NATURE ALBERTA

MAGAZINE

FALL 2024
VOLUME 54 | NUMBER 3

A COMMUNITY CONNECTED BY A LOVE OF NATURE

Soaring Success

The Story of Peregrine Falcon Recovery

Grizzly Bears Under Fire

The Cryptic Pygmy Whitefish

Preventing the Spread of Invasive Plants

PM40015475

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

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.

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SHARING OUR SPACE

Amphibian Roommates

As cool autumn weather descends, all sorts of animals search for a safe place to spend the winter. This includes our native amphibian species, some of the northernmost amphibians in the world. Alberta is home to ten amphibians: two salamanders and eight frogs and toads. They tend to be elusive, spending their time in wetlands, under forest leaf litter, or underground. Alberta amphibians hibernate through the winter, usually in a burrow of soft soil or under rotting vegetation. Some species, like the wood frog, have amazing physiological adaptations for surviving being turned into frozen frogsicles.

Tiger Salamander. ALEXANDER MOROZOV

Sometimes amphibians find their way into the sheltered spaces we create. Folks living near storm ponds may find small species like boreal chorus frogs opportunistically hopping in your front door. The amphibian most commonly found indoors is the tiger salamander. They normally overwinter in damp, dark burrows, but can be drawn to cool, sheltered spaces like garages and basements, which can be quite a surprise for unsuspecting human residents!

Whether or not you like the idea of having a wild salamander for a roommate, it's important that the invading amphibian not stay indoors. These animals need to keep their skin moist, and won't live long if they dry out, which is sure to happen inside. So this fall, if you find an unexpected amphibian guest, do the critter a favour and move it outdoors to a damp place with a lot of plant cover. Make sure to thoroughly rinse your hands before handling the animal, as amphibians can absorb toxic chemicals through their skin, and wash your hands with soap afterwards. You can gently scoop them into a clean container or your hand. Some people might find their cold, slimy skin off-putting, but no amphibian in Alberta is dangerous for people to touch, and they certainly won't give you warts. Wildlife make much better neighbours than roommates!

— NICK CARTER, NATURE KIDS COORDINATOR

Nature Alberta News

Welcome our New Nature Kids Coordinator!

Nick Carter joined the Nature Alberta team in the early summer. Nick has been a professional science communicator and naturalist for over a decade. After getting his B.Sc. in biology at the University of Alberta, his experience has included teaching the public about dinosaurs at Jurassic Forest, working as an ornithology lab assistant at the Royal Alberta Museum, leading educational programs at the John Janzen Nature Centre and Muttart Conservatory, running the education department at the Philip J. Currie Dinosaur Museum, and co-leading the WILD Outside program in Edmonton with the Canadian Wildlife Federation. Nick has been associated with Nature Alberta since 2021, his involvement including leading interpretive nature walks and educational stations, helping with event logistics, writing magazine articles, and various other projects. He now brings his extensive knowledge, experience, and enthusiasm to the Nature Kids Coordinator role. Nick says, "As a passionate naturalist who has been involved with Nature Alberta for several years now, I'm thrilled to officially be on the team and sharing my enthusiasm for Alberta's natural history in this role!"

May Bird Count Results

The May Bird Count has documented an accumulative 341 species since 1976. This year, 445 people volunteered 1,258 hours to count 160,206 birds, documenting 263 species! A new species, ash-throated flycatcher, was added to the count in Writing-on-Stone Provincial Park. Another rarity, black-chinned hummingbird, was recorded in Cardston. We had record-high counts of common grackles, loggerhead shrikes, and blackburnian warblers, but some previous count regulars, yellow rail and yellow-bellied flycatchers, were not seen at all. Read more about how these numbers compare to previous years at **naturealberta.ca/may-bird-count-2024-results**.

Blackburnian warbler, ALAN MACKEIGAN

Alberta Biodiversity Challenge Results

The Alberta Biodiversity Challenge tabulated observations on iNaturalist from June 13 to 16. Overall, we had 8,995 observations of 1,673 species by 718 observers, identified by 664 volunteer identifiers. Like last year, Metro Edmonton won the "Battle of Alberta" for number of observations (3,489) and species (894), but Calgary won again this year for overall participation with 185 observers. View detailed results from each participating city and park at **naturealberta.ca/2024-alberta-biodiversity-challenge-results**.

2024 Summer Nature Kids Events a Wild Success!

Thank you to our funding partners whose contributions made these events possible:

Alberta Conservation Association
Canada Summer Jobs
City of Edmonton
Edmonton Community Foundation
Environment and Climate Change Canada
Nature Canada
North West Redwater Partnership
TD Friends of the Environment Foundation

Alberta's Fish and Wildlife Management: Headed Backwards to Dark Times?

BY LORNE FITCH

As a retired Alberta biologist — and a hunter and angler — it is troubling to witness the political dismantling of the science-based approach to fish and wildlife management in this province. This should concern all of us, whether we hunt, fish, or appreciate wildlife in other ways.

It took a concerted effort to drag ourselves out of the biodiversity hole created by our rapacious pioneer era of settlement. Conservation of wildlife resources didn't occur by chance, by edict, or by random action. Stewardship happened — and still does — by the application of science, wielded by experienced biologists, supported by citizens determined to put conservation values first.

The guiding principles of fish and wildlife stewardship are found in the North American Model of Wildlife Conservation, of which Alberta is a signatory. A fundamental principle is that wildlife resources are conserved and held in trust for all citizens. In addition, this model prescribes professional, science-based management as the proper means for wildlife conservation. For this model to work, adequate public resources need to be allocated to wildlife management, and professionals require the freedom and authority necessary to carry out their duties. Political override eclipses that ability.

Alberta has seen several remarkable species recovery success stories, such as that of the whooping crane, when political will aligns with evidence-based stewardship.

Alberta has had an impressive record of working on restoring populations and habitats for a large number of species. A short list includes peregrine falcon, swift fox, bison, trumpeter swan, whooping crane, pronghorn, Canada goose, grizzly bear, ferruginous hawk, northern leopard frog, elk, northern pintail, mountain goat, bighorn sheep, white pelican, mountain bluebird, lake sturgeon, walleye, bull trout, and prairie rattlesnake. These successes could not have been achieved without the efforts of professional biologists working in the public interest, with public support.

The task is far from over, given current risks to biodiversity. Future conservation efforts will require the application of more science, not less, and more experienced scientists and biologists, not fewer. Regrettably, Alberta is no longer a leader in the application of science-based conservation. Today, management that used to be guided by experienced, professionally trained biologists has been sidelined — or worse, taken over — by politicians and lobbyists. These are individuals who either don't understand science or don't

want to, who don't trust biologists and the data they produce, or who have a vested economic interest in pursuing their own agenda. The evidence for this is expressed with the following examples:

- In Alberta, grizzly bears are a Threatened species. Despite this, in a politically directed administrative sleight of hand, a hunt was initiated under the contrived guise of protecting public safety and property (see the article on page 18). Hunters, selected by draw and disconnected from bear conservation plans, are to provide a rapid response to "problem bears" and will be able to keep the carcass. Grizzly bear experts are unanimous that sport hunting, contrary to assertions, will not minimize depredations against private property or human/bear conflicts.
- Cougar hunting is managed based on strict regional quotas. This is a tightly regulated hunt, based on years of study. Near the end of a recent season, there was political intervention to increase the quotas, even for female cats, and open up new areas to hunting, including a provincial park. All this was contrary to the management plan and was a wild deviation from scientific objectives.
- Quotas for mule deer, mountain goat, and moose hunting have also been manipulated to appease special interests. This is inconsistent with the way quotas should be derived: from evidence-based decision-making based on aerial surveys.
- Years of patient, evidence-based recovery of lake-dwelling sport fish were nearly derailed by a politically motivated attempt to throw open harvest levels, the approach that had caused these populations to crash in the first place.
- Despite no solid evidence that cormorant control measures work to protect game fish populations, a politically inspired cormorant season was opened, under the shield of a "damage control licence."
- Other changes have been mused about, including night hunting for predators and hunts for mourning doves and whistling swans.

Hunting quotas for big game such as moose should be derived from evidence-based field surveys, not manipulated to appease special interests. RICK PRICE

A retired colleague of mine calls the rationale behind these "light on fact, heavy on political pressure."

Hunters, conservationists, and biologists are concerned that recent changes in wildlife management are more about supporting business interests than about conservation in the broad public interest. The scenario currently playing out is a serious deviation from publicly supported, science-informed, and professionally guided management practices. These are the tactics being employed:

- Undermine and slash budgets and staffing, making professional biologists and their actions seem ineffective.
- Separate functions, including allocation, research, enforcement, education, and wildlife coexistence, into different departments with unrelated mandates. Then discourage collaboration and co-operation between biological staff now working in separate departments.
- Hinder communication with the public by gagging and isolating biologists from public engagement. In addition, refuse to share or delay the sharing of publicly funded data and reports when the information happens to be contrary to the chosen political narrative.
- Enforce a top-down, authoritarian decision-making process in which ideas are to be blindly implemented and then defended.
- Punish any staff expressing objective concerns, displaying independent thinking, or proposing alternate approaches. Also, facilitate early retirement or resignation of committed biologists by frustrating their efforts, and then fail to replace them.
- Promote public mistrust in professional biological staff by treating them as political servants instead of knowledgeable advisors.
- Deny or ignore scientific evidence in favour of advice by would-be experts with vested interests.
- Weaken the concept that fish and wildlife are a public resource to be stewarded and instead treat them as commodities, like oil, gas, and timber, to be exploited for financial gain by special economic interest groups.
- Narrow the focus of management to "game" species while undercutting work on species at risk and critical habitat conservation.

What we are now seeing is a full-blown contagion of political meddling in fish and wildlife management. This never ends well. There are hard limits to what nature can provide, which means we can't always have what we want. The collapsed Newfoundland cod fishery is the poster child for what happens when politics intrude into resource management. Closer to home, the failure to listen to expert advice on game ranching has resulted in chronic wasting disease crippling wild ungulate populations and wild boars running rampant. Failure to believe the data on caribou, native trout, and sage grouse declines has stymied recovery efforts. The bottom line is that gut instincts, intuition, personal whims, crowd-think, social media opinion, and political favouritism are poor substitutes for evidence-based decision-making.

Professional biologists unanimously agree that reinstating a grizzly bear hunt is not a sustainable solution to reducing human/bear conflict. RICK PRICE

There is public support for science-based stewardship of our wild heritage because it serves the majority of Albertans. Politically driven decisions that benefit only a few is retrogressive, taking us back to dark times for wildlife. When the public is excluded and biologists are not allowed to employ their professional responsibilities (and ethics) due to political interference, we run the risk of progressive declines in Alberta's wildlife.

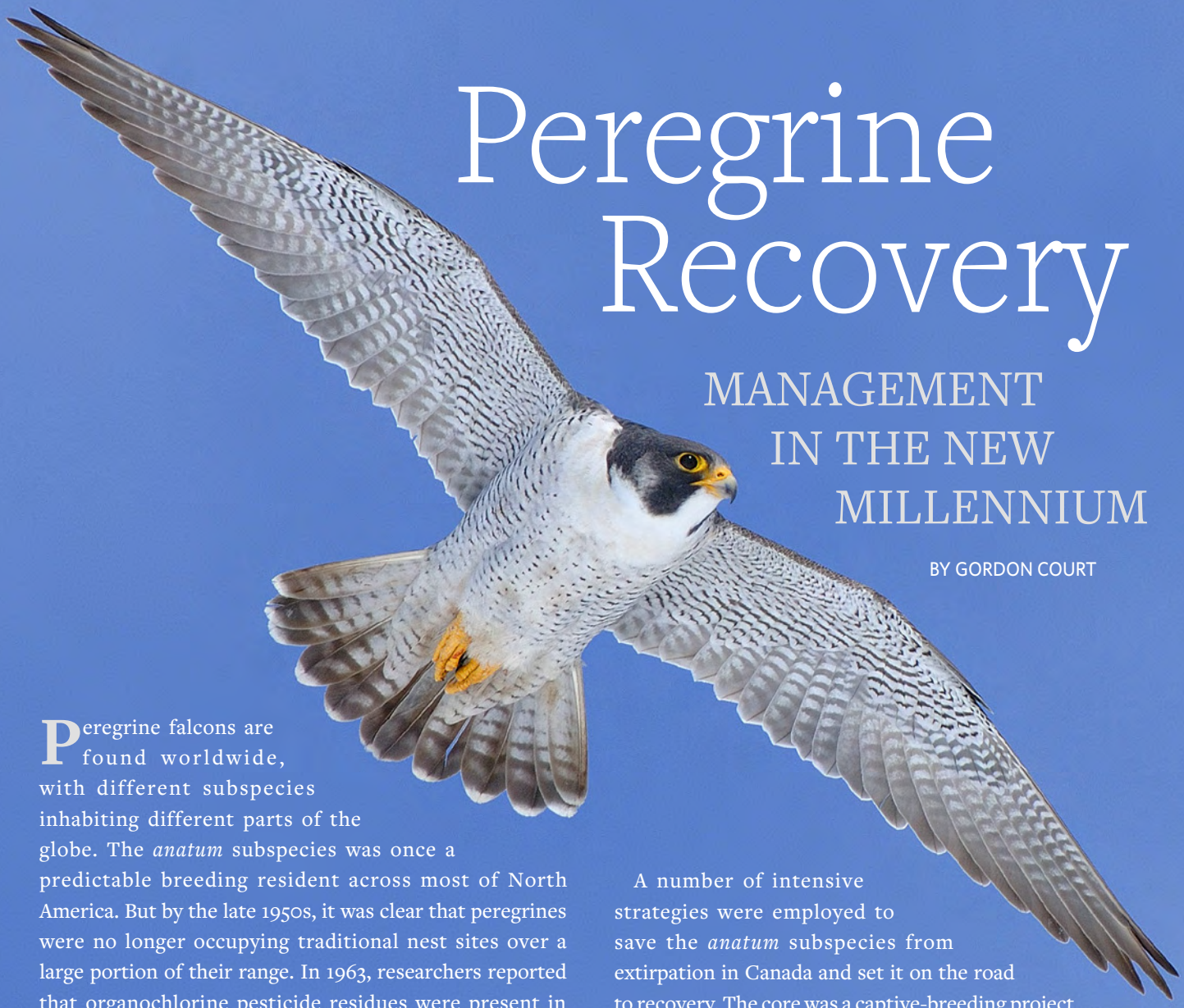
Everyone — hunters, anglers, and naturalists — benefits when we steward fish and wildlife using science and facts applied in a professional manner and refined through a balanced, fair, and open public process. When we don't, stewardship fails, and we all lose. ■

Lorne Fitch is a Professional Biologist, a retired Fish and Wildlife Biologist and a past Adjunct Professor with the University of Calgary. He is the author of *Streams of Consequence: Dispatches from the Conservation World.*

Peregrine Recovery

MANAGEMENT IN THE NEW MILLENNIUM

BY GORDON COURT



Peregrine falcons are found worldwide, with different subspecies inhabiting different parts of the globe. The *anatum* subspecies was once a predictable breeding resident across most of North America. But by the late 1950s, it was clear that peregrines were no longer occupying traditional nest sites over a large portion of their range. In 1963, researchers reported that organochlorine pesticide residues were present in high concentrations in unhatched peregrine falcon eggs in Britain, suggesting a possible cause. Further research revealed that this problem was widespread and that a large part of the North American population of peregrines was in danger of extirpation from reproductive failures associated with these pollutants, most notably DDT.

Rally for Recovery

In 1969, the use of DDT was banned in Canada, and it was banned in the United States three years later. In addition, raptor researchers recommended that the peregrine be designated as Endangered throughout its range. Continent-wide surveys began in 1970, and the results of the first survey revealed that the *anatum* subspecies was particularly threatened. Only one pair was confirmed to be nesting successfully south of 60° N and east of the Rocky Mountains; several hundred pairs across southern Canada, from Alberta to Nova Scotia, were gone.

A number of intensive strategies were employed to save the *anatum* subspecies from extirpation in Canada and set it on the road to recovery. The core was a captive-breeding project initiated by the Canadian Wildlife Service (CWS) in 1970. Young birds from remaining productive nests, along with adults donated by falconers, were consolidated in a captive population established at Canadian Forces Base Wainwright. There, CWS technicians pioneered captive breeding techniques for peregrines and other raptors that were used over the next three decades. The challenge was huge, and there were many who doubted that falcons could be bred successfully in captivity, but by 1975 enough young birds were being produced that experimental reintroductions could take place.

In 1975, a few young peregrines were "fostered" to wild remnant pairs in northeastern Alberta whose own eggs failed to hatch successfully. In addition, CWS wildlife technicians, with the help of Alberta Fish and Wildlife personnel, experimented with the first Canadian release of peregrines in an urban environment. They did this from a "hack box" — a surrogate nest — located on the top of the O.S. Longman

PHOTO BY GORDON COURT

Above: Custom-designed by Steve Schwartze, this hack box, complete with a "baby gate" that prevents peregrines from jumping from the box at too young an age, helps ensure high levels of fledging success. STEVE SCHWARTZE

Right: Landowner Larry Law with a juvenile peregrine rescued from a busy road in Edmonton by members of Peregrine Falcon FledgeWatch. GORDON COURT

Building in Edmonton, beginning in July of 1976. One of the four birds released that first summer — a male — was observed later that year in Belize, Central America, demonstrating the effectiveness of hacking as a reintroduction technique. Another Alberta peregrine success occurred in 1977, when one of the foster birds from 1975 was discovered breeding at a nest site near Fort Chipewyan. This bird was the first captive-raised peregrine falcon in the world to return and breed in the wild — a tremendous "feather in the cap" of the Canadian peregrine recovery effort.

In the late 1970s, hack releases of peregrines occurred at various locations in Alberta, in both urban and rural areas. Alberta Fish and Wildlife biologists working in the O.S. Longman Building were well situated to keep track of returning birds, and they recorded several adult birds visiting the building by 1979. The ultimate success came in 1980, when a nesting site of a pair of peregrines was discovered on the Alberta Government Telephones (now Telus) building in Edmonton. This pair became the first captive-produced peregrines to pair and breed in Canada. Fostering young to wild pairs continued to occur in northeastern Alberta, and with the combined efforts of the Alberta Fish and Wildlife Division, CWS, and Wood Buffalo National Park staff, this northern population began to show signs of slow recovery.

Back from the Brink

The early 1990s brought a renewed vigour to the Alberta peregrine reintroduction program. Buoyed by declining DDT residues in prey, and novel corporate sponsorship, a large-scale release program was initiated in 1992. The CWS Wainwright facility continued to operate, largely on a cost-recovery basis, and provided all the young for the stepped-up Alberta releases. Mass hack releases were undertaken on the Red Deer River and, during the next decade, the central Alberta population would grow from two to over 20 pairs, several of them returning to breed on man-made structures. Dozens of budding biologists took part in this extensive release program and many of them now hold positions in various conservation agencies across Canada.

The CWS breeding facility closed in 1995, after having produced more than 1,500 peregrines over 25 years, with birds released across southern Canada. It was decided that there were now enough wild peregrines to assure sufficient reproduction in the wild. Moreover, analysis of pesticide residues in peregrine eggs showed that eggshell thinning was no longer limiting to the population. The population had finally started a strong rebound after over 20 years of concentrated recovery efforts.

The ultimate sign of success: An adult peregrine leaves the eyrie shortly after feeding her young at a nest site unoccupied by peregrine falcons since 1956. JON GROVES

A fledgling peregrine enjoys its first summer shower at the Pembina release site. JON GROVES

The stark beauty of the peregrine is best seen in the springtime, when the plumage and the bright skin tones are prime. GORDON COURT

Bans on the use of DDT in Canada and the United States and close to three decades of intensive management by federal and provincial bodies led to recovery of the *anatum* peregrine falcon over most of its historical range by the early 2000s, with several hundred pairs reoccupying historically used nest sites throughout southern Canada. The falcon was downlisted to Threatened by the Committee on the Status of Endangered Wildlife in Canada in 2007 and was later delisted to Not at Risk by the same committee in 2017.

Peregrines in Alberta

Ironically, despite playing such a large part in the country-wide recovery of the *anatum* peregrine, Alberta was among the last jurisdictions to show a complete recovery of the population. The recovery of populations in northeastern Alberta and Wood Buffalo Park was spectacular; however, historically used nest sites along southern rivers, including the upper North Saskatchewan, Red Deer, Pembina, and Bow, were largely unoccupied even by 2010.

To achieve the recovery goal of having at least 70 breeding pairs distributed across the peregrine's entire historical range

Female peregrines in spring are magnificent. The bands applied to rescued/released birds make identifying their origins relatively easy. GORDON COURT

Above: Steve Schwartze adds a young peregrine, fresh from being picked up from between the traffic lanes of 170 Street in Edmonton, to a hack box. GORDON COURT

Right: A combination of rescued young, captive-raised birds, and naturally produced birds originating on the peregrine release cliff has led to some very unusual sightings. Here, a group of young peregrines greets the morning light. GORDON COURT

in Alberta, and again having access to corporate donations, a new hack release program was initiated in 2011. Alberta Environment and Protected Areas led the initiative, with support from several other organizations and the cooperation of landowners Mary-Anne and Larry Law. This time, the captive-raised young were released near a historically occupied nest site on the Pembina River bordering the Pembina River Provincial Park — a cliff last used in 1964. Young birds collected at urban and industrial nest locations throughout the province, where post-fledging mortality was known to be chronically high, were also added to the releases.

The project met with almost immediate success. An adult peregrine pair began breeding at the site in 2014, 50 years to the month since the Pembina River last hosted a pair of peregrines. This success was widely celebrated, but it did have one downside. The nesting pair had chosen to occupy the site that managers had been using for reintroductions, potentially making it unusable. Master falconer and falcon breeder Steve Schwartze, who conducted all the Pembina releases, said, "Not so fast." Knowing that adult peregrine pairs in dense populations often tolerated the presence of juvenile peregrines from other nests within their territories while their own young were in the fledgling stage, Schwartze was keen to continue the hack. He felt that "as long as the young from the wild pair fledge first and we supplement with plenty of extra food, there is a good chance they will treat any released birds as their own. It all comes down to the personalities of the adults." Fortunately, he was right!

Captive stock and rescued fledglings continued to be released at the Pembina site during the entire lifespan of the breeding pair that was established in 2014. A total of 228 birds fledged at this beautiful location over the last 13 seasons, including several young produced by the territorial pair. These juveniles matured and went on to occupy nest sites in central Alberta that have been abandoned by peregrines since the late 1950s and 1960s, while others came back to nest in urban and industrial settings. Some of the Pembina birds have also been photographed over the years while on migration through locales as near as the Inglewood Bird Sanctuary in Calgary and as far away as Texas.

Plans are in place to continue to release rescued peregrine young from the Pembina location, as the most significant predators of young peregrines — golden eagles and great horned owls — appear to be absent from the area, and fledging success is very high. Time has passed, and the original pair of tolerant foster parents are now gone. We will cautiously test the patience of the new pair in hopes of continuing this successful and inexpensive way of managing the species to complete recovery. With continued success, it is very likely we can remove the peregrine falcon from Alberta's list of species at risk within the next decade! This magnificent species has made its return to its historic range in our province — back by popular demand! ■

Gordon Court has worked on the recovery of the peregrine falcon in western Canada for over four decades and is recognized internationally as an expert on this species. He is the former Canadian Director of the U.S.-based Raptor Research Foundation. Presently, he is the Provincial Wildlife Status Biologist for Alberta Environment and Protected Areas.

YOUR SHOT Images of Alberta's Natural Heritage

WHEN A CAT CROSSES YOUR PATH

"I stopped for snacks and hydration while out birding, and my timing was rewarded with my first-ever sighting of a cougar. I kept as perfectly still as possible, only moving to pick up and align my camera when it looked away. My efforts at stealth soon paid off when the cougar turned to check out something that caught its attention in the bushes, offering a beautiful profile portrait."

—Robin Albright

"I'M READY FOR MY CLOSE-UP"

"To my delight, blue jays began showing up in my neighborhood last year. I love their vibrant colour, and I've snapped countless pictures of them over the months. Feeling like I needed a fresh perspective, I reached for my trusty 600-mm lens to capture a sharp, close-up shot. And let me tell you, that jay couldn't have been more co-operative in posing for me!"

—Joanne Klausner

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 **communications@naturealberta.ca.** Photos of all native species and natural landscapes within Alberta are welcome.

Death by a Thousand Invasive Cuts: Slowing the Spread of Plant Invasions in Alberta

BY MEGAN EVANS

Invasive species are organisms that originate in one region and later relocate to a new environment where they cause harm. They can outcompete native species because they grow unimpeded by aspects of their native environment that naturally control their populations, such as predators, pests, competition, and climate. When they outcompete native species, they reduce biodiversity, alter the food and habitat that wildlife rely on, and change ecosystem processes. These ecological impacts translate into economic impacts. It's estimated that invasive species cost the Alberta economy over $2 billion each year, primarily due to agricultural losses. This number will only continue to grow — death by a thousand cuts — unless we stop the bleeding and alter how we respond to invasive species.

Many invasive plants were brought to Canada and sold in greenhouses and nurseries for years before we recognized the risk they posed. Examples include Himalayan balsam, yellow flag iris, creeping bellflower (nicknamed the "zombie weed" because it spreads relentlessly and is notoriously difficult to eliminate), and many others. People have said that had they known creeping bellflower was on their property, they would not have purchased it! Other invaders hitchhiked their way into Alberta unintentionally in contaminated forage, in mud on vehicle tires, through burrs on wildlife, or by slowly making their way here through natural dispersal via wind or other pathways. Many more invasive species are lurking close by, waiting to make an appearance.

Creeping bellflower (*Campanula rapunculoides*) is a noxious weed that was introduced as an ornamental species. It is commonly found in residential gardens. AISC

Left: Blueweed (*Echium vulgare*) is a noxious weed. It is widespread in the southwesternmost part of Alberta. KASJANEK, AISC

Dealing with the Threat

The main approach we use to manage invasive plants is the Alberta Weed Control Regulation (currently under review). There are 75 invasive plants listed in the Regulation, including some that are not yet present in Alberta but are included to facilitate early detection and rapid response should they arrive.

Oxeye daisy (*Leucanthemum vulgare*) is a noxious weed that is widespread throughout Alberta. AISC

Landowners are required to manage these listed species, and non-compliance can result in control work that is billed to them. In addition, there are unregulated plants that, while beneficial in some circumstances, can be as invasive and damaging as the regulated species. Why aren't those species regulated? Well, it's complicated...

Consider lawn grass. A common species is Kentucky bluegrass, desired by many homeowners because it can provide a classic vibrant green lawn. (Let's talk about reconsidering lawns some other time!) The problem is, when species like Kentucky bluegrass make their way to natural areas, they slowly invade, gaining ground each year and outcompeting native species. It's the same story with many agronomic species that are seeded in pastures for hay production, such as Timothy, smooth brome, and cicer milkvetch. These species are great for producing forage, but when they are inevitably introduced to native grasslands they invade just like lawn grass.

There are also horticultural species that are problematic. Take Russian olive; this tree is incredibly invasive in drier areas of the province, where it can completely take over riparian areas and is difficult to control. If you're a gardener, you're likely aware that species like goutweed and lily of the valley, all commonly found in garden centres, are incredibly aggressive and will take over urban gardens, becoming a burdensome nuisance for years.

What about dandelions? There's nothing dandy about them! Dandelions were removed from Alberta's list of regulated species in 2010, but not because they are no longer a threat. It's actually the opposite. Dandelions have become so widespread and abundant in Alberta that they are too onerous to regulate and enforce. Opinions about how to deal with dandelions are mixed. Some people encourage leaving dandelions in urban yards because they provide an important early source of food for bees. But do you know what is a much better source of food for our native bees? The native wildflowers they evolved with! It's hard to justify encouraging the growth and proliferation of dandelions when we know they are aggressive invaders of natural areas. As such, they pose a risk to what all our native bees and other native species fundamentally need: native plants.

Cicer milkvetch (*Astragalus cicer*) is a forage species planted as a pasture or hay crop. AISC

Lesser burdock (*Arctium minus*) is a noxious weed. The seed pods are encased with burrs that cling to clothing, hair, and other materials, aiding in dispersal. AISC

Once invasive plants have become established in an area, the best approach for managing them is integrated pest management. The first step is to properly identify the species present and document their distribution and abundance. It is also important to know the mode of reproduction (e.g., seeds and/or underground creeping roots, etc.) and life cycle (annual, biennial or perennial) for each species. Control should be implemented using a tailored approach that best addresses the characteristics of each plant. For example, for a biennial that has flowered or gone to seed, manually bagging and landfilling the seed is effective; whereas for creeping rooted perennials, the seed production and the creeping roots both need to be targeted through measures that may include manually pulling, mowing, and/or herbicide application. Locations where invasive plants have been controlled also require follow-up monitoring. It often requires many years to verify that there is no new vegetative growth or germination of seeds in the soil. Managing invasive plants is a long-term endeavour; it's costly, challenging, and complex. And there is no silver bullet.

Prevention Is Key

An ounce of prevention is worth a pound of cure, and the biggest bang for our buck is preventing introductions in the first place. We could shrink the overall cost of invasive plant management by directing more effort to prevention, early detection, and rapid response to new invaders. Yet, ironically, this is where we invest the least. In the invasive species world, our successes are invisible and our failures are everywhere. Consequently, preventative measures are often a hard sell. We tend to wait until damage becomes apparent before acting, instead of investing heavily in prevention.

Orange hawkweed (*Pilosella aurantiaca*) is a prohibited noxious weed that reproduces by seed, above-ground runners, and creeping roots. SAPIN

Spotted knapweed (*Centaurea stoebe*) is a prohibited noxious weed that is becoming increasingly common in the southern part of the province. AISC

Prevention strategies need to be implemented at multiple levels. We need to focus on preventing new invaders to Alberta, new invaders to municipalities (that might be present in other parts of Alberta), and new invaders to individual yards. To do this, Albertans need to be aware of the dangers of invasive plants and be able to identify and report them. Images of wild boar, zebra mussels, crayfish, and spongy moth often foster unease. But for most, a field of oxeye daisies is not scary at all; it may even appear to be an improvement over what was there initially. We have more work to do to convince the public that there is a difference between wildflowers and weeds, and that everyone has a role to play in preventing their introduction and spread.

Despite the aforementioned challenges, Alberta continues to be a leader in invasive species management. We are the world's largest rat-free jurisdiction and we have robust legislation overseeing the regulation and management of species. Nevertheless, given the current rate of spread, we need to do more.

Tall buttercup (*Ranunculus acris*) is a noxious weed that is toxic to livestock and is common throughout Alberta. RICHARD SCHNEIDER

How You Can Help

The good news is there are actions we can all take to be a cut above the rest and prevent the introduction and spread of invasive plants.

- Spread the word, not the weed! Commit to talking to one other person about this issue and encourage them to adopt the following practices to prevent introductions and spread.
- Come clean and leave clean! Simple practices such as cleaning boots, gear, and vehicles when moving between areas can prevent the introduction and spread from

"hitchhikers" that might otherwise tag along.

- Be "Plant Wise!" When at plant swaps and other events, scrutinize plants that readily spread and require no maintenance. Make sure to read seed packets and check for regulated species.
- Be proactive! Assess your property for invasive plants. Determine which species are eradicable and use an integrated pest management approach to controlling new invaders.
- Learn to identify and report invasive plants. There are lots of resources available, including plant guides and apps. The Alberta Wildflowers app lists thousands of native plants and many invasive plants as well. It has an easy-to-use interactive key that will help you narrow down what you are looking at. The Early Detection and Distribution Mapping System (EDDMapS) app covers all the regulated invasive species and a few others with photo galleries, descriptions, and distribution maps all built in. Reports of invasive species that are submitted through EDDMapS are verified (using the photos you submit) and sent to the local authority for follow-up and can be used without cell service. This is a particularly great resource if you find invasive plants when hiking, camping, or visiting natural areas.
- You'll find a wealth of informative resource and practical tips on the Alberta Invasive Species Council (AISC) website, **abinvasives.ca**. Sign up for the newsletter to stay in touch and up to date on all the latest invasive species news and developments. You can also support AISC's work and connect with a like-minded community by becoming a member.

Common tansy (*Tanacetum vulgare*) is a noxious weed, commonly found along riparian and upland areas. It is widespread throughout Alberta. AISC

With your help and these simple actions, we can protect Alberta from the impacts of invasive species! ■

Megan Evans is a terrestrial ecologist with over ten years in the field. She is passionate about protecting biodiversity, especially our native plants and pollinators. She contributes to those efforts through her work as the Executive Director of the Alberta Invasive Species Council and as the President of the Alberta Native Bee Council.

A Small Fish with a Big Pull: The Curious Case of the Pygmy Whitefish

BY KENTON NEUFELD

Pygmy whitefish are small, silvery fish found in only two locations in Alberta: the Athabasca River and Upper Waterton Lake. GORDON COURT

Yellowhead Lake lay in almost complete darkness, broken only by the light of a boat approaching the boat launch. Moments earlier, the people on board had been noisily navigating through the shallows, lights brightly shining, generator rumbling, yelling out whenever they scooped up small silver fish with big eyes in their net. You might suspect these were anglers engaged in illegal night fishing with lights. Not at all. This was a group of curious, unconventional biologists, drawn from the warmth of their homes into the freezing October night to explore a British Columbia lake in search of answers to pressing questions about one of Alberta's rarest fish species: the pygmy whitefish.

Cryptic Fish

Of all the fish found in Alberta, the pygmy whitefish is perhaps the most cryptic. It has only been found in two locations in Alberta. In appearance, it is very similar to the closely related and much more numerous mountain whitefish. In fact, there is no easy way to tell them apart. You have to count the number of scales between the lateral line and the dorsal fin to be certain: the pygmy whitefish has seven and the mountain whitefish has eleven.

The biology of the pygmy whitefish is generally similar to other whitefish species in Alberta. It spawns in the late fall, laying its eggs in cold streams or along the rocky shorelines of lakes. It feeds on invertebrates and appears to be able to adapt its feeding to whatever insects or zooplankton are present. Where it differs markedly from other species is its small size, which is how it got its name. Pygmy whitefish can be mature at less than 10 cm in length and only one year of age. The largest specimen ever recorded was 26 cm, and in many populations they don't grow larger than 14 cm.

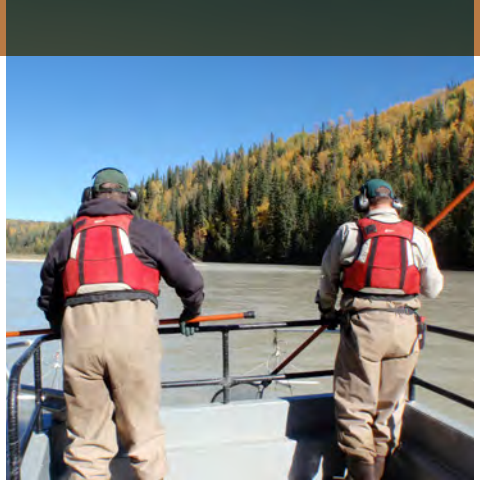
Both of Alberta's pygmy whitefish populations are found in the Rockies;

Pygmy whitefish and mountain whitefish look similar, but can be distinguished by counting the number of scales above their lateral line; the pygmy has seven compared to the mountain's eleven. MIKE BLACKBURN

however, the two sites are separated by hundreds of kilometres. The southern population lives in the deep, cold water of Upper Waterton Lake. The northern population is found in the Athabasca River and some of its tributaries in Jasper National Park. This disjointed distribution is quite unusual in other species, but seems to be common in pygmy whitefish. Most of its populations, which are scattered from Lake Superior to Siberia, are isolated. How they arrived at these locations — and not everywhere in between — is a bit of a mystery, and it's the question the biologists on Yellowhead Lake were trying to answer.

Yellowhead Lake is located a few kilometres southwest of the Yellowhead Pass within the boundaries of Mount Robson Park in B.C. The low pass may have provided a route for pygmy whitefish to make their way from the Fraser River watershed in B.C. to the Athabasca River watershed in Alberta at the end of the last Ice Age. The presence of pygmy whitefish in Yellowhead Lake would lend credence to this hypothesis, which is what motivated the biologists' visit. Up to that time, the presence of the fish in headwaters of the Fraser River watershed had not been confirmed (though the fish is found in other scattered locations in B.C.).

"It was like a treasure hunt," described Laura Macpherson, a fisheries biologist who was on the Yellowhead Lake sampling trip. The biologists had suspected that pygmy whitefish were present, but weren't entirely sure. After checking one spot and finding only lake trout, they eventually found a shallow area of the lake that started producing. "We got more than we were anticipating," said Macpherson, which was a good sign for the sustainability of the population. Their presence in this lake suggests that it may have been the route the fish took to get to the Athabasca. If needed in the future, it could potentially be used as a stocking source to recover that population.



Above left: Biologists at work on the Athabasca River, collecting samples of pygmy whitefish. RYAN COX

Above right: Lake Athabasca is the most likely place in Alberta to discover a new population of pygmy whitefish, but setting nets there in the winter is cold work! MICHAEL SULLIVAN

Lingering Mystery

While some information is known about the biology of pygmy whitefish, there are big gaps in our understanding about specific populations. In particular, the Waterton Lake population has had little study compared to the Athabasca River population, and not much is known about its population size, spawning patterns, and feeding habits. It's a location ripe with opportunities for more investigation.

Since the two Alberta populations are so limited in their distribution and both are located in national parks, there are relatively few immediate threats to their persistence. Still, that small spatial range means that a single event could have a catastrophic impact on a population. A spill of a deleterious substance along the Yellowhead corridor in Jasper, from the highway, railway, or pipeline, could impact that entire population. Because of this vulnerability, it was listed as Threatened in Alberta, and a recovery plan for the species was completed in 2022 (though it's still waiting for ministerial approval).

The lead author of the recovery plan, Michael Sullivan, and his daughter Sierra, who is also a fisheries scientist, are self-described pygmy whitefish fanatics. They have made several expeditions to sample the species across western Canada. One trip ended with celebratory drinks in a bar in Field, B.C. while still geared up in waders. Another ended with them almost being stranded in Fort Chipewyan for the summer as the ice road conditions deteriorated. The latter trip was to look for pygmy whitefish in Lake Athabasca during the winter; this lake is the most likely location for finding an additional population in Alberta.

The mysteries surrounding pygmy whitefish in Alberta are a testament to their overlooked and cryptic nature. The fact that most sampling trips for the species seem to involve icy mountain rivers, treacherous ice roads, or dark mountain nights speaks to the challenge of exploring the beautiful and remote places where they live. In a province where it sometimes seems like we've been everywhere and mapped everything, a hint of mystery is a good thing. ■

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 to increase appreciation of Alberta's aquatic life.

RICK PRICE

Grizzlies in the Crosshairs

Unpacking the Decision to Reinstate the Grizzly Hunt

BY RICHARD SCHNEIDER

Female grizzlies give birth in winter, while in the den. Cubs stay with their mother for two to three years before heading out on their own.
RICK PRICE

The Alberta government's recent decision to reinstate a grizzly bear hunt is highly concerning from a conservation perspective. It's also puzzling, since the idea seems to have come out of left field. Just four years ago, the province released a comprehensive grizzly bear recovery plan that outlined strategies for achieving a stable and sustainable grizzly population while also dealing with bear conflicts when they arise.[1] This plan was the culmination of over six years of effort, involving workshops with experts and consultations with stakeholders and the public. Now, the Minister of Forestry and Parks, Todd Loewen, is telling us that the province is being overrun with bears, and consequently a posse of hunters, selected through an online draw, is needed to protect the public from "grizzlies and other problem wildlife."[2] What's going on?

To unravel these recent developments, we need to step back and examine the causes of the grizzly bear's decline and the steps that have been taken to recover the population. Grizzly bears are one of the more challenging threatened species to manage because conservation is not the only goal. Managers also need to grapple with the dangers that bears can pose to humans and livestock. The recovery plan makes it very clear that continued public support for grizzly conservation is highly dependent on managing the risks that grizzlies pose. Last, but not least, outfitters and a subset of the hunting community continue to lobby for the reinstatement of a grizzly hunt.

Why Have Grizzly Bears Declined?

Before the days of European settlement, grizzly bears were found throughout most of what is now Alberta, including the southern prairies, where they lived alongside bison and other species of the open grasslands. As settlement brought farms, ranches, cities, and resource extraction, grizzly bears were extirpated from much of their original range. Today, the distribution of grizzlies in Alberta is restricted to the mountains and foothills.

Grizzly bear populations have continued to decline in recent decades, mainly because encounters with humans have led to an unsustainably high rate of mortality. Before the grizzly trophy hunt was halted, in 2006, hunting accounted for over 50% of human-caused grizzly deaths and was a major contributor to the population decline.[1] The elimination of the hunt helped initially, but other sources of mortality have continued to be a problem.

Based on the most recent data, the four highest sources of human-caused mortality now are poaching, accidental collisions with highway vehicles or trains, self-defence kills (usually by hunters), and black bear hunters misidentifying and shooting grizzly bears (see Figure 1).

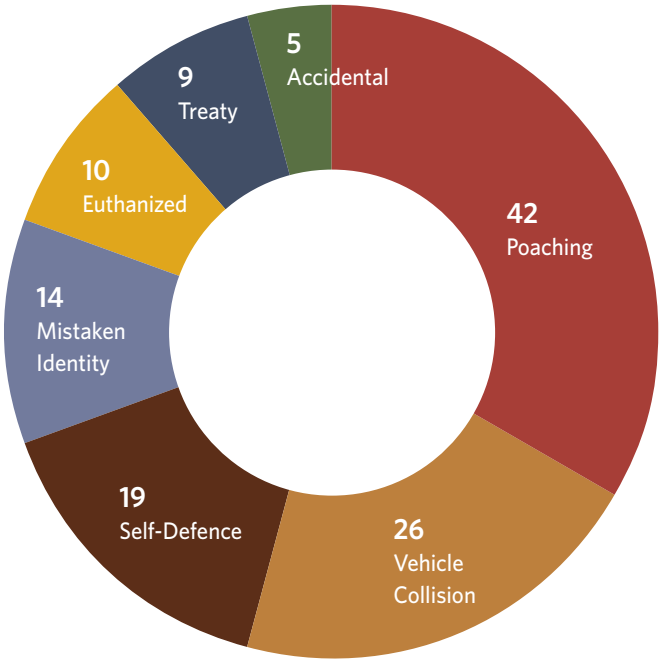


Figure 1. The sources of human-caused grizzly bear mortality in Alberta from 2010 to 2015 (excluding national parks).
Source: Alberta Grizzly Bear Recovery Plan.[1]

Grizzly bears used to range across most of Alberta, but their core habitat is now restricted to the Rocky Mountain region. RICK PRICE

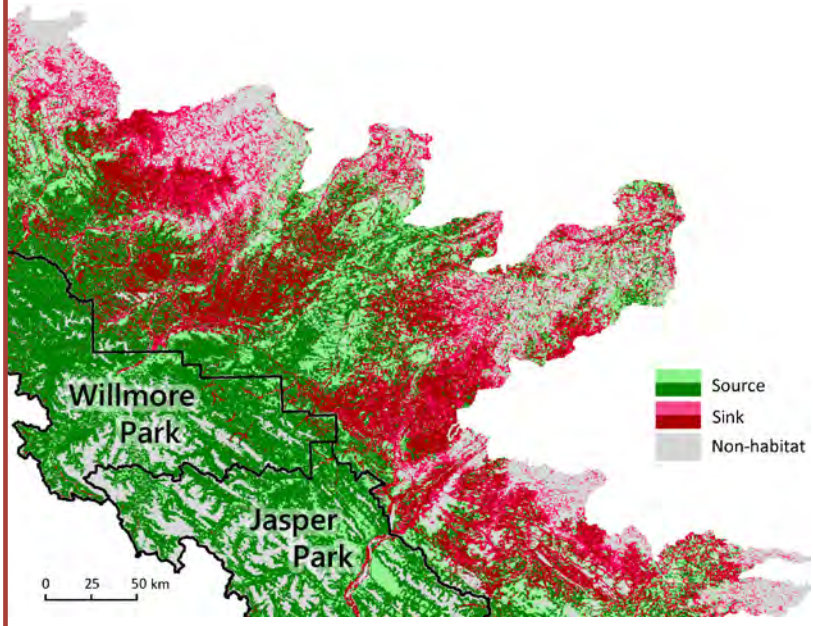


Figure 2. The distribution of source and sink habitat for grizzly bears along the eastern slopes of the Rocky Mountains in Alberta near Jasper National Park. Sink habitats east of the mountain parks have an unsustainably high rate of mortality associated with high levels of human access. Adapted from Nielsen et al. 2006.[3]

Grizzly bears are known for their large curved claws. Other distinguishing features include a prominent shoulder hump, wide face, short rounded ears, and short snout. Coat colour is usually brown, but ranges from light blonde to black. RICK PRICE

As with most conservation issues, there is also a habitat dimension to the problem. Much of the grizzly's current range lies within the mountain park system, where the bears benefit from a high level of protection (though road and railway collisions remain a major problem). It's a different story in the foothills, where parks only cover 1.4% of the region. Since the mid-20th century, the foothills have been subject to intensive development involving forestry, oil and gas extraction, and coal mining. Because of this industrial development, access roads now permeate the foothills. More recently, widespread off-road vehicle use has become a major additional source of disturbance. With a high level of access and activity comes a high level of bear encounters, and inevitable bear mortality.

The relatively intact parts of the grizzly bear's current range in Alberta are referred to as "source" habitat. In these areas, bear mortality and reproduction are relatively balanced, and the population is stable or even increasing. In contrast, areas that have experienced a high level of industrial development have an unsustainable rate of bear mortality. These areas are referred to as "sink" habitat, and the bear populations in these areas rely on the influx of dispersing bears from source habitat to remain viable (see Figure 2).

Many of Alberta's grizzly bears reside in the foothills region, which has been heavily impacted by industrial development. The mortality rate of bears in this region is unsustainably high. RICK PRICE

Recovery Planning

Formal recovery planning for the Alberta grizzly bear began in the early 2000s, with a draft recovery plan completed in 2005.[4] A key recommendation in this initial plan was to eliminate the grizzly hunt, and this was enacted in 2006. Additional recommendations included reducing conflicts between grizzlies and humans, reducing human-caused deaths, improving the scientific understanding of Alberta grizzly populations, and maintaining the integrity of grizzly bear habitat. In 2010, the grizzly was listed as a Threatened species under the provincial *Wildlife Act*.

The following decade featured intense field research on all aspects of the grizzly bear, including basic bear biology and habitat needs, causes and patterns of mortality, and mitigation options. There were also concerted efforts to better understand human-bear interactions and to identify the best methods for dealing with conflicts. These efforts culminated in the release of an updated grizzly recovery plan in 2020.[1]

The recovery plan divides bear habitat into three zones: Core, Support, and Habitat Linkage. The Core zone is where the province hopes to achieve and maintain a sustainable population of grizzly bears. A key recommendation is to limit road density within this zone to under 0.6 km/km^2. Research has shown that the rate of bear mortality becomes unsustainable when road density exceeds this threshold.[5] The Support zone provides an actively managed buffer that helps ensure the viability of the bear population in the Core zone. This buffer is needed because bears do not know where the boundaries of the Core zone lie, and so they often move between the Core zone and adjacent habitat. Without ongoing efforts to minimize human-bear conflict in the Support zone, the bear population in the Core zone would slowly be depleted. The role of the Habitat Linkage zone is to maintain connectivity between habitat zones, which is critical for maintaining gene flow.

Another key strategy in the recovery plan is to increase public support for grizzly bear conservation, especially among those living, working, and recreating in bear habitat. Researchers have found that residents and workers in bear country generally (but not exclusively) have positive attitudes to grizzly bears. However, it is important to provide these individuals with the opportunity to participate in local management solutions in order to maintain their support. Promptly dealing with problem bears, either through translocation (where feasible) or euthanasia, is also important, as is providing compensation for economic losses attributable to bears.

Other elements of the recovery plan include education and outreach (delivered through the BearSmart program), managing food attractants that draw bears to human settlements and agricultural areas, reducing accidents that result in bear mortality, minimizing the illegal killing of grizzlies, and ongoing monitoring and research.

Top left: Male and female grizzly bears generally live apart, but during mating season they will spend several days courting each other. RICK PRICE

Bottom left: Grizzly cubs grow quickly, but are not sexually mature until four or five years of age. RICK PRICE

Ministerial Monkey Wrench

Given the years of effort and the extensive consultation that went into the 2020 grizzly recovery plan, the new policy that enlists hunters to control grizzly bears — enacted by ministerial order without input or support from wildlife biologists, relevant scientific data, public consultation, or proper legislative review — is both puzzling and concerning. The pieces just don't add up.

Let's begin with the rationale given for the policy change. In his press release, Minister Loewen said, "As Alberta's grizzly bear and elk populations continue to grow in numbers and expand their territories, negative interactions have increased in both severity and frequency."[2] The impression we are given is that the province is suddenly overrun by bears, necessitating urgent and extraordinary control efforts. The reality is that we do not have a good estimate of current grizzly population numbers, mainly because the bears exist at low densities across vast areas, making them difficult to census. According to the best available data, published in the 2020 recovery plan, there has been growth in a couple of localized areas, but no indication that the entire grizzly population is rapidly expanding. The rationale for changing the *Wildlife Act* and overriding the grizzly recovery plan appears to be contrived.

Next, where did the idea to enlist hunters come from? It's definitely not part of the bear management toolkit that has been developed through years of research and field testing, both in Alberta and around the world. We know what works: electric fencing, attractant management, acoustic and visual deterrents, livestock guardian dogs, bear spray for individual protection, education and outreach, and collaborative management at the local level. When prevention falls short, bear relocation can be used to address local problems without negatively impacting the bear population.

In some cases, problem bears do need to be killed, especially repeat offenders and bears exhibiting dangerous behaviour. Until now, this has been done by trained fish and wildlife officers. Transferring this task to private citizens with no ties to the grizzly bear recovery program is not wildlife management. It is simply bear hunting in disguise.

The inescapable conclusion is that Minister Loewen's claim about instituting a new policy to protect the public is a ruse. If he was serious about managing bear conflicts, he would be directing more resources to implementing the conflict mitigation

measures in the 2020 grizzly recovery plan. In particular, there is much more that should be done in terms of expanding the BearSmart program, improving landowner compensation, and advancing local-level management planning. We should also be filling the Human-Wildlife Conflict Specialist staff position, which has been vacant for the past couple of years. As for killing problem bears, fish and wildlife officers are more than capable of handling this task without the aid of hunters, as they have for decades. We are left to speculate as to the real reason for the new policy, but the *cui bono* (who benefits) rule suggests that lobby efforts by outfitters and grizzly hunters are likely involved.

We Need to Do Better

The deeper problem here is bad decision-making, on at least two levels. Minister Loewen has done an end-run around his own government's planning process for grizzly bears. Planning provides a structured process for obtaining public input, clarifying objectives, identifying trade-offs, and applying science to craft workable solutions. Informed by this process, elected officials sometimes have to make difficult political decisions about intractable trade-offs. But this is not the same as crafting policy by winging it, which is what this ministerial order has done.

We also see here the prioritization of special interests — outfitters and grizzly hunters — over the broad public interest. Most Albertans place a priority on grizzly bear recovery rather than reinstituting grizzly bear trophy hunting. It's likely this applies to the general hunting community as well, as most hunters are conservation oriented. Indeed, hunting groups like Ducks Unlimited have been instrumental in advancing conservation in Alberta and other parts of Canada.

Unfortunately, the decision to revive the grizzly hunt seems to be part of a general deterioration in natural resource decision-making by the current provincial government. As Lorne Fitch describes in his article on page 4, the list of decisions favouring special interests has been growing, sidelining the work of professional wildlife managers and the interests of the general public. For example, we have seen the same type of political intervention occur with the hunting of cougars, which is now permissible within some provincial parks.

If these developments are of concern to you, please take a few minutes to write to Minister of Forestry and Parks Todd Loewen and let him know your views: **fp.minister@gov.ab.ca**. Be sure to cc your local MLA as well. A letter template is available at **naturealberta.ca/grizzly-hunt-action**, which you can use as-is or modify. As we have seen in the past, change is possible if enough concerned citizens push back and demand more of their government. ■

Grizzly bears are a keystone species; they serve as an important indicator of ecosystem health. It is vital that they remain protected. RICK PRICE

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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 is the editor-in-chief of *Nature Alberta Magazine*.

Mosses and liverworts growing in harmony on a decaying log. BRITTNEY MILLER

Mosses of Alberta: A Miniature Leafy World

BY BRITTNEY MILLER

What do you think of when you hear the word "moss"? Amorphous green emerging from the cracks in your driveway? The green blanket of a forest floor? Maybe you picture reindeer moss (a lichen masquerading as moss in craft stores). Or perhaps you think of the peat moss you use in your garden. Maybe you've never even considered it! You wouldn't be alone — moss is often overlooked. Its small size makes it easy to miss and even harder to understand and identify. But these examples are only a small sampling of the complex story of moss. Despite its small stature, it is just as charismatic as other plants and animals in our province. Moreover, there is a wealth of diversity in form and function, fulfilling important ecological roles.

I love moss. I love the gentle hue of their shimmering leaves in the morning dew. I love connecting at eye level with a decaying log or searching the contours of a cliffside to find that next photo-worthy specimen. I love the joy that comes from finally finding the species description that perfectly fits the plant I'm looking at. I love the ever-evolving journey of learning about mosses, how they relate to each other, and how they relate to us and the health of our planet. My aim here is to share my passion and knowledge of moss by addressing some of the most common questions I'm asked about them. Who knows... you may become a moss lover too!

Are mosses and bryophytes the same thing?

Bryophytes include three closely related plant groups: mosses, liverworts, and hornworts. Mosses are the most diverse group, and the one we see most often, so it is easy to think that moss and bryophyte mean the same thing. But bryophyte is really an umbrella term for all three groups.

Bryophytes were the first plants to colonize land, approximately 450 million years ago. As such, they represent an early stage of plant evolution, and this is reflected in some of their unique features. Unlike other land plants, bryophytes do not form true roots or vascular tissue that allows them to regulate their internal water content.

The common moss, *Dicranum polysetum*, showing sporophytes, the spore-producing reproductive stage of the plant. BRITTNEY MILLER

Above left: Thalloid liverwort, *Marchantia polymorpha*. Its sporophytes are housed in the unique umbrella-shaped structures, called archegoniophores. BRITTNEY MILLER

Above right: The pale-colored leafy liverwort, *Chiloscyphus pallescens*, growing among the moss *Haplocladium microphyllum* and displaying its white-stalked sporophytes with round, black-brown capsules. The four-segmented structures are capsules that have already burst open and unleashed their spores. BRITTNEY MILLER

Because of this, they are referred to as non-vascular plants.

Another distinctive feature of bryophytes is their life cycle. In most plants, a female egg is combined with male pollen to produce a seed that has two sets of chromosomes, one from each parent. Not bryophytes. Instead of seeds, they release spores, which have only a single set of chromosomes. These spores grow into male or female plants (or both), with just a single set of chromosomes in each cell. To reproduce, the males release sperm into the environment, which has to make its way to the female eggs. There the egg and sperm fuse to produce an embryo, which eventually undergoes a special type of division to form the spore-producing structures (kind of like a bryophyte version of a flower). The spores are tiny (less than 0.05 mm wide) and can travel hundreds of kilometres via wind.

Bryophytes also commonly reproduce by cloning themselves. Specialized structures form on leaf tips or roots or other parts of the plant to do this. Sometimes it's simply leaf tip fragments themselves. When these structures fall off, they can form an entirely new plant genetically identical to its parent.

No roots? No vascular tissue? How does it survive?

Bryophytes have adaptations that allow them to survive even without having roots to draw in nutrients and water, or vascular tissue for water retention. On a hot, dry day you may notice that all the moss you see looks... well... dead. But go back after a rain shower you will see that all the moss has seemingly come back to life, looking green and luscious.

Bryophytes have developed a tolerance to drying out. When their environment is dry, they can slow their metabolic function to the lowest possible level, going into dormancy and taking on that shrivelled-up appearance while they wait for moisture to become available again. When that rain shower comes, they turn their metabolism back on and get right back to growing. Furthermore, their leaves are typically only one cell thick, allowing water and nutrients to be passively absorbed. Some mosses are better at tolerating dehydration than others. You may have noticed lovely boulders in the mountains that are fully exposed to the sun and heat and yet are still covered in moss. These are species that excel at being dormant. Conversely, not far away, you may come across a creek hidden in the trees, where an abundance of entirely different moss species exists. These are species that prefer constant exposure to water.

Adaptable spores are another important strategy for dealing with environmental variability. Spores can sit in the soil and wait for conditions to be just right, and once they are, they will grow into a healthy little plant. Incredibly, spores have been shown to survive 4,000 years of being trapped in ice! These spores patiently waited for millennia and then, when given the right conditions, grew!

What does moss "do"?

Mosses (and all bryophytes) have many important ecological roles. They provide habitat for many invertebrates — I've often discovered little rotifers

and nematodes when dissecting bryophyte samples, and even the occasional water bear (more formally known as tardigrades). They also provide soft nesting material for small mammals, amphibians, and birds. They are one of the first organisms to colonize after a disturbance, stabilizing the soil and facilitating nutrient cycling, which then allows vascular plants to grow.

One of their most newsworthy roles is carbon storage. Peatlands, which are wetlands with organic material accumulations over 40 cm thick, are mainly composed of mosses such as *Sphagnum*. The moss in peatlands decays slowly because of the waterlogged, acidic environment, and as a result the mosses in peatlands can be hundreds of years old and still identifiable. This slow decaying process is also why peatlands are so proficient in carbon storage. As the mosses grow, they take in carbon from the atmosphere, and that carbon is retained in the peatland. (For more information on peatlands, see the Summer 2024 issue of *Nature Alberta Magazine*).

Can you eat moss?

I love this question, and I actually get it a lot. The answer is, yes, you can, but there is little to no point. Moss has almost no nutritional value and the crude-fibre texture is rather unpalatable. Yes, I've tried! I marinated and fried up *Scorpidium scorpioides*, a rather juicy and turgid moss occurring in nutrient-rich water, during a field season at Alexandra Fiord, Ellesmere Island. Our field crew all tried it out of sheer curiosity (and maybe a little bit of insanity after having been up there for months). We regret nothing, but would not do it again... Probably not, anyway.

Does anything eat moss?

Although not fit for humans, many small creatures love to feast on mosses. Invertebrates such as isopods and mites have been documented chomping away at various parts of mosses, the developing spore-producing structures offering the juiciest morsels. Slugs, snails, and even lemmings happily munch away at mosses as well.

Do mosses compete like vascular plants do?

Mosses may seem like the mild-mannered version of flowering plants, but some studies have found that they do indeed compete with each other. If the environment changes and is less favourable for one species, another species more suited to this change is happy to take its place.

Hornwort, a rare find in Alberta! This flat, blob-like (thalloid) plant is more common to tropical regions and is distinguished by its horn-like sporophytes that split vertically to release their spores. BRITTNEY MILLER

Above left: *Sphagnum capillifolium*, a common peat-forming moss, with sporophytes. *Sphagnums* have rounded capsules that dehydrate into an urn-like shape, creating so much pressure in the capsule that they burst open at their tops, expelling their spores. BRITTNEY MILLER

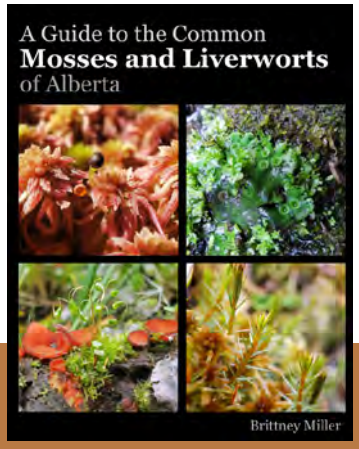
Above right: The water-dwelling moss, *Scorpidium scorpioides*, that I attempted to eat with my Arctic research crew. It was not good. BRITTNEY MILLER

Where do I find moss?

Everywhere! If you're looking, you can find bryophytes growing on trees in your neighborhood, on wet soil in river valleys, even in your backyard if the conditions are right. Bryophytes occur all across our province, forming peatlands in our boreal forests and covering and stabilizing soil in prairie grasslands. Although they occur everywhere, if you want to see the most diversity in one place, then moist, protected, rocky nooks in the mountains are your best bet.

How do I learn more about mosses?

There are over 800 species of bryophytes in Alberta. In my recent book, *A Guide to the Common Mosses and Liverworts of Alberta*, I provide an introduction to 170 of the most common species. Each species in this book has a field-based description in non-technical and technical terms, a large field photo, a macro photo of leaves, a watercolour illustration, habitat information, a map showing where the plant can be found in Alberta, and a list of species that it could be commonly confused with. There is also an illustrated key and a guide to species by features to help with identification. The goal of my book, akin to this article, is to share my love and knowledge of the miniature leafy world of mosses. It is a beautiful and intriguing part of our province's natural world! ■



Brittney Miller's new guidebook provides an introduction to 170 of the common mosses and liverworts of Alberta and can be found at **tinyurl.com/CommonBryophytesofAlberta**.

Brittney Miller first fell in love with moss after taking a field botany course during her B.Sc. at the University of Alberta. She completed M.Sc. research on ancient bryophytes emerging from retreating ice patches in the southwest Yukon. Her passion for bryophytes has taken her to glaciers in Canada's Arctic (Ellesmere Island, Nunavut) as a researcher, and throughout the province of Alberta as a consultant. She has previously worked for the Alberta Biodiversity Monitoring Institute (ABMI) doing bryophyte taxonomy and currently works as a vegetation scientist for Vertex Professional Services.

Dark Secrets

Discovering the Unusual Habits of the Black Swift

BY GEOFF HOLROYD

If you hike into Johnston Canyon in Banff National Park, be on the lookout for the black swift, a bird with some unusual habits. They have been observed on the nest as late as mid-September, with winter snow already capping Pilot Mountain. Why would any bird, especially one that eats flying insects, nest so late? Why is there only one young in that nest? And why nest in this cold canyon? Answers to these questions are emerging now, 120 years after the first North American black swift nest and egg were found.

The black swift's uniqueness becomes even more apparent when it is compared to other swifts. For example, its eggs are three times larger than those of the white-throated swift, even though the adults of these two species are of similar size. Comparison with Vaux's swift, which has a similar distribution, is also intriguing. Vaux's swift lays four to six eggs in late May, whereas the black swift lays a single egg in late June. The Vaux's nestling fledges in July after 21 days in the nest, while the black swift nestling fledges by mid-September after up to 45 days in the nest. The Vaux's swift nests in a warmer tree cavity of a broken snag, whereas the black swift nests in cool canyons and on cliffs.

There are physical differences as well. Most members of the swift family have a large salivary gland that produces large quantities of saliva used in nest building. The extreme examples are the swiftlets of Asia that construct whole nests of saliva (which are the source of bird's nest soup, a gastronomic delight). Black swift nests would make poor soup since they contain no saliva at all. Their salivary gland is small compared to other species; for example, it's less than half the size of the chimney swift's gland.

A Closer Look at Nesting Behaviour

The first step in understanding the black swift's unique nesting behaviour is to examine its choice of nest location.

Previous page: Besides its spectacular scenery, Johnston Canyon is also an important nesting location for black swifts. LAURI STEN

An adult black swift incubating its single egg on a moss nest. TOM ULRICH

A young black swift, right, eagerly receiving its meal after waiting as long as a full day since its last one. TOM ULRICH

A top priority is keeping the nest contents safe from terrestrial predators. All nests discovered to date have been on sea or mountain cliffs, in canyons, and in caves — places inaccessible to mammals.

Swifts select nest sites that are high above the local terrain with an unobstructed flight path. This is necessary because swifts fly at relatively high speeds and are not adept at manoeuvring through forests. They also benefit from the flight advantage that comes with nesting on cliffs, where the drop from their nest allows them to gain flight speed, compensating for their relatively small chest muscles.

Black swift nests are located near moving water. All the documented nests are over a stream, beneath a waterfall, or above the sea. The advantage here is not as clear. Does the water noise drown out any begging noise from the young that might attract a predator? In Johnston and Maligne Canyons in the Alberta Rockies, the nest ledges are near waterfalls, so close to the spray zone that green moss grows below the nest, fertilized by the droppings of the young and adults. Photographer Tom Ulrich observed the young reaching for drops of water. Do wet sites help keep the young hydrated?

Most curious, though, is the requirement that the nest be located so that the sun does not shine on it! Warm, south-facing, sunny cliffs are shunned in favor of cool, north-facing cliffs. Why would the swifts not choose a warm nest site for their young, especially in the mountains where warmer locations are still relatively cool?

Young black swifts are well equipped to deal with their cold, wet environments. Although they hatch naked, the young quickly develop an extensive downy plumage before growing their adult plumage. These new feathers erupt from their sheaths by the eighth or ninth day and cover the nestling by day 19. Downy plumage is not found in other swifts, except for some closely related species in the genus *Cypseloides*.

Investigating the Mysteries

My interest in black swifts began in 1975, when two friends showed me a nest in Johnston Canyon. I returned annually for 43 years to count the nests on the accessible cliffs that are visible from the nature trail. The number of

Left: A black swift chick initially develops downy plumage, which transitions into speckled feathers, as seen on the large juvenile on the right. The adult on the left displays uniformly dark plumage except for some white in front of the eyes. TOM ULRICH

Below left: A large young flexing its wings in anticipation of fledging after a lengthy, 45-day stay in the nest. TOM ULRICH

swifts varied from seven to 13 pairs until 1993. But the next year, the number of occupied nests dropped significantly and there have been only two to four nests since then. Why the number dropped so dramatically is still unknown.

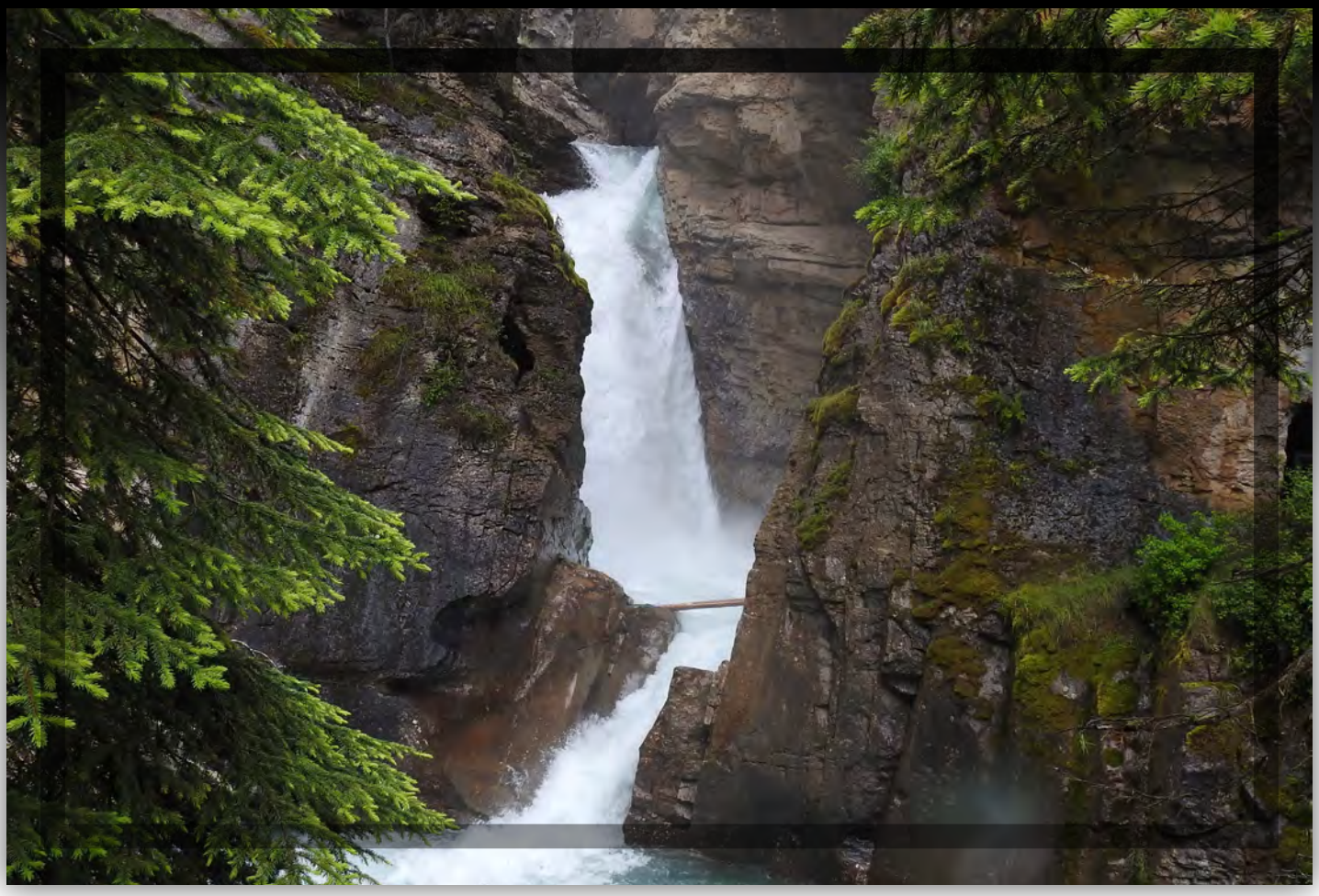
In 1982 and 1983, I visited the canyon weekly to collect droppings beneath a few nests that were not built directly over the stream. Droppings from these nests fell on rocks where I could scoop up the fecal matter. These droppings contained digested but identifiable insect parts that provided clues to explain the black swift's strange breeding behaviour.

In early summer, black swifts eat flies, beetles, and other insects, similar to the diet of swallows. There are no young until later July, so these droppings are all from the adults. In August and early September, when most droppings are from juvenile swifts, carpenter ants dominate the diet. These ants disperse in swarms in late summer to establish new colonies. Flying ants are a very desirable food since they are 40% fat and 7% glycogen — approximately six times the energy content per gram of flies. Although ants are a highly energy-rich food source, they are widely dispersed. This requires long searches, but the swifts are suited for such long flights.

Observations from Vancouver provide evidence of the long-distance flying ability of black swifts in the breeding season. While nesting in mountains to the east, up to 1,000 black swifts have been observed on the southern British Columbia coast. They make this journey to avoid cool, wet weather, which occurs when low-pressure systems from the Pacific Ocean pull cool air from the north behind them. The black swifts leave the mountains and fly south into the warm air, where insects are likely to be more abundant. Once the cool front passes, they return north. In Europe, such flights extend up to 1,600 km over three days before the cool weather passes and the European swifts return to their nests.

Because the parents must forage widely for dispersed food, the chick is only fed infrequently, typically daily in the evening when both parents return. Occasionally the adults will return during the day to feed the young chick, but most days the youngster is left alone. The relative inaccessibility of the nest site provides some security, though the chick may still be vulnerable to aerial predators. While the chick waits for this infrequent feeding, it must conserve valuable nutrients and energy. This explains why the nestling takes 45 days to grow and fledge, considerably longer than other similar-sized birds. It may also explain why black swifts raise a single young rather than many.

Infrequent feeding may even be the reason swifts choose a cool nest site. It's possible that a cool environment may facilitate torpor in the young while the adults are away. In other words, the young conserve energy by lowering their temperature and metabolism. This strategy would be similar to that of alcid seabirds, which also typically raise a



The cool, wet cliffs of Johnston Canyon provide the features that black swifts desire when selecting a nest site.
GERTJAN VAN NOORD

single young that matures slowly. Like black swifts, these seabirds forage for dispersed prey far from the nest and require a nesting strategy designed to cope with infrequent feeding. Adult swifts are known to use torpor to cope with inclement weather and lack of insect food.

Species that have a slow rate of reproduction are generally believed to be long-lived. This appears to be the case for black swifts, since researchers from the Bird Conservancy of the Rockies in Colorado caught a female swift in August 2023 that they had banded as an adult at the same nest in 2005, making the swift at least 19 years old!

Looking Forward

Black swifts continue to intrigue me. So many questions remain to be answered! If in fact the young do become torpid to save energy, this implies that the adults are purposely selecting a cool nest site. This would be highly unusual. In other species where torpor has been studied, it is used by birds to cope with cold and lack of food, not, as seems to be the case here, to save energy while harvesting a dispersed food source.

When my son Michael was ten days old, I took him to see the black swifts in Johnston Canyon. Ten years later, he was the first to find a nest in Maligne Canyon in Jasper National Park. Will he be able to show his children black swifts?

The black swift has received little popular press. The inaccessible nest sites provide security for the young but make monitoring the population difficult. What does the future hold for this species? How do the various ant species that make up their young's diet react to the clear-cutting practices of North American forestry and to large expanses of burned trees? These and other questions need to be answered to gain a better understanding of the black swift's biology. As we search for more clues to the ecology of black swifts, we must also ensure that we protect their remote nest sites. ■

Geoff Holroyd is a retired research scientist with Canadian Wildlife Service and Environment and Climate Change Canada, and a retired adjunct professor at the University of Alberta. He is currently chair of the Beaverhill Bird Observatory. He monitored black swifts in Johnston Canyon for over 40 years and documented their diet in the 1980s.

A Muskrat for All Seasons

BY MARGOT HERVIEUX

TONY LEPRIEUR

For most wetland creatures, autumn is a time to fuel up for migration or prepare for winter dormancy, but this isn't the case for muskrats. These busy rodents are active all winter long, looking for food and sheltering under the ice.

Muskrats are a giant version of their closest cousins, mice. They are brown, about the size of a small cat, and have small eyes and ears. Unlike beavers, muskrats have a long, naked tail, which is flattened side-to-side. The tail is visible when they swim, sometimes even sticking up out of the water. Muskrats are well adapted to living in the water. Their hind feet are partly webbed, and they can hold their breath for up to 15 minutes if they have to.

TONY LEPRIEUR

Like other rodents, muskrats are mainly vegetarians, but they will also eat freshwater mussels, snails, and frogs. They dine on a variety of water plants, especially underwater roots and stems, which they carry to shore or to their shelter to eat.

Muskrats make their own shelters, either by burrowing in the bank or building a mound in shallow water. They also make use of empty beaver lodges. Muskrat mounds are constructed from bulrushes, water weeds, and mud, and have a sleeping platform inside. Since muskrats are very territorial, usually only one muskrat occupies a dwelling, but females will share space with their young for their first year.

In winter, muskrats also build push-ups over openings in the ice. These domes of plants and mud freeze solid to make a safe shelter where the animals can emerge from the water. The push-ups also help maintain breathing holes. By building a series of push-ups away from its burrow, the muskrat can greatly increase its winter feeding area.

As one might expect from a rodent, muskrats are prolific breeders, producing five to ten young each spring. In our part of the world they only have one litter a year, but in more southern regions they may have two or even three sets of kits each year. Young muskrats are independent by six weeks of age, but they usually stay in their parent's territory until fall. If food is plentiful, they may even be allowed to stay until the following spring.

When young are kicked out by their mother, or territorial rivalry prompts a move, muskrats will travel long distances over land in search of new wetlands. You can also occasionally find wandering muskrats in the late fall when a home pond freezes too deep.

Muskrats have lots of predators and they don't hesitate to fight back if cornered. They have to watch out for mink, coyotes, foxes, and human trappers, but their biggest threat is loss of wetland habitat.

Muskrats are a delight to watch as they swim through the marsh or sit on a hummock to feed. You may also spot them sitting atop the ice through the winter if there is open water near your favourite ice-fishing hole. ■

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 MILES CONSTABLE, LYN DRUETT, AND TONY DRUETT

Big Lake Environment Support Society

The **Big Lake Environment Support Society (BLESS)** was established in 1991 by Doctors Fin Fairfield and Bob Lane. Big Lake is located in the southernmost tip of Sturgeon County, bordered by St. Albert, Edmonton, and Parkland County, and is one of the Capital Region's best-kept secrets. The society's major objective is the conservation of the Big Lake environment and wetlands through advocacy, public education, stewardship, and data collection programs. BLESS was instrumental in establishing Big Lake as a provincial Natural Area and Important Bird Area, and in 2015 it formed the basis for Lois Hole Centennial Provincial Park (LHCPP).

BLESS has received the Alberta Emerald Award for Environmental Excellence in Education and the Steward Service Excellence Award from Alberta Community Development. We are the designated stewards of LHCPP. Many of our Presidents and Directors have received local awards for their tireless work to improve our environment. The area's beauty has inspired a song ("Beautiful Big Lake" by Peter Jansen) and a poem ("On the Creation of Lois Hole Provincial Park" by BLESS President Louise Horstman).

Beginning in 1993, BLESS, with its partners the City of St. Albert and Alberta Environment and Parks, was instrumental in constructing (and eventually rebuilding) a picnic shelter next to the Sturgeon River and a very popular viewing platform at the lake.

BLESS has conducted water quality surveys of Big Lake, as well as a breeding bird survey and plant survey. Our latest efforts have created handy, pocket-sized plant, bird, and animal guides for the park. These books are now available at BLESS events and at the Musée Héritage Museum in St. Albert Place.

In 2005, BLESS became politically active in efforts to ensure that the alignment of Ray Gibbon Drive was moved away from Big Lake. In recent years, BLESS has lobbied against developments that would negatively impact the park environment. BLESS also has positive and productive relationships with the Cities of St. Albert and Edmonton and the Counties of Parkland and Sturgeon, as well as the province. We have worked with Parks staff to name the existing LHCPP trail system and to plan future improvements and extensions. The province's recent Order in Council has added more than 100 hectares (250 acres) to LHCPP, and both St. Albert and Edmonton are now modifying their development plans to match the new park boundaries.

BLESS's Summer Nature Program is in its 21st year. Kids and parents alike have enjoyed the BLESS Nature Centre's game-based activities, which teach basic ecological and environmental principles in a fun way. In response to COVID in 2020, the program had to move outdoors to LHCPP, but this allowed us to create more hands-on

environmental education. The program now offers daily nature walks with a theme (bug week, pond dipping, birds, etc.), as well as some evening programming.

Each May, BLESS celebrates World Migratory Bird Day, welcoming migrating birds back to Big Lake. In 2024, BLESS co-hosted the event with Nature Alberta. The scheduled walks and talks by many participating organizations were very popular.

For more information on our activities, photos, and to join BLESS, check out our website at **bless-env.ca**. ■

Miles Constable is the Treasurer of the BLESS board. Lyn and Tony Druett are Directors at Large on the BLESS board. All three of them have been involved with BLESS for many years.

Nature Kids

MY BIG ALBERTA BACKYARD

BY NICK CARTER

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

The Sanctuary

The Clifford E. Lee Nature Sanctuary is a protected natural area southwest of Edmonton in Parkland County. First established in 1978 by the Clifford E. Lee Foundation, the Sanctuary has grown over the years to its current size of 140 hectares (348 acres).

The Sanctuary is a place where the plants and animals are meant to be safe from being affected by people. That's why it's important to be a responsible visitor, which means we shouldn't pick flowers or berries, let pets – or ourselves! – run around off the trails, leave garbage on the ground, or feed the animals.

Eared grebes are among the many different bird species that come to the Clifford E. Lee Nature Sanctuary every year to lay eggs and raise their young. NICK CARTER

From spring to fall, dozens of different butterfly species, like this silver-bordered fritillary, can be found throughout the Sanctuary. NICK CARTER

Things To See and Do

The Clifford E. Lee Nature Sanctuary provides lots of different habitats for a variety of wildlife, and walking the network of trails through the property will allow you to get a good look at all sorts of species. Just past the main entrance, there's a picnic area surrounded by trees where you can sit and watch the resident birds, squirrels, and bugs go about their business.

A lot of the Sanctuary is a wetland, and the Boardwalk Loop Trail passes through this environment where you can see all sorts of water-loving birds like American coots, eared grebes, and many different types of ducks. You can also see wetland songbirds like swamp sparrows and blackbirds, as well as colourful dragonflies. In the spring and fall, American tree sparrows stop for a migration break here. This trail continues into an open meadow and down through a dense forest, which are great places to find butterflies, before arriving back at the wetland.

The Clifford E. Lee Nature Sanctuary preserves wetlands that are important for all sorts of different plants and animals. NICK CARTER

The Aspen Ridge Trail is a short but beautiful walk through a trembling aspen forest in the middle of the Sanctuary, and is a good place to see woodland songbirds like warblers. The Pine Knoll Loop goes through a patch of paper birches up to a sandy hill covered in jack pines. Keep an eye out for black-capped chickadees and blue jays here year-round. From there, the Woodland Flower Trail winds through the forest to the south end of the Sanctuary.

Why Is the Sanctuary Important?

The Sanctuary is surrounded by places where people live. The forests around the property are filled in by country neighbourhoods, and past that are farmlands and the growing city of Edmonton. The living things in this area need a safe place like this that people won't disturb.

It's good for us, too. The Clifford E. Lee Nature Sanctuary is an easy, nearby place to go for people who want to get out of the city and enjoy nature. By being responsible visitors, we can help keep this special place safe, clean, and protected for everyone. ■

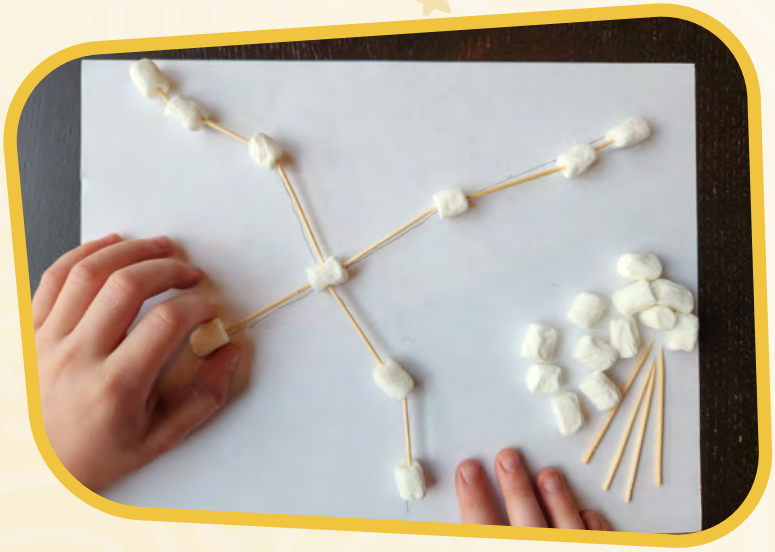
A lookout platform along the Boardwalk Loop Trail where you can walk above the marshy ground. MACK MALE

Nick Carter is a naturalist and science communicator from Edmonton, and is Nature Alberta's Nature Kids Coordinator. He studied biology at the University of Alberta and has had a lifelong fascination for all things in the natural world.

Nature Kids OUT AND ABOUT

MARSHMALLOW CONSTELLATIONS

BY LOREENA NIEUWENHOUT



Alberta is home to several Dark Sky Preserves, which are areas where there is less human-made light that shines up into the night sky. These areas are excellent spots to go stargazing! With this activity you'll get to go out to a dark area, look at some constellations, and then recreate them at home using marshmallows and toothpicks!

You'll Need

- ✔ A stargazing app or printable star finder
- ✔ Paper and pencil
- ✔ Mini marshmallows
- ✔ Toothpicks
- ✔ A dark place outdoors

What To Do

1. Download a free stargazing app such as Night Sky or Sky Guide. You can also go to the Royal Astronomical Society of Canada's website and get a free download for a printable star finder here: **rasc.ca/star-finder**.
2. Pick a cloudless night to go to a dark place, away from bright city lights, to look at the stars. Alberta's Dark Sky Preserves are an excellent choice if there is one near you. Visit **bit.ly/ab-dark-sky** to find your closest Dark Sky Preserve.
3. Spend some time comparing what you see in the night sky with the named constellations on your app or star finder.
4. Sketch your favourite constellations using your pencil and paper. You'll use this drawing for your constellation recreation!
5. When you go home, recreate your favourite constellations, using the marshmallows as stars. Connect the "stars" using the toothpicks. If some stars are close together, have an adult cut the toothpicks into shorter lengths to connect them. When you're all done, you can take out the toothpicks and enjoy your marshmallow stars in some hot chocolate – like a swirling night sky in a cup! ■

Did you know you can use binoculars for looking at stars and planets in the night sky?

Alberta night sky in wintertime.
THERESA MUTH

Nature Kids ASK STUART

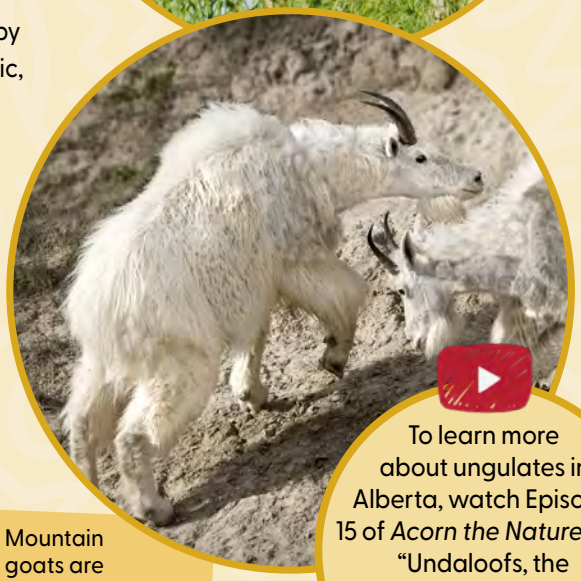
WITH HELP FROM LOREENA NIEUWENHOUT—AND THE NATURE NUT!

Filming *Acorn the Nature Nut.* PROVIDED BY JOHN ACORN

Welcome to **Ask Stuart**, in which our Nature Kids mascot, Stuart the swift fox, responds to questions asked by kids across Alberta. 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. This time we have some special questions inspired by ***Acorn the Nature Nut***, a show from the 1990s hosted by Nature Alberta's Patron, John Acorn. Each episode explored a different topic, and had a lot of fun doing it! You can watch the whole series on YouTube: **bit.ly/acorn-nature-nut-eps**.

Q What does the word "ungulate" mean?

Ungulate is a word people use when they're talking about big, grazing mammals that have hooves. The word "ungulate" comes from an old Latin word meaning "hoof." In Alberta, we have many species of ungulates, including bighorn sheep, caribou, moose, bison (the largest land animal in North America), and mountain goats. Mountain goats' hooves are uniquely adapted to allow them to climb extremely steep mountain surfaces. Their two toes have rough pads on the bottom to grip rocky surfaces better. Their hooves also spread apart to help them hold on to the steepest mountain faces. ■



Mountain goats are amazing climbers! RICK PRICE

To learn more about ungulates in Alberta, watch Episode 15 of *Acorn the Nature Nut*, "Undaloofs, the Hoof-ed Ones" **bit.ly/acorn-nature-nut-ungulates**

Q How do owls fly so silently?

Owls are known as the quietest fliers in the bird world. It's much harder to hear an owl in flight compared to the noisy flapping of a Canada goose or mallard duck. When a bird flies, lots of air moves over their wings, and just like when you hear the wind blow through the trees, you can hear the wind making noise over a bird's feathers. Owls have special feathers on the front of their wings with comb-like edges that help break up the wind flowing over them. As the rough wind flows through the combed edges, it gets smoothed out and doesn't make as much noise. What little noise is left from the moving air gets absorbed by the rest of the soft feathers on their wings, resulting in a near-silent flight! ■

The great grey owl silently swoops! RICK PRICE

To learn more about owls, check out episode 53 of *Acorn the Nature Nut*, "Owl See You in My Dreams" **bit.ly/acorn-nature-nut-owls**

A Gift that Grows

Over 50 years ago, six nature clubs came together to form what would become Nature Alberta. Since then, we have grown to encompass a community of 50 naturalist groups across the province. We provide resources to support their local efforts and expand their profiles.

We nurture the next generation of nature lovers with outreach programs that create inspiring moments of connection with the natural world at an early age.

We give voice to nature, advocating for positive change and rallying support to safeguard Alberta's wild spaces and species.

Your support makes our work possible.

The **Nature Alberta Endowment Fund** provides a sustainable source of funding that grows over time. Your donation today will pay dividends for years to come.

Plant a seed that will grow into greater appreciation and protection of our shared natural heritage.

For full details, and to make your gift, visit

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