

NATURE ALBERTA

MAGAZINE

WINTER 2020
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A COMMUNITY
CONNECTED BY A
LOVE OF NATURE

Wetlands: Alberta's Biodiversity Hotspots

A Story of
Mammals and
Landscapes

Clones and
Seedlings, Floods
and Droughts

Revelations
on Combat
Biology

Salt Creek
Conservation Site

It's an Alberta thing.



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NATURE ALBERTA MAGAZINE

WINTER 2020

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Editorial Committee

At Nature Alberta, we are committed to providing our audience with current, relevant and reliable information in all our publications. To help us continue to provide quality content and maintain the editorial integrity of Nature Alberta Magazine, we have established an Editorial Committee.

This committee of dedicated volunteers, who all have a passion for nature, lend their respective experience and expertise to developing editorial outlines, commissioning articles and reviewing/ vetting article submissions for the magazine. The committee includes:

Dennis Baresco
Lu Carbyn
Anagha Devkota
Linda Howitt-Taylor
Kim MacKenzie
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Richard Schneider
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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. We are a community connected by a love of nature. Learn more at <http://naturealberta.ca/>



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FROM THE PRESIDENT

Not only do people greet change of direction in the flow of life, but organizations change as well. This time last year I wrote about the need for change. I am proud and excited to say that Nature Alberta is well on its way to embracing renewed ways of meeting the needs of its members.

Fifty years ago, visionary nature lovers banded together to form the Federation of Alberta Naturalists to improve communication and inter-club relations and promote the love of nature with a united voice. They knew together they could be stronger, supporting each other in their mission to inform others of the gifts enjoyed when interacting with nature. Today, Nature Alberta's volunteer board members remain just as committed to ensuring strong collegial relationships with our 40 member clubs as we seek to ensure that nature in Alberta remains healthy and accessible to all.

One of our renewal initiatives has been to improve readability and provide greater access to the magazine among a broader audience. Guided by our new Editorial Committee, this first renewed issue contains the same quality articles, photos and stories you have enjoyed previously, youth-focused content in a dedicated Nature Kids section, and a fresh new look. You can read it on-line for free or subscribe to the full-colour printed version. We aim to provide you with continued enjoyment and hope you learn something you may not have known about Alberta's natural habitat and the creatures who live here, including ourselves.

I must thank all our volunteers and staff who have worked diligently to bring this renewal project to fruition including Kim Mackenzie, Dr. Richard Schneider, Brook Skagen, Dr. Lu Carbyn and Kristina Dembinski. Special thanks also to the writers who contribute quality content, and the proof-readers who ensure this publication goes out in top shape. A list of all who have contributed to our reincarnation of the magazine is on page three.

I especially honour Dennis Baresco who took on the task of being editor 15 years ago. Despite facing health challenges over the years, with the help of friends who have served as proof-readers, supporters and contributors, Dennis has provided us steadfast service through the magazine. He continues to contribute his skills and experience to the Editorial Committee and the success of Nature Alberta Magazine. Bravo Dennis and thank you.

LINDA HOWITT-TAYLOR

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Nature Alberta News

Something Looks Different

You may have noticed this issue of *Nature Alberta Magazine* looks a bit different from past issues. In the year leading up to the organization's 50th anniversary, we tasked ourselves with renewing and refreshing some of our efforts, which included renewing and refreshing this longstanding publication. In addition to the new design and layout, we also established an Editorial Committee, comprised of volunteer board members, staff and other volunteers. This committee of dedicated volunteers and staff, who all have a passion for nature, lend their respective experience and expertise to developing editorial outlines, commissioning articles and reviewing/vetting article submissions for the magazine. The committee currently includes Dennis Baresco, Lu Carbyn, Kristina Dembinski, Anagha Devkota, Linda Howitt-Taylor, Kim MacKenzie, Valerie Miller, Richard Schneider and Brook Skagen. As we continue down this new path, we wish to express our utmost respect for and gratitude to Dennis Baresco, magazine editor for 15 years, along with Brook Skagen, associate editor, who both contributed countless hours and delivered magazine after magazine with passion and integrity. Thanks to you both.

150+ Things to Do in Nature

Earlier this year, we launched our *Things to Do in Nature* online story map; an engaging, digital narrative that features 150+ ways people can explore, experience and enjoy Alberta's natural heritage. This interactive story map introduces you to our member nature clubs, Important Bird and Biodiversity Areas, some of the province's important wetland areas, Alberta's two UNESCO Biosphere Reserves, along with an opportunity for you to share your own story and experiences with nature. Check it out at <http://naturealberta.ca/explore>.

A New Nature Alberta Checklist

Alberta has abundant natural areas that support a broad range of birds and wildlife. The Important Bird and Biodiversity Areas (IBA) program is one way in which we help support and promote the protection and conservation of these natural areas that are essential habitat for bird populations, which have been shown to be effective indicators of wider biodiversity. *Important Bird and Biodiversity Areas: A Nature Alberta Checklist* introduces you to Alberta's IBAs, and highlights a fascinating piece of our province's natural history that we hope you will take the time to learn about, experience and enjoy. View it online at <http://naturealberta.ca/publications>.

Look Who's Turning 50

In 2020, Nature Alberta marks its 50th anniversary. It's a tremendous milestone; we have much to celebrate and you'll hear more as things progress during the year. To start, we are seeking archival materials from Nature Alberta (Federation of Alberta Naturalists) e.g., back issues of *Alberta Naturalist* newsletter, *Nature Alberta Magazine*, photographs or other historical material. We're also calling for volunteers to help sort material that has accumulated in the Edmonton office over the years. If you have something to share or can help us out, please contact us at info@naturealberta.ca or phone (780) 427-8124.

Boots on the Ground

Did you know? Since 1999, Nature Alberta has been the provincial coordinator of the Important Bird and Biodiversity Areas (IBA) program in Alberta. A key component of our efforts includes providing resources and support to the IBA Caretakers, the local volunteers who are matched to one or more IBA in their community and who are so integral in making the program a success. Nature Alberta understands the importance of fostering and maintaining connections and our engagement with Caretakers helps strengthen the IBA network. We invite you to learn more at <http://naturealberta.ca/programs/birds-biodiversity/important-bird-and-biodiversity-areas>.

The Gift That Keeps on Giving

BY ALEXANDRA FREDERICKSON

Stable, long-term financial support is a goal that all charitable organizations strive for. But growing competition among charities and non-profits for increasingly limited donor and grant dollars, combined with lean economic times, makes it more challenging to raise much-needed funds on a regular basis.

To create some measure of financial security, more and more organizations are establishing endowment funds. Not long ago, Nature Alberta's board of directors took a big step towards creating a more stable financial future for the organization by setting up the Nature Alberta Endowment Fund.

Getting things started

An endowment fund is an invested pool of money that provides a reliable source of income in perpetuity from which an organization can count on annual disbursements to support its operations and programs. In the fall of 2018, at the urging of and with significant seed funding from Past President, Lu Carbyn, the Nature Alberta board of directors established the Nature Alberta Endowment Fund

through the Edmonton Community Foundation (ECF).

Lu, who is a dedicated biologist/scientist, internationally recognized expert on wolf biology and Past President of the board, has been actively involved with Nature Alberta since it was established nearly 50 years ago. But he wanted to be able to do something more to support the organization's future as well.

"This organization has been around for a long time and we intend for it to be around for many years to come," explains Lu. "So, not

only was it important that the board take steps to better position Nature Alberta for the future, I personally wanted to contribute and help establish our endowment fund."

The ECF was pivotal in supporting the momentum that Lu sparked. The Foundation offers the Endowment Sustainability Program (ESP); a training program that helps charitable organizations develop a strong endowment and planned giving program. In 2018, Nature Alberta's executive board members and staff participated in this training program, receiving quality one-on-one access to ECF's extensive knowledge base and expertise in securing long-term financial support, and gaining insight into how to establish and maintain an endowment fund.

With board support and Lu's initial contribution, and following the ECF



training, Nature Alberta was well equipped to move forward with providing donors with more options to support the organization in perpetuity.

"The effective and efficient nature of ECF was a key part in getting board support and in making this endowment a reality," adds Lu.

Investing in the future

An endowment fund is truly an investment in the future of an organization, providing for the long-term financial success of the organization, and acting as a buffer in times of financial need and/or fundraising challenges.

"We (the board) are keenly aware of the challenges of keeping an organization like ours functioning in the highly competitive non-profit fundraising environment," offers Linda-Howitt Taylor, President of Nature Alberta. "We knew we needed to think differently about how we generate revenue. As it grows, this endowment fund will be a game-changer for us."

Financial sustainability is a priority for Nature Alberta and the endowment fund is an important tool to help achieve that. Nature Alberta's endowment fund provides a solid foundation on which to build a financially sustainable future for the organization.

Supporting people, programs and projects

An endowment gift keeps on giving. Properly structured, endowed funds generate interest income that is used to ensure the continuation of an organization's operations and its important programs and projects.

"We knew we needed to think differently about how we generate revenue. As it grows, this endowment fund will be a game-changer for us."

With a well-established endowment in place, facing the ups and downs of the economy and the challenges of fundraising in the highly competitive non-profit sector becomes easier for an organization.

"From an operational perspective, this kind of financial planning and forethought is critical," adds Brian Ilnicki, Nature Alberta's Executive Director. "And because donors care more than ever about helping their favorite organization become sustainable well into the future, an endowment fund is also a means to help fulfil donors' wishes."

Lu mirrors this statement, adding that he hopes the Nature Alberta

endowment inspires others in their charitable giving efforts to utilize estate planning, bequests and planned giving options to enable the seed which he planted to grow over time.

Growing the legacy

An endowment fund provides donors with more options to support an organization in perpetuity. That is the power of endowment. There are several ways donors wishing to leave a legacy can contribute to their chosen endowment including bequests, life insurance, charitable gift annuities, gifts of property, cash and in conjunction with estate planning.

In 2020, Nature Alberta plans to launch a province-wide, public campaign to promote and grow support for the endowment fund. The campaign will detail the various ways donors can contribute and outline the impact these important contributions will have on our organization and efforts. ■

Donate Today

Contributions made to the Nature Alberta Endowment Fund will allow our organization to continue promoting, conserving and protecting Alberta's natural heritage, now and well into the future. Become part of our community connected by a love of nature by donating to the Nature Alberta Endowment Fund.

www.ecfoundation.org/funds/nature-alberta-fund

A Story of Mammals in Alberta's Beaver Hills Biosphere Reserve

BY FRANCES STEWART

I was walking through an aspen forest in the UNESCO Beaver Hills Biosphere Reserve (BHB), 50 km east of Edmonton and south of Elk Island National Park. The first rays of sunlight were peeking through the trees and shining off the fresh snow on this crisp January morning. It was silent, still. I could see my breath shimmering in front of me like the beautiful hoar frost on the surrounding branches. A perfect morning for live-trapping fisher.

I approached one of the 25 traps I'd set the night before as part of my Ph.D. research. There was a small scuffle, some breath rising from the protective branches I'd placed on top of the trap, and a quiet "chortle" sound coming from within. Bingo. I'd caught another fisher.

The last fisher trap I walked up to was on a Nature Conservancy parcel of land, donated by a private landowner, and nestled between two provincial protected areas. My veterinarian and I peeked inside the trap. Score! It was a fisher that we had not yet collared. I could deploy my last collar and collect my final batch of data. Luck goes a long way in wildlife research.

We went through our approved protocol for putting a GPS collar on this animal. While handling a fisher you get a rare glimpse into the life of this incredibly elusive, strong and free creature. They are roughly the size of a house cat – this female was 2.2 kg and males can be up to 7 kg. Their coat is luxurious, thick, rich and warm. Surprisingly, fishers smell

beautiful; rich, earthy and with a slightly musky odour that I associate with cinnamon. Working with these animals gave me a personal and broader scientific perspective of how another species may use the landscapes we all call home.

After placing on the collar, we released the female fisher and watched her dart quickly and gracefully through the snow and away under the wild roses that thickly covered the ground. Her movements would illustrate the most important parts of the BHB for maintaining mammals. Her DNA would tell us the story of where she came from and how her ancestors got to the BHB. Her camera trap photos let us know how she contributed to the general wildlife assemblage of this landscape, and more broadly, to how humans affect the persistence of mammals on similar landscapes globally.

We silently packed up our fisher trapping kit, hopped in the car and I made a final check that all my notes and forms were complete. Back to our field base we went, with thoughts of fresh fisher tracks in the bright morning snow and what they might tell us about maintaining biodiversity in each of our own backyards. It was time for a warm beverage.



Frances Stewart starts one of her fieldwork mornings checking fisher-live traps on Alberta's Beaver Hills Biosphere as part of her PhD research. © JASON T. FISHER

Understanding How We Affect the Wildlife in Our Own Backyards and Beyond

The Beaver Hills UNESCO Biosphere Reserve (BHB) is a landscape of both natural beauty and human use. Some parts of the BHB are fully protected, others are partially protected, and some are used for agricultural production. Its defining feature is a glacial moraine that has maintained many of its natural components. The BHB lies at the junction of Canada's boreal forest and aspen parkland ecozones and is composed of coniferous and aspen forest, patches of natural grasslands, and various types of wetlands. This complex mosaic of habitat types supports a high diversity of wildlife.

The Beaver Hills Biosphere Reserve Association (formerly the Beaver Hills Initiative) is a multi-stakeholder entity that aims to conserve the biodiversity within the various parks and recreation areas in the BHB as well as in the embedded agricultural lands. This initiative brings together the many stakeholders of the area including local landowners, environmental non-government organizations, all levels of government and industry. These stakeholders have different perspectives, but the collective aim is to maintain the ecological integrity of this important landscape.

In collaboration with the BHB, my research goal was to broaden the scientific understanding of how our collective actions affect biodiversity and the role conservation efforts play. The mammals within the BHB provided a perfect study system. Mammals are charismatic,

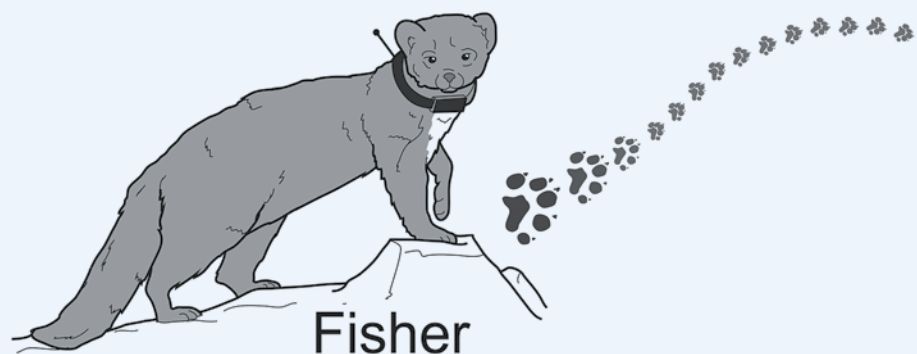
so people generally want to get involved in the research, and they are wide ranging, so understanding one portion of their range can provide inferences for other areas as well. Finally, the BHB was a tractable size for a time-limited Ph.D. program.

With the support of my team, I began by setting up 64 wildlife cameras across the study area. This provided a survey of the mammals that roamed the BHB – the variety of species present, their spatial distribution and the frequency of sightings. We also installed a non-invasive hair snagging device that provided samples for genetic analysis of fishers. Fishers were the specific target of the genetic work because they had been reintroduced to the BHB in the 1990s, after being extirpated early in the 20th century. I wanted to know if these fishers remained as an isolated population, or whether fishers from healthy populations in northern Alberta had

moved into the BHB. This would help us better understand how biodiversity is shared between these two regions.

I found that fishers in the BHB are not as isolated as previously supposed. There is, in fact, a lot of genetic similarity between fishers from northern Alberta and from the BHB. Individuals must have been moving and interbreeding regularly over the last few decades to be so closely related.¹ It appears that the BHB is functionally connected to biodiversity in other regions of the province.

Next, I wanted to understand how the movement patterns of fishers within these landscapes were affected by human land uses as well as by conservation practices. Fortunately, the fisher trapping had been going well. Trapping fisher is notoriously difficult, but I was lucky. I was getting two, even three animals some nights! The GPS collars I put on animals were the most advanced of their kind; incredibly light weight, sleek



Fisher GPS movement tracks were used to understand how mammals piece together a landscape with multiple types of use: from agriculture, to parks and protected areas, industry, and recreation.
© JEFF DIXON AND INNOTECH ALBERTA

...my research goal was to broaden the scientific understanding of how our collective actions affect biodiversity and the role conservation efforts play.



MATTHEW ZALEWSKI (CREATIVE COMMONS LICENCE)

and able to take a GPS position once every five minutes. I combined these animal movement paths with landscape information – essentially overlaying the tracked routes on a GoogleEarth™ map – to understand how fishers were piecing together the BHB. What I saw was that fishers

consistently moved within forested areas and avoided open areas or areas of industrial use. Whether the sites were privately owned land or within a protected area did not matter; it was the type of landscape, not the type of protection, that mattered most.²

At this point, I knew a lot about fishers on the BHB. But what about the other mammal species? How were they affected by different forms of land use? And what could be done to ensure these species remained viable? I used the camera trap photos to investigate these questions. Again, by placing these photos in a GoogleEarth-type map, I could draw associations between specific species and the types of land-use features on the BHB (natural, industrial, agricultural and/or some form of protection).

I found that mammals on the BHB were clustered close to natural features – features that existed before human settlement (e.g., forest, natural grasslands, shrub areas and wetlands). Mammals generally avoided areas of human land use. Interestingly, as with the fisher movement results, this was not limited to sites designated as protected. The backyard of a private landowner was just as valuable at hosting the BHB's wildlife as many of the protected areas and conservation areas, as long as it contained natural features.³ The upshot is that natural features on privately owned land play an important role in maintaining biodiversity. These areas compliment the support provided by areas of formal protection.

The findings of my research have important management implications. Small fragments of natural landscape features are important for animals to piece together the resources they need to survive – whether within an official protected area or on privately owned land. My work will help conservation organizations identify the best sites for biodiversity conservation on the BHB. For example, the Nature Conservancy of Canada has initiated a program to protect high conservation value areas in the BHB through conservation easements and land purchases, and to promote the stewardship of the entire region. Such efforts will ensure that the functional integrity of the landscape is maintained, and that the biodiversity of this region is conserved for our children and grandchildren to enjoy. ■

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- ² Stewart, F.E.C., Darlington, S., Volpe, J.P., McAdie, M. and Fisher, J.T., 2019. Corridors best facilitate functional connectivity across a protected area network. *Scientific reports*, 9(1), pp.1-9.
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Dr. Frances Stewart completed her Ph.D. in 2018. The work was very much a combined Albertan effort involving collaboration between diverse stakeholders living across the BHB. She enjoys communicating the outcome of this research with all individuals involved and interested. Project reports, publications and updates are available at <https://mesocarnivore.weebly.com/>

TAKE A BIOSPHERE RESERVE BREAK

A remarkable place

Just 20 minutes east of Edmonton, Alberta, the Beaver Hills Biosphere is an important area of biodiversity conservation. One of only two UNESCO biosphere reserves in Alberta, this unique landscape contains many valuable wetlands, lakes and forests, and is home to 48 types of mammals, eight amphibians and reptiles, and more than 150 species of birds.

A four-season destination

Distinctive geography and exceptional biodiversity makes the Beaver Hills Biosphere a go-to destination for a wide variety of year-round outdoor recreation, and sustainable tourism activities and experiences.

Prominent biosphere destinations:

- Beaver Hills Biodiversity Trail
- Beaver Hills Dark Sky Preserve
- Cooking Lake-Blackfoot Provincial Recreation Area
- Elk Island National Park
- Ministik Lake Game Bird Sanctuary
- Miquelon Lake Provincial Park
- Strathcona Wilderness Centre
- Ukrainian Cultural Heritage Village

Popular biosphere activities:

- Walking / hiking
- Bird watching / wildlife viewing
- Snowshoeing
- Cycling / mountain biking
- Cross-country skiing
- Nature photography
- Golfing
- Camping

Plan your visit today



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Clones and Seedlings, Floods and Droughts: Cottonwood Regeneration

BY C. DANA BUSH

Riparian forests are the only native tree and shrub communities in most of the prairies, and they are critical habitat for many prairie animals. Without cottonwood forests, we could lose up to 75% of our prairie birds. The extensive cottonwood forests on the Oldman River between Pincher Creek and

Lethbridge are significant to the biodiversity of the prairies and are internationally recognized.

Lethbridge has three species of cottonwood, all of which are at the edges of their ranges. Narrow-leaved cottonwood (*Populus angustifolia*) is a western species that just enters Alberta in the southwest corner,

balsam poplar (*Populus balsamifera*) is a northern species, while plains cottonwood (*Populus deltoides*) is a southern and eastern species.

Southeastern Alberta is the one place all three species occur together and they produce a swarm of hybrids making identification difficult.

Cottonwoods regenerate from a combination of clonal shoots from roots and branches, and seeds. Either way, occasional floods are necessary for them to establish.

Clonal shoots

Cottonwoods produce clonal shoots from beaver-felled stumps and flood-toppled trees. Sometimes it is hard to tell if a young forest began by seeds or clones without digging up the roots, but cottonwoods with multiple trunks often originated as clonal shoots.



Flooding

Floods restructure the floodplain, scouring the bottom of the river, breaking and rebuilding riverbanks and islands, and depositing fresh silt.



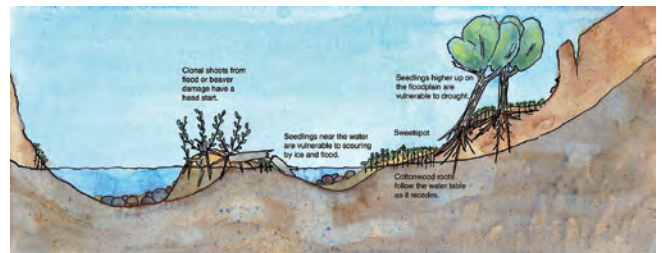
Seeding

Cottonwood seeds are released in mid-June to mid-July, just in time to land on the fresh silt deposited by spring floods. Once moistened, a cottonwood seed germinates within 24 hours.



Shoots and Seedlings

The seedling roots immediately grow at 0.5 to 1 cm/day, reaching a length of about 60 cm after the first growing season, as they follow the water table downward. If the water table drops too quickly (below a dam, for instance) the seeds lose contact with the water table and they will perish.



Cottonwoods typically germinate in a fringe or band no more than one metre above the late summer river stage. Above one metre, the seedlings are susceptible to drought. Below that band, the seedlings may be scoured by ice or later floodwaters.

Cottonwood bands

The bands range from 7 cm seedlings from the previous year, to 3-metre-high saplings from previous floods. If you walk along a healthy floodplain, you will see even-aged stands in arcuate bands, illustrating the history of the river.



Cottonwood recruitment naturally occurs at irregular intervals. High flow events occur, on average, one in six years. Lethbridge experienced three events in 1902, two of which were major floods, but there were 20 years between the 1975 flood and the 1995 flood. Recent floods occurred in 2010, 2013 and 2014. Young seedlings can be scoured away by subsequent flooding, as in 1902, or perish from lack of water during drought years, as in 2006 and 2007 after good germination in 2005.

Dams alter the flow of water and can help or hinder cottonwood recruitment. Past water management in the Oldman, Waterton and St. Mary's Rivers deprived cottonwood

seedlings of much needed water during the summer drawdown and subsequent years, so recruitment was low. Research by Stewart Rood at the University of Lethbridge, John Mahoney with Alberta Environment, and the operators of the St. Mary's, Waterton and Oldman Dams showed that the seedlings required a gradual recession of 4-5 cm/day after a flood, and 2-3 years of consecutive flows to support the recruitment event. Now the dam operators manage the water to encourage cottonwood survival, providing the weather cooperates. As a result, there are thick stands of different aged saplings re-establishing along the Oldman River. ■

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Dana Bush has a B.Sc. and M.Sc. and has worked as a professional vegetation ecologist for over 20 years. She has done extensive fieldwork in the boreal, mountains, prairies and parkland, specializing in rare plant and wetland surveys. Ms. Bush has written numerous technical reports and environmental impact assessments, and reviewed EIAs. She has written articles for IRIS (The Alberta Native Plant Council Newsletter) and is the author and illustrator of the Compact Guide to the Wildflowers of the Rockies, published by Lone Pine Books. She recently returned to school and obtained her B.F.A. from ACAD (now the Alberta University of the Arts). Her epitaph will read "She liked plants way too much" (according to a student in a lab taught by Dana at U of A).

Up Close Naturally: Bird Feet

BY MARGOT HERVIEUX

The next time you see a bird at your feeder or in a tree, take a look at its feet. Bird feet come in a variety of shapes and sizes and help their owners with all kinds of tasks.

The standard bird foot design has four toes; three pointing forward and one back, but there are differences depending on lifestyle. Birds that spend lots of time on the ground have stronger toes and a walking gait while birds that live most of their life in the trees have smaller feet and hop when on the ground.

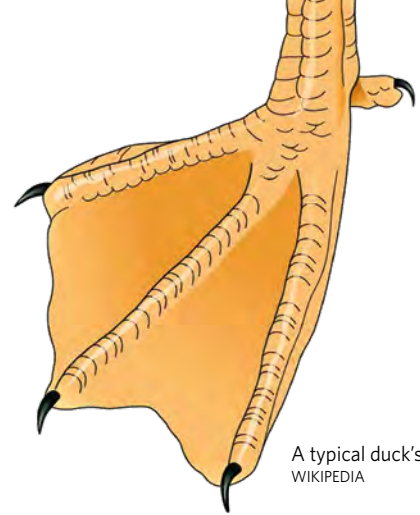
The family of songbirds is also known as the perching birds because their feet are especially well adapted for grasping a perch. When these birds bend their legs, the tendons running into their toes tighten so they can hold on even when asleep.

At this time of year, it also seems surprising that bird feet don't freeze. The answer lies in the fact that bird feet are all

scaly skin and tendons so there isn't anything in the feet to freeze. The muscles and other soft tissue are further up the leg where the bird's body heat keeps them warm.

The feet of a Ruffed Grouse take winter adaptation to another level. These birds have scales on the edges of their toes that, when spread out, create mini snowshoes. This allows the grouse to walk across the snow instead of sinking in. Grouse also have feathers right down to their toes to help reduce heat loss.

Birds of prey are also famous for their feet. Their sharp claws or talons are used to grasp prey



A typical duck's foot.
WIKIPEDIA

and their powerful toes have rough pads for extra grip. Fish-eaters like Osprey have larger scales on their feet to help them hang onto slippery fish.

Another group of well-known feet belong to water birds. Ducks, geese, swans and gulls have webbed toes

**At this time of year,
it also seems surprising
that bird feet don't freeze.**

to give them power when swimming. Grebes have lobes of webbing on each toe rather than across the whole foot. Webbed feet, or the long toes of shorebirds and herons, also make it easier to walk in the mud.

Highflying birds like swallows, hummingbirds and nighthawks have tiny feet that are only big enough to

grasp a branch. These birds spend most of their time in the air and big feet would just get in the way.

Woodpeckers depend on their feet to grab onto trees as they move up the trunk and so they have a different toe alignment. With two toes facing forward and two back they are better able to brace themselves.

We can't imagine doing things without our fingers, but birds do just fine with their feet and beaks. Not only do their feet help them get around, but they are also used to catch and hold food and carry nest-building materials. ■

Songbirds, like this Spotted Towhee, are known as the perching birds because their feet are especially well adapted for grasping a perch. SIBLEYGUIDES.COM



Grebes have a lobate foot, where the anterior digits are edged with lobes of skin and the lobes expand or contract when a bird swims. WIKIPEDIA





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Bohemian Waxwings

BY MYRNA PEARMAN

It is always a treat when a winter flock of Bohemian Waxwings suddenly descends on the cotoneaster bushes in our yard. No matter the weather, their constant trilling fills the air and they devour the berries with great flourish. Although always in constant motion, they usually allow close approach – a photographer’s delight!

Like their namesakes, the gypsies of ancient Bohemia, Bohemian Waxwings are consummate nomads. They move south from their mountain/boreal nesting grounds for the winter, wandering

great distances in a ceaseless quest for food. Described as being “notoriously” irruptive, the composition of their winter flocks is fluid and the birds regularly move long distances.

However, banding studies conducted by Dr. Stuart and Mary Houston in Saskatoon, Saskatchewan, found that many individuals may remain in one area for extended periods of time.

Bohemians and their smaller, more svelte summer cousins, Cedar Waxwings, typically flock independently, but individuals of one species sometimes associate with flocks of the other. Many birders in Alberta carefully scan winter flocks of Bohemians to see if they can find any Cedars among them.

Waxwings are unusual among passerines in that they do not have a true song. However, they do issue a readily identifiable high-pitched, rapid, vibrato trill while perched or in flight. This trill (called the basic trill) has seven variations: social call, contact call, male and female courtship calls, injury call, begging call and disturbance call.

Bohemian Waxwings eat mostly sugary fruits but will supplement their diet with such protein-rich foods as insects, tree buds and the berries of American elm. Their preferred winter fruits, which they pluck and eat either in pieces or swallow whole



Sometimes they give a berry a ceremonial flip in the air. MYRNA PEARMAN

(sometimes after a ceremonial flip in the air), include juniper, mountain ash, hawthorn, rose hips, cranberry, highbush cranberry, ornamental crabapples and hedge cotoneaster. They will often drink water or eat snow after consuming dried berries. In the spring, they will feed on maple or birch sap drips and will also dine on catkins and tree/shrub blossoms.

It is well documented that Bohemian Waxwings can become intoxicated after consuming fermented berries, especially in late winter or early spring. While the birds have relatively large livers and can metabolize ethanol better than most bird species as they have high levels of alcohol dehydrogenase, they are sometimes seen staggering or fluttering about in a drunken state.

Since they are so abundant, and in winter can be quite docile, Bohemian Waxwings are often targeted by birds of prey, especially Merlins. It is thought that Merlins have increased in number and range because of this abundant prey base, which in turn has thrived because of the widespread planting of ornamental shrubs (especially crab apple and mountain



MYRNA PEARMAN

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ash) in urban and suburban backyards in the 1970s.

Sadly, Bohemian Waxwings are susceptible to collisions with windows, probably because ornamental fruit shrubs and trees are often planted near buildings. According to Medicine River Wildlife Centre, window collisions are highest in spring, apparently because window reflection patterns are affected by the angle of the sun.

While Bohemian Waxwings are not considered to be a common or typical backyard feeder species, some bird enthusiasts collect, freeze and then set out mountain ash berries and/or crabapples for them. They have also been observed bathing in open water or heated bird baths.

When I first met Charlie and Winnie Ellis, they shared stories about the great flocks of Bohemian Waxwings that visited their yard each winter. In addition to feeding on the many crabapple trees in Winnie's orchard, the waxwings would receive extra-special treats: Charlie would go to town each week and buy cases of apples and large bags of raisins, which Winnie would mash up together and glob onto pie plates. Charlie would carry the plates outside to the waiting hordes. Luckily, one image remains of Charlie and their Bohemian friends. ■

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Charlie Ellis fed more than bluebirds and grosbeaks; he's a friend of waxwings too. MYRNA PEARMAN

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MYRNA PEARMAN

MULTiple Species At Risk Conservation in Alberta's Grasslands

BY BROOK SKAGEN

If you were to close your eyes and envision Alberta's wild prairie, you would most likely find yourself enveloped in a sea of golden grass swaying in the southern breeze, ever stretching and never ending. However, the prairies of today are but a sliver of a memory, nearly lost to time and the "success" of humankind.

Only an estimated 25% of Alberta's original native grasslands remain intact, and most of these are in the driest areas of southeast Alberta.¹ The loss, fragmentation and degradation of our grasslands has led to the decline of numerous prairie species. Today, approximately 75% of the province's species at risk, including birds, mammals, herptiles, fish and plants reside within the Grassland Natural Region.² Management strategies

and status reports for at-risk species nearly always stress the same point: the primary driver for population instability and decline is the loss and degradation of critical habitat.

As Alberta's grassland species become increasingly scarce, we must look to more effective conservation and management approaches. Clearly, more must be done to ensure the future of these species; more groundwork rather than paperwork is required.

Perhaps the most ambitious and successful example of boots-on-the-ground conservation is the MULTiple Species At Risk (MULTISAR) project, which I have been working on as a wildlife biologist for several years. MULTISAR is a collaborative land stewardship

program involving landowners, the Alberta Conservation Association, Alberta Environment and Parks, the Prairie Conservation Forum and other stakeholders. The program, which began in 2002, has a focus on multi-species conservation at the landscape scale.

Over 170 habitat management and enhancement projects have been implemented to date. Through these projects, approximately 400,000 acres of native grassland and tame pastures have been managed for the creation of suitable habitat for a wide array of species throughout Alberta's Grassland, Parkland, and Rocky Mountain Natural Regions. Rather than becoming bogged down in the intricacies of prioritizing species, creating population targets and managing populations, as is often done for species at risk recovery initiatives, the approach taken by MULTISAR is both far simpler and more effective: maintain the habitat and you maintain the wildlife.



"A world of grass and flowers stretched around me, rising and falling in gentle undulations, as if an enchanter had struck the ocean swell, and it was at rest forever."

- Eliza Steele, *Summer Journey in the West* (1840)

BURROWING OWL - ENDANGERED (AT RISK)

MULTISAR consists of three primary components:

01

Habitat Conservation Strategies

which are detailed plans developed with the landholder(s) that can be used as a tool for the management of their land. Landholders outside the priority landscape of the Milk River Watershed and portions of the South Saskatchewan River Watershed complete a condensed version of the Habitat Conservation Strategies, referred to as Species at Risk Conservation Plans

02

Education, Outreach, and Awareness

Programming which involves the development of beneficial management practices for various species, the annual *Grassland Gazette* publication, and presentations to the public.

03

Research, Monitoring, and Evaluation

which involves the monitoring of habitat enhancements every one to two years and evaluation of the detailed habitat plans every five years to determine if they are having the desired effect or are in need of adjustments.

The success of the program lies in its ability to work directly with landowners to implement conservation initiatives and work towards desired outcomes for wildlife, their habitat and the land stewards who care for them. The ever-increasing range and scope of MULTISAR's operations have proven that progress is possible with a little cooperation.

However, challenges remain. Some important conservation measures, such as retaining wetlands instead of draining them (see the article by Lu Carbyn in this issue) carry an economic cost. We cannot expect landowners to shoulder all of these costs on behalf of society. Better ways of supporting farmers and ranchers in undertaking conservation measures are needed. The ecosystem services concept has been gaining attention in recent years as one potential approach for providing such incentives, though the

FERRUGINOUS HAWK -
ENDANGERED (AT RISK)



actual mechanisms have not yet been worked out.

To learn more about MULTISAR, Alberta's species at risk or how you can get involved, visit the MULTISAR website at: www.multisar.ca.

You can read the latest issue of MULTISAR's *Grassland Gazette* at: www.multisar.ca/news. ■



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Nature Kids



Bighorn Sheep. IMAGE BY WONITA JANZEN
FROM PIXABAY FREE IMAGE SOURCE

My BIG Alberta Backyard

ZOE MACDOUGALL, NATURE KIDS PROGRAM COORDINATOR

Meet the Majestic Rocky Mountains

Alberta is a great place to live. It's a big beautiful province full of all kinds of natural wonders. This is where we introduce you to the diversity of wildlife and unique and interesting wild spaces that are part of your Big Alberta Backyard. In this issue you will learn about the Rocky Mountains of Alberta.

What are the Rocky Mountains?

The Rocky Mountains of Alberta are one of six natural regions that exist in this province. These mountains stretch across the western part of Alberta. The Rocky Mountains are huge land formations that were formed millions of years ago when the earth moved and shifted. They have many peaks and valleys and there are many beautiful, clear lakes that were created

by glaciers melting. These mountains are a popular place for people to visit. People come from all over the world to bike, hike, camp, climb and fish in these areas.

Why are the Rocky Mountains important?

Within the Rocky Mountains in Alberta there are three national parks; Banff National Park, Jasper National Park, and Waterton Lakes National Park.

Banff National Park is a very special park because, not only is it incredibly beautiful and home to many species, it is also Canada's very first National Park. It was established and designated a protected area in 1885. The reason it became a protected area was the discovery of the Cave

and Basin Hot Springs. These hot springs attracted people to the area and, when visitors saw how beautiful and important the area was, Albertans worked hard to protect it. The park has become what it is today through the efforts of many people who realized how important these natural areas are for all the diversity that exists within them. Banff National Park is also designated a World Heritage Site, which means it is a place of special significance.

What lives in the Rocky Mountains?

Living in the Rocky Mountains isn't easy. Animals and plants have adapted to make their homes where temperatures are colder and the elevation is high. For example, there



Moraine Lake in Banff National Park. IMAGE BY CONNORMIK FROM PIXABAY FREE IMAGE SOURCE

is a special kind of lichen that lives in the Rocky Mountains called Sugared Sunburst. This lichen has adapted to live in areas that are very high up where there isn't much but rock. This lichen adheres to rock and can withstand strong winds without being blown from its rocky habitat.

Rocky Mountain Bighorn Sheep have also found many ways to make living in the rugged Rocky Mountains a little easier. Their hooves are split and have grip which helps them balance on the ledges of the Rockies. They also have very good vision which helps

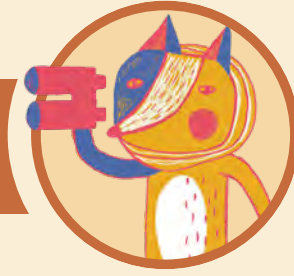
them to navigate around in this area without falling.

The Rocky Mountains of Alberta are extraordinary, and we hope you get a chance to visit them someday. ■

Happy exploring!



Ask Stuart



Welcome to Ask Stuart, a regular Nature Kids feature in which Stuart, our Nature Kids mascot (who just happens to be a swift fox), responds to questions asked by nature kids from across Alberta. From time to time Stuart will also be asking local experts to help him answer these questions. If you have a question that you would like answered by Stuart, send it along to our Nature Kids Program Coordinator at naturekids@naturealberta.ca and it may be featured in our next edition of Ask Stuart.

Q Why do geese fly in a V-formation?

During their annual migrations geese fly great distances. Some geese fly to Canada all the way from Mexico in the spring and all the way back in the fall. That can be a very tiring flight. To help make these flights easier, geese (and other migratory birds) fly in a characteristic V-shape in order to save energy. The goose at the front of the “V” breaks the wind and creates a

current that the other birds can ride on. Flying at the front of the flock is harder than flying on the current created by the leader. When the leader gets tired, it switches off with one of the other birds. By flying together this way, biologists believe geese can fly up to 70% further than if they had to fly by themselves. ■

Q What bird has the farthest migration?

Migration is a big part of many birds’ lives and as we mentioned, birds fly extreme distances every spring and again every fall. Some birds fly further than others. The Arctic Tern has the farthest migration of all migratory birds. This little bird can fly up to 40,000 km every year! That’s six times the length of Canada in one year. That little bird must be exhausted! Arctic Terns can live up to 25 years so, in their lifetime, they will have flown up to one million kilometres which is three times as far as the Earth is to the moon. Pretty impressive! ■

Arctic Tern. IMAGE BY JONATHAN CANNON FROM PIXABAY FREE IMAGE SOURCE



V-formation. IMAGE BY A-MBLOMMA FROM PIXABAY FREE IMAGE SOURCE

Out and About



Frozen Bird Seed Treats

Make these easy ornaments and help feed the birds this winter.

These ornaments are so easy to make and look great hanging in your trees in the backyard in the winter. There are two types of frozen bird seed ornaments you can make. It is up to you which one you make and how many. The more you make, the happier the birds will be! ■

WHAT YOU NEED:

- ✓ Water
- ✓ Bird seed
- ✓ Whole cranberries
- ✓ Twine
- ✓ Scissors
- ✓ Ice cube tray
- ✓ Bowl with flat bottom
- ✓ Drinking glass

WHAT TO DO

To make a round, donut shaped ornament:

- 1 Take the bowl and put the drinking glass inside the bowl.
- 2 Add water to the bowl, filling it about an inch around the glass.
- 3 Add the bird seed and put the bowl in the freezer overnight.
- 4 When it is fully frozen, take it out of the bowl and tie a piece of twine around the ornament and hang in your tree.

To make a cube shaped ornament:

- 1 To start, cut a piece of twine and tie it in a loop.
- 2 Put the cranberries in the ice cube tray so they cover about 1/3 of the cube.
- 3 Put the looped twine in the cube with the knot side down.
- 4 Fill the rest of the cube with bird seed and then fill it with water until all the ingredients are covered.
- 5 Put the ice cube tray in the freezer and leave overnight.
- 6 To get the ornaments out of the tray, put the tray in a bit of warm water for a couple minutes and the ornaments will come out much easier.



Black-capped Chickadee.
IMAGE BY LARRY DOUCET FROM PIXABAY
FREE IMAGE SOURCE





Conserving Alberta's Wetlands

BY LU CARBYN

Wetlands—wherever they occur—are hotspots for biodiversity. I learned that firsthand, as a boy growing up in South Africa. Each day, as I walked to school, I passed by a marsh teeming with birds and aquatic species of all shapes, sizes and colours. I feel very fortunate to have had such up-close and personal encounters with these animals.

Wetlands also provide essential ecological services, such as water storage, improvement of water quality (lowering water treatment costs), carbon storage and the support of recreational pursuits, both non-consumptive and consumptive in nature.

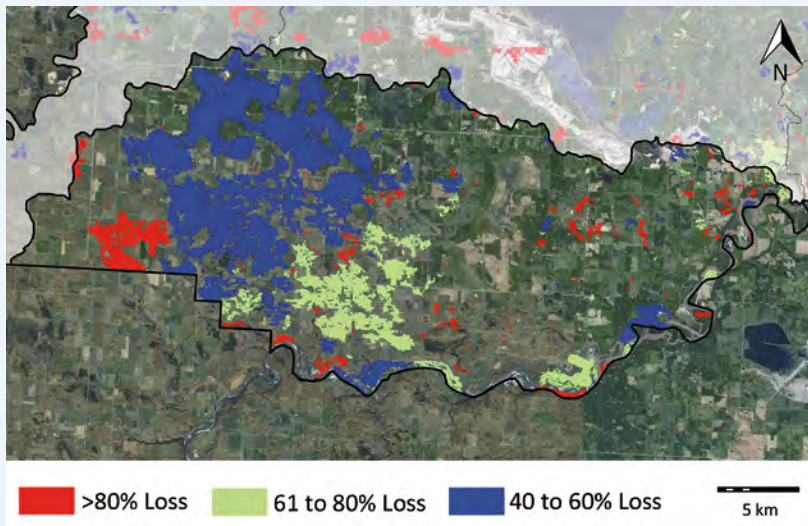
Unfortunately, all around the world, wetlands are being destroyed at an accelerating pace. I have returned to my former South African home many times and what once was is no more. Vineyards, conventional agriculture, forestry, industry and urban sprawl now completely dominate that landscape. I have witnessed similar wetland losses along the Pembina River in west-central Alberta. Indeed, the loss of wetlands is widespread throughout Alberta's grassland and parkland regions.

The most detailed analysis of wetland changes I am aware of was prepared by Fiera Biological Consulting in 2016.¹ This report describes the changes that occurred from the 1950s to 2013 in Parkland County, just west of Edmonton. In addition to quantifying changes in wetland distribution and prevalence, the report also includes an extensive set of maps, one of which is presented on the following page.

A key finding of the report was that between 1950 and 2013 wetland area was reduced by approximately 56,500 hectares, constituting a loss of approximately 56% of the wetlands in Parkland County that had existed prior to 1950. Total losses are even higher, given that wetland reductions had already occurred prior to the study period.

The concentration of wetland losses in the grassland and parkland region of Alberta can largely be attributed to the impacts of modern agriculture. Marshes and areas that flood periodically are unsuitable for crop and hay

LU CARBYN



Extent of wetland losses from 1950-2013 in a study area near Wabamun Lake.

production, providing a strong incentive for farmers to drain them by creating ditches.

Although the overall area of farmland plateaued early in the 20th century, the draining of wetlands has continued in lock step with the progressive intensification of agriculture. Individual farms have become larger and so has farm machinery, making it increasingly difficult for farmers to navigate around small scattered wetlands. In addition, the drive to maximize farm production and efficiency has made farmers less tolerant of patches of farmland that do not contribute to the farm's economic bottom line.

Across the broader prairie agricultural region, it has been estimated that more than 40% of wetlands have been lost to drainage over the last century and there is little to suggest that the rate of loss has slowed in recent years.² The ecological effects of these losses are apparent in the long-term declines of many wetland species, such as the yellow rail, Nelson's sparrow and sedge wren.

In forested areas, most wetlands take the form of bogs and fens. Drainage of these wetlands has not been a major concern in Alberta, though it has been an issue in eastern Canada in areas of intensive forestry. The main

threats to wetlands in the forested parts of Alberta are the alteration of water flows from roads (which form barriers), peat mining, fragmentation from oil and gas development and outright loss in areas of oilsands mining. The ecological effects of these types of disturbances have not yet been well documented.

Setting a New Direction

Many farmers and ranchers acknowledge the impact they have had on wetlands. They have seen and experienced it firsthand. Some are apologetic and would like to do better; others consider it the price that must be paid for food production. I too am a landowner and I interact with farmers on a regular basis. They have my sympathetic ear. Nevertheless, big-picture considerations mean that, as a society, we need legislation and policy to protect biodiversity, which is a public resource. Fortunately, we have such legislation in Alberta with the provincial *Water Act* and the *Public Lands Act*. In principle, this legislation requires formal approval for direct impacts to all waterbodies in the province including wetlands. The mechanisms for doing so have been articulated in Alberta's *Wetland Policy*.



DAN MOONEY

YELLOW RAIL

BY RICHARD HEDLEY

Yellow Rails are an elusive, primarily nocturnal inhabitant of Canada's wetlands, best identified by their loud "tick" calls at night. Their preferred habitats are wetlands with 0-30 cm of standing water and vegetation cover of sedge, rushes and grass. These shallow wetlands are highly sensitive to slight changes in hydrology and were historically among the first wetlands drained for agricultural and industrial developments across southern Canada. Owing to the secretive nature of Yellow Rails and the lack of baseline information, the full impacts of these habitat changes on their populations remain practically unknown. However, concern about ongoing wetland losses was sufficient for Yellow Rails to be listed as a species of Special Concern under the *Species at Risk Act* in 2005.

The *Wetland Policy* traces back to 2010, when a policy team of the Alberta Water Council began extensive public consultations. These efforts eventually resulted in a proposed provincial policy and associated implementation plan. The draft policy recommended a “no-net-loss” approach for provincial wetland conservation and management. Simply put, it recommended that every hectare of unavoidable wetland impact or destruction needed to be offset (replaced) by wetlands that were restored elsewhere. This meant active habitat restoration for any approved wetland losses.

This was an important step forward. The members of the wetland policy team, composed of 20 different stakeholders, were quite proud of what they had accomplished, especially given the diversity of viewpoints represented. With such mixed backgrounds and agendas, it was amazing that the group was able to find common ground.

Then, incredibly—at the last minute—two stakeholder groups pulled out of the consensus decision: the Alberta Chamber of Resources and the Canadian Association of

Petroleum Producers (CAPP). That was a major setback, particularly when it involved an influential organization such as CAPP, which claimed to have a “stellar” record in conservation! Clearly economic interests had prevailed over ecological ones.

Eventually, after many more concessions and additional years of work, the new provincial *Wetland Policy* came into effect in 2013. The

Unfortunately, all around the world, wetlands are being destroyed at an accelerating pace.

policy was officially implemented in the White Zone (i.e., the settled area of the province) in mid 2015. It was then extended to the Green Zone (i.e., the non-settled area) in 2016. Individuals and companies requesting approval for wetland disturbances in the province were henceforth required to submit applications under the new policy, using all the supporting directives, guides and tools.

Under the new policy, wetlands are to be assessed for their “relative wetland value” prior to disturbance, based on a process endorsed by Alberta Environment and Parks. This, in turn, determines how they are to be managed. Unfortunately, provincial regulators have not placed much emphasis on enforcing the new rules and companies often find ways of skirting their intent. From personal experience, I have noticed an abysmal lack of routine government monitoring. Moreover, the government has displayed little appetite for curtailing wetland drainage by farmers. Enforcing rules on private lands has always been a challenge, and the *Wetland Policy* has

not changed that. Thus, wetlands continue to be degraded.

On agricultural lands, implementation of the concepts embodied by the *Wetland Policy* will require more of a carrot than a stick approach. The most important step is to achieve better communication and cooperation between the government and Alberta’s private landowners to achieve effective wetland stewardship.

The government must improve awareness of the importance of protecting wetlands and provide guidance on how they can be conserved. There are also economic incentives available.

Farmers collectively receive more than \$1 billion each year in federal and provincial subsidies. These subsidies can and should be directed in ways that promote environmental stewardship rather than simply maximizing production.³ Finally, there is a need to better enforce the *Water Act* when serious damage is being done.

Alberta Environment and Parks (AEP) relies principally on public complaints for enforcement of wetland protection. I have noted examples of effective follow-up on such cases. This means we are the eyes and ears of the government, even though monitoring is a government responsibility. If you observe any wetland disturbances, particularly those that you think may not be approved, you should report them to AEP using their toll-free complaint line (1-800-222-6514). At the very least, the government can look to see if a *Water Act* approval application has been filed. If not, they can implement a cease work order and/or require that the violator compensate for their wetland impacts if they are too far along.



Lu standing on a beaver lodge on a wetland north of Westlock. SHELLIE CARBYN DUCHSCHERER

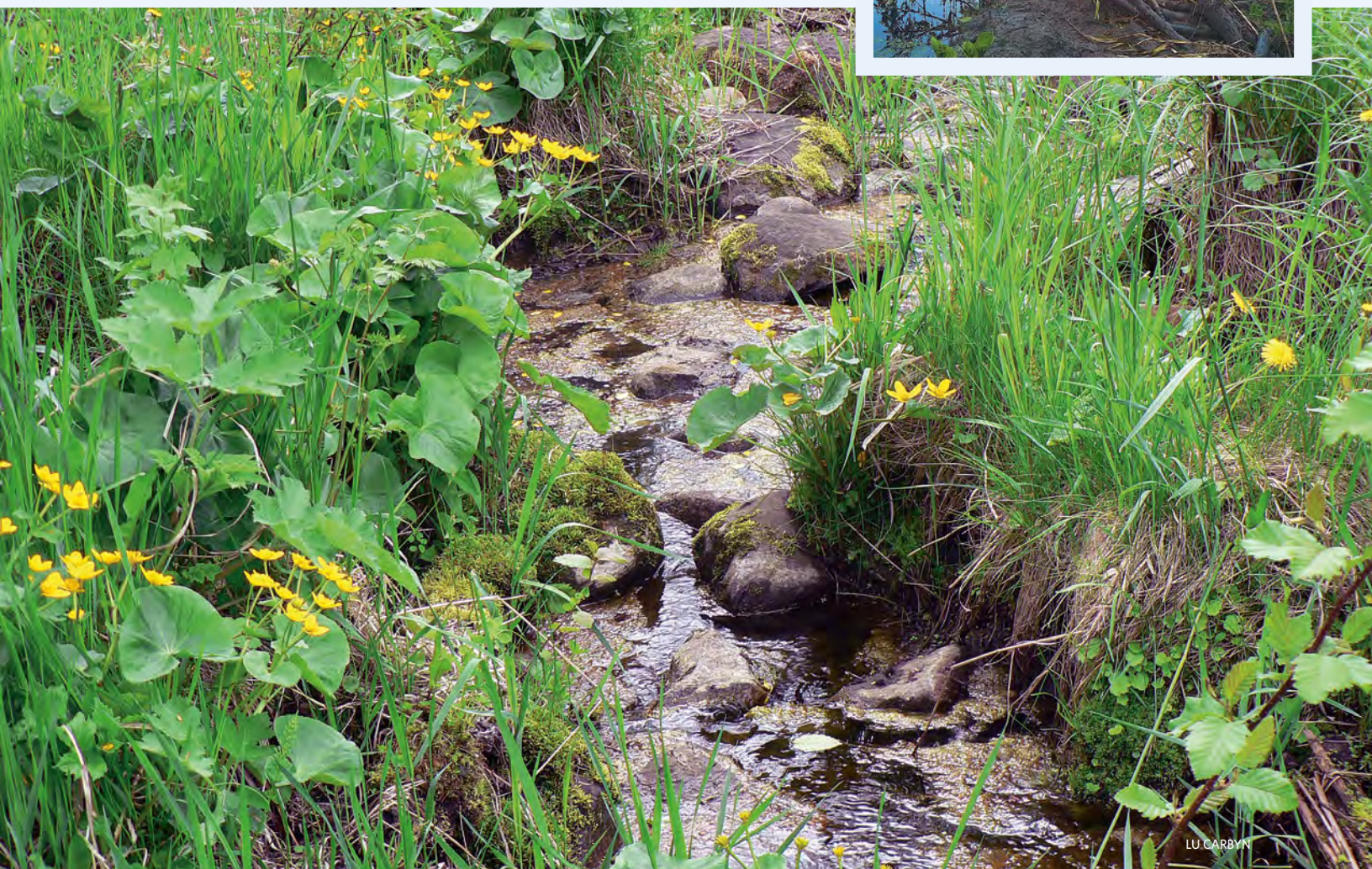
With the *Wetland Policy* and related legislation in place, we are much farther ahead than we were 30 years ago. We now have the tools to get the job done. Still lacking are the financial resources and political will needed to implement the policy and achieve our societal conservation goals. Until this happens it is important for the naturalist community to continue to champion wetlands and provide a voice for their conservation.

My thanks to Jonathan Thompson. ■

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Geese and beaver photos taken by trail cameras that Lu had set out at wetlands on an Edmonton Area Land Trust property near Darwell, Alberta.



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Revelations on Combat Biology

BY LORNE FITCH, P. BIOL.

Elevated like the vertebrae of a whale beached on land, a series of north-south trending ridges lie just outside the Livingstone Mountain Range in southwestern Alberta. Twisted limber pine on the ridge tops, enormous Douglas firs on the slopes, and a covering of rough fescue grasslands provide a sylvan scene of wild country. Only the occasional fence and truck trail detract from the sense of untrammelled wilderness. This is the Whaleback.

It was nearly not so. Beneath the shag rug of fescue grasslands and elk winter range lie pockets of natural gas—sour, hydrogen sulfide-rich gas. This attracted Amoco, an international petroleum giant (formerly the Standard Oil Company built by John D. Rockefeller).

Amoco thought, with their deep connections to the Alberta government, they could skate through the regulatory hurdles with a minimum amount of public and community involvement. It was evident both Amoco and the Alberta government wanted to avoid a regulatory hearing and proceed with development of the gas field under “standard” (read “minimal”) operating conditions. Any thought of an environmental impact assessment (EIA) was squashed at senior levels within the government department ostensibly charged with protecting

fish and wildlife, even though the site contained critical elk winter range, then the second largest in Alberta.

The biologists working within the Fish and Wildlife Division were stymied. Though they remained concerned about the implications of industrial development in the region, they were not permitted to discuss the utility of an EIA with Amoco, or anyone outside the department. However, there was a chink in the gag-order amour. The Energy Resources Conservation Board (ERCB), which was the regulatory body of the day, was obligated to make public any correspondence on the subject of a proposed gas field development.

Fish and Wildlife biologists reached out to a like-minded individual within the ERCB and had him make a verbal request (nudge, nudge, wink, wink) to the Fish and Wildlife Division about what would be needed to assess the environmental impacts of the proposed development. The biologists responded with a letter to the ERCB on all the necessary components of an impact assessment that would address issues and concerns related to fish and wildlife populations and their habitats. Since the letter was transmitted within government and followed standard protocols no one broke any rules.

When the terms and conditions of a possible EIA related to fish and wildlife issues became public

through the exchange of letters with the ERCB, it threw a wrench into the tightly scripted and controlled agenda of Amoco and senior officials of the government of Alberta to slide a potentially harmful development past the noses of Albertans. An ERCB hearing was eventually held, and the rest is history. It became apparent Amoco had not done their homework on assessing environmental impacts, had grossly underestimated the impact on wildlife and the local human community, and could not persuade the Board they could safely extract high-risk gas from the field.

In an almost precedent-setting decision for a petroleum-dominated province, the ERCB concluded that the project was not in the public interest, effectively telling Amoco to go away.

Combat biology is about finding solutions and effective strategies rather than accepting inertia.

The Nature Conservancy of Canada became involved and raised enough funding to buy back the mineral rights from Amoco. This sparked protected area status for the Whaleback, perhaps forever ending the risk from industrial development.

If this small group of concerned biologists had merely stood by, had strictly followed orders to remain quiet and let events unfold, it is likely the Whaleback now would be an industrial site with multiple roads, well sites, compressor stations, pipelines, the rotten-egg stench of sour gas emissions, constant truck traffic, power lines, weeds, sediment, and no elk. This is the essence of combat biology.

Combat biology is a term introduced by Holly Doremus and Dan Tarlock in their book *Water War in the Klamath Basin* (subtitled *Macho Law*,

Combat Biology and Dirty Politics). This form of combat involves words and ideas rather than bayonets and bombs, yet the metaphor aptly captures the essence of the process. Describing combat biology in war terms may seem dramatic but not all wars are military. At times, the metaphor can seem frighteningly similar, since many biologists often work under fire.

The concept of combat biology isn't well understood, even by many biologists. A researcher, looking into the hidden life of a creature, defining essential habitat or diet, or using DNA to identify new species isn't likely to be a combat biologist. An academic, teaching the fundamentals of ecology to young, compliant and willing minds may not encounter the phenomena. A consulting biologist, defining impacts for a proposed project and recommending mitigative

solutions may dance on the edge of combat biology, but not be completely immersed.

This field is largely restricted to those biologists who operate at the interface of resource use and protection, who have seen the impacts of resource exploitation and who can predict the ecological outcomes of proposed development schemes. They bear the scar tissue created from seeing landscapes fragmented, ecological thresholds surpassed, and populations diminish and sometimes wink out even though all the land use conditions, guidelines, policies and mitigative strategies were followed. These are the people who stand in the way of the "just gitur dun" mentality—the argot of industry, motorized recreation, and the short-term mentality evidenced in the rush to turn natural resources and wild areas into stock dividends and muddy ruts.

The biologists who hold up their hands, physically and metaphorically to say, "*This is too much, you are leaving too little; this is irreplaceable; and all the kings horses and all the kings men will not be able to reassemble this marvelously, interconnected, intertwined work of natural art,*" understand, implicitly, combat biology. They ask the difficult, the penetrating and the embarrassing questions. To the chagrin of politicians, industry and organizations blind to consequences, they point out the inconsistencies, the errors and the lies in the dreams and schemes of resource exploitation.

Combat biology does not involve environmental activism, although some, in sheer frustration, are drawn to it. It is advocacy though, giving voice to concerns about the future well-being of fish, wildlife and plant populations, the essential habitats they rely on, and

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the space required for them to survive and thrive.

There might be a tendency to view combat biology and those who practice it as underhanded, sneaky and unethical. Some equate it with being science-lite or science-select, twisting facts to support a pre-conceived outcome.

I take an alternate view. Although any technique can be abused, combat biology as I have seen it used, involves the application of science to find solutions to problems and the use of reliable, factual evidence to guide decisions. Often, it is a process of postulating effects, then testing the assumptions to predict outcomes and minimize management uncertainties. At its essence, the art of combat biology is understanding the levers to pull or push, knowing who controls those levers, and encouraging those responsible for the levers to move the system in a way that benefits ecological health, resilience and the persistence of wild creatures.

Combat biology applies a combination of data, research, experience, communication skills and strategic thinking to help the public, politicians and industry understand impacts and consequences. It is often a message not only scorned, but unwanted. Most combat biologists

are not dissuaded by this and employ other methods to plant ideas. On reflection, many biologists in this role would say they might have been better served with backgrounds in psychology or sociology than with academic training in biology.

This follows a basic understanding that science cannot give us all the answers. Combat biologists recognize the fact that the most difficult questions and the most persistent problems are not matters of science, but of values. Science may tell us what is happening, it can help us understand the consequences of various choices, but it can't make us do anything about it or tell us which choices to make.

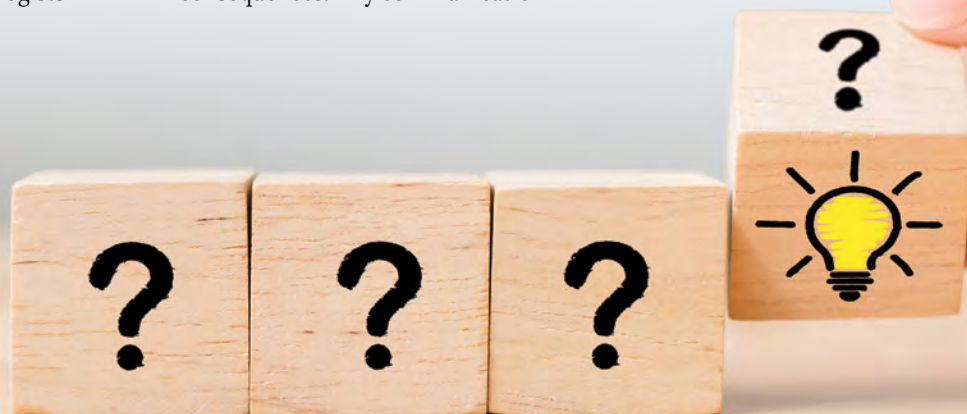
Although it is tempting to unleash the artillery of facts, to blast by broadside a barrage of data, changing minds is a more nuanced affair. Facts, evidence and the weight of science often aren't enough. Conflicts boil down to disagreements over values and priorities, even though they often masquerade as arguments over data. Even if the evidence is perfect, decisions can't be reduced to an algorithm.

So, a combat biologist attempts to illuminate the problem in ways to indicate options, choices and consequences. Any communication

effort integrates three components: the message, messaging and the messenger. Imagery, humor and stories are used as vital pieces of effective communication. Sometimes the source of the message (often a combat biologist) is seen to lack credibility and the message is unheeded. Shrewd biologists employ, through collaborative efforts with other like-minded individuals and organizations, arm's length mechanisms to get messages out, to exert pressure and to ask the difficult questions.

In the arsenal of a combat biologist are techniques to evoke nostalgia, empathy, guilt and stewardship. These are combined with pragmatic devices like avoiding prosecution, saving money, understanding cumulative effects and maintaining social license.

Classic in simplicity, and a teachable moment in its use, is the explanation of shifting baselines, helping people see that the decisions of the past (and today) remove options for the future. It can be an effective counterweight to the notion that our



resource use footprint isn't cumulative in both space and time. In reality, today is a shadow of yesterday; it is a mere slice, and the more slices we carve with our resource use decisions the poorer we become in fish and wildlife, wild places and options.

Biologists are not mindless automatons, responding only to the direction of bureaucrats, politicians, and corporate voices. We are not "captured" by the organizations which employ us or the industries and activities we help regulate. Our profession is one of caring about and for wild things, nature and the web of life that we all require to survive. To suggest biologists should subvert those principles for the sake of political ideology, economics or the latest fad, fashion and craze is untenable.

There was a time (and it may still be with us) where saying "no" to a development proposal was tantamount to career suicide. This was the "Alberta Advantage," interpreted by some to mean no development proposal could be rejected. In response, some of my inventive colleagues learned how to tailor a "no" in a way that sounded like a "yes." This was accomplished by ensuring the conditions for approval were onerous and crafted to achieve a conservation objective.

Sometimes, the combination of pre-development inventories, cumulative effects assessments, buffer zones, project re-design, access controls, noise abatement, timing constraints, and extensive

monitoring requirements coupled with mitigation to fully restore fish and wildlife habitats to pre-development conditions proved too expensive, time-consuming and logistically difficult. This provided the proponent the opportunity to consider whether the development was really worth it; some reflected it wasn't.

Combat biologists understand the rules, but they have not drunk the corporate Kool-Aid. As the saying goes, *"Others make the rules, we play the game."* If one understands the rules one can anticipate where the flexibility might exist and how to stretch the envelope to achieve a better ecological outcome. This follows an (unwritten) axiom of bureaucracy: *"Rules are for the guidance of the wise and the rigid adherence to by fools."* Rules only provide a rough approximation of the boundaries; aspects of vision, principles and strategy are more important determinants of a combat biologist's motivation.

Some might find the attitude to rules and their evasion troubling. Combat biologists don't. As a rule, they operate on two principles: *"If you have to ask, the answer is no,"* and *"It is better to beg for forgiveness, than sometimes to ask permission."*

A challenge that combat biologists must grapple with, especially those in government service, is that the stated objectives of an organization may not square with how an organization operates. If an organization hires competent professionals to do the job of managing, conserving or protecting biodiversity values, it makes little

sense to ignore their advice, to fail to seek their advice or to stifle the provision of advice.

This is an institutional failure where the perversity of organizing a thing (like biodiversity conservation) is that soon there is an inclination to pay more attention to the needs of the organization, rather than the values for which the organization was originally organized. Combat biologists rarely forget the prime directive of their task.

Combat biologists go about their tasks quietly, for to shine too much light on their activities is as detrimental to them as it might be to a shy, retiring wild creature. But, they understand, cerebrally as well as viscerally, that evolution gave us a neck and meant us to stick it out. Combat biology is about finding solutions and effective strategies rather than accepting inertia. In contrast, playing it safe, not rocking the boat and being risk-averse is not an inspirational philosophy for ethical behavior, nor is the ecological outcome helpful.

There is no organization of combat biologists although they know well amongst themselves who they are. If they were to rally behind a slogan, it might well be *"Whatever works!"* ■

Lorne Fitch is a Professional Biologist and a retired Fish and Wildlife Biologist.

Book Review

REVIEWED BY LU CARBYN

Eugene Odum was the first to write a textbook in ecology and it became a classic of its time – the twentieth century. Times are changing.

Books are not what they used to be – the Internet has taken over. Rick Schneider's new book "bucks" the trend. This book is as important as Odum's book but written for the 21st century. Instead of all theory, this book takes you from theory to the practical world; how to get the job done.

Here we have an authoritative synthesis of biodiversity conservation, as it pertains to species and ecosystems across Canada. Written in a clear and engaging style and brimming with full colour figures and illustrative case studies, this book explains how conservation decision making is informed by science, shaped by social and political context, and embedded in a complex set of institutions. The subject is exceptionally well dealt with.

obtained in classes to dealing, in a practical and meaningful way, with real world conservation problems.

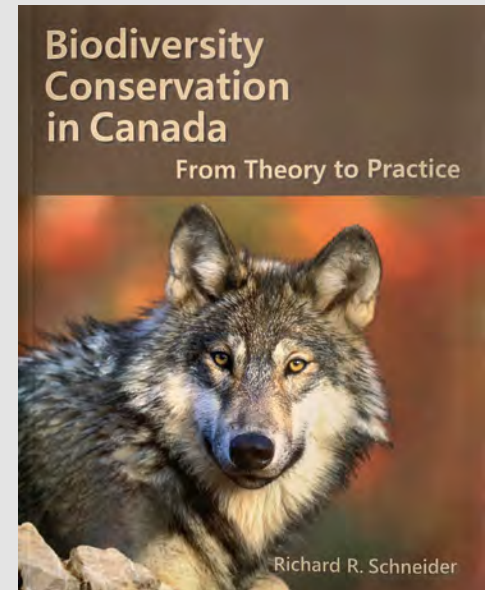
I believe there is also an overarching contribution to a much broader audience. In addition to conservation science, topics include the history of conservation, threats to biodiversity, conservation laws and policies, climate change and conservation decision making. The list goes on.

It occurred to me that much in this book could also be applied to high school curricula. In the very least, a copy could well be placed in every high school library in our country. I found the chapter on "The Historical Foundations of Conservation in Canada" particularly interesting. This book deals with Canadian issues. Many new Canadians have little exposure or knowledge about such important events of the past such as the fur trade in the 19th century and how it influenced Canadian history.

Instead of all theory, this book takes you from theory to the practical world; how to get the job done.

Dr. Schneider intends this book to be used as a teaching instrument. For undergraduates, it is meant to expose future practitioners to a broad overview of both the scientific and social dimensions of conservation. For graduate students, the book is a way of moving from theoretical information

The book outlines, in a very clearly written and superbly illustrated manner, logical approaches to finding solutions to complex problems. There are often many different solutions to dealing with diverse problems, yet the various options are often not clear, and this book covers the range that is



Schneider, Richard R. 2019. Biodiversity Conservation in Canada – From Theory to Practice. The Canadian Center for Transitional Ecology, 364 pp.

available; it looks at the pros and cons of doing business in different ways. It has a no-nonsense common practical approach that I found so compelling.

This book represents applied biology at its best. Conservation practitioners, conservation organizations, government scientists, academicians, and people in all walks of life with an interest in our natural world, can get a great deal out of this book. For an older biologist such as myself, I am pleased to have in one reference book such concepts described as structured decision making, decision framing, adaptive management, climate change, and so much more. I highly recommend it.

Learn more about *Biodiversity Conservation in Canada – From Theory to Practice* at www.ccte.ca. Copies are available at Amazon.ca. ■

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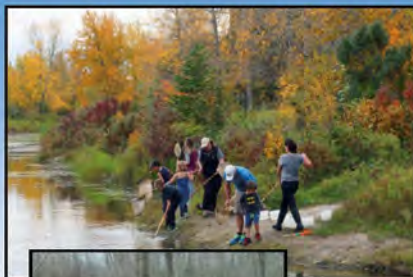
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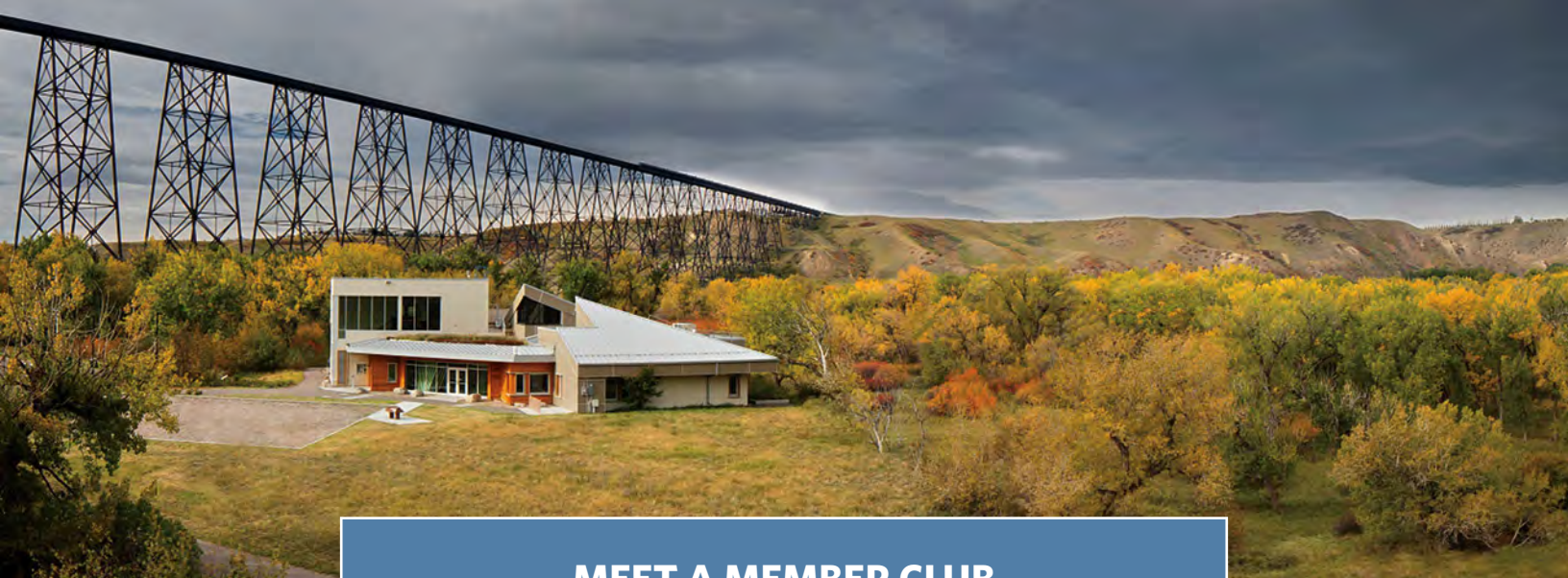
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MEET A MEMBER CLUB

Friends of the Helen Schuler Nature Centre

Nature Alberta is proud to support a diverse range of naturalist organizations representing people passionate about all things nature – from mushrooms to birds and butterflies, reptiles and more. We are excited to welcome a new member club, Friends of the Helen Schuler Nature Centre Society, to our community connected by a love of nature. Read on to learn what the society does and how you can get involved.

Registered as a charitable society in 2017, Friends of the Helen Schuler Nature Centre was established with the main goal of fundraising to support Lethbridge's truly spectacular Nature Centre, which receives ~53,000

visitors annually. These fundraising efforts help support the centre and also develop an immense amount of youth activities and engagement events that are held year-round within the facility. The Friends have been hard at work and in June 2019 they successfully reached their fundraising goal to create a new and improved outdoor learning classroom and amphitheatre.

Being able to support a nature interpretive centre that caters to all ages through exhibits, nature quests, discover walks, hands-on activities and more has helped the Friends elevate the Helen Schuler Nature Centre as an important part of the community. Another interesting and important element of the Friends of Society work in 2019 was advocating the Provincial government to recognize the role of municipally funded nature centres in Alberta. Their advocacy resulted in \$1,000,000 total invested from the Climate Leadership plan towards 13 nature centres in Alberta. This provided a substantial and much-needed boost to the efforts of nature centres across Alberta.

"My favorite element of this special place is the people," offers Annette Orich, a volunteer with the Friends for more than nine years. "We see visitors from all over Alberta and it's a pleasure working alongside the staff at the centre."

Guests from the local community, as well as people from all over the world, visit the Helen Schuler Nature Centre and have the opportunity to gain meaningful knowledge about the natural world and they all leave with cherished memories.

Currently, the Friends have 50 active members and they have reached over 4,200 individuals through their events and programming. Nature Alberta is proud to call them a member club and looks forward to hearing about the continued success of their important fundraising efforts.

To learn more about the Friends of the Helen Schuler Nature Centre Society, support their work, volunteer, become a member or browse their upcoming events please visit their website <https://naturecentre.ca>. ■



First-Hand: Bear Finds a New Home

BY KEN COLWILL, ELITE LITHOGRAPHERS

This year at my bear stand near Baptiste Lake started out much the same as the previous ten years. Haul in bait barrels, trail cameras, food and my tree stand through knee deep or better snow to set up for the season. Weekly checks of the trail cameras reveal what is coming in to eat.

Every year, we have small bears rush up the tree we are in when larger bears come in; they may have even come into the stand when we weren't present.

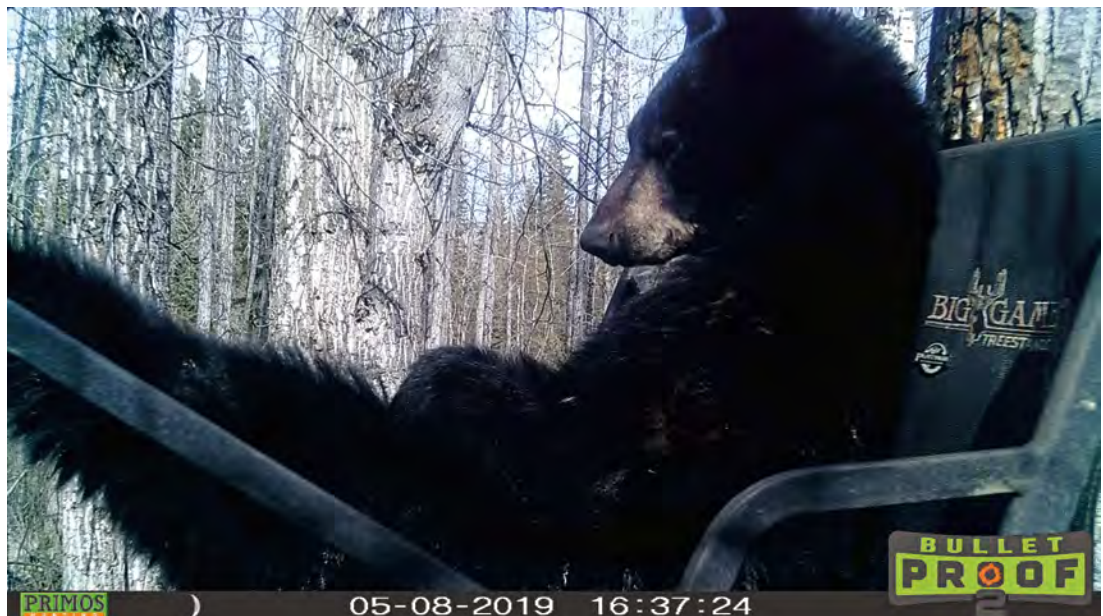
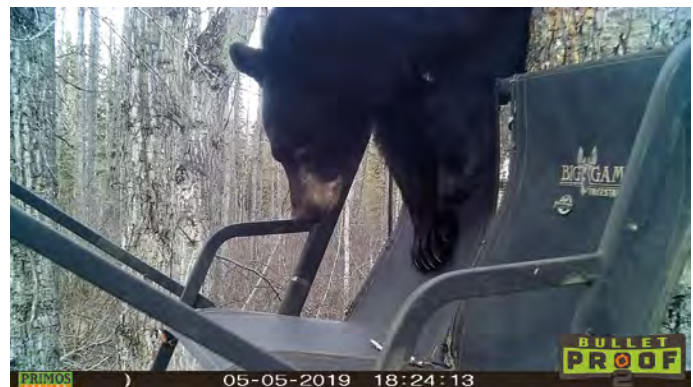
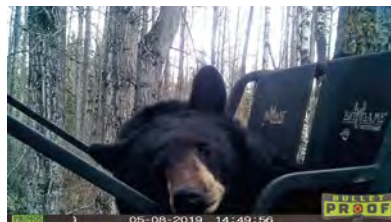
This year in early May things were different. It started when we noticed that the seat had been folded down in the tree stand and some smelly messes in the floor grate.

The following weekend we arrived to find the culprit sitting in the stand. We chased her off then went up for some bear watching. That same afternoon we found her in the same location and chased her off again.

My buddy suggested we put a trail camera up in a small tree next to the stand. One week later we come in and she is in the stand but takes off as we walk in.

We go up in the stand to find a torn-up seat and a gently chewed camera. Using a card reader and a cell phone we viewed the pictures on the card.

It turns out that the little sow had pretty much moved in; 665 pictures before she broke the camera. In that time frame a small brown one came in once and looked equally as comfortable. ■



PHOTOS PROVIDED BY
KEN COLWILL



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