NATURE ALBERTA MAGAZINE

SPRING 2023
VOLUME 53 | NUMBER 1

A COMMUNITY CONNECTED BY A LOVE OF NATURE

American Dippers
Aquatic Songbirds Take the Plunge

Alberta Bats Threatened by Fungal Outbreak

Snorkeling Reveals New Depths of Biodiversity

Butterflies for Beginners

PM40015475

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are a big part of what makes the backcountry in Alberta so incredible.

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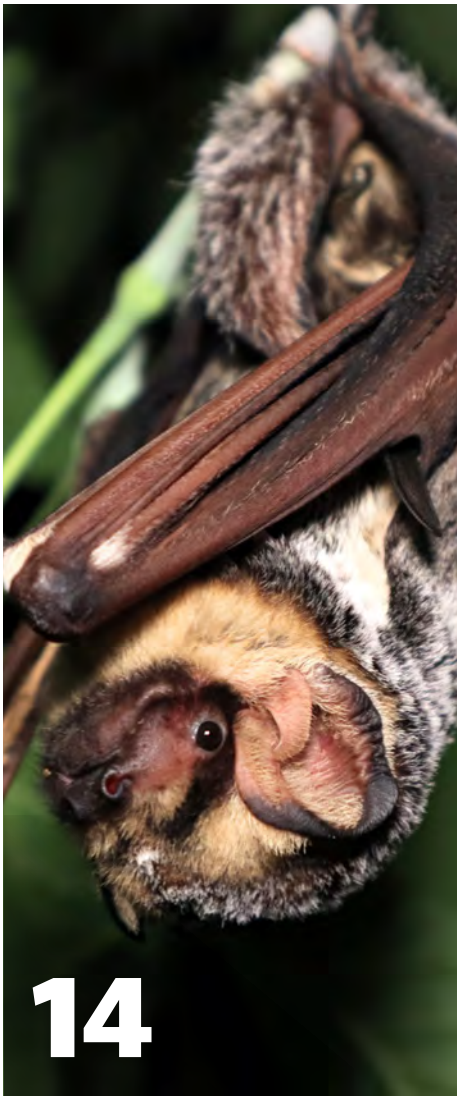

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VOLUME 53 | **NUMBER 1** | **SPRING 2023**
ISSN 1713-8639

Publisher Nature Alberta
Editor-in-Chief Richard Schneider
Managing Editor Jason Switner
Assistant Editor Erin McCloskey
Creative Susan May, intrinsic design

Nature Alberta Magazine is published four times per year by:

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Edmonton, AB T5M 3K6
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Subscriptions circulation@naturealberta.ca

Nature Alberta Magazine (electronic) is made available free of charge at **naturealberta.ca**. Print copies of *Nature Alberta Magazine* are available by annual subscription for $32 (Canadian funds + GST), which covers four issues per year, plus postage and handling, within Canada. Subscriptions can be purchased at **bit.ly/nasubscribe**.
Publications Mail Agreement No. 40015475

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.

Nature Alberta acknowledges that the land we know as Alberta resides within Treaties 6, 7, and 8, as well as portions of Treaties 4 and 10, and is the ancestral and traditional territory of First Nations, Inuit, and Métis peoples. We have a responsibility to care for these lands and waters, and to honour the history and culture of those who have been here for generations.

NATURE ALBERTA

A COMMUNITY CONNECTED BY A LOVE OF NATURE

NATUREALBERTA.CA

CITIZEN SCIENCE SPOTLIGHT

Spring is a time of hope and renewal, and it comes with many opportunities to contribute to citizen science. Whatever your experience level or particular interest in the natural world, there is a project for you!

This year, we are spotlighting Franklin's ground squirrels, thirteen-lined ground squirrels, and northern leopard frogs, all of which need better monitoring. If you encounter any of these species in your travels, be sure to take a photo and submit your observation to iNaturalist. You can visit **naturealberta.ca/citizen-science** for guidance on identifying these species and information on other citizen science projects.

Here are some upcoming opportunites to get out and participate you can add to your spring calendar:

City Nature Challenge
Friday, April 28–Monday, May 1

The City Nature Challenge is an international bioblitz competition between urban centres to engage people to document nature. Observations are recorded on the iNaturalist app or website. Cities compare final results for a friendly competition. Visit **citynaturechallenge.org** to learn more about participating.

Nature Alberta's May Species Count
Late May

The May Plant Count focuses on documenting the flowering status of native plant species across Alberta. To learn more about the count and to participate, visit **naturealberta.ca/may-plant-count**.

The May Bird Count tracks bird populations across Alberta at a fixed time of year, providing insight into population trends over time. Count compilers organize efforts across a set area called a count circle. Visit **naturealberta.ca/may-species-count** to connect with your local count circle.

Biodiversity Challenge
Thursday, June 8–Sunday, June 11

The Biodiversity Challenge invites all Albertans, urban and rural, to take part in a photo bioblitz using iNaturalist. Upload your photos of birds, plants, mammals, moss, lichen, mushrooms, and bugs. Your contributions will be used to help understand more about the species we share our space with. Visit **naturealberta.ca/citizen-science** for more information.

— STEPH WEIZENBACH, NATURE ALBERTA PROGRAM DIRECTOR

Nature Alberta News

Welcome Our New Nature Kids Coordinator

To coordinate our Nature Kids program, Volunteer Team, and social media outreach, Nature Alberta has added Kethu Mendis to our staff as our Nature Kids Coordinator.

Kethu brings experience designing and leading environmental workshops and events in schools and the community as an Environmental Educator at Langley Environmental Partners Society, while also volunteering as the leader of the Tri-Cities Club with NatureKids BC. She began her professional journey with a Bachelor's in Chemistry, working as an analytical chemist, and is currently completing her Master's in Environment and Management. Kethu strongly believes in connecting people, especially the younger generation, with nature and bringing awareness about the importance of conservation to a larger audience. "When you educate children about all the wonderful things that nature has to offer," she says, "we will be raising a next generation who values and appreciates nature, and they will one day be the adults who take care of the environment."

If you have any questions related to the Nature Kids program or volunteer opportunities, please contact Kethu at **naturekids@naturealberta.ca**.

Upcoming Events

We're looking forward to a spring and summer filled with events and activities all across Alberta. Visit **naturealberta.ca/events** for details on these and even more events.

LEO DE GROOT

Snow Goose Festival
Tofield, east of Edmonton
Saturday, April 22 and Sunday, April 23

A celebration of spring bird migration! Enjoy the opportunity to view many bird species on a tour led by knowledgeable naturalists and attend a unique trade fair with numerous activities for visitors of all ages.

Migratory Bird Day
Lois Hole Centennial Provincial Park, Sturgeon County
Saturday, May 13

Join Nature Alberta, Big Lake Environmental Support Society, and partners for our World Migratory Bird Day Celebration. Learn about the importance of water for migratory birds. Enjoy free family fun activities along the boardwalk and viewing platform. Make sure to stop by the shelter to add your mark to Nature Alberta's community art project!

Tree Planting for Biodiversity
Rundle Park, Edmonton
Thursday, June 8

Celebrate the annual Biodiversity Challenge by planting trees and participating in citizen science with Nature Alberta and Root for Trees! Your efforts will restore wildlife habitat and also help document species currently found in this urban park.

Family Nature Nights
Wednesday evenings in July and August

Family Nature Nights promote positive learning experiences for youth and their families by fostering appreciation for nature. These free, public events take place in urban parks and are open to families of all ages and abilities. Each event features a different theme with local experts helping you explore through guided activities. We'll reveal the theme of each event as we get closer to summer. Keep an eye on **naturealberta.ca/events** and our social media for updates.

- July 12 in Calgary
- July 19 in Red Deer
- July 26 in Edmonton
- August 9 in Edmonton
- August 16 in Edmonton
- August 23 in Sturgeon County

CONSERVATION ISSUES

How UCP Environmental Policies Stack Up Against Past Conservative Government Efforts

BY RICHARD SCHNEIDER

Our society is becoming increasingly fragmented, but one thing almost all Albertans will agree on is that it's important to take good care of our environment, both for our own well-being and for the generations that will follow.

So how are we doing on the environmental protection front? The UCP government has taken heat for some of its policies, but navigating the complex trade-offs between economic development and environmental protection is never easy. To get a clear picture of where we currently stand, it's useful to look back and examine how previous Conservative governments have approached this challenge.

We'll begin with Peter Lougheed, Alberta's first Conservative premier. In common with later premiers, he placed an emphasis on resource development and economic diversification. However, his government also took meaningful steps to protect the environment, particularly along the Eastern Slopes. Lougheed understood the concept of balance, saying that the economy, the environment, and social issues represent the three legs of a stool, and if any one of the legs is shorter than the others, the stool tips over. He established Kananaskis Provincial Park (now called Peter Lougheed Provincial Park), established the Environment Conservation Authority, and created the Coal Policy and the Policy for Resource Management of the Eastern Slopes, following years of public consultation.

Toward the end of Lougheed's time in office, the oil boom was over and the economy was struggling. This led to the weakening of some of the environmental measures that had been enacted earlier and the disbanding of the Environment Conservation Authority. The retrenchment continued when Don Getty became premier in 1985. Given the crash in oil prices, Getty turned to expansion of the forest industry as a new source of revenue. A key step was allocating virgin forests in northern Alberta, encompassing an area greater in size than Great Britain, to forest harvesting. In contrast to Lougheed's approach, there was no analysis of the environmental effects of this shift in policy, nor was there any public consultation. The 1980s were a period where environmental protection was put on the back burner and resource development was all that mattered.

Ralph Klein's government, beginning in 1992, had a mixed record. An early order of business was completing Getty's expansion of forestry, including the construction of the world's largest kraft pulp mill, owned by Al-Pac, and several other major mills. By this time, the public had found its voice and the Al-Pac mill faced massive, ongoing protests. The mill eventually went ahead, but public awareness and expectations concerning resource management were fundamentally changed. As the tide of heightened environmental awareness gathered strength across the country, the Klein government shifted its stance and created the Special Places 2000 program. Through this program, 17,800 km^2 were added to Alberta's provincial parks system, tripling its size (this calculation excludes national parks).

One thing the Klein government was not good at was developing policy. By the time Ed Stelmach became premier in 2006, Alberta landscapes were crowded with overlapping industries operating in the absence of coordinated planning. The individual disturbances from wells, clearcuts, roads, and other activities were adding up over time, transforming our landscapes and placing increasing pressure on wildlife populations. Stelmach's key contribution, following extensive public consultation, was the development of the *Alberta Land-use Framework*, which sought to bring order to this chaos and place limits on cumulative impacts.

Under the *Land-use Framework*, Alberta was divided into seven regions with the intent of developing a land-use plan for each region. Lougheed's concept of balanced planning was taken out of cold storage and given new life, now under the heading of the "triple bottom line." The first plan to be completed, in 2012, was for the northeast corner of the province, home to most of Alberta's oilsands development. Under this regional plan, several new Wildland Provincial Parks were identified, totalling almost 15,000 km^2. Together with Wood Buffalo National Park, these sites collectively form the world's largest boreal protected area

and comprise a full third of the provincial protected area system. The northeast regional plan also included formal commitments to establish cumulative effects thresholds and to develop a biodiversity strategy.

Unfortunately, Stelmach resigned before the land-use planning process could be completed. Only one other regional plan was delivered, for the southern region of the province, and after that the entire process ground to a halt. Many expected Rachel Notley to revive the planning process and tackle the cumulative effects issue when she became premier in 2015, but this did not happen. Instead, her government's environmental protection efforts were site specific, involving the Castle region west of Pincher Creek, the Bighorn region west of Nordegg, and three northern sites intended to protect caribou range. Only the Castle initiative was successful, resulting in a new park.

Having reviewed how previous governments navigated the balance between economic development and environmental protection, we can now turn to the current UCP government. Sadly, the UCP record has been extremely lopsided in favour of development, out of step with public sentiment and even previous governments' policies. The only entry in the protection column has been the expansion of the Kitaskino Nuwenëné Wildland Provincial Park in northeastern Alberta.

In all other respects, the UCP has prioritized development. Most alarming has been the progressive unwinding of protection measures and regulatory constraints that previous Conservative governments put in place. Some key examples include:

- A proposal to delist 164 parks, retracted after public backlash.
- A proposal to rescind the Coal Policy, temporarily retracted after public backlash.
- A proposal to increase the rate of forest harvesting by 30%, well beyond sustainable limits.
- A proposal to massively expand irrigation in southern Alberta, well beyond sustainable limits for the affected rivers.
- New legislation, the *Red Tape Reduction Act*, that facilitates the circumvention of existing provincial environmental constraints.
- An attempt to circumvent federal environmental protection laws, such as the *Species at Risk Act* and *Impact Assessment Act*, through new sovereignty legislation.
- The dismantling of Alberta's Fish and Wildlife Division and Alberta Parks, reducing their effectiveness (see page 22).
- A failure to honour government commitments to complete regional land-use plans, establish limits on cumulative effects, and develop a biodiversity strategy.
- The ongoing sale of public lands.
- A proposal to pay oil companies for their legally required cleanup of old wells, creating an expectation that industry is not responsible for meeting its environmental obligations.

Another distinctive feature of the UCP government has been the lack of consultation. Environmental policies that were based on years of public dialogue are being reversed with no public input at all. Rather than governing in the broad public interest, the UCP seems focused on satisfying a core base of supporters. This may explain the extreme positions they have taken, which are out of step with mainstream public values.

In the final analysis, the UCP government stands apart. While past Conservative governments have struggled to balance resource development and environmental protection, none have been as one-sided as the UCP, with the possible exception of the Getty government in the late 1980s. It is no wonder that even lifelong Conservative voters have become disenchanted with the party, which has morphed into something unrecognizable.

Albertans deserve leadership that reflects our values. If yours include protection of our shared natural heritage, be sure to make your voice heard. ■

Richard Schneider is a conservation biologist who has worked on species at risk and land-use planning in Alberta for the past 30 years. He currently serves as the Executive Director of Nature Alberta.

Dippers stick it out through even the coldest Alberta winters. MARK BRADLEY

The Aquatic Songbird: **American Dippers**

BY MARK BRADLEY

I had been a flatlander my entire life when I moved to Jasper in 2005. Enamoured of my new mountain home, I was taking a mid-winter hike and enjoying the view. I could see my breath and hear the snow crunch beneath my boots as I walked along the edge of a swiftly flowing stream. That's when I heard a long, complex, and melodious song. I thought, "What kind of crazy bird is singing cheerfully at –20°C?" Then I caught a glimpse of a little grey bird standing on a rock — my first sighting of an American dipper! I watched with fascination as this tiny songbird jumped in and out of the water with no regard to the frigid temperatures.

Although American dippers have no distinctive field marks, they are unlikely to be confused with other songbirds because of their fondness for aquatic foraging along flowing streams. American dippers are plump little birds, 18–21 cm, that weigh about 50 grams (roughly the weight of a golf ball). Both sexes have a slate-grey body with a brownish-grey head, an upturned tail, and flashing white eyelids. The juveniles are a lighter grey with a whitish throat and some belly barring. The bill varies from dark grey to yellow depending on age and the time of year.

Since American dippers are only found near swiftly flowing mountain streams, their distribution just barely makes it into Alberta. Their range extends across the western mountain ranges from Alaska down to Panama. Four additional dipper species exist, distributed across South America, Asia, Africa, and Europe. Old World flycatchers are their closest relatives. Unlike many passerines (perching birds in the order Passeriformes), dippers do not migrate to warmer climes for the winter, though they may descend short distances to maintain access to open water.

The American dipper's main food source is aquatic invertebrates. Caddisfly larvae seem to be a particular favourite where I watch them, but they will take a wide variety of insects, and will even tackle small fish when they can get them. Dippers have a variety of foraging techniques, but all involve catching prey underwater. A dipper will often stand on a low rock in a stream, scanning for movement, then jump in the air and dive completely underwater, emerging with an insect in its beak. They will also stand in shallow running water with their heads underwater, snapping up insects as they come within range. Flipping rocks also seems to be a favourite tactic. Most impressively, they can swim to the bottom of the stream using their wings and walk along the streambed in search of prey.

Top to bottom:

Dippers are never far from fast water.

A dipper will often stand on a rock with its head underwater to search for prey.

Dippers will jump and dive from low perches.

Typical dipper habitat: a shallow stream with a rock and gravel substrate.

MARK BRADLEY

Dippers are aggressively territorial. Stretches of suitable habitat, particularly swiftly moving shallow water with a gravelly or rocky substrate, are jealously guarded. Territorial behaviours include calling, chasing, and posing on rocks with beak pointed to the sky and wings shaking. Territoriality is kicked up a notch when the breeding season starts, and considerable energy may be devoted to defending feeding habitat near a nest site.

Dippers typically nest on large rocks, cliffs, or bridges over water, making it difficult for predators to find and access their nests. The football-shaped nest is built out of moss, sticks, and bark and lined with dry grasses. Both males and females build the nest and care for the young. Clutch size is four to five eggs, incubation period is just over two weeks, and the chicks fledge within 25 days.

American Dippers are listed as "Least Concern" by Bird Life International[1] and "Low Concern" by Partners in Flight[2], because of their large and relatively stable population. The total population is estimated to be about 160,000, though this number is imprecise because of difficult survey conditions. The bird is relatively robust to human disturbance; however, poor development decisions can lead to the pollution of mountain streams and subsequent loss of dipper habitat. Dippers have also been shown to accumulate mercury and selenium in their blood and feathers, so pollution of their streams can affect them directly and may also reduce or eliminate their local food sources.[3] Climate change could also affect dippers as they are known to be susceptible to changes in rainfall and local hydrology.[4]

Top: A dipper about to swallow a caddisfly larva.

Middle: Juveniles are a paler grey, with a whitish throat and some patterning on the belly.

Bottom: An American dipper returns with grass to line the nest.

MARK BRADLEY

Watching dippers is one of my favourite birding pastimes. If you want to enjoy some dipper watching for yourself, just go to the mountains and look for shallow, swiftly running streams — muddy streams will not have any dippers. Elbow Falls Provincial Recreation Area is a good place to try. You'll probably hear their beautiful song or the incessant "chrrrr" of their territorial calls before you see them, because looking for little grey birds on grey rocks isn't always the easiest! ■

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1. BirdLife International (2023). Species factsheet: Cinclus mexicanus. birdlife.org.
2. Partners in Flight Databases (2023). pif.birdconservancy.org.
3. Wayland, M., J. Kneteman and R. Crosley (2006). The American dipper as a bioindicator of selenium contamination in a coal mine-affected stream in west-central Alberta, Canada. Environmental Monitoring and Assessment, 123(1), pp.285-298.
4. Sullivan, S.M.P. and K.T. Vierling (2012). Exploring the influences of multiscale environmental factors on the American dipper Cinclus mexicanus. Ecography, 35(7), pp.624-636.

Mark Bradley is a recently retired Parks Canada biologist, now residing in Calgary. Over his career, Mark worked on barren-ground caribou, polar bears, peregrine falcons, whooping cranes, mountain caribou, moose, elk, Columbian ground squirrels, and grizzly bears. Mark now spends his time exploring and photographing the prairies and foothills of Alberta.

YOUR SHOT Images of Alberta's Natural Heritage

SPRINGING INTO ADULTHOOD

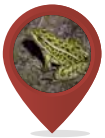
"Great horned owls nest much earlier than most other birds, with hatchlings present by early March. When I saw this youngster in Calgary's Fish Creek Provincial Park in early June, it was already as tall its parent."
—Tony LePrieur

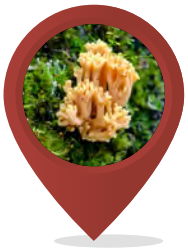
A SECOND CHANCE

"Like many other animals, foxes will accept an orphan into their family. After finding a suitable den, this little fox was given a second chance at life with his new family, proving once again how remarkable nature is."
—Karen Fahrlander

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







Citizen Science in Alberta: The Year in Review

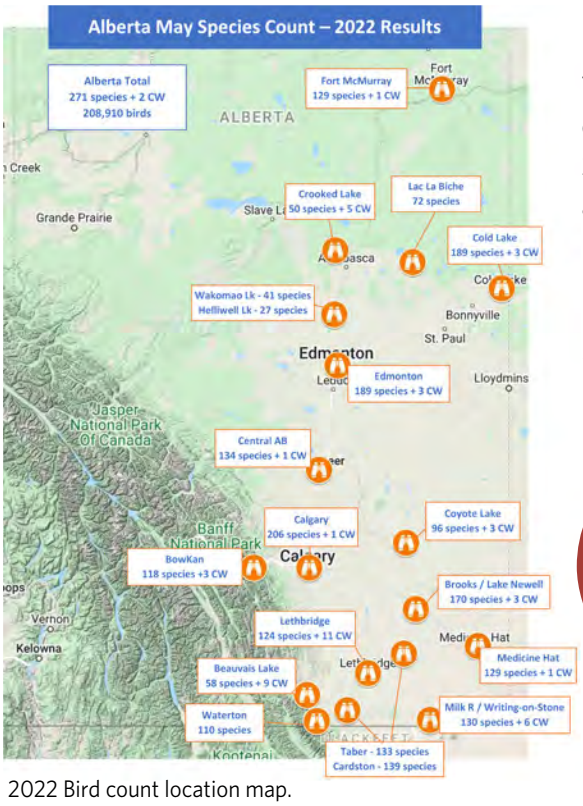
BY LARA FITZPATRICK, TREVOR FLOREANI, GREG POHL, AND RICHARD SCHNEIDER

Citizen science continues to grow in popularity and its contributions to the conservation of biodiversity are increasing. The Franklin's ground squirrel project Nature Alberta initiated last year provides a good example. Because data on this species are lacking in Alberta, it is currently listed as "data deficient" rather than a species at risk. However, by compiling citizen science data collected over the past decade (57 observations), Nature Alberta has shown that the squirrel's Alberta range has been contracting, particularly in the region around Edmonton where these squirrels used to be frequently encountered. This is strong grounds for officially listing this species as being at risk. The importance of citizen science observations is clearly apparent when you consider that the official government species database includes only two Franklin's ground squirrel records over the past decade (plus nine squirrels killed as part of a predator reduction study). You can read the full story about this initiative in the Winter 2023 issue of *Nature Alberta Magazine*.

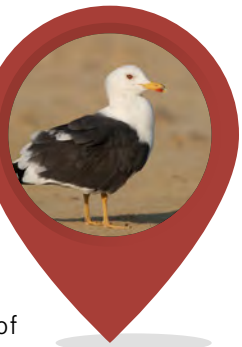
In 2022, Nature Alberta also lent its support to three locally run citizen science initiatives: the May Bird Count, the May Plant Count, and the Biodiversity Challenge. More than 1,000 people from across Alberta participated, submitting observations on more 1,500 different species. Here we take a look back over the year and provide highlights from each of the three projects.

May Bird Count

The Alberta May Bird Count has been running since 1976 and has grown steadily over the years. The first Count identified 184 different species, and another 156 species have been added since then. This brings us to a cumulative total of 340 species.



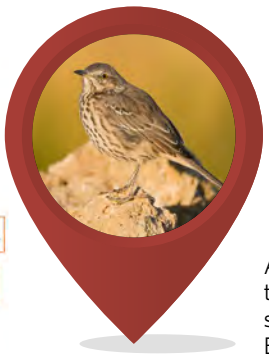
2022 Bird count location map.



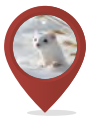
A lesser black-backed gull was observed in Fort McMurray.

The 2022 Count took place over two days during the last week of May (the specific dates varied among count areas). This year there were 508 participants, which was 28% above the average over the last 15 years. The number of species recorded was 271, which is right at the 15-year average. The total number of birds observed was an incredible 208,910, just under the average annual tally.

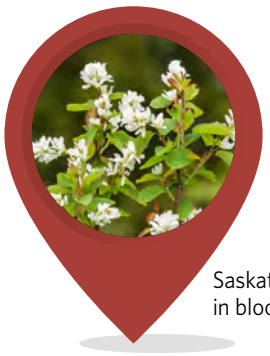
One new species was reported this year: a lesser black-backed gull observed in Fort McMurray. Unusual



A sage thrasher was spotted in Brooks.



Rufous hummingbird.
TONY LEPRIEUR



Saskatoon in bloom.

Tall lungwort.
RICHARD SCHNEIDER

species reported this year included a sage thrasher and a Lewis's woodpecker in Brooks, an eastern bluebird in Kananaskis, a Pacific loon in Lethbridge, a great crested flycatcher in Edmonton, and American black ducks in Lac La Biche. No thick-billed longspurs or lark buntings were reported this year, even though these two species were reported at least 14 of the last 15 years. Additional details are provided in a summary report available at **naturealberta.ca/may-species-count**.

For the 2022 Count, participants were encouraged to use eBird for recording observations. This simplifies count logistics and, more importantly, it ensures the observations contribute to the eBird database, which is of great value to birders and conservation scientists. This year, all of the observations made in the two largest count centres, Calgary and Edmonton, were submitted to eBird. Several other count locations are beginning the transition to eBird and hopefully all sites will eventually adopt its use as standard practice.

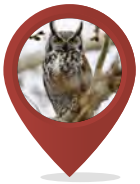
May Plant Count

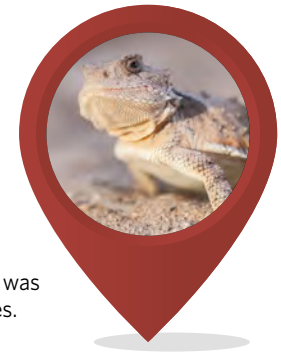
The annual Alberta May Plant Count is focused on recording the phenology (flowering stage) of vascular plants. During the last week of May, participants head out to their favourite outdoor spots to record which species are in bloom. A standardized coding system is used to distinguish plants that are about to flower, plants in full bloom, and plants that have faded flowers.

The main goals of the Count are to increase awareness of native plants and to get people thinking about phenology and its inherent variability. The observations are useful for tracking plant species in the province and trends related to climate change.

In previous years, observations were manually recorded on forms that were later submitted to Count organizers. In 2022, participants were encouraged to submit their observations using the iNaturalist smartphone app (though the traditional method was still permitted). This was seen as a great way to increase participation in the Count, given the huge popularity of iNaturalist. It also provided a reliable way to store observations and photos, and easy public access to all of the information (see **inaturalist.ca/projects/alberta-may-plant-count**). Moreover, it meant that the May Plant Count was contributing to the iNaturalist database, which is increasingly used to support conservation efforts.

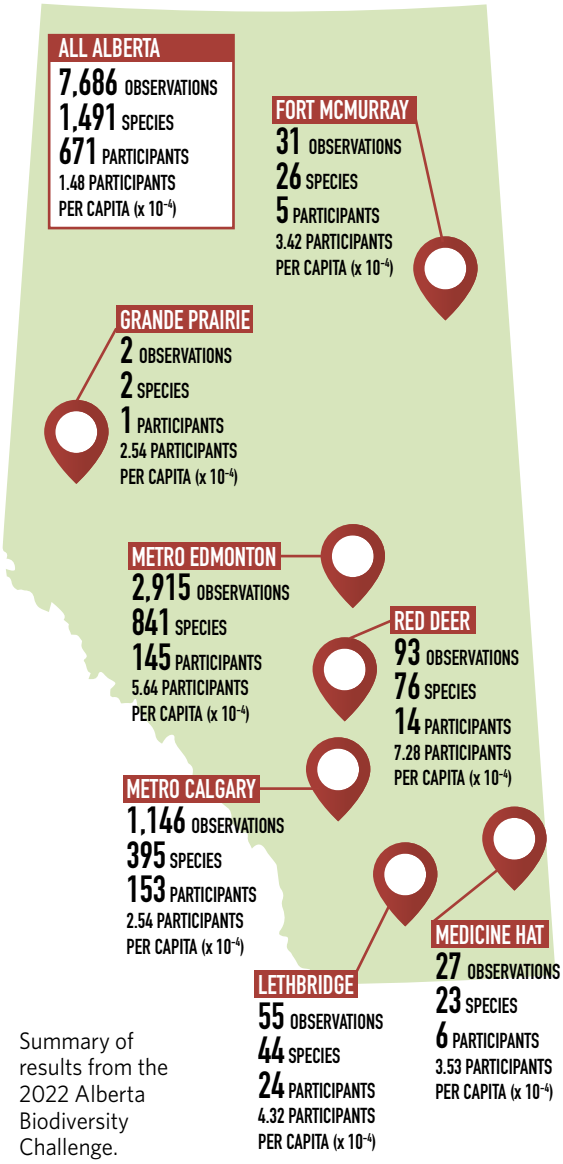
There were 32 participants in the 2022 Count who submitted a total of 557 observations (split between iNaturalist and manual submissions). Based on preliminary data compilation, 205 plant species were identified in 23 locations across the province. Not surprisingly, the species with the most observations was saskatoon, followed by early blue violet, rough-fruited fairybells, wild strawberry, and prairie crocus. The general consensus from most participants was that the spring of 2022 was on the cool side and many species were behind in blooming stage compared to typical years.





A short-horned lizard was seen near Manyberries.

Polyphemus moth (*Antheraea polyphemus*).
GREG POHL



Summary of results from the 2022 Alberta Biodiversity Challenge.

Biodiversity Challenge

The Biodiversity Challenge was inspired by the City Nature Challenge, a global biodiversity "contest" where cities compete against one another to survey their urban biodiversity on the last weekend in April. The iNaturalist app is used to record the observations. The goal is to produce an inventory of the biodiversity of a given place and to encourage public engagement with nature and conservation science. The data collected help researchers determine species ranges, track threatened species, monitor invasive pests, and note important new sightings.

Several municipalities in Alberta have participated in the global City Nature Challenge over the past few years. However, the early spring date of the event, set by the original U.S.-based organizers, is not ideal for our climate. Therefore, in 2022, local volunteer organizers created a parallel event — the Alberta Biodiversity Challenge — which ran from June 9–12. This survey covered the entire province, with subprojects for seven urban centres (see map). The idea quickly spread to other municipalities across western Canada and the northwestern U.S., and they held their own Biodiversity Challenges on the same date (see **inaturalist.ca/projects/2022-prairie-biodivercity-challenges**). There was also a follow-up survey held in mid-September.

In the 2022 survey, Edmonton had the greatest number of species identified; however, Calgary had the most participants and Red Deer had the highest participation rate per capita. There were also a large number of observations made outside of the seven major centres. Given that there was limited promotion of the Biodiversity Challenge outside of urban centres, many of these non-urban observations may have been made independent of the official event.

Some of the more interesting and unusual observations made during the Biodiversity Challenge included: a northern scorpion, fluorescing under

UV light in Lethbridge; a short-horned lizard, seen near Manyberries; and the first-ever iNaturalist observation of the newly described moth species *Caloreas hyperboreas*. The full listing of species observed can be viewed on the iNaturalist website: **inaturalist.ca/projects/alberta-biodivercity-challenge-2022**.

Citizen science initiatives like these depend on the dedicated efforts of local volunteer organizers and the broad participation of the naturalist community.

Get Involved

Citizen science initiatives like these depend on the dedicated efforts of local volunteer organizers and the broad participation of the naturalist community. We thank everyone who was involved in 2022 and helped to make these projects a success.

All the projects discussed here will run again in 2023 and we encourage everyone to participate. It's a great way to support conservation science — and it's fun! Our Franklin's ground squirrel project will continue, now in collaboration with Dr. Jessica Haines at MacEwan University. We will also begin compiling data on leopard frogs and thirteen-lined ground squirrels — species that are also in need of better monitoring. If you see any of these species, be sure to take a photo and submit your observation to iNaturalist (you can do this at home if you don't have the iNaturalist app on your phone).

The Citizen Science Spotlight on page 2 of this issue lists some important event dates to remember. For additional information, visit Nature Alberta's citizen science webpage: **naturealberta.ca/citizen-science**. There you will find background information on citizen science and how it is used to advance conservation research, as well as guides on getting started with eBird and iNaturalist and a comprehensive list of projects that you can participate in. We look forward to seeing you out in the field this spring. ■

Lara Fitzpatrick is the Provincial Count Compiler for the May Bird Count.
Trevor Floreani is an Organizer of the May Plant Count.
Greg Pohl is the Lead Coordinator of the Biodiversity Challenge.
Richard Schneider is the Executive Director of Nature Alberta.

Hibernating bats affected with white-nose syndrome. Note the white fungus around the nose of each bat except for the individual on the far left. N. HEASLIP

Deadly Fungus Adds to Alberta's Bat Conservation Concerns

BY CORY OLSON

Even under the best of conditions, winter is a challenging time for bats. The six species that spend the winter in Alberta must survive for about six months without food. Fewer than half of young bats make it through their first winter.[1] However, those that survive into their second year typically live long lives — the current record for oldest known bat in North America is a little brown myotis from Alberta, which lived to over 38 years old.[2]

Bats are among the slowest-reproducing mammals on the planet and most bats produce only one pup per year. Their long lifespan and naturally low adult mortality (after their first winter) are essential for maintaining viable populations. Consequently, when die-offs happen, it can take a long time for bats to recover.

White-Nose Syndrome

Bats have a remarkable ability to manage energy reserves; however, few can withstand the devastating impacts of white-nose syndrome (WNS). This disease is caused by a fungus, *Pseudogymnoascus destructans*, that grows on bats during hibernation. Infection leads to more frequent arousals during the winter, depletion of energy stores, and eventual starvation. The fungus was brought to North America from Europe and was first detected in New York State in 2006. It has been spreading state-to-state and province-to-province since that time, resulting in catastrophic declines of hibernating bat populations wherever it spreads.

Bat species that are vulnerable to WNS have seen population declines exceeding 90% in affected regions.[3] This has led to northern myotis and little brown myotis being listed as endangered under both the federal *Species at Risk Act* and, recently, the *Alberta Wildlife Act*. Those two species were among the first to be listed in part because their range extends into eastern North America, where WNS originally started. Catastrophic mortality in eastern cave hibernacula — over 98% in some cases — has been observed.

Western Canada has other myotis species that are now encountering the fungus. All five of the myotis species in Alberta are likely vulnerable to this disease to varying extent, so there is a high level of conservation concern.

Wildlife Conservation Society Canada, with the assistance of several government, university, and community partners, began monitoring for the WNS fungus in western Canada in 2021. During our first year, we confirmed its presence in eastern and southern

Above: A little brown myotis from northern Alberta. CORY OLSON

Right: A northern myotis. US FISH & WILDLIFE SERVICE

Saskatchewan, but none of our samples collected in Alberta and western Saskatchewan tested positive at that time. Unfortunately, that situation didn't last long. In 2022, we confirmed the presence of the fungus along the Red Deer River, with several other inconclusive detections suggesting incursions along multiple fronts. The known range of this fungus in western Canada increased by more than 500 km in a single year, although the fungus was likely more widespread than we were able to detect.

The Alberta detections occurred a short distance northwest of Dinosaur Provincial Park, as well as at multiple points farther down the Red Deer River and along the South Saskatchewan River. There were also inconclusive detections along the Milk River in Alberta, and the Battle and Beaver Rivers in Saskatchewan, just east of the Alberta border. These are likely to be real detections, but lab results didn't meet required thresholds, so follow-up monitoring will be completed this year to confirm those detections.

The presence of the fungus along the Red Deer River is particularly concerning because of the importance of this area for hibernating bats. It is one of few locations in Alberta where bats have been observed to hibernate in places other than caves. The western small-footed myotis, long-eared myotis and big brown bat have all been found hibernating in this region. They spend the winter in deep cracks and crevices within the cliffs and steep slopes of the Red Deer River badlands.[4] This area is the largest known hibernation area for multiple species of bats (though we have only begun to understand the winter behaviour of bats in Alberta). Furthermore, some bats likely follow the Red Deer River upstream to the Rocky Mountains, near caves where bats such as little brown myotis and long-legged myotis are known to hibernate. This makes the prospect of the fungus quickly spreading throughout Alberta much more likely.

The badlands along the Red Deer River are riddled with cracks and caverns that several bat species use for hibernation. RICHARD SCHNEIDER

Monitoring Efforts

In eastern North America, the presence of WNS is relatively easy to detect and monitor because bats hibernate in large numbers within large caves and mines. In the west, however, most of our bats appear to be wintering in scattered rock crevices that are inaccessible and, for the most part, unknown. To date, our detections of the WNS fungus have all been acquired through testing of guano samples taken from under bridges and in building roosts.

Although bats can fight the infection during the summer, through grooming

A hoary bat from Alberta. White-nose syndrome is not a major threat to this species, but large numbers die each year because of wind turbines. CORY OLSON

and other defences, they still carry trace amounts of the fungus with them when they leave their hibernation sites in the spring. Therefore, monitoring summer roosts is an effective, non-invasive way to monitor the spread of the disease. Even trace amounts of the fungus can be detected in bat guano using current genetic sampling techniques (see "Scanning for Life Forms: Using Environmental DNA to Identify Species" in the Spring 2022 issue of *Nature Alberta Magazine*).

Two collaborative projects run by Wildlife Conservation Society Canada have been instrumental for locating roosts and monitoring the progression of WNS across western Canada. The first is the Alberta Community Bat Program's community science initiative, which encourages people to submit reports of bat roosting locations and colony counts. Many landowners and conservation organizations have contributed to this database, which is now supporting multiple bat studies and monitoring projects in Alberta.

The second project, which has resulted in most of the fungus detections to date, is our survey of bridges that cross rivers and creeks. Along with our partners, we have already surveyed over 800 bridges across western Canada. Remarkably, more than half the bridges we've visited had bat guano that we could collect, usually conveniently sheltered on the undersurface of the bridge. Because bridges are widely dispersed across the landscape, we can collect samples in even the most remote regions of the country. Not only is this allowing us to monitor the spread of the fungus, but we are also using DNA barcoding to document the presence of different bat species, resulting in the largest-scale bat species inventory in Canada to date.

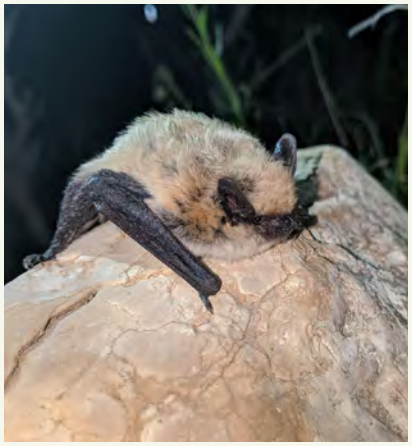
The Road to Recovery

Combating this disease is difficult because it spreads readily from bat to bat. Even bats that overwinter in Alberta may migrate up to 500 km between summer and winter habitats. This makes it all but certain that the disease will quickly spread, regardless of efforts to contain it.

Treatments are currently being tested that may one day help us to control WNS, but none of these will be ready in time to prevent the initial impacts of this disease in Alberta. The good news is that a small proportion of bats appear resistant to the fungus.[5] There is hope that, with proper management, bats will eventually recover. The current priority is to avoid adding to the threats faced by bats and to address any additional bat mortality from other causes.

Perhaps no action is more important than ensuring that bats have healthy environments to live in. Healthy wetlands, ponds, and riparian areas produce abundant insect prey that enable young bats to grow quickly and bats of all ages to fatten for hibernation. Fat bats have higher overwinter survival, especially when faced with a white-nose syndrome infection. Also important is to ensure that bats are not disturbed during the summer when they are raising offspring, or during winter while they are hibernating. To support the management of bats in Alberta and ensure that we have populations of healthy, well-fed bats, we have

A little brown myotis maternity colony roosting in an old granary. JASON HEADLEY



A western small-footed myotis. CORY OLSON

developed several resources, which can be found on our website: **albertabats.ca**.

With all the attention on WNS, it's worth remembering that bats were a conservation concern even before the arrival of this deadly disease. Habitat loss has been a consistent issue, along with high fatality rates of bats at wind farms. The impacts of wind turbines on migratory bats is one of the most pressing conservation challenges in Alberta and is rapidly becoming worse with the manyfold increase in wind energy capacity now underway. Wind turbines do not appear to be a major threat to the six species that hibernate in Alberta. Instead, it is the three species that migrate to the U.S. in the fall that are primarily being affected: the hoary bat, silver-haired bat, and eastern red bat.

Hoary bats are one of the most spectacular and charismatic bat species in Canada. Population models for hoary bats predict extinction for this species if we don't soon implement mitigation strategies to lower mortality rates at wind farms across North America.[6] Eastern red bats and silver-haired bats have not been modeled but may experience similar declines. Status assessments for these species are already underway; however, opposition by industry is derailing meaningful actions. Unlike WNS, there are obvious solutions for reducing fatalities caused by wind turbines, and these need to be consistently implemented. Unfortunately, not enough is being done, and provincial wildlife directives are no longer up to the task of slowing this threat.

Between WNS and wind energy, few bat species remain secure in Alberta. Biologists are estimating that it could take centuries for our bat populations to recover to the numbers we are used to. But our first concern is to prevent populations from disappearing altogether. WNS and the other threats facing Alberta's bats are not simple to solve, but solutions do exist. With enough people working on them, and with public support, these threats can be overcome. We need better policies, stronger wildlife directives, and substantial funding for wildlife in Alberta. ■

Cory Olson is Program Coordinator for Wildlife Conservation Society Canada's Alberta Bat Program. He is a Professional Biologist who has been working with bats for over 15 years.

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PLUNGING INTO A WATERY WORLD

BY KENTON NEUFELD

Crouching between the opened doors of my truck, I struggle to pry the skintight wetsuit from my leg while balancing on my free foot, ducking the curious glances of the family having a picnic 30 feet away. It's October and the Elbow River is running cold and clear just down the hill from the parking lot. I'm wet, shivering, and half naked, but right now the only thing going through my mind is the highlight reel of the past hour. Schools of whitefish with reflected sunlight flashing along their sides as they sway as one with the current. Green and gold cutthroat trout, looking enormous because they are so close. And bull trout, lurking at the bottom of the pool, seemingly uninterested in the other fish around them despite their voracious reputation.

A Hidden World

Compared to other wildlife, fish occupy a world largely hidden from our view. Birds fly in the air above us and perch conveniently, offering us a good look. Mammals walk the same ground we do. But fish live on the other side of a divide. Even the clearest, cleanest water obscures our ability to see fish when we're on the dry side. I think this may be why we tend to view fish with less familiarity and connection; why our most common values attached to fish are their ability to provide excitement on the end of a fishing line and a tasty meal.

Like many people, it was those experiences that initially introduced me to fish, and I eventually turned that interest into a career as a fisheries biologist. Angling and sampling fish as a biologist have definitely provided me with great opportunities to observe and interact with fish. However, these techniques are almost all disruptive to the fish, and they lack the naturalist aspect that most other types of wildlife viewing provide.

Even in the earliest days of my career, I craved a way to see fish in a more natural state, but finding a way to observe and experience something so inaccessible without disturbing it is tough. The reality is that Alberta's lakes and streams aren't the easiest places to wade into and explore. If they're not freezing cold, they're usually either clogged with aquatic plants and algae or carrying such a high sediment load that you couldn't see anything even if you did jump in.

Then I began hearing stories that suggested that our lakes and streams may not be as inaccessible as I thought. It turns out that donning a mask and snorkel isn't just for the Caribbean; snorkeling is actually a viable activity right here in Alberta! A friend of mine who had been snorkeling for years told me of fascinating adventures where he would see species that, as a biologist and angler, I usually didn't spend much time thinking about.

For example, he told me of a stream where sculpin live stacked in the cracks between cobbles on the downstream side of a gravel bar. Below the sculpin in the pool, plains sucker graze on algae while longnose dace root around in the rocks looking for bits and bites. And with a watchful eye over them all, bull trout lurk in the flickering shadows under fallen trees, waiting for unsuspecting prey to pass by. It's

Top of page: Snorkeling in Cascade Ponds near Banff townsite. JOHN McCUAIG

an unusual combination of species, located right on the fringe of where a cold mountain stream starts slowing down and warming up as it reaches the prairies.

He also told me of a warm, clear lake where the floating mat of vegetation along the shore creates a world hidden from above, filled with a network of crevices and caves. This is where brook stickleback fathers protect their microscopic young from marauding yellow perch. Where finescale and northern redbelly dace form schools, flashing bright red and yellow as they vie for mates. It's possibly the closest you'll get to a tropical reef within a couple hours' drive of Calgary.

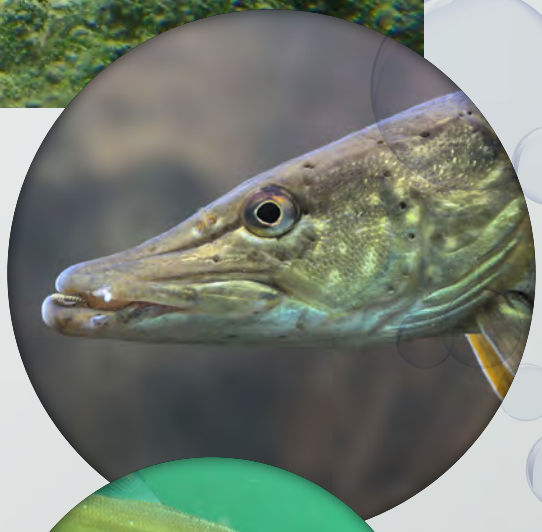
With this motivation, I decided to jump in and give it a try. I bought the thickest second-hand wetsuit I could find, some neoprene socks and gloves, and a snorkel and mask. A significant investment, but not more expensive than a few days on the ski hill. Now, watching trout and whitefish in the pools of the Elbow River has become a favourite therapy of mine. I've also discovered a couple of clear lakes where it's possible to paddle around with the perch and pike. I have a lot more exploring to do, but there's no shortage of places to visit within a day trip of home.

Alberta's Underwater Diversity

At first glance, Alberta might not seem like the kind of place that would hold the type and variety of fish to inspire anyone to dive in for a closer look. But this assumption deserves to be challenged.

It's true that when compared to many other parts of Canada, Alberta is a tough place for fish to live. First of all, there just isn't that much open water. We don't have an ocean coast, or the thousands of lakes of the Canadian Shield, or the seemingly endless streams and rivers of mountainous B.C. Moreover, Alberta lakes are relatively unproductive. We have harsh, cold winters and short summers, which means a shorter growing season than our neighbours to the south.

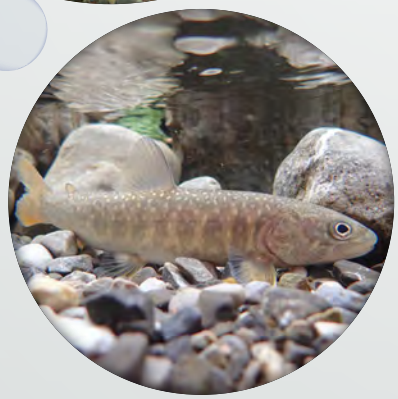
Alberta aquatic resources are also under enormous pressures from our human population. We have two cities of over a million people and thousands of industrial, commercial, and agricultural



Top: Longnose sucker and westslope cutthroat trout share habitat in the lower reaches of some of our mountain streams. ELLIOT LINDSAY

Middle: Northern pike are a common fish in Alberta's prairie and boreal forest waters. GILLES SAN MARTIN

Bottom: Mountain whitefish congregate in large schools in the fall to spawn. ELLIOT LINDSAY



Top: Aquatic vegetation provides important habitat for many species of fish. ELLIOT LINDSAY

Middle: Bull trout and brook trout are closely related and can produce hybrids, such as this one from the upper Red Deer River. KENTON NEUFELD

Bottom: The colouration of a juvenile bull trout helps it hide among the rocks of a mountain stream. KENTON NEUFELD

users all vying for the limited water resources that are available. This puts pressure on the habitat needed to sustain our fish populations. And since many of those people enjoy fishing as well, angling pressure on some species can be unsustainably high.

Despite these challenges, Alberta still boasts a fascinating fish community. This is because the province sits on the boundary of several major watersheds and ecotypes, resulting in a wide diversity of fish species. In the northern part of our province, our rivers flow into the Arctic Ocean via the Mackenzie River. There, in the Peace, Athabasca, and Hay watersheds, you'll find Arctic grayling with their large flashy dorsal fin and iridescent colouring.

In the far south, the Milk River empties into the Gulf of Mexico via the Missouri and Mississippi Rivers. It supports Alberta's only catfish species, the stonecat, as well as the western silvery minnow, also more typically found in the big prairie rivers to the south.

Our mountains and foothills have four species of native trout: bull trout, westslope cutthroat trout, Athabasca rainbow trout, and lake trout. All of these, except for lake trout, are listed as either threatened or endangered, making them particularly special. The Athabasca rainbow trout is unique in being the only population of rainbow trout to have naturally made the jump over the divide from the Pacific drainages to settle in Alberta.

Out on the prairies, we have the northern pike, yellow perch, and walleye that anglers are so familiar with. But how many people have seen a quillback, shorthead redhorse, or river shiner? These species aren't uncommon in our prairie rivers, but are rarely encountered.

Taking the Plunge

I'll admit that snorkeling in Alberta isn't going to be everyone's first choice of recreational activity. It can be murky, barren, and sometimes downright frigid. But I have had some great experiences and it has taught me that fish live in more places than one might expect and that the smaller, more common species can provide some fun viewing opportunities.

Many fish can be seen from the shore without the need to jump into the water at all. Minnows and juvenile fish of many

species spend much of their lives in the shallow areas of lakes and streams, and you can spot them if you know what to look for.

One's appreciation for fish watching, whether via snorkeling or not, can be enhanced by learning the basics of fish biology, species identification, and distribution. I recommend starting with *Fish of Alberta* by Michael Sullivan and Amanda Joynt. This book is accessible for the layperson and includes suggestions on where to view most species of fish. For more in-depth study, try the similarly named *The Fishes of Alberta*, by Joseph Nelson and Martin Paetz, which is a seminal text with a more scientific bent. For the data nerds out there, Alberta's Fish and Wildlife Management Information System is an online spatial database that holds the majority of the province's fisheries data. If you're curious about which fish species live in a specific waterbody, this database will tell you (assuming it has been sampled at some point).

Keep in mind that there is a degree of risk associated with snorkeling. In the Alberta context, cold water and flowing water present some very real dangers that should be treated with respect. Before jumping in, make sure to research appropriate safety measures and talk to an expert or someone more experienced than you. Start small, stay within your limits, and always swim with a buddy.

It's unlikely that my spot on the Elbow River will be inundated with other snorkelers any time soon. But the next time you're floating down your local river in an inflatable unicorn in the heat of summer, pull into one of the side channels or a calm backwater for a break. If you look carefully, you'll probably see some longnose dace or other minnows swimming and feeding among the rocks in the shallows. And if you happen to bring a pair of goggles, stick your head underwater for a quick peek at a surprisingly diverse hidden world! ■

This bull trout won its fight with an angler, but was left with an uncomfortable souvenir. ELLIOT LINDSAY

Kenton Neufeld is a fisheries biologist living in Calgary and working in the Eastern Slopes of Alberta, specializing in fish species at risk. He is always on the lookout for new and interesting experiences and stories to share with the public and increase appreciation for Alberta's aquatic life.

Who Is Minding Alberta's Fish and Wildlife?

BY LORNE FITCH

By the time you read this, the old Fish and Wildlife Division will probably not exist under any recognizable name or department. This was the Alberta government agency that inventoried and assessed fish and wildlife populations, allocated opportunity for hunting and fishing, determined species at risk and their recovery, ran fish hatcheries, provided hunter training and conservation education, enforced fishing and hunting rules, and, most importantly, provided advice on proposed land uses to ensure fish and wildlife populations were conserved.

The UCP government has been stealthily engaged in the gutting of what was left of the Fish and Wildlife Division. The task of allocating fish and wildlife has been hived off to Forestry, Parks and Tourism, under the auspices of a minister who coincidentally has one of the largest guiding and outfitting companies in Alberta. I'm sure that isn't a conflict of interest. The fish culture section (all the hatcheries) has been sent to Agriculture and Irrigation, leaving the species at risk function behind in Environment and Protected Areas.

Previous Conservative governments transferred enforcement (the fish and wildlife officers) to the Solicitor General's department. Much of the fish and wildlife inventory and habitat development function went to the non-government Alberta Conservation Association. Resource education was privatized under the Alberta Hunter Education Instructor's Association.

The UCP tout grassroots democracy and red tape reduction. Yet none of these recent changes have had any public consultation, let alone input from conservation organizations. As to red tape reduction, the notion that parcelling out the functions of fish and wildlife management between four government departments and two non-government organizations makes things more efficient defies logic.

The Fish and Wildlife Division has an important role in monitoring the status of Alberta's wildlife populations, including grizzly bears. US NATIONAL PARKS SERVICE

These changes are the equivalent of sending hospitals to Municipal Affairs, family health to Education, trauma and emergency services to Transportation, and diagnoses to Public Safety. It's hard to imagine any successful business that would operate on such an uncoordinated and non-integrated approach.

Like a successful business, the delivery of government programs designed to serve the public interest needs to function in an integrated way under the umbrella of one departmental administration with a similar purpose and direction.

For fish and wildlife to be managed well, there need to be adequate, timely inventories of

populations; an assessment of what the allocation should be to hunting and fishing interests; ways to monitor population responses to harvest; robust habitat protection; policy development to ensure biodiversity is always part of government agendas; responses to the legal (and moral) requirements for species at risk, with necessary recovery actions; provision of additional recreational angling opportunities through fish hatchery operations; and a level of enforcement to ensure rules are followed. These functions are not divisible; they hinge upon each other and can only work as a unified whole.

How fish and wildlife management and conservation will happen — in such a fractured way, between four departments, all with differing mandates, priorities, and directions — is a question unanswered (it may be the question was never thought of at all). The real risk is that our fish and wildlife populations will slip through the bureaucratic cracks, the intents for conservation will be weakened, and red tape will increase with interdepartmental conflicts over mandates, budgets, and staff levels.

I admit some bias in this assessment as I was a part of the Fish and Wildlife Division before the hemorrhaging began, when it was still considered one of the elite fish and wildlife agencies in North America.

Like selling provincial parks and throwing the Eastern Slopes open to coal exploration, gutting fish and wildlife management is another example of how out of touch the UCP is with Albertans over the conservation of resources considered as provincial treasures. It speaks to a most extraordinary and dangerous hubris. ■

Lorne Fitch is a Professional Biologist, a retired Alberta Fish and Wildlife Biologist, and a former Adjunct Professor with the University of Calgary. A version of this article previously appeared on **healthing.ca**.

Fish and Wildlife biologists lead recovery efforts for Alberta's species at risk, including the burrowing owl. RICK PRICE

The Fish and Wildlife Division has been the lead voice within government representing wildlife concerns when decisions about land uses are made. RICHARD SCHNEIDER

The 20,000-Year-Old Story of the Golden-Crowned Kinglet

How Population Genetics Informs Conservation

BY DANIKA SCHRAMM

For many people, the topic of genetics has to do with the determination of personal traits like eye colour and inherited disorders such as Huntington's disease. But for conservation biologists, it is the genetic composition of entire species that is usually of interest. For example, let's say we are developing a recovery plan for a specific species of duck. Should we apply the same recovery measures to all ducks? Or do some populations need to be handled differently because they are genetically isolated from the rest?

The level of interbreeding among populations is important because isolated populations may, over time, develop genetic adaptations that are specific to their local environment. These unique local gene pools often warrant protection in their own right. Moreover, isolated populations face higher risk of population decline because there is less chance of rescue from individuals flowing in from other populations.

Population genetics is also central to differentiating related species and understanding the process by which species arise in the first place.[1] In most cases, speciation occurs when a physical barrier, such as a mountain range or desert, slows or prevents interbreeding between populations. Random genetic mutations will accumulate in the separate populations, and given enough time (think thousands of years), the populations can diverge into two distinct species. Differences in habitat and other environmental factors between the two locations will speed the process of divergence. It is worth noting that, in the modern world, habitat fragmentation caused by humans is also causing populations to become isolated.

Glaciers as Drivers of Speciation

An event that had an enormous impact on Canadian species was the last Ice Age. The glaciers reached their maximum size approximately 20,000 years ago, during the late Pleistocene. At

The crown of the female golden-crowned kinglet is more subdued than that of the male and lacks the orange band in the centre. JEN GOELLNITZ

The male golden-crowned kinglet has a bold yellow-and-orange crown and the feathers may be raised in display. STEVEN KERSTING

that time, most of what we now know as Canada was under several kilometres of ice. To survive, species had to move to pockets of suitable habitat south of the ice sheets, called glacial refugia. In some species, all individuals lived together in a single glacial refugium. In other species, there were multiple refugia that supported separate populations. The genetic outcomes of these two situations were drastically different.

For species that resided in a single glacial refugium during the Pleistocene, the impacts of glaciation would have been fairly similar for all individuals. Also, interbreeding would have ensured that populations remain genetically similar despite random genetic mutations. In contrast, species that became divided among multiple glacial refugia often developed distinct genetic differences between groups.[2]

Golden-crowned kinglets live mainly in coniferous forests. JEFFERY OFFERMANN

To illustrate how scientists have arrived at these conclusions, I'm going to walk through a real-world example from my own research. One of my study species was the golden-crowned kinglet. These tiny birds are one of North America's smallest passerines (perching birds in the order Passeriformes), weighing under six grams. They primarily inhabit conifer forests and are known for their characteristic "golden" crowns.

To research the genetics of a species, it is necessary to collect genetic samples from numerous individuals. Furthermore, these samples need to come from multiple locations in order to assess differences among populations. In birds, blood or tissue samples are typically best for genetic research. Tissue samples are often shared through museums and their collections. Blood samples, on the other hand, need to be collected from live birds. As humorous as it would be, we do not chase birds around with butterfly nets hoping to snatch one out of the air. While we do use nets, the process is a little different.

Most passerines and small-to-medium land birds are caught using mist nets. Mist nets are made of a fine mesh that birds cannot see; they get tangled up in the net as they fly through the underbrush. When a bird is caught we gently untangle it and place it in a soft cloth bag to be weighed, banded,

The distribution of the two main ice sheets that covered North America at their maximum, approximately 20,000 years ago. The bird symbols show where the golden-crowned kinglets may have resided during this time.

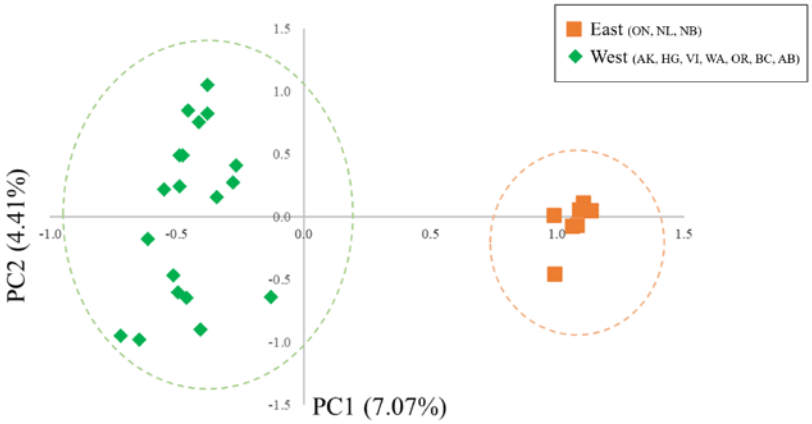
An adult male golden-crowned kinglet being held during field work in Saskatchewan.
DANIKA SCHRAMM

and measured. We take a small blood sample from a vein under the bird's wing and then allow the puncture to clot while we take the remainder of their measurements (things like wing length, bill length, age, and sex). As soon as the bird's measurements are recorded, we release it on site. The entire process is brief; birds are usually handled for five minutes or less. Our priority is always bird health and safety. If at any time we feel a bird is potentially experiencing high levels of stress, we release it even if all measurements have not been collected. All birds are captured and handled by trained individuals under appropriate permits.

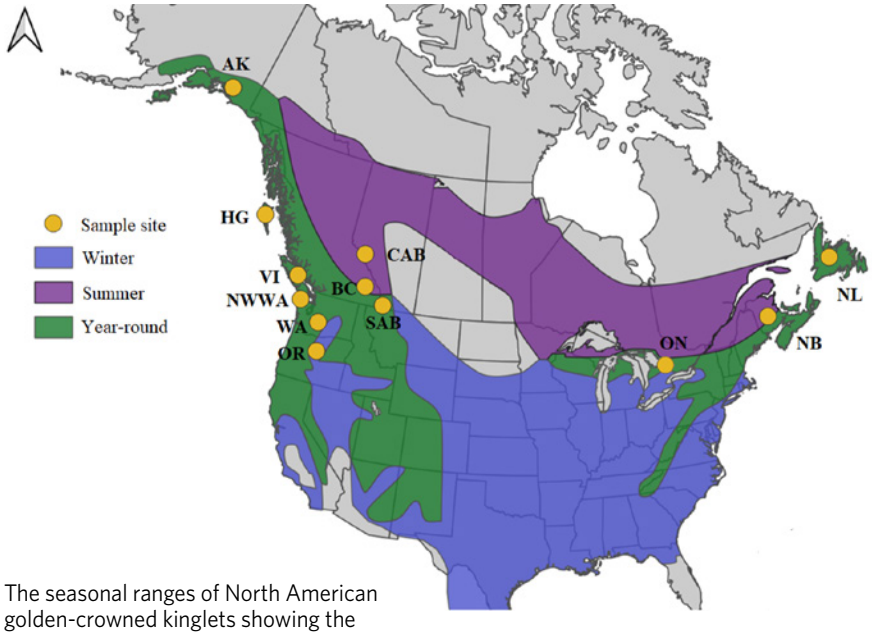
Once we have collected the required samples, we return to the laboratory to isolate the DNA, which is then sent to a sequencing company. With recent advances in sequencing, hundreds of individuals can be sequenced at once in a short period. The sequence files can be incredibly large and therefore serious computing power is required to analyze them. The first step is to clean and sort the data, after which several different analyses can be performed.

A common approach for visualizing genetic patterns within populations is a statistical technique called Principal Coordinates Analysis. I used this method, among others, to illustrate the similarities and differences in genetic makeup of the golden-crowned kinglets I sampled. The results are presented in the accompanying graph. Each point represents an individual kinglet. Individuals that are close together are more similar in genetic makeup than those that are farther apart. It is easy to see that the kinglets I sampled fall into two distinct genetic clusters: one containing individuals from eastern North America, and one containing individuals from western North America.

The distinct east-west split evident in my kinglet data has been observed in multiple other species. It is believed this pattern is the result of thousands of years of isolation between the two groups during the Pleistocene Epoch, while the two groups resided in separate glacial refugia. Though the two groups are now again able to interbreed in some areas, there has not been enough genetic mixing to counteract the genetic divergence that occurred through the long period of isolation.



A Principal Coordinate Analysis using genetic data from the birds in my study. Each point represents one golden-crowned kinglet. The farther apart two points are, the more genetic difference there is between them.



The seasonal ranges of North American golden-crowned kinglets showing the sample sites used in my study. MAP FROM BIRDLIFE INTERNATIONAL[4]

Previous research has determined the approximate locations of glacial refugia for many forest-dependent species. Through this research, we know there was at least one pocket of forest near the east coast and another near the west. This lends support to my finding that golden-crowned kinglets were spatially separated during the most recent glaciation. Once the ice began to melt, these tiny birds began to recolonize the new forest as it grew where the ice previously covered the ground.[3]

Conservation Applications

As more and more information about the genetic structure of species is revealed through research, it is beginning to inform species recovery efforts. However, there are many complexities to grapple with. For example, not all birds exhibit the simple east-west split observed in my golden-crowned kinglet study. Some species have multiple genetic groups whereas others appear to entirely lack significant regional differences. A species' life history traits, dispersal capabilities, historical and present ranges, and many other factors all contribute to the patterns we see.

There is also the issue of how much genetic variation needs to present for a group to be split into subgroups. You may be surprised to learn that there are no firm rules with respect to delineating subspecies and regionally distinct groups on the basis of genetic structure. This remains a widely debated topic. When it comes to listing species at risk in Canada, the decisions are made on a case-by-case basis by the Committee on the Status of Endangered Wildlife in Canada.

While my kinglet study is just one example of how genetic patterns can be visualized in a population, it is important to remember that this is just the tip of the iceberg of what can be done with genetic data. The conservation implications also should not be ignored, particularly in species at risk or those sensitive to disturbance. And even if the species is not of current conservation concern, the changing climate and landscape can cause unpredictable changes to populations.

I hope that this gentle introduction to population genetics has allowed a peek into some of the research being done today. It is so easy to become bogged down in the complex details when the story itself is often much simpler. Don't get me wrong, the details and the intricate processes can be fascinating, but the big picture and influence of population genetics is one that will shape research for years to come. ■

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Danika Schramm recently completed her master's degree in biology at the University of Lethbridge studying the genetics of two North American passerines. She is an experienced bird bander who has spent time bird banding in both Belize and western Canada.

Butterflies for Beginners

BY NICK CARTER

For naturalists who focus on vertebrates like birds and mammals, the world of insects can seem intimidating, given the millions of species that exist. Thoughts of pinning boards, dichotomous keys, and microscopes can send a shiver down the backbones of those happier with just a pair of binoculars and a birding guide. But my experience is that once you've been bitten by the entomology bug, you won't look back. A good group to start with, if you are keen to expand your biodiversity horizons, is butterflies.

Butterflies provide a good introduction to the world of insects for a variety of reasons. Many species are bright, colourful, and not too hard to find. And because butterflies prefer the midday sun, you don't have to get up early to spot them, as is the case with many birds and mammals. The distribution of species varies among natural regions, and they exist in their adult stage at different times of year, providing a rotating variety of species from spring to autumn. They don't bite or sting, and being so approachable, they're pleasant to watch and enjoy. It's true that some butterfly species can be challenging to identify, but Alberta does not have so many types that learning the common ones is a chore.

Butterfly Families

To make the most of your butterfly watching, it is good to know something about their taxonomy. Butterflies are members of the moth order Lepidoptera. In fact, butterflies are really just a group

Canadian tiger swallowtail (swallowtail family), right. This is a large, easily identified butterfly. The wings are bright yellow with black stripes and red and blue spots along the trailing edges. The V-shaped stripe patterns on the wings differentiate it from the Old World swallowtail, below, which is also common in Alberta. NICK CARTER, SUSAN MAY

Above, left to right:

Arctic skipper (skipper family). Typical of skippers, this species has short, stubby wings and hook-ended antennae. The wings are orange and black, with silvery spots on the underside of the hindwings. It is found in meadows and woods throughout the province.

Western tailed-blue (gossamer-wings family). This is a small butterfly found in woodlands in northern and central Alberta. The wing undersides are spotted and dull grey while the upper sides are metallic blue. Note the small pointed "tails" at the bottom of the hindwing on this species.

Mustard white (whites and sulphurs family). This is a mostly plain white butterfly. The veins on the wing undersides are often darkly highlighted, and the hindwings have a small yellow blotch on the front edge of the wing base. It is found in wooded areas north of the grasslands.

NICK CARTER

White admiral (admiral subgroup of the brushfoot family). This species is easy to identify based on its large, striking, black-and-white wings, often fringed with red-and-white patterns. It is found in deciduous woods and groves across the province. AARON CARLSON

of colourful daytime moths with club-shaped antennae instead of the feathery antennae of other moths. While many are typical nectar-eating pollinators, some also feed on tree sap or mud. In Alberta there are five major butterfly families to know: swallowtails, skippers, gossamer-wings, whites and sulphurs, and brushfoots. They're all sufficiently different that identifying a native butterfly down to the family level usually isn't hard. The accompanying photos provide representative examples from each of the major groups.

Perhaps the most noticeable and majestic of Alberta's butterflies are the swallowtails (family Papilionidae). These big, yellow-and-black butterflies are almost kite-like in appearance, with their trailing wing tassels fringed with blue and orange. The striped Canadian tiger swallowtail is a common species in aspen forests and adjacent meadows. The introduced Old World swallowtail is similar, but has a black base on each forewing instead of the v-shaped stripes of the Canadian tiger. Unlike other butterflies, swallowtails flutter their wings while feeding. The unique relationship between swallowtail butterflies and wood lilies was described in the Fall 2022 issue of *Nature Alberta Magazine*.

Skippers (family Hesperiidae) are small, short-winged butterflies with distinct hooks on their antennae tips. The forewings are shaped like a right triangle and the hindwings are round. With their big eyes and stubby bodies, skippers are the teddy bears of the butterfly world. They fly in quick darting motions instead of the graceful flight of other butterflies. Skippers can be found

Top left: Aphrodite fritillary (fritillary subgroup of the brushfoot family). Like other fritillary species, this butterfly has orange-and-black wings with silver spots and a pale, crescent-shaped band on the hindwing undersides. Fritillaries can be hard to tell apart, but the black chevrons on the edge of the wings and brown eyes help this species stand out. It is found throughout much of the province in forests and open prairie.

Top right: Common ringlet (satyr subgroup of the brushfoot family). This is a small, pale grey-and-copper butterfly with a dark eyepatch on the underside tip of the forewing. It is found in open meadows and prairies in central and southern Alberta.

Bottom: Milbert's tortoiseshell (anglewing subgroup of the brushfoot family). Vibrant bands of yellow and red on the upper side of its brown wings make this common butterfly easy to identify. Also note the red, eyelike patches and pale spots on each forewing. It is often seen standing on patches of bare, sunlit ground near wooded areas across the province.

NICK CARTER

in dry grasslands and meadows as well as dense forests, depending on the species. Some are fairly drab and typically "moth-like" in colour, but others are more vivid. Common species include the orange-and-black Arctic skipper, with its distinctive white underwing spots, and the introduced European skipper, with its rust-coloured wings rimmed with black.

Gossamer-wings (family Lycaenidae) are a diverse family of small butterflies. They include the hairstreaks and coppers, but the group I most often see are the blues. The wings of butterflies in this family are larger than those of skippers and are fairly simple in shape — angular forewings and round hindwings. In blues, the wings are a beautiful metallic shade of blue on top, with some combination of subtle black spots and black-and-white edges depending on the species. Underneath, the wings are drab with black spots, though some have nice little red markings on the hindwing called auroras. With its small yet distinct hindwing "tails," the western tailed-blue butterfly is a standout.

The whites and sulphurs (family Pieridae) are, as their name suggests, a group of mostly white and yellow butterflies. The mustard white butterfly, named for its preferred diet in the larval stage, is common in gardens, meadows, and forests. Its plain white wings with dark veins and yellow patches at the base of the forewings make it easy to identify. The similar cabbage white butterfly is an introduced species from Europe. It is a common pest of gardens and farms, with dark spots on the upper side of otherwise plain white wings. The greenish-yellow clouded sulphur butterfly, with its distinctive red spots on the underside of the hindwing, is a common species in the sulphur group.

Last but not least are the brushfoot butterflies (family Nymphalidae), which comprise the most diverse group, with over 6,000 species worldwide. Named for the fuzz on their reduced forelegs, these butterflies use only the four rear legs when standing. Several subgroups of this large, complex family are found across Alberta, including the admirals, fritillaries, satyrs, and anglewings. This family also includes the famous migratory monarch butterfly, which you may be lucky enough to spot in southern Alberta.

A notable member of the admiral group is the regal white admiral, an easily recognizable species found in deciduous woods with black-and-white wings rimmed with red and blue spots on the hindwing. There's also the monarch-mimicking viceroy.

The fritillaries are large, graceful butterflies with orange-and-black upper wings and variable patterns underneath. Fritillaries can be hard for novices to

identify, but wing colours and patterns along with size and region found can help narrow things down. A common example is the variegated fritillary, which lives just about anywhere south of the boreal forest. Another group of much smaller orange-and-black butterflies are the crescents and checkerspots. The northern crescent is one of the most common summer butterflies north of the prairie grasslands. In the southeast it's replaced by the similar pearl crescent.

Butterflies in the satyr group are subdued, brownish species found in prairies, meadows, and aspen woods. Many, such as the ringlet, northern pearly-eye, and common wood nymph, have noticeable eyespot patterns on the wing undersides. These spots help deter bird predators and can be used to differentiate species, especially since satyrs always seem to perch with their wings folded up. Others in this group, like the alpines and Arctics, are more of a mothy grey and black.

Finally, there are the anglewings and their close relatives. In many species, when the wings are folded the camouflaged undersides show a dull brown colour, so they aren't much to look at. But when the wings unfold, the vibrant colours of the upper sides are revealed. This group includes the lovely painted lady butterfly and its close relative the red admiral, both of which are migratory. Two of my favourite species, the Milbert's tortoiseshell and mourning cloak butterfly, are common throughout the province, with adults toughing it out through winter in hibernation before awakening in early spring. The anglewings are known for their highly scalloped wing edges, coming in varying patterns of orange and black on the top side and dull brown below. Some have a white, comma-shaped mark under the hindwing, and so are referred to as the "commas."

Beginning Your Butterfly Watching Adventures

To learn more about butterflies, John Acorn's book *Butterflies of Alberta* is a great resource. It provides an introduction to butterfly ecology and behaviour, as well as photographs and descriptions of the butterflies you are most likely to encounter in Alberta. The Insects of Alberta website is also a good resource for finding and identifying Alberta butterflies: **insectsofalberta.com/butterflies**.

There are many species to find and countless things to learn about Alberta's butterflies. You can even start at home by engaging in "butterfly gardening," a hobby that entails cultivating certain native flowers that are likely to attract different butterfly species. Finding these insects beyond the backyard is also a great excuse to get out and explore. Whether it's high mountain meadows, sun-baked prairies, or deep northern woods, the butterflies will be waiting. Be sure to have the iNaturalist app loaded on your phone so your observations will contribute to the citizen science database. And remember that, like all other natural history pursuits, butterfly watching is often best enjoyed in the company of other "rhopalocerophiles" — a label that any butterfly fan can wear with pride. ■

Butterflies, like this red admiral, are attracted to bright blossoms, so cultivate your own native species pollinator garden to start attracting a stunning array of Alberta's beautiful varieties. LOGI AER

Nick Carter is a writer, photographer, and naturalist from Edmonton. From birds and bugs to flowers and fossils, Nick is always seeking out the natural wonders of this province and sharing his enthusiasm with others.

Nature Kids MY BIG ALBERTA BACKYARD

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

Listening to Nature

When you walk through a wetland over a boardwalk, all can seem quiet until you stop, sit down, and listen. Within a few minutes, the wood frogs will resume their surprisingly loud chorus. Similarly, while walking along a quiet forested trail, if you sit and listen, suddenly the songbirds will resume their songs as though you are not even there. But there's even more going on in nature than we can hear with the naked ear.

Nature Alberta's Parton, John Acorn, has a do-it-yourself (DIY) hack to help listen to nature, and he's shared it with us! John's Listening Lid allows him to tune in to more songbirds singing in the trees, bugs buzzing in the tall grasses, and tiny ducklings peeping in the reeds. You can make your own Listening Lid and give it a try!

Tune in to nature by making your own Listening Lid.
JOHN ACORN

Supplies to Make a Listening Lid

- ✔ Sound recorder with a fuzzy or foam windscreen. Any recorder that's small and comes with a built-in microphone works best, but a cell phone with a voice recording app will work in a pinch.
- ✔ Large bowl or trash can lid.

(SAFETY NOTE: Shiny bowls or lids will focus light as well as sound, which can make your Listening Lid's focal point become *dangerously hot!* We recommend that you *avoid using* stainless steel or other metals for this activity.)

What To Do

1. Place the recorder next to the lid or inside the bowl.
2. Move the recorder around in the lid/bowl to find the best position for it to pick up the most sounds. HINT: The curved lid/bowl helps direct sound towards a "focal point," usually at the centre. To get the best sound, try placing the recorder so the microphone faces this focal point.
3. Try to be very gentle when you move the recorder because the sound of your hands near the microphone might drown out some of the sounds you're trying to collect from nature.
4. Record all the nature sounds around you!

"BUZZZZZZ" goes the bumblebee. RICK SCHNEIDER

"CHE-BEK" sings the least flycatcher. JACK WALLER

Listen Up (Or Down and All Around)!

Point your Listening Lid towards a patch of trees to see if you can pick up sounds from birds, bugs, and other creatures. If you live near a pond or lake, try pointing the Listening Lid towards the reeds, and then water. What new sounds do you hear? Get low to the ground or point it to the sky. How many different sounds can you hear in nature?

Listen Through the Seasons

Nature can sound very different throughout the seasons. For example, bird sounds will vary greatly from season to season. In the spring, songbirds will sing to attract mates and announce their territory. In the summer, birds are communicating with their fledglings, who are often heard begging to be fed. In the fall, many birds congregate in flocks to pass through during migration. And in the winter, you can hear the chittering of our resident birds and new migrants that flew south from the Arctic to overwinter in Alberta! All seasons are sure to bring you new sounds and excitement. ■

"PRREEP" croaks the boreal chorus frog. TONY LEPRIEUR

"CHIRP" calls the Richardson's ground squirrel. TONY LEPRIEUR

These instructions make a temporary Listening Lid, leaving the lid or bowl intact. But you can also make a permanent Listening Lid – just don't do it with your family's best salad bowl! Get John Acorn's instructions on our Nature Kids DIY Activities page! **naturealberta.ca/nature-kids-activities**

Nature Kids OUT AND ABOUT

BY STEPH WEIZENBACH, PROGRAM DIRECTOR

In the Northern Hemisphere, the Spring Equinox occurred on March 20, marking the official beginning of spring. Here in Alberta, many of us wait for signs from nature to signal that spring is finally here. Match up the photos to their descriptions below, then go explore outside and see how many things you can check off your **Spring Seek and Find**!


1


2


3


4


5


6


7


8


9

Match up the photo... Then get out and find them!

- ◯ Wandering ladybugs
- ◯ Singing songbirds (American robin)
- ◯ Splashy puddles
- ◯ Blooming flowers (prairie crocus)
- ◯ Fluttering butterflies
- ◯ Blossoming catkins (pussy willow)
- ◯ Hopping frogs (wood frog)
- ◯ Slithering snakes (garter snake)
- ◯ Squawking gulls (Ring-billed gull)

PHOTOS BY JOHN ACORN, STEPH WEIZENBACH, RICK SCHNEIDER, GERALD ROMANCHUK

Nature Kids ASK STUART

BY STEPH WEIZENBACH, PROGRAM DIRECTOR

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 to **naturekids@naturealberta.ca** and it may be featured in a future issue.

Q What's the difference between snow geese and Canada geese?

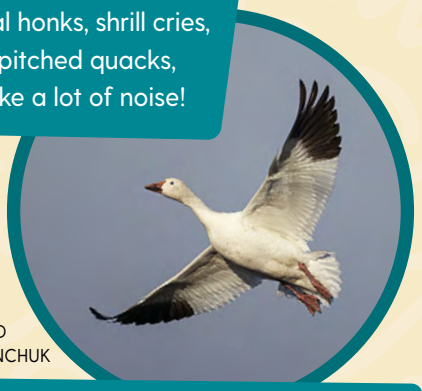
Snow Geese

WHAT THEY LOOK LIKE:

- Large white body
- Black wing tips
- Pink feet and beak
- Blue morph: white face and undertail with a dark brown body

GERALD ROMANCHUK

WHAT THEY SOUND LIKE:
With nasal honks, shrill cries, and high-pitched quacks, flocks make a lot of noise!



GERALD ROMANCHUK

WHERE YOU'LL SEE THEM, AND WHEN:
Snow geese fly across Alberta during spring and fall migration. They spend the summer in the Arctic and overwinter in the U.S.A. and Mexico. While migrating through Alberta, snow geese rest and eat in farmers' fields, lakes, and country ponds.

Canada Geese

WHAT THEY LOOK LIKE:

- Large brown body with light underbelly
- Long black neck
- White cheek patch
- Black feet and beak

DORIS MAY

WHAT THEY SOUND LIKE:
Noisy honks, and when you get too close, they will hiss to let you know to give them space.

GERALD ROMANCHUK

WHERE YOU'LL SEE THEM, AND WHEN:
Canada geese are found across Alberta during the spring, summer, and fall. Most migrate south for the winter, except for a few that overwinter in Alberta in areas of open water. You can find Canada geese just about anywhere, from city ponds to farmers' fields.

Q Why do geese poop so much?

Geese certainly do poop a lot – in fact, they can poop up to 15 times per hour! They poop the most when they are eating roots and rhizomes (underground stems) from plants in the mud. The roots and rhizomes are high in fibre, helping the food pass through the goose's digestive system in as little as one hour!

What's in a Nest?

BY MARGOT HERVIEUX

Even before the snow melts, a sure sign of spring is seeing magpies and crows breaking sticks from trees and carrying them off. The magpies are constructing their large, ball-shaped nests in bushy areas, while crows build bowl-shaped nests high in a tree. A magpie nest offers a good defence against predators because the single entrance means that intruders risk coming face-to-beak with an angry parent.

Nest building never ceases to amaze me. Imagine trying to weave a tapestry using only a pair of chopsticks. Materials range from grass, mud, and twigs to moss, hair, and even spider webs. Cup shapes are the most common, but nests can also be suspended in woven bags, attached to cliff walls, or hidden at the end of a tunnel.

Early spring is a good time to watch for the remains of old nests from last season. Most birds build a new nest each year; though larger birds like eagles and herons continue to add to their nests year after year, creating real masterpieces. Some bald eagle nests can reach more than two metres across and weigh over 1,000 kilograms.

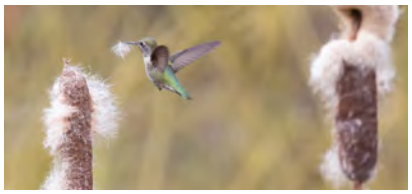
Each species of bird builds a unique type of nest and many use trademark nesting materials. Tree swallows like to line their nests with large feathers, while chipping sparrows usually include animal hair. Most people are familiar with the grass-and-mud cups created by robins or the mud funnels that cliff swallows attach to the sides of buildings or the struts under bridges.

Songbirds tend to build the most intricate nests. Northern orioles hang a tightly woven, plant-fibre sack from the end of a high branch. Flycatchers construct their nest in the crotch of a tree branch using strands of bark, plant stems, and poplar fluff. Male house wrens will fill every available cavity with sticks and then the female chooses one site for a nest that often includes caterpillar cocoons.

Many birds get by with much simpler nests. Woodpeckers and other cavity nesters protect their eggs with a few wood shavings in the bottom of their hole. Most shorebirds hide their speckled eggs in plain sight, laying them in a scraped-out spot on a sand or gravel beach. Kingfishers excavate a burrow in a stream bank and place their eggs in a chamber at the end.

Wetland dwellers such as grebes and trumpeter swans build platforms of vegetation among the reeds to support their nest. Red-wing blackbirds hang their nest between cattail stems.

The most delicate nests are built by hummingbirds. These tiny structures usually straddle a horizontal branch and consist of lichens, moss, and plant down held together with spider silk. The nest is only three centimetres across, yet it will be home to two growing chicks.



Bird nests are amazing structures. Built to hold the weight of both eggs and young, plus provide insulation and camouflage, they are truly architectural wonders. As spring progresses, keep your eyes open for birds collecting bits of grass, sticks, fluff, and even dog hair. A nest is sure to be hidden nearby. ■

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

MEET A MEMBER CLUB

BY SHELDON FRISSELL

Wainwright Wildlife Society

The **Wainwright Wildlife Society** (WWS) began in 1987 as volunteers from Wainwright and surrounding communities dedicated to helping folks understand the importance and value of wildlife and wild places. Our passionate members meet monthly to plan various activities. One of our big projects is assembling bird feeders, bluebird boxes, and kits to share with local Scouts groups, 4-H clubs, and school students. We educate local youth through school presentations on fossils, the geological history of the Battle River Valley, wildlife identification, and orienteering. WWS also organizes field trips to see tipi rings, Indigenous effigies, mud flats, the Parkland Dunes, a snake hibernaculum, a heron rookery, and the Battle River Valley. We take part in the Great Canadian Bird Count and owl surveys each winter. Our outreach also includes creating a yearly calendar promoting local wildlife and providing display tables at local craft shows.

We have hosted many educational guest speakers for the community, such as blue bird specialist Lois Johnson; Myrna Pearman, formerly with Ellis Bird Farm; WildNorth Wildlife Rescue and Rehabilitation; bird identification with Saskatchewan Breeding Bird Atlas; and the Backyard Bird Centre. This year's March banquet featured a presentation by celebrated Saskatoon beaver photographer Mike Digout.

WWS is renowned for guiding school groups and photographers from all over the world to witness the amazing

TRAN LIEU

sharp-tailed grouse dancing each spring from the comfort of specially designed viewing blinds. We partnered with the Association for Life-Wide Living under the direction of Dr. Jane Ross to host three public Grouse Symposiums entitled "Project Bring Back the Grouse," featuring information from grouse specialists and Indigenous leaders about the status of grouse in the Battle River watershed. Another joint venture was the production of sharp-tailed and ruffed grouse information cards distributed to drivers in the oilfield so they could become helpers in locating and reporting bird numbers in the Battle River area.

WWS maintains a 14-km nature trail system northeast of Wainwright in the Battle River Valley near the scenic Mistahiya Lodge. A local treasure, the public can enjoy hiking, snowshoeing, cross-country skiing, mountain biking, birding, and wildlife photography, at no cost for use. The trail features a wildlife-viewing tower, labeled flora, a Little Free Library, and two maple grove picnic areas. One section climbs to a stunning panoramic lookout over the valley with plenty of wild flora and fauna to discover!

The Society was honoured to be recognized with the Battle River Watershed Alliance 2021 Otis Award for our commitment and stewardship.

We welcome you to join our group or be our guest for a sharp-tailed grouse watch this spring. You can find us on Facebook (search Wainwright Wildlife Society) or email us at **wainwrightwildlifesociety@gmail.com**. Let's value wild things and visit wild places together! ■

Sheldon Frissell is President of the Wainwright Wildlife Society.

Your legacy. Our shared future.

Our community is connected by a shared love of nature. We share the desire to preserve the wild spaces and wonderful species that inspire our appreciation of nature, so future generations can share in the experiences we so deeply cherish.

A bequest willed to the Nature Alberta Endowment Fund helps us nurture and protect that future. Your legacy gift is carefully stewarded for long-term growth, providing a stable and sustainable source of funding for our operations and initiatives.

The security of the Endowment Fund ensures that your gift will continue to grow and fund our mission to promote and protect Alberta's natural heritage well into the future.

NATURE ALBERTA

Visit our website to learn more about making Nature Alberta part of your estate planning.

naturealberta.ca/planned-giving

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