The snowy or arctic owl is the heaviest, weighing in at up to 6 pounds. RICK PRICE

Top: Snowy owl checking me out on the fly up! My number 1 favourite bird in the world to photograph; I can't think of another more spectacular. RICK PRICE

Bottom: Bear magic! This little guy didn't like to play with his two siblings; he was a mama's cub. RICK PRICE



When you're going to rest or have lunch, park where you are most likely to have a wildlife encounter and *always* have your camera close by. You need to be 100% ready to go in a heartbeat! Sitting in a lawn chair and waiting also works. When you're sitting in one spot for a while, the mountain sheep lambs, the baby foals, and the foxes at the den will get used to you. There's no mystery about what you are or might do. But if you move around a lot, talk, or stand up, you've blown it.

I sometimes use a camouflaged tent, but it's not a perfect solution. I've had an animal I've been waiting for finally show up, only to be spooked and run off at the sound of the first exposure from my camera.

### **Approaching Animals on Foot**

When you need to get closer to an animal, walk slowly in a meandering pattern. You can also try bending over at



the waist, so that you look slow, clumsy, and half your size. Also try to avoid any kind of eye contact. I look away, like I'm not even interested in them, and I always hide my face and eyes behind a ball cap, even when I drive by in my vehicle.

Once you're close enough for quality photos, stay there and don't move. Also avoid eye contact. Just wait, and chances are something cool will happen!

You will always do better if you are on your own. But if you are with a group, walk single file so that you are less imposing. If the group begins to

spread out, say to get different photo angles, the animal may perceive this as encirclement, as a wolf pack would do. If you can walk on a hard surface, and make less noise, that's all the better.

### **Photographic Techniques**

I try to have two cameras available, either on the seat beside me or hanging on either hip. One camera has a long telephoto lens for far away subjects and the other has an all-purpose zoom that will go from mild telephoto to wide angle. This way you will never miss anything — a trick I learned during my years as a professional event photographer.

It's also important to check all your camera settings before a shoot. You don't want to be fumbling around with settings at the critical moment when an animal wanders by. In addition, be sure to carry an extra battery and a blank memory card with you.

In the days of the film camera, it cost a dollar every time you tripped the shutter. Now digital cameras take up to 30 frames per second and it doesn't cost a thing. If you take hundreds of photos, you can expect that most will be terrible. This is why God gave us the delete button. So don't be afraid to take lots of photos. Fire that camera off



From the edge of extinction, trumpeter swans are back! Weighing more than 25 pounds, they're North America's largest native waterfowl and heaviest flying bird. What an honour to catch this swan just taking off and landing for the exercise! RICK PRICE





Swimming moose family. It took me three years, off and on, of hanging around trying to get this photo of the whole family.  
RICK PRICE



A beautiful cross fox! I've noticed the further one goes west toward the mountains and B.C., the more cross and black foxes you see (as opposed to the red fox of the prairies and foothills). RICK PRICE

like a machine gun — I try to get smoke coming off mine. This way, you'll have a much better chance of surprising yourself with some great images. This time-honoured technique is referred to as "spray and pray."

Once you've taken your close-ups of an animal, shift gears and do some wide-angle shots, where the animal is in a scene. These "environmental" photos are often much more pleasing and interesting than just a series of close-ups that might have been taken in a zoo for all the viewer knows. Then keep thinking about what else you might do. Work for those photos! What about video? As photographers, we are historians and storytellers, and this is how you should be thinking about the scene.





Mountain bluebird, frozen at 1/4,000th of a second shutter speed. I finally pegged it! RICK PRICE



Coyote on his favourite rock near their den. They are much easier to get photos of when the den is empty of pups and the early February breeding season is getting close. That's when the males get silly and reckless — totally focused on the ladies. RICK PRICE





Top: Here's a lot of ram! Notice how this first bighorn sheep has "broomed" the end of his horns, either from fighting or intentionally wearing them down to better see predators coming. Unintentionally, he has also made himself illegal to hunt, because now his horns will never go beyond his eye, which means he is a sub-legal ram for the rest of his life. RICK PRICE

Right: These lynx kits are two members of a family of three young ones and their mother. RICK PRICE



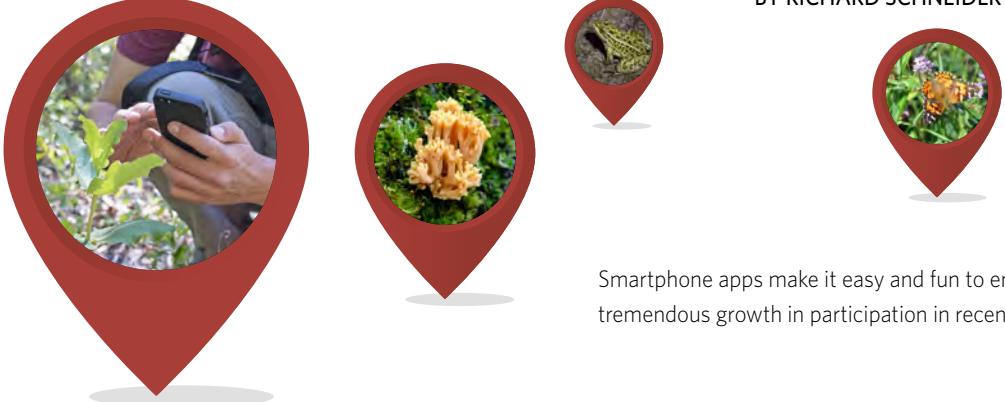
There are still many photos I haven't been lucky enough to take yet. My "Holy Grail" is a whole family of bears standing up or babies riding on their mother's back. The possibility that this might be the day I get that shot gets me up early every morning. Find what inspires you and begin your own adventures photographing wildlife. Fair warning: it can be addictive — but it's also incredibly rewarding! ■

Rick Price spent most of his career as a professional portrait and commercial photographer in Red Deer. Ten years ago, he rediscovered nature photography, his original passion, and hasn't looked back. You can see more of his photographs on Flickr at: [flickr.com/photos/130809464@N02](https://www.flickr.com/photos/130809464@N02)



# Making Citizen Science Count

BY RICHARD SCHNEIDER



Smartphone apps make it easy and fun to engage in citizen science, which has led to a tremendous growth in participation in recent years. ANDY WRAITHMELL (FAR LEFT AND FAR RIGHT)

Over the past few years there has been an explosion of interest in citizen science, largely thanks to new smartphone apps linked to online databases. On eBird alone, there have been over 80 million checklists submitted to date, recording more than *one billion* bird observations.

To be clear, citizen science is not new. Observing and documenting animals and plants is something that naturalists have always done; it's part of the job description. What's new is the enormous increase in participants and the rapid, widespread sharing of information made possible by the Internet.

The new citizen science apps serve naturalists in a variety of ways. At the most basic level, they provide an efficient way of making and storing observations, largely replacing the handwritten checklists of the past. The quality of observations has also increased, through the inclusion

of photographs, sound recordings, automatic time stamps, and GPS locations.

As the databases have grown, they have become increasingly useful to naturalists. The larger platforms

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*As naturalists, we love to watch wildlife, but if we want wild species to remain viable we need to actively contribute to their conservation.*

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provide excellent resources for learning about species, and their map products are valuable for trip planning. Some apps are also beginning to assist with species identification in the field, using image and sound recognition

algorithms derived from citizen science databases (e.g., Seek and Merlin). These identification tools are still at an early stage of development, but even now they are a great help to novice naturalists.

Another important benefit of the new citizen science apps is that they provide a gateway for the entry of new individuals into the naturalist community. The apps are free and they are easy and fun to use. Younger people in particular — the critical next generation of naturalists — may well find that “capturing” wildlife on their phone is more compelling than capturing imaginary creatures on the Pokémon GO app. At least we can hope.

Last, but certainly not least, citizen science provides an opportunity for naturalists, both novice and experienced, to meaningfully contribute to science and the conservation of biodiversity. This is what it's all about. As naturalists, we love to watch wildlife, but if we



want wild species to remain viable we need to actively contribute to their conservation. Participating in citizen science is a great way to accomplish this, and in this article I will explain how to get involved and how to maximize the value of your efforts.

### Conservation Science

The aspirational goal of biodiversity conservation is to restore and maintain species and ecosystems as they would be in the absence of human disturbances. But in practice, conservation mainly entails finding an optimal balance among competing human objectives. For example, we want to restore caribou populations, but we also want to harvest trees to produce paper and extract oil to run our cars. Therefore, it is best to think of conservation as a form of decision-making concerned with how we interact with natural systems. The end result is a set of evolving rules and limits on what is allowed and where it can happen. The role of conservation science is to inform these decisions.

Science contributes to conservation decision-making in several ways. Biodiversity monitoring programs serve to identify problems and quantify the level of risk. This is how we

The Cornell Lab, which runs the eBird program, statistically analyzes eBird checklists to generate maps of bird abundance. Shown here is the abundance of ruby-throated hummingbirds over the course of the year (darker shades = higher abundance). These abundance maps can be downloaded for free from the eBird website. RICHARD SCHNEIDER

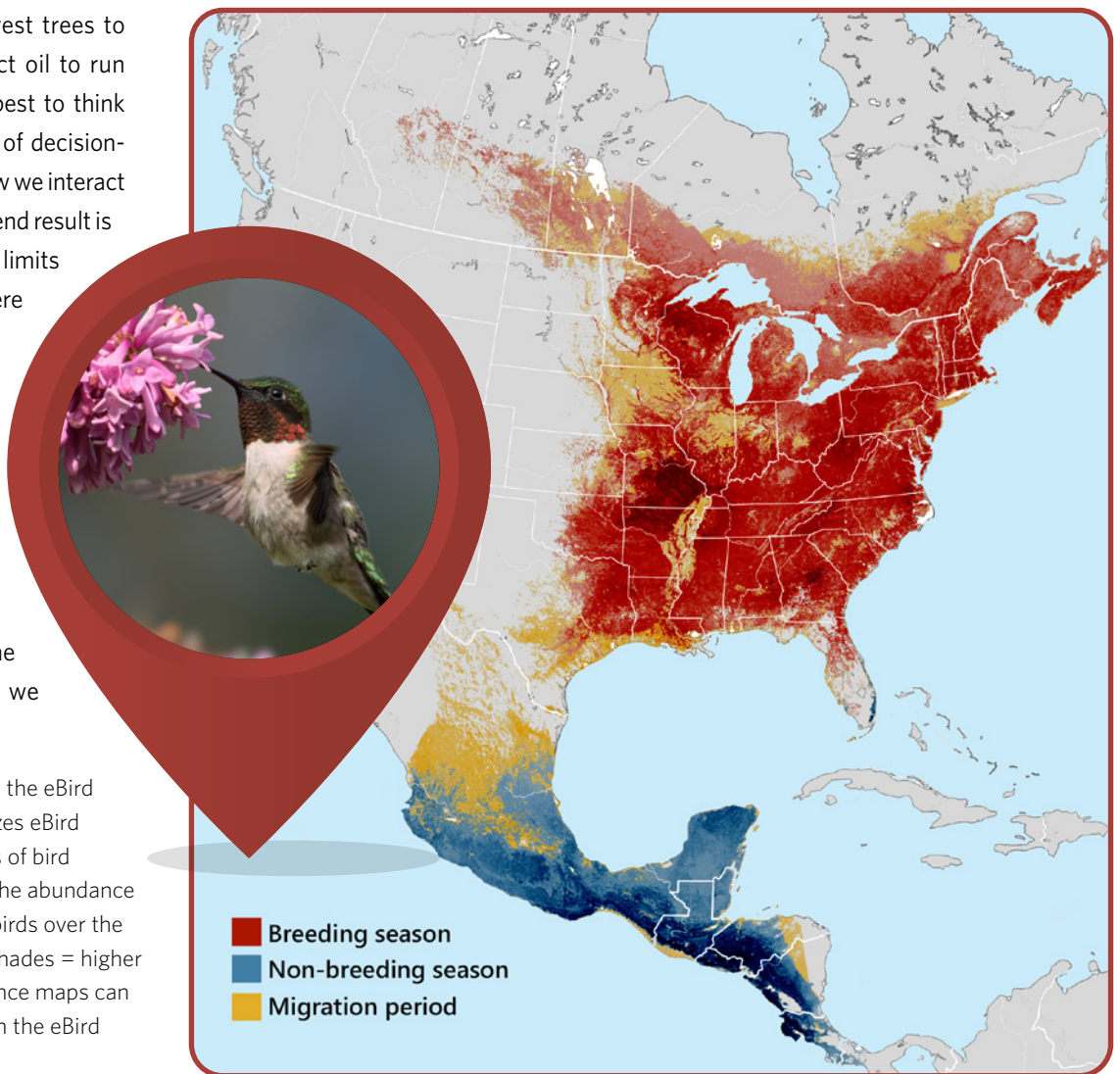
know which species are in trouble and where the priorities lie. Other monitoring programs provide feedback on the effectiveness of management activities. Research programs provide insight into how natural systems work, including the causes of species declines. This provides the foundation for developing management actions and predicting likely responses — critical contributions to decision-making.

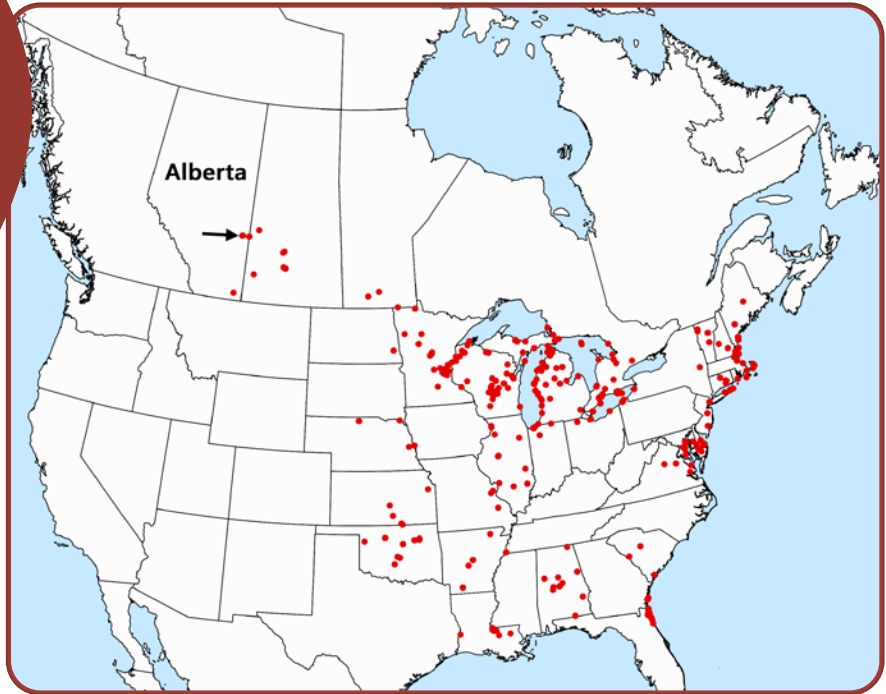
The main takeaway is that there is more to conservation science than observing nature. The true value of the data is realized when it is used to support management decisions. Unfortunately,

the connection between research and its application to management is not always easy to achieve, even for well-structured studies. As we will see shortly, this is a key challenge for citizen science projects as well.

### The Contribution of Citizen Science

Citizen science is the practice of engaging the public in scientific projects that produce reliable information usable by scientists, decision-makers, and the public.<sup>1</sup> In the field of conservation, most citizen science projects focus on broad-scale species monitoring. These projects provide information on species abundance, species distribution,





migratory patterns, and the timing of natural processes such as flowering. Some projects focus on monitoring aquatic and terrestrial habitat quality. In addition, researchers and resource managers sometimes recruit volunteers to help collect data for specific research studies.

The core strength of citizen science is the large number of observers it engages. This complements the main weakness of conventional science, which is limited capacity. Scientists are very good at collecting high-quality data, but there just aren't that many of them. Placing literally millions of additional observers in the field makes a tremendous difference in what can be achieved. Through citizen science, we can monitor across vast spatial scales and over extended time frames. We can also track rare species and species that are generally overlooked through conventional monitoring programs. Moreover, through the new phone apps, which provide photographs, sound recordings, GPS locations, and time stamps, the value of citizen observations has been greatly enhanced.

Last summer, my wife and I came across a very large, very hairy, blue-eyed beetle while hiking in the Wainwright Dunes Ecological Reserve. Through iNaturalist we learned that this unusual insect was a goldsmith beetle. Moreover, our observation helped to define the extreme northwest edge of the beetle's range (black arrow). RICHARD SCHNEIDER

Citizen science projects come in two main forms: structured and unstructured. Structured projects are established for a defined purpose. Typically, the organization or individual that initiates the project also leads the analysis of the data and the application of the findings. Structured projects are characterized by well-defined protocols that observers must follow. These protocols define what is to be studied as well as standardized methods for making observations.

Unstructured projects are more open-ended. Generally, the intent is to build a database of observations without explicitly defining what the data will be used for. Projects may impose some requirements on observers, such as requiring a photograph or limiting which species are to be included. But participants are otherwise free to make

observations whenever and wherever they please.

With the rising profile of citizen science in recent years, the number of projects has greatly increased. This can present a challenge for budding citizen scientists. How do you choose which project to participate in? Obviously, there has to be a good fit with your interests. If you have a passion for spiders then a project documenting lichens is probably not for you. Beyond that, if your intention is to maximize your contribution to conservation — which I hope it is — there are six main criteria to consider:<sup>2</sup>

**1. Accessibility.** Projects should facilitate the broad, public sharing of information (at no charge). You don't want the fruits of your labour mouldering in an obscure database that few people know about.



**2. Data products.** Further to point 1, projects that analyze the incoming data and provide products such as distribution maps and summary reports are preferable to projects that just store the data. Note that most data downloads are actually from members of the public who use the information for educational purposes and for informing local conservation efforts.

**3. Application.** In conservation, the fundamental role of science is to support management decisions and guide conservation actions. Therefore, projects that have the attention of researchers and resource managers are preferred over those that do not. The more direct the connection between observations and their management application, the better.

**4. Spatial and temporal scope.** Species do not respect administrative boundaries. Therefore, all else being equal, a national or global project is preferable to one that is local in scope. Similarly, projects that collect observations all year long are preferred over projects that provide only a snapshot at a particular time of year.

**5. Data quality.** Projects that have standardized protocols for making observations generate higher-quality data than projects that do not. So do projects that check the validity of species identifications submitted by observers. High-quality data facilitates the ability of researchers to draw meaningful insights from the observations.

**6. Data security.** It is an unfortunate reality that citizen science initiatives

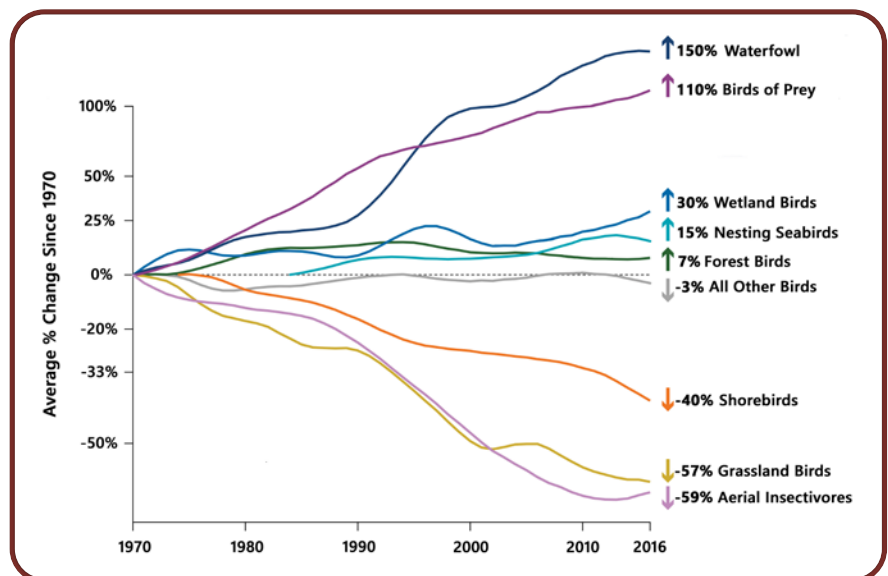
sometimes shut down after a period of time, typically because of a lack of funding, a change in an organization's priorities, or the loss of key people. Some projects have also lost data (mainly in the era before cloud-based storage). Therefore, consideration should be given to the long-term viability of the project and its ability to store data reliably.

Well-designed structured projects tend to score highly on these criteria. The Breeding Bird Survey provides a good example. Each spring, volunteers count birds along a series of fixed survey routes using a standardized observation protocol. The Canadian Wildlife Service, which oversees the program in Canada, analyzes the data and generates regular reports on the state of birds in Canada, which wildlife managers rely on. No better dataset exists for tracking changes in bird abundance over time.



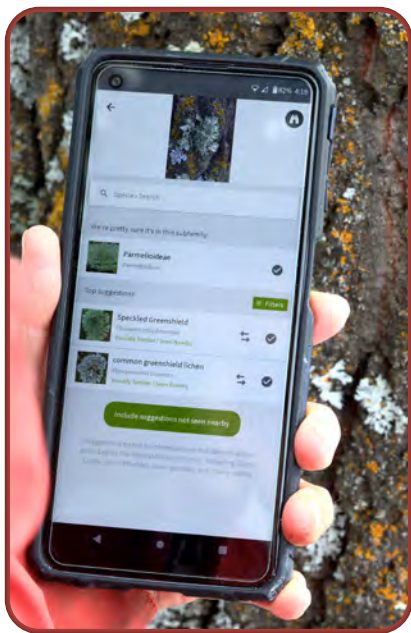
Some of the larger unstructured projects, such as iNaturalist and eBird, also score highly, despite the opportunistic nature of the observations. In this case, size is a key factor — both projects are global in scope and each has *millions* of participants. Never in the history of science has so much information been collected about so many species. The large number of observations permits meaningful insights to be made, despite biases and variability among observers.

Because iNaturalist observations are unstructured, the database is not well suited for monitoring trends. But it excels at describing species distributions, especially of uncommon species and invasive species, which are difficult to monitor using conventional methods. In the case of eBird, the checklist



The Breeding Bird Survey is a citizen science program that has been generating high-quality data on bird abundance since 1970. This information has been vital for determining how different groups of birds have fared over time, as shown in this graph from the 2019 State of Canada's Birds report.<sup>3</sup>

approach permits the estimation of both distribution and abundance. Furthermore, because observations are submitted all year long, the data are useful for studying migratory patterns. Given their large size, both projects have attracted the attention of researchers and wildlife managers, who increasingly look to these databases to inform their work.



Some platforms, like iNaturalist, provide species identification suggestions in the field. These are not fully reliable but help narrow down the range of choices. Preliminary identifications are later verified by species experts. RICHARD SCHNEIDER

Despite the inherent benefits of large projects, the value of small, local projects should not be discounted. A small project may have very high conservation value if it is focused on gathering data for a specific local application. In other words, purpose and application are overriding factors.

### Tips for Maximizing the Value of Your Observations

Besides selecting projects with high conservation value, there are several other things you can do to maximize the value of your citizen science efforts. To begin, you can work on improving the quality of your observations. For example, if you are using eBird, make an effort to improve your bird identification skills and be sure to submit complete checklists rather than just casual observations. Incomplete checklists are generally excluded from the statistical analysis of eBird data. If you are submitting photos to iNaturalist, make sure your pictures are of good quality and capture the elements that are needed for species identification (e.g., both leaves and flowers). Remember, individual observations can include multiple photographs from different angles.

It's also useful to travel off the beaten path when making observations. Citizen science contributions tend to cluster around urban centres, leaving data gaps in more remote areas. Your observations will be more valuable if they serve to fill these spatial gaps. Similarly, when using iNaturalist it is helpful to emphasize uncommon and invasive species, since they are most in need of monitoring.

Lastly, try to move up the citizen science "ladder" as you become more experienced. For example, once your bird identification skills have improved using eBird, you might consider taking on a Breeding Bird Survey route. There is always a need for new survey volunteers, and the contribution to bird conservation

is very high with this program. You can also look for opportunities to become a "citizen steward" by supporting the conservation of a favourite natural area, or advocating for nature by writing or phoning decision-makers about key conservation issues.

You can learn more about citizen science opportunities in Alberta on Nature Alberta's website: [naturealberta.ca/citizen-science](https://naturealberta.ca/citizen-science). The citizen science section of the website has recently been expanded and it contains loads of useful information on how to get engaged and how to make your observations count. ■

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Richard Schneider is a conservation biologist with over 30 years of experience working at the interface between science and policy. He currently serves as the Executive Director of Nature Alberta, which he considers to be his retirement project.



# On the Trail of Disjunct Alpine Plants from Alberta to Ontario

BY ASHLEY HILLMAN

It's Day 4 on the trail. It's humid, hot, and did I mention humid? Our packs are impossibly heavy with food, camping gear, and sampling equipment. I wish there was someone else to blame for deciding to mix backpacking with field sampling, but unfortunately it was my idea. I have already cut myself on a rock and slipped into the frigid waters of Lake Superior as we struggle down the coastal hiking trail of Pukaskwa National Park. But all this suffering has rewarded us with just what we were looking for: plants!

Not just any plants, mind you. I was searching for alpine and Arctic plants, such as common butterwort (*Pinguicula vulgaris*), three-toothed saxifrage (*Saxifraga tricuspidata*), and alpine bistort (*Bistorta vivipara*). The same plants that greet

me when I'm hiking high in Alberta's Rocky Mountains. These cold-adapted plants are able to thrive on the bedrock shoreline along Lake Superior because the lake is cold and deep and has high winds that push its frigid air far inland.

I've always been amazed at the adaptations alpine plants have to their harsh conditions. High above treeline, where it appears that nothing lives, if you look closely in nooks and crannies you'll see plants. Tiny, clinging to cracks in rocks, but with the beautiful diversity of flowers you see in lower elevation forests. Their tiny, waxy leaves reduce water loss, their small size protects them from high winds and snow damage, and in some cases different species will clump together to reduce heat loss. These plants thrive in some of the harshest environments on Earth.



Fractures and depressions in the bedrock along the Lake Superior shoreline provide habitat for disjunct species. Species of saxifrage grow in the small amount of soil built up in cracks in the rock, while depressions filled with water provide habitat for moisture-loving plants such as butterworts and rushes. ASHLEY HILLMAN



A common butterwort grows along the north shore of Lake Superior. These carnivorous plants are more commonly found in the Rockies and in the Arctic. ASHLEY HILLMAN



But how exactly did these alpine species — or at least what we consider to be alpine species — end up along Lake Superior, thousands of miles to the east? This was the question I sought to answer through my doctoral research. And this is what brought me to the shores of Lake Superior last summer.

It turns out that these cold-adapted plants did not miraculously disperse from the Rocky Mountains to Ontario. Instead, these plants were once widespread across Canada, and what we see today are just the remnant populations, which are sometimes widely separated or “disjunct.” To understand how this happened we have to travel back to the last Ice Age.

During the Ice Age, most of Canada lay under ice three kilometres thick. As the glaciers retreated, about 12,000 years ago, exposed bedrock was left behind. Populations of small plants adapted for harsh environments were among the first species to return, dominating the exposed bedrock where few other plants could survive. As our climate warmed over thousands of years, larger plants and trees were able to establish, and slowly outcompeted these small, bedrock-specialist plants. Today, these hardy little plants persist in only the harshest environments in Canada: the alpine habitat of the west, the high Arctic, and the cold, exposed shorelines of Lake Superior. These strongholds of cold conditions are known as climate refugia, and they’re becoming ever more important with climate change.

Climate warming will affect cold-adapted plants in different ways. Melting ice will expose more habitat for alpine and Arctic species, and earlier springs may allow some species to flower earlier and longer and be more successful at producing seeds. However, there are also drawbacks. Early springs may trigger development of leaves and flowers, but if a frost occurs after plants have leaves, those leaves can shrivel and die, potentially resulting in the plant’s death. Early flowering may seem beneficial, but if pollinators have not also emerged, then those flowers will go unpollinated, resulting in fewer seeds. In alpine regions of Alberta, warmer temperatures will allow trees to move further upslope into areas that were previously too cold or snow-covered. This advancing treeline will ultimately remove habitat for alpine species that rely on barren rock and an open canopy. As a result, plants that are adapted to cold conditions are at risk of becoming locally extinct.

Cold-adapted plants along Lake Superior face a unique challenge under climate change. In alpine and Arctic zones, cold-adapted plants can respond to warming temperatures by moving upslope or further north. At Lake Superior, however, there’s nowhere for them to go. Lake Superior’s shoreline is separated from other cold, exposed bedrock by thousands of kilometres, making dispersal to these alternative sites essentially impossible. Our early research into plant dynamics along the



Top: Moss campion, a cushion plant, is one of the few species to grow high above treeline in Alberta’s Rockies, and a single cushion can be hundreds of years old. This individual has a nice view of Yoho National Park in B.C. ASHLEY HILLMAN

Middle: One-flowered cinquefoil on top of Coral Creek ridge in Nordegg, Alberta. ASHLEY HILLMAN

Bottom: Silky scorpionweed on an unnamed ridge in Yoho National Park, B.C. ASHLEY HILLMAN



shoreline suggests that the outlook for cold-adapted plants here is not good. Under a moderate projection of 3.3°C warming, approximately 75% of disjunct plant habitat will no longer be suitable, and under a worst-case-scenario projection of 5.7°C warming, only 4% of their original habitat will remain.

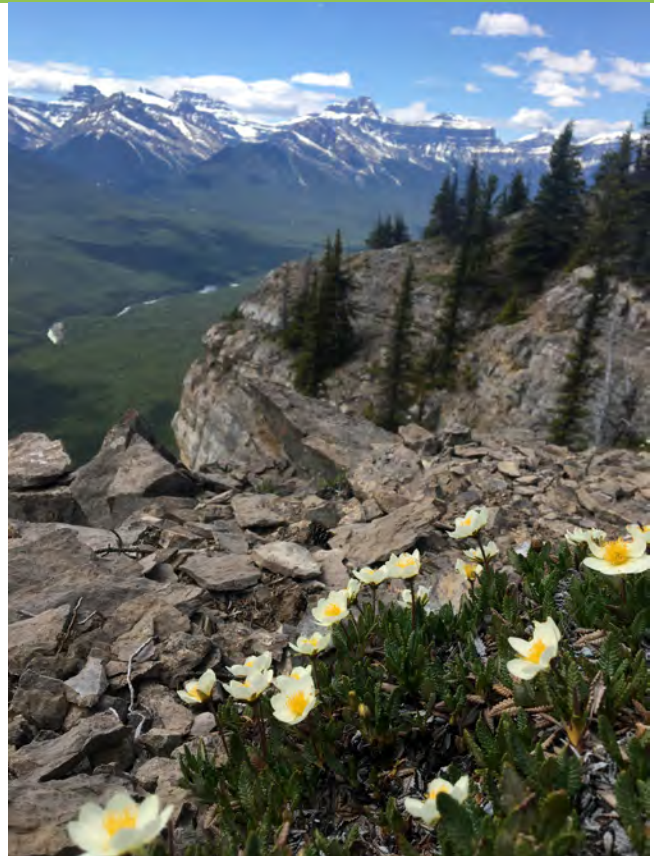
A recent focus in the scientific community has been on mapping climate refugia throughout North America and using that knowledge to better inform conservation efforts. The idea is to protect sites that will retain cool conditions the longest to ensure that cold-adapted species will have the time they need to adapt to warmer conditions. And it's not just plants that benefit from climate refugia. In Alberta's alpine areas, heat-sensitive mammals such as pika can use climate refugia as they adapt to warming temperatures. In the case of isolated populations, like those at Lake Superior, the hope is that at least some species will survive within their current habitat. This will largely depend on how much warming ultimately occurs.

While the protection of refugia can help plants and animals transition to a warmer climate, the real key to conserving biodiversity is to slow the rate of climate change. Controlling greenhouse gas emissions, focusing on carbon sequestration within natural ecosystems, and supporting other climate change measures in the immediate future will be critical to avoiding massive losses of biodiversity. Therefore, we all have a part to play in ensuring the viability of our favourite alpine plants and animals.

Back on the rugged shores of Lake Superior, I drop my monstrous pack and plunk down beside a tiny crack in the bedrock. A few centimetres of soil are all that supports a colony of encrusted saxifrage (*Saxifraga paniculata*). This species is typically found in the arctic and in the Maritimes, but knowing that they're still here, waiting to be surveyed, is all the fuel I need to keep struggling down the trail. Well, maybe some chocolate would help too. ■

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Top: White mountain-avens are a common alpine species. This one was found in Nordegg. ASHLEY HILLMAN

Bottom: Spotted in Nordegg: this spotted saxifrage. The genus name for saxifrages (*Saxifraga*) means "rock breaker," and these small but diverse plants can be found high above treeline in cracks in the rock. ASHLEY HILLMAN

Ashley Hillman is a PhD student in the department of Renewable Resources at the University of Alberta. She has a broad background in field research and has spent many seasons in the boreal forest, trudging through peatlands and swatting away insects. She is also an avid backpacker and naturalist, and can often be found slowing down a hiking trip to stop and look at plants.





# Shall We Gather at the River?

## Irrigation and the Future of Southern Alberta's Rivers

BY LORNE FITCH

In the heat dome and severe low flows of 2021, our canoe left smears of colour on several barely submerged boulders of one of Alberta's prairie rivers. These low water levels had me reflecting on the recent scheme by southern Alberta's irrigation sector to expand irrigated acreage. I thought of the old hymn, "Shall we Gather at the River."

The details of this irrigation expansion, now spun as a "modernization" project, are sketchy, perhaps by design. Ten of the 13 Irrigation Districts, with funding support from the Province of Alberta and the Canada Infrastructure Bank, propose to "modernize" 56 components of irrigation infrastructure and construct (or expand) four off-stream reservoirs. The contention is that, with efficiency gains and new water storage, irrigation can be expanded by 230,000 acres.

Irrigation Districts now hold licenses to withdraw half of the average natural annual flow from southern Alberta's rivers. This doesn't leave much wiggle room for uses outside of irrigation because the other half of the South Saskatchewan River basin's flow must be passed on to Saskatchewan. On average, Irrigation Districts withdraw two-thirds of their allocation each year. In dry years, essentially all is removed. The most critical period is in summer when demand is high for other uses of our rivers.

Irrigation has re-plumbed the landscape with dams, diversions, reservoirs, and canals to deliver water to a broad area of cropland in southern Alberta. LORNE FITCH



This doesn't bode well for fish populations, wildlife habitat, healthy riparian areas, or people who enjoy our rivers.

### Draining the System

Evidence from the government's own reports suggest that southern Alberta rivers below major irrigation dams and diversions are stressed, some significantly degraded, and the prognosis is for a continual decline in river health.<sup>1</sup> That was the inescapable conclusion even before the irrigation expansion project was proposed.

Irrigation Districts (and their precursors) have been diverting water from southern Alberta's rivers for well over a century through an extensive, artificial plumbing network of dams, reservoirs, and irrigation canals. Irrigation infrastructure delivers water on demand over vast crop acreages in a landscape that is classified as semi-arid. The cost to develop and maintain this engineering marvel was (and is) borne largely from the public purse.

Alberta government departments charged with water stewardship have turned out to be the agents of water disposal, merely rubber-stamping the expansion demands of the irrigation sector. This is analogous to the proverbial fox guarding the henhouse. Other interests have been ignored and additional allocations have been passed out like party favours.

It wasn't until 2006 that the Alberta government finally closed the Bow, Oldman, and South Saskatchewan sub-basins to further allocation. Some have commented this was too little, too late.

There might be a vague awareness of the environmental costs of irrigation, such as drowned river valleys above

dams, rivers starved for water below diversions, and fish dying from habitat disruptions. But those costs are far beyond most citizens' sensibilities.

Another critical factor to consider is that water flows in southern Alberta rivers are running into the wall of climate change. A warmer climate means less river flow and an inevitable limit to growth. There is the impression that we have amended the laws of nature in this dry land with complex engineering works and turned on a tap that never runs dry. But we haven't.



Irrigation enables crops to be grown in dry areas of the province but requires tremendous volumes of water, which is a finite resource. MARCIA O'CONNOR

According to Dr. John Pomeroy, Canada Research Chair in Water Resources and Climate Change at the University of Saskatchewan, about 80% of flow in the Saskatchewan River basin comes from the Eastern Slopes, mostly from snowpack, making southern Alberta's rivers "very vulnerable to climate change."<sup>2</sup> Pomeroy believes it is "important to look at the whole thing before expanding irrigation in one part or managing it differently in another part, and we're going to have

to do that always with an eye to the mountains." Lessons from south of the border backstop this statement, since over-allocation of water, coupled with drought in the Colorado River basin, has led U.S. governments to severely curtail water use by irrigators.

Modelling studies of the Oldman River at Lethbridge show drought, a reality under climate change, throws a significant wrench into the works — water needs would exceed supply and droughts that last more than two years could not be mitigated

by reservoir storage.<sup>3</sup> This shows building more reservoirs is, at best, a questionable adaptive strategy. We're only fooling ourselves if we think we can outwit nature instead of adapting to its realities.

### It's Time for a Realistic Assessment

There is a way of managing the issues of environmental flows, and that involves establishing limits — real ecological limits. An "instream flow need" is a rigorous, science-based recommendation for the amount of

water that should flow at any particular time to meet the objectives of river health.

Healthy rivers should always have been the goal of management efforts, but while many waited for the answer from proper water flow research, water managers in the government of Alberta were busy giving away the water that would have assured a measure of ecological integrity. Now, because of allocations to irrigation, too little water is left to meet instream flow needs.



Irrigation pivots cover a quarter section. The crop most often irrigated is alfalfa, which feeds the livestock industry. LORNE FITCH

Our rivers, especially those in southern Alberta, show the strain of over a century of careless development. Provincial water managers seemed oblivious, even after a massive fish kill related to high water temperatures, exacerbated by excessive diversions, occurred on the Highwood River in 1977. This incident (and others) placed irrigation diversions and inadequate instream flows into the broad public consciousness.

But when you've exceeded ecological limits, all that's left are some administrative band-aids to

give the impression that our rivers are being managed to avoid ecosystem failure. These are rarely met and will not restore health to degraded rivers. In stark terms, southern Alberta rivers are on life support, without enough water to guarantee a healthy, functioning ecosystem. And that's before any of the proposed expansion is considered.

Initiatives where there is a proposed investment of public money, that involve a public resource (water), and have the potential to significantly impact

the public interest in broader matters of ecosystem health require scrutiny. What could be more in the public interest than the health of southern Alberta's rivers?

Irrigation Districts, with support from government, boldly assert that this initiative does not require any public review. Therefore, this massive irrigation expansion could occur without a determination of whether or not it is in the public interest.

An independent review, through an environmental impact assessment, would clarify a mind-boggling amount of

information on public interest matters, such as whether or not this expansion of irrigation is to come from efficiency gains, or is just another way to maximize water withdrawals. Is yet another massive injection of public money warranted when the result will be the sacrifice of something in the broad public interest — healthy rivers — for private enterprise profit, like we see with coal, petroleum and timber?

We need to get out of the "hydro-illogical" cycle, where every dam, reservoir, and efficiency gain is touted as solving the problem of water scarcity, until they are built and then the cry starts for the next one to solve the problem of not addressing limits, and so on, ad infinitum, ad nauseam.

In the continual focus on downstream structural features, no one seems to think about water sources — the headwaters. This is the ultimate "reservoir" for downstream water users and interests. In the headwaters, unsustainable logging, proposed coal mining, and a proliferation of roads and trails drain this natural reservoir too quickly. An environmental assessment with a broad scope is required to avoid past parochial decisions. Most significantly, such an assessment might allow those not benefitting directly from this scheme to see how other attributes important to a broader public, like similarly imperilled native grasslands, might be affected.

A review would help us answer the questions of how much is enough and whether we have already exceeded reasonable limits. It could also open up a new conversation about irrigation and about how to successfully adapt to changing conditions, which is imperative.





### Where Will We Gather?

If this scheme is a race to exercise irrigation “rights,” to use up all the allocation, who eventually wins? It won’t be southern Alberta’s rivers and those who cherish them. Maybe irrigators could resolve to live with a little less water, so the river can have a little more. However, even those that foresee the upcoming crisis seem to accept none of the responsibility for it.

As Cheryl Bradley, an independent biologist who has followed this issue for years, observes: “There is a palpable reluctance to release water under [irrigation] licences, perhaps because it would mean relinquishing control over a valuable commodity in short supply.” In reality, giving up some of “their” water to let rivers live will not diminish irrigation agriculture.

What does it mean to take so much water out of southern Alberta rivers? Sadly, these rivers are shadows of what they once were. We know they are degrading, we know what they are degrading from, and we can measure their death throes. Natural justice and a sense of equity need to be injected into plans for irrigation expansion, while there is still a chance to salvage a better future for our rivers.

Otherwise, counter to the old hymn, there will be no living river left where we can gather. ■



Top: The depleted Oldman Reservoir after drought conditions in 2001. Droughts of more than two years in duration cannot be mitigated with reservoir storage. The irrigation sector needs to factor climate change into any expansion plan. LORNE FITCH

Bottom: Cottonwood trees on the St. Mary River below a reservoir, which have died due to chronic low flows. To produce crops under irrigation requires a massive diversion of water from southern Alberta rivers. Too little water is left in rivers to support the aquatic community and riparian areas. LORNE FITCH

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Lorne Fitch is a Professional Biologist, a retired Fish and Wildlife Biologist, and a past Adjunct Professor with the University of Calgary.

# Nature Central

## Celebrating Our Wild Alberta Parklands

BY MYRNA PEARMAN

On a warm and sunny afternoon in early November 2020, a good friend and I hiked a beautiful Nature Conservancy of Canada property near Stettler. The property, Rachel Agnes Hayes, is part of a network of conservation properties in the Buffalo Lake Moraine. As we stood atop a hill and scanned to the far horizon in three directions, I felt disappointed that I'd never visited this area before. I then wondered how many other protected areas were scattered throughout central Alberta that I did not know about. As it turns out, there are a lot!

That memorable hike prompted me to propose an idea to the Red Deer River Naturalists (RDRN) that, with the help of fellow naturalists, evolved into a new program called Nature Central: Celebrating Our Wild Alberta Parklands. The main objectives of the program were to compile an online, publicly accessible inventory of protected rural landscapes in central Alberta and to increase the appreciation and respectful enjoyment of these spaces. We also sought to raise the profile of our club, increase membership, and develop partnerships with the owners and stakeholders of these protected areas.

Most of the funding for the program — which ran from May 1 to August 31, 2021 — was provided by the RDRN, complemented by a grant from ECO Canada as well as two private donations. A biology student, Shaye Hill, led the

program as the Naturalist-in-Residence, and Sherry Scheunert was hired as an assistant. Their work was overseen by an RDRN committee. We also partnered



Naturalist-in-Residence Shaye Hill and Assistant Naturalist Sherry Scheunert. MYRNA PEARMAN

with Nature Alberta to take advantage of their provincial outreach capabilities and to host a Family Nature Night as part of their Nature Kids program.

To identify the properties, we explored the online resources of local

municipalities, the Nature Conservancy of Canada, Alberta Environment and Parks, Ducks Unlimited Canada, the Alberta Fish and Game Association, and the Alberta Conservation Association's Discover Guide, then followed up with personal communication. All property owners and stakeholders were contacted early in the season to request their collaboration and cooperation, and to ensure that activities promoted by Nature Central were compliant with site regulations and land management guidelines.

We created a new website, [naturecentral.org](http://naturecentral.org), and social media channels with content updated on a regular basis. Properties were organized according to their distance from Red Deer, in 25-km increments up to 100 km. We provided a short description of each site, including key features and links to external websites where visitors could get further details, as well as directions



Naturalist-in-Residence Shaye Hill giving a presentation on raptors at Family Nature Night at Kerry Wood Nature Centre in Red Deer. MYRNA PEARMAN





Nature Central leading an enjoyable evening kayak to The Narrows on Buffalo Lake. MYRNA PEARMAN

to the site. We also created an internal spreadsheet containing access details and biological information obtained during site visits. Photos were taken at each property and Shaye would often supplement the photographic documentation with videos and blog posts.

We were surprised by the number of publicly accessible protected areas we found in central Alberta. By the end of the season, a total of 171 properties were identified! The team was able to visit 104 of these properties.

In addition to cataloging the sites, the Nature Central team promoted the appreciation and enjoyment of the more accessible properties (i.e., those with parking, outhouses, trails, etc.). Nature walks were held on ten Saturdays between mid-June and mid-August, and a very popular kayak trip

to The Narrows at Buffalo Lake was held in August. Indigenous teachings were incorporated into two walks with the participation of an Indigenous



Shaye Hill leading a Saturday hike. MYRNA PEARMAN

Elder. A very successful Family Nature Night event was held in August at Kerry Wood Nature Centre in partnership

with Nature Alberta and the Waskasoo Environmental Education Society.

With a comprehensive online listing of rural protected areas now readily available to the public, we hope that an increasing number of sites will be visited by hikers, snowshoers, cross-country skiers, photographers, naturalists, new Canadians, young families, and others who will respectfully explore and enjoy the properties. We are maintaining the program over the winter/spring season on a limited basis until the 2022 summer team is hired to continue and expand this exciting initiative.

Visit [naturecentral.org](http://naturecentral.org) to plan your next Central Alberta adventure! ■

Myrna Pearman is a retired biologist, nature writer, photographer, and author of several books. Her books are available at [www.myrnapearman.com](http://www.myrnapearman.com). For more information about Nature Central, please contact her at [myrnapearman.nature@gmail.com](mailto:myrnapearman.nature@gmail.com).



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# Nature Kids



# My BIG Alberta Backyard

BY ABIGAIL STOSKY, NATURE NETWORK ASSISTANT

**A**lberta is a great place to live. It's a big, beautiful province full of all kinds of natural wonders. This is where we introduce you to the diversity of wildlife, and unique and interesting wild spaces, that are part of your Big Alberta Backyard. This time, let's explore **Midland Provincial Park**, just outside of Drumheller.

## In the Heart of the Badlands

Midland was made an official provincial park in 1979. It used to be the site of the Midland Coal Mine, and you can still visit the old mining office today. It's also the home of the Royal Tyrrell Museum.

The park is surrounded by badlands. The Badlands are usually very hot and dry, so not a lot of plants can grow. Sage and prickly pear cactus are some exceptions, because they have adaptations to live without very much water. For example, cactuses have special stems with waxy skin which helps trap water. Many animals would like to munch on these juicy stems, so cactuses often have pointy thorns to help protect themselves.

## Badlands Rock

You can find lots of really amazing rocks in the Badlands. Ironstone is a very common one. It is usually orange,

brown, or red because there's metal, iron, inside the rock that rusts when it comes into contact with air.

In fact, the hoodoos that are found in the park are formed when a piece of hard rock, like ironstone, sits on top of some soft sandstone. The sandstone gets worn away by wind and other weather, but the harder rock doesn't. Eventually, all that is left is a column of soft sediment with an ironstone "hat."

Another common type of rock is bentonite. Bentonite is extremely soft and crumbles easily. It often looks "wrinkled" or has a popcorn texture. Bentonite can soak up almost 10 times its weight in water, and becomes very slippery. It takes a very long time to dry out. Always be careful when walking on bentonite so you don't accidentally slip!



Prickly Pears rely on bees to help pollinate them. ABIGAIL STOSKY

## Where Dinosaurs Roamed

Midland Provincial Park is most famous for the fossils that have been discovered there. Some fossils can even be found lying right on top of the surface of the ground! But if you find a fossil, be sure to leave it alone. It is illegal to take anything out of a provincial park (even a wildflower). This is especially true for dinosaur bones. Dinosaur bones across the province, whether they're found in Midland or your own backyard, all belong to the government. It seems





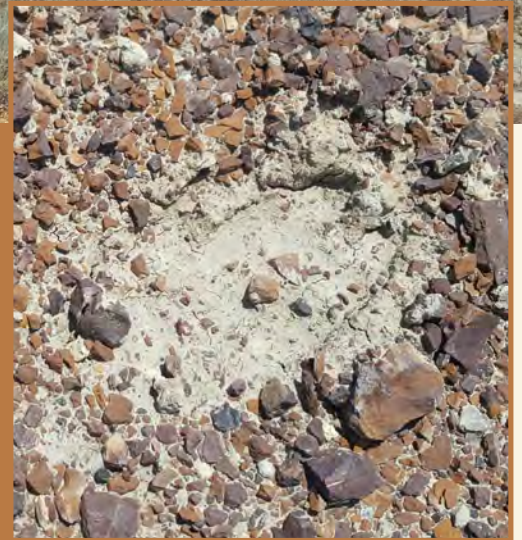
Hoodoos like these can be found all over the badlands. LEO DE GROOT

like a strange rule, but this is so that people can't sell the fossils to private collections. Instead, the fossils are given to scientists so that we can continue learning about these amazing creatures from millions of years ago.

If you're interested in searching for fossils, the Royal Tyrrell Museum offers fossil-hunting programs in the summer. They also have a fantastic interpretive trail near the museum where you can learn even more about the amazing badlands of Midland Provincial Park. Who knows what you might discover?! ■



Above: It's easy to see different layers of rock in Midland Provincial Park. Each layer can give scientists important information about life millions of years ago. ABIGAIL STOSKY



Left: Ironstone pebbles are common in the badlands. Can you spot a track that was left behind? ABIGAIL STOSKY

# Out and About

BY VALERIE MILLER, FUTURE ENERGY SYSTEMS

## What you need:

✓ 10 plant seeds.

We recommend blanket flower, *Gaillardia aristata*.

✓ Small plate

✓ Clear plastic bag (such as a reused Ziploc bag) large enough to cover your plate

✓ Paper towel

✓ Water

✓ Paper and pencil



Blanket flower in bloom. RICHARD SCHNEIDER



## BONUS VIDEO

To watch a video to learn about the importance of plants for a healthy Earth, along with instructions for this experiment, visit [bit.ly/journeyofaseed](https://bit.ly/journeyofaseed)

## Journey of a Seed

Planting native flowers in your yard can provide an important source of food and shelter for wild birds and native bees! Each plant has unique requirements to germinate and grow. What is germination? Germination is when a plant emerges and starts to grow out of a seed, stemming into a seedling — a baby plant. Testing the germination rate, which is what percentage of your seeds germinate, helps us decide how many seeds to plant to get a certain number of plants. For example, if we want 10 plants and the germination rate is 50%, we need to plant 20 seeds. Let's get testing!

### What to do:

- 1 Place a folded paper towel on your plate and pour water on it to make it wet. Drain away any pooling water.
- 2 Place 10 seeds on top of the wet paper towel and then put the plate, paper towel, and seeds inside a clear plastic bag. Leave the bag unsealed.
- 3 Place your plastic bag — filled with your plate, paper towel, and seeds — in a sunny, warm place.
- 4 Check on your seeds daily.
  - On your sheet of paper, write down the date and the number of seeds that have germinated — when you can see a root or stem coming out of seed. If you choose blanket flower seeds, it can take seven days to three weeks for your seeds to start germinating.
  - Remove seeds as they germinate and plant them according to the seed packet instructions. They have successfully been accounted for in your experiment!
  - Add more water to the paper towel if it becomes dry, but remember to drain away pooling water.
  - Continue to monitor the seeds until they have all germinated, or until no more seeds germinate (seven days after the last seed germinated).
- 5 Now you are ready to calculate your germination rate using this equation, where 10 is the starting number of seeds:

$$\frac{\text{Total Number of Seeds Germinated}}{10} \times 100\%$$

- 6 Use the germination rate to decide how many blanket flower seeds to plant in your garden.

You can try this experiment again testing other types of seeds, different temperature conditions, and various levels of water. Try and guess what will happen in each new experiment! ■



# Ask Stuart



BY VALERIE MILLER, FUTURE ENERGY SYSTEMS

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](mailto:naturekids@naturealberta.ca) and it may be featured in a future issue.

## Q How does a seed turn into a plant?

It all begins with germination: the process of a plant emerging out of the seed. Water is a really important part of germination. In the first step, called imbibition, the seed soaks up water and the outer layer begins to swell and soften. Next there is a lag period when the inside of the seed starts to become more active — it breathes and starts to make and store food and proteins.

Finally, we begin to see root emergence, as the plant starts to come out of the seed. The white part that emerges from the seed first is the early roots. In nature, roots may attach to the soil, keeping the plant where it is. The roots absorb water. After this step, the shoot will emerge and the seedling will continue to grow into a plant. ■



Blanket flowers growing wild. STEPH WEIZENBACH

## Q Why didn't my seed germinate?

Different seeds have different needs to germinate. For a seed to germinate, it needs the right amount of water, light, and warmth.

Some seeds require lots of light whereas others require more darkness. Some seeds have an ideal temperature to germinate in; it may be too warm or too cold where you are testing your seeds. Seeds also need water to germinate, but too much water can be a problem if it stops seeds from getting oxygen.

Some seeds may never germinate under the conditions you are testing. This could mean that the seed is dead or that the seed is dormant. Dormant means that the seed is in a sleep period, which stops the seeds from germinating. You may be able to break dormancy by replicating the conditions seeds experience in nature. For example, storing the seed in cold replicates winter conditions that some seeds need before they germinate.

Other seeds might need to be eaten by animals so that a hard outer layer of the seed can be reduced or removed — in this case we can scratch the seed surface. Some seeds need to be exposed to different chemicals, light conditions, temperatures, or even fire. (Don't try that last one at home!) When these conditions are met, it signals to the plant that environmental conditions are best for it to grow. ■



Planting native flowers in your own backyard is fun for the whole family. STEPH WEIZENBACH



Information from: [extension.psu.edu/seed-and-seedling-biology](http://extension.psu.edu/seed-and-seedling-biology)



Learn more from Future Energy by exploring their Nature Kids Playlist on YouTube: [bit.ly/naturekidsplaylist](https://bit.ly/naturekidsplaylist)

Valerie Miller, PhD, is the Outreach and Engagement Coordinator for Future Energy Systems at the University of Alberta, Coordinator of the Land Reclamation International Graduate School, and a Nature Kids Volunteer.

# The Animal-Plant Dynamic

BY MARGOT HERVIEUX

Everyone is familiar with food pyramids and how plants, directly or indirectly, feed most of the world's animals. What we often don't think about, however, is how plants also depend on animals.



DEBBIE GODKIN

The most valuable service that animals provide to plants is pollination. A wide variety of insects, birds, and bats carry pollen from plant to plant, ensuring reproduction. In fact, over three-quarters of our food plants, including coffee, chocolate, fruit, and wine, depend on some kind of creature for pollination.

While nectar attracts animals for pollination, fruits attract animals to transport seeds. Since plants can't move, they need help spreading their seeds. They recruit that help by hiding their seeds in bright, sweet packets. After the fruit is eaten, the seeds are carried long distances before being passed out and deposited with a bit of fertilizer. Some

seeds can't even germinate until they have passed through the digestive track of a specific bird or mammal.

Animals that store seeds also help to move plants around. Blue jays, chickadees and other birds are famous for hiding food and, though they return for more than half of their stash, many seeds are left to sprout. Squirrels also play an important role in "planting" cones and nuts. I find clumps of sunflowers in my garden every year where the seeds were buried by chipmunks.



DEBBIE GODKIN

Animals also carry seeds attached to their coat. Anyone who has walked in woods or fields has had the seeds of yellow avens, agrimony, or grasses stick to their pants. The hooks or burs on

these seeds also snag the fur of passing mammals and then the seeds drop to the ground when the animal stops to scratch or groom.

For plants living in locations with low levels of nitrogen and other nutrients, another survival strategy involves actually eating insects. Bog- and fen-loving sundews and butterworts have sticky leaf surfaces that trap small prey and then acidic secretions dissolve the meal to release nutrients.

Bladderworts use yet another strategy for capturing prey. This plant floats on the surface of the water and has small bladders located along the stem. When hairs at the mouth of the bladder are touched, water rushes in, taking tiny invertebrates with it. The door then shuts and the prey is digested.

When it comes right down to it, everything in a plant's life is affected in some way by animals. Birds remove pesky insects, dry branches are broken by rutting deer, and competitors are removed by beavers. Plants even use the carbon dioxide that creatures breathe out. The simple food chains we learned about in school are only a small part of nature's fascinating complexity. ■

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](http://peacecountrysun.com).





RUSSELL HEMMINGSON

## MEET A MEMBER CLUB

BY MARILYN MATSUOKA

# JJ Collett Natural Area Foundation

One of the best-kept secrets in Central Alberta... up until spring 2020 when our world changed and we saw a significant increase in visitor traffic! **JJ Collett Natural Area** is located not far off Highway 2, near the hamlet of Morningside. It consists of 635 acres, boasting over 18 km of maintained trails winding through a mosaic of shrublands, aspen groves, and stands of white spruce on shady hillsides.

JJ Collett is unique in that you can experience the boreal forest, foothills, parkland, and grasslands, all in one location. It is truly a special, family-friendly place that draws you in and charms you with its wildlife, wonderfully treed paths, and diverse topography. Wetlands and grassy meadows are typical of the area, though you may be surprised to also come across sand dunes.

Each season highlights new wonders. Spring brings fresh aspen buds and wildflower blooms. Summer displays a wide range of vegetation including native grasses. Fall gives way to the vibrant, turning colours. And winter opens the snow-covered forest trails to a peaceful cross-country skiing experience.

Steeped in history and privately owned prior to 1974 by Joe Collett, the provincial government and the Alberta Wildlife Foundation jointly purchased the land in trust to be used for environmental education. In 1976, the site was designated the JJ Collett Natural Area in memory of John Joseph Collett, Joe's son, who studied forest technology and was devoted to the preservation of natural resources. John founded the original trails, which are still in use today.

In 1985, the **JJ Collett Natural Area Foundation** was formed, with a mandate to preserve the area and use this resource for environmental education. The Foundation's active group of volunteer directors maintains the area with the goals of preservation, protection, and instilling environmental values in the community. An endowment fund has been established for future sustainability.

After a two-year hiatus, we hope to bring the Foundation's Grade 6 environmental education program back to local area classrooms soon. Students learn about identifying plants, discuss environmental issues, and enjoy a field trip to visit the natural area.

We offer visitors guided educational walks in the spring and fall, often led by our resident expert and honorary director, Dr. Charles Bird, retired Professor of Botany. We are privileged to have his expertise, knowledge, and keen eye for spotting rare flora and fauna native to the area.

Put Sunday, May 29, 2022 at 2 p.m. in your calendar — you're invited to join us for our annual Spring Walk. We will have guided tours identifying plants, wildlife, and all the sights of the spring season. You may even witness a bird release by Medicine River Wildlife Centre.

For more information on the JJ Collett Natural Area Foundation, follow us on Facebook and visit our website: [jjcollett.com](http://jjcollett.com). You will find a treasure trove of information on the rich history of the area, extensive species checklists and photos, and a map of the vast trail system. We also encourage you to check out opportunities to support the Natural Area Foundation in our mission to preserve a remnant of Central Alberta's beautiful landscape. ■

Marilyn Matsuoka is a Director with the JJ Collett Natural Area Foundation.



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