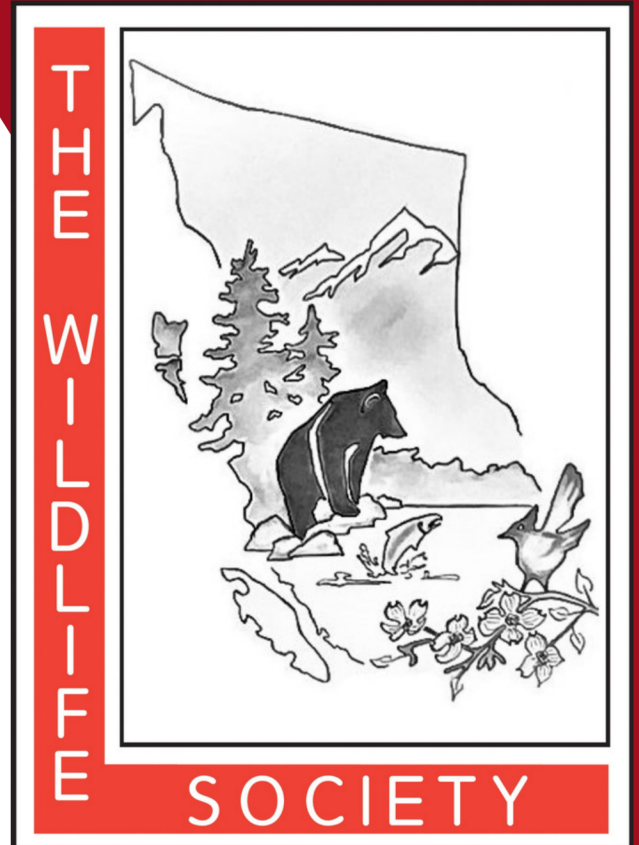


BC Chapter & Canadian Section of The Wildlife Society

Joint Conference
Our Future Together



British Columbia Chapter

March 30 - April 1, 2023
Victoria Conference Centre

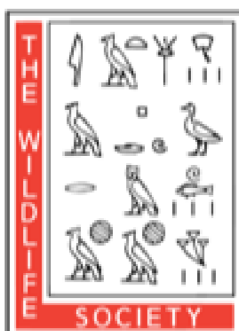


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Welcome from the British Columbia Chapter of The Wildlife Society.

It is my sincere pleasure to welcome you to the 2023 BC-CSTWS Conference, with the theme, Our Future Together!

This conference is taking place on the traditional territories of the lək'wəŋən peoples - the Songhees and Esquimalt First Nations communities. There are a number of talks this weekend that will highlight the importance of building real, long-lasting relationships and centering Indigenous voices in our collective pursuit of conservation and stewardship. We are very grateful to be gathering on these territories and continuing to further our relationships with First Nations partners, and to see wildlife professionals across the country engaging in meaningful ways.

Students and professionals of all ages, with all types of career specialties, will be present this weekend – I view this as an opportunity for us all to learn new things outside of our usual areas of expertise (or even within them!) and to expand our network of colleagues and friends. Especially considering the challenges of the past couple of years, there may be names and faces you know from the screen but have not yet had the pleasure of meeting in person. The coffee breaks, poster session, and future planning session will all be excellent times to get to know your peers and expand your view of the profession.

I cannot express my gratitude enough to each and every one of you for attending – your willingness to share your work, to support others doing the same and re-invigoration of both the BC Chapter and the Canadian Section after missed years of conferences is invaluable.

If you feel so inclined, I encourage you to thank the many sponsors who have supported this conference – you will see their logos displayed throughout the conference, as well as some booths – and to spend FAR too much money on the silent auction we will be hosting on Thursday and Friday.

I thank you for your attendance, energy, questions and appreciate you contributing to the current and future landscape of wildlife professionals in the province and across the country.

Sincerely,
Alexia Constantinou
President-Elect BCTWS / 2023 Conference Chair

Welcome from the Canadian Section of The Wildlife Society.

It is my pleasure to welcome you to this joint conference of the British Columbia Chapter and the Canadian Section of The Wildlife Society (TWS). The Canadian Section acknowledges and respects the ləkʷəŋən peoples on whose traditional territory we are meeting and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day. I would also like to acknowledge the partnership with the BC Chapter that has led to hosting this joint conference, which promises to be a great opportunity to learn, interact with colleagues, meet long-time and new friends, and lay the foundation for another important step in the growth of both the BC Chapter and the Canadian Section. We would not be having this meeting without the support of the many conference sponsors — they are identified in the program and will be displayed on slides during the breaks — and I ask that you thank them for their support if you have the opportunity.

The theme of the conference is Our Future Together, and this applies to so many of the opportunities and challenges we have in wildlife conservation and management from local, to provincial, to national, and to international levels. As members of TWS, many of our best opportunities to influence conservation and management of wildlife are by supporting initiatives led by Indigenous Communities. I look forward to learning more about the implementation of the vision of Together for Wildlife by the BC Government, which will be the focus of one panel during the conference.

Our Future Together also applies to the continued growth of the BC and other Canadian Chapters along with the Canadian Section. The Section and Chapters have spent the last year working to finalize affiliation agreements that link the Chapters, through the Section, to the parent TWS in a model that recognizing that Canadian-based TWS units are in some ways different from other Sections and units. At the same time, each level of TWS can benefit from the support of other TWS units. The immediate Past President of TWS, Gordon Batcheller, will talk to us about how TWS can work to ensure that Canadian members are fully supported in their work to conserve wildlife.

As was the case with the 2019 BC Chapter Conference in Kelowna, it is inspiring to see the strong involvement of so many students at this joint conference. Today's students are the future of The Wildlife Society. The conference has an emphasis on rapid-fire talks, which will give us some insights into each other's work, insights that should then lead to some great conversations during the rest of the conference.

This joint conference was originally planned for a 2022 venue in Prince George, but that like so many other aspects of our lives was interrupted by Covid-19. Fortunately, we can again meet in person. Please respect the varying comfort levels of your co-delegates with social interactions and follow the Conference Covid policy throughout the meeting.

Thank you to everyone for coming. Enjoy the Conference!

Mike Gillingham

President, Canadian Section of The Wildlife Society

Committees:

BCTWS Executive Team	CSTWS Executive
President: Julie Kanya	President: Mike Gillingham
President-elect: Alexia Constantinou	Past-President: Dennis Brannen
Treasurer: Bill Harrower	Vice-President: Kara MacAulay
Secretary: Rod Davis	Treasurer: Peter Hettinga
Director: Student Liaison: Agnès Pelletier	Secretary: Jessica Lang
Director: Newsletter: Alex Ritz	Member at Large: Don Sexton
Director: Communications: Cayla Naumann	Member at Large: Andrea Morehouse
Director at Large: Jason Fisher	Executive Director: Karin Snyder
	TWS CDN Section Rep: Evelyn Merrill

Conference Coordination
Conference Coordination: Alexia Constantinou
Communications: Julie Kanya
Social Media and Marketing: Cayla Naumann
Registration: Rod Davis
Panels: Alexia Constantinou, Rod Davis, Bill Harrower, Mike Gillingham
Paper Program: Alexia Constantinou, Evelyn Merrill
Student Liaison: Agnès Pelletier
Volunteer Coordinator: Agnès Pelletier, Rod Davis
Fundraising: Karin Snyder
Silent Auction: Catherine Denny
Venue and Social: Jason T Fisher

Special thanks to all the other volunteers that helped with the conference!

Conference Volunteers:

UVic – Student Chapter Execs and Members

Moderators: Rick Baydack, Elizabeth Kleynhans, Rod Davis, Jason Fisher, Agnes Pelletier, Cliff Nietvelt, Garth Mowat, Cole Burton, Erin Tattersall

Our Sponsors



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OF BRITISH COLUMBIA



**HABITAT
CONSERVATION TRUST
FOUNDATION**



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COLUMBIA**

Ministry of
Water, Land and
Resource Stewardship



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Thank You!

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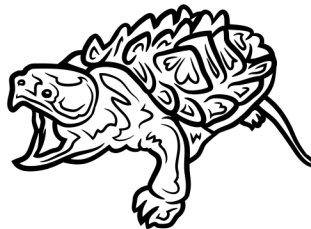
Lotek

advancing wildlife science



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FOR WILDLIFE FERTILITY CONTROL**

Silent Auction Donators

Make sure to bid on the silent auction donations during the breaks and Friday evening poster session.

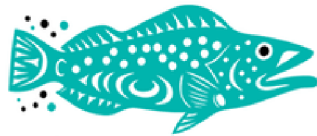
Silent Auction closes Friday, March 31 - 6 PM

THANK YOU!

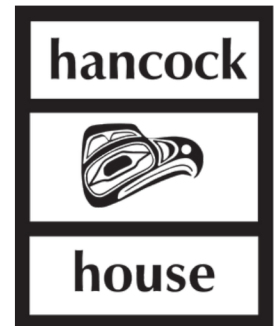
TWA DOGS



ARC'TERYX



Shaw) CENTRE FOR THE
SALISH SEA



ORCA SPIRIT ADVENTURES

BC Ferries



The Butchart Gardens.

Silent Auction Donators

Make sure to bid on the silent auction donations during the breaks and Friday evening poster session.

Silent Auction closes Friday, March 31 - 6 PM

- Kathy Parker and Michael Gillingham
- Grizzly Woodworks
- Hancock House Publishers
- Grove Outdoors Victoria
- Garth Mowatt
- Evelyn Merrill
- Wini Kessler
- Bill Harrower
- Sheringham Distillery
- Munro's Books



Thank You

General Information

Venue:

Victoria Conference Centre
720 Douglas St, Victoria, BC V8W 3M7

Complimentary basic wifi is available throughout the Victoria Conference Centre. Basic wifi is suitable for checking emails and light web browsing. Additional wifi packages are available for purchase

Registration:

Located at the pre-lecture hall area is the registration booth. The registration desk will be open: Thursday March 30 8am-830am, Friday March 31 8am - 9am and Saturday April 1st 8am - 9am. Conference presenters should check in here to upload their presentation and confirm poster location. **Please arrive early on the day of your presentation to allow time for uploading.**

Lunch Breaks:

Lunch breaks are scheduled from 12pm-1pm and are on your own. There are many great dining options in the vicinity of the conference centre. We highly recommend joining with other conference goers to continue to network over lunch!

Refreshment and Networking Breaks:

Coffee, tea, and snacks will be served during all networking breaks in the pre-function area. Please note that there is a water station - feel free to bring your reusable water bottles.

Welcome Social and Poster Session:

Please join us for the Welcome Social and Poster Session on Thursday March 31st from 430pm - 530pm in the pre-function area

Offsite Evening Social:

Everyone is welcome to the evening conference social Thursday March 30th starting at 6pm at the Bard and Banker - 1022 Government St, Victoria, BC V8W 1X7. The social is hosted by the BC Chapter & Canadian Section. Conference goers as well as friends, colleagues and partners are all welcome to attend.

Offsite Lunch and Wildlife Trivia:

Join fellow conference goers for a fun lunch social hosted by the UVic TWS Student Chapter in the Buckerfields Room at Swan's Pub (1601 Store St, Victoria, BC V8W 1N6) from 12:30-3:30pm on Saturday April 1st. Wildlife trivia will start promptly at 1:00pm

Silent Auction:

Silent auction items will be displayed in the pre-function area during the conference. Participants are encouraged to bring items to donate for this fundraising auction. Proceeds help to defray the costs of this and future conferences for students and young professionals and ensure maximum participation and professional development opportunities.

Auction bids close Friday, March 31 end of day; winners to be listed at registration desk Saturday April 1st at 8:00am.

Film Screening: Transmission

Thursday, March 30, 4:30 PM,
Main lecture hall



transmission

WILD SHEEP SOCIETY OF BC PRESENTS FILTER STUDIOS PRODUCTION
BY DAN MINSKY AND JESSE BONE WITH TASH BAYCROFT

www.movifree.org



Everyone Welcome



CONFERENCE SOCIAL

Beer and Networking
Thursday, March 30 | 6 PM
Bard and Banker
1022 Government Street



Post-conference Lunch and Wildlife Trivia

Saturday, April 1st
Doors at 12:30 pm
Trivia starts at 1:00 pm
Swan's Pub
1601 Store St
Buckerfields Room



Conference Covid Policy

Covid-19 and other respiratory diseases continue to prevail. The following protocols will be in place for the joint 2023 BCTWS and CSTWS conference:

1. The conference will abide by guidelines and directives issued by the British Columbia Provincial Health Officer and provincial health authorities.
2. Wearing masks during indoor venue events will be encouraged but not required. This policy is subject to change dependent on any health authority directives in place at the time of the conference. A supply of medical masks and sanitizer stations will be provided at the venue.
3. Please do not attend the conference if you are feeling ill. We ask that every person self-monitor for symptoms of illness before entering the event each day. If you are feeling feverish, have a persistent cough, or are otherwise experiencing potential symptoms of Covid-19, please do not enter the event. Registration refunds may be arranged by contacting BCTWS by email at tw.bc.chapter@gmail.com.
4. Attendees should at all times follow directions that may be given by event or venue staff, to ensure the safety and comfort of all event attendees. We look forward to everyone enjoying a healthy, safe and productive event.

The Victoria Conference Centre is addressing COVID-19 safety in their Safe Space plan, here:

www.tourismvictoria.com/sites/default/files/vcc_safe_space_sheet_12apr2022.pdf

Schedule at a Glance:

Time		Thursday March 30		Friday March 31		Saturday April 1	
7:30		Registration Table Opens (7:30am)		7:30 Registration Table Opens		8:00 Registration Table Opens	
8:30		Opening Remarks & Plenary			8:00 CSTWS AGM		
8:35							
8:40							
8:45							
8:50							
8:55							
9:00							
9:05							
9:10							
9:15							
9:20				Plenary Gordon Batcheller	Mod Cole Burton	Networking & Refreshments	
9:25						<i>buffer</i>	Contributed Research Talk
9:30	Moderator Rick Baydack	Rapid Fire Talks	Mod Erin Tattersall	Contributed Research Talk		Future Planning Session for Chapters	
9:35							
9:40							
9:45							
9:50		Rapid Fire Talks					
9:55		<i>buffer</i>					
10:00							
10:05	Rapid Fire Talks			Networking & Refreshments			
10:10							
10:15		Networking & Refreshments					
10:20							
10:25				Contributed Research Talks			
10:30	Moderator Elizabeth Kleyhans	Contributed Research Talks	Moderator Agnes Pelletier				
10:35							
10:40				Rapid Fire Talks			
10:45							
10:50							
10:55		Contributed Research Talks					
11:00							
11:05		Rapid Fire Talks					
11:10							
11:15						Student Awards & Closing Remarks	

11:20		buffer				
11:25		Rapid Fire Talks		Contributed Research Talk		
11:30						
11:45						
11:50				Rapid Fire Talks		
11:55						
12:00		Lunch on your own		Lunch on your own		
1:00	Moderator Rod Davis	Together for Wildlife Panel	Moderator Bill Harrower	Wildlife Health Panel	UVic TWS Student-led Triva @ Swan's Pub 12:30pm-3:30pm	
1:05						
1:10						
1:15						
1:20						
1:25						
1:30						
1:35						
1:40						
1:45						
1:50						
1:55						
2:00		Moderator Cliff Nietvelt	Rapid Fire Talks	Moderator Cliff Nietvelt		Contributed Research Talk
2:05						
2:10						
2:15						
2:20						
2:25				Rapid Fire Talks		
2:30						
2:35						
2:40		Networking & Refreshments		Networking & Refreshments		
2:45						
2:50						
2:55						
3:00	Moderator Jason Fisher	Contributed Research Talks	Moderator Garth Mowat	Contributed Research Talk		
3:05						
3:10						
3:15		Rapid Fire Talks				
3:20						
3:25						
3:30						
3:35						

3:40	Mod Jason Fisher		Moderator Garth Mowat	Contributed Research Talk	
3:45					
3:50					
3:55					
4:00		Contributed Research Talk			Rapid Fire Talks
4:05					
4:10					
4:15		Buffer - AV switch for film screening		Contributed Research Talk	
4:20					
4:25					
4:30		Canadian Section Lifetime Achievement Award		Poster Session	
4:35					
4:40					
4:45					
4:50					
4:55		Film Screening - Transmission			
5:00					
5:05					
5:10					
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5:20					
5:25					
5:30					
5:35					
5:40					
5:45					
5:50					
5:55					
6:00			Social at the Bard & Banker 6pm - late		

Detailed Schedule:

Time		Thursday March 30
7:30		Registration Table Opens
8:30		Opening Remarks & Plenary
9:30	Moderator Rick Baydack	Angus Smith - Understanding Roosevelt Elk on Vancouver Island: habitat selection, migration, and dispersal
9:35		Rebecca M. Smith Looking at the big picture: using wildlife camera traps to understand the impacts of human disturbances on large mammals in and around Canada's Mountain National Parks
9:40		Nicole Boucher - Risk-prone maternal resource selection linked to survival of older moose calves across disturbed landscapes
9:45		Kyla Wallin - Moose (<i>Alces alces</i>) response to two major wildfires in Interior British Columbia
9:50		Camille Roberge - Is forage quality limiting for moose (<i>Alces alces</i>) in a logged landscape?
9:55		buffer
10:00		McIntyre Barrera - Molecular systematics of enteric parasites in the Vancouver Island marmot
10:05		Kevin Gourlay - Patterns of endoparasitism in the Vancouver Island marmot
10:10		Haley Andersen - Home Range and Movement Patterns of Released and Wild Vancouver Island marmots (<i>Marmota vancouverensis</i>)
10:15 10:30		
10:30	Moderator Elizabeth Kleyhans	Adam Taylor & Malcolm McAdie - Conservation of the Critically Endangered Vancouver Island Marmot (<i>Marmota vancouverensis</i>)
10:35		
10:40		
10:45		Sydney Goward - Building Indigenous community & youth connections through science, story, and reciprocity: a wildlife scientist's journey to doing community-valued research
10:50		
10:55		
11:00		Madeleine Wrazej - Non-Invasive Sampling to Assess the Impacts of Recreation on Mountain Goats in Banff and Yoho National Parks
11:05		Victoria Harbo - Using Camera Traps to Model Recreation Impacts on Cougars on Southern Vancouver Island
11:10		Laura Balyx - Conflict and Coexistence with Mountain Goats in a Protected Alpine Landscape
11:15		buffer
11:20		
11:25		Genevieve van der Voort - Motion-triggered video monitoring to observe <i>Platanthera</i> orchid pollination in British Columbia
11:30		buffer
11:45	Cara Snell - Small mammal composition in novel climate-focused silviculture treatment sites in northern British Columbia	
11:50	Laura Eliuk - Tires vs tracks: Linear features explain mammal distributions better than motorized recreation in Alberta's Rockies	
11:55	Jason T Fisher - Boreal mammal declines with cumulative effects of development: Why are they happening?	
12:00		Lunch on your own

1:00	Moderator Rod Davis	Together for Wildlife Panel	
2:15		Nikki Beaudoin - Squeezing biologically relevant visits out of camera traps: A comparison of independent visits to total images	
2:20		Maria Leung - Sun Hats for Bat Boxes: Mitigating the risk of overheating at northern latitudes	
2:25		Emily Studd - Wildlife activity: Is it a useful and informative metric?	
2:30		Jamie Gorrell - Hare population cycles impact lynx genetic diversity and gene flow	
2:35		Steven F. Wilson - Does Removing Predators Increase Predation? Re-examining the Evidence for Social Disruption	
2:40-3:00		Networking & Refreshments	
3:00	Moderator Jason Fisher	Marcus Atkins - Reflecting on Benchmarks and Shifting Baselines in a Western Rattlesnake (<i>Crotalus oreganus</i>) Population in British Columbia	
3:05			
3:10			
3:15			
3:20			
3:25			Jade Spruyt - Effectiveness of road mortality mitigation for at-risk snakes in the South Okanagan
3:30			Julia Burkart - Get out of the heat: Can we attract Western Rattlesnakes to artificial refugia?
3:35			Kryisia Tuttle - Conservation Challenges and Successes for Amphibians during Road Construction on the West Coast of Vancouver Island
3:40			Alexa Wiebe - Seasonal movements of Painted Turtles within a complex of water bodies: are there discernable patterns?
3:45			Julien Gullo - A snapshot of the dietary breadth of introduced European wall lizards (<i>Podarcis muralis</i>) in urban Victoria, British Columbia
3:50			Andrew F. Barnas - Large-scale anthropogenic and natural landscape traits entrain different mammalian responses to local anthropogenic disturbance
3:55			Anastasiia Danusevic - Causes and Consequences of Social Cohesion in Sable Island Horses: From the Individual to the Population Level
4:00	Chloe Howarth - Variation in Western Rattlesnake (<i>Crotalus oreganus</i>) migratory tactics in British Columbia		
4:05			
4:10			
4:15 - 4:30		Buffer - AV switch for film screening	
4:30 - 4:45		Canadian Section Lifetime Achievement Award Presentation	
4:45 - 5:15		Film Screening - Transmission	
6:00		Social at the Bard & Banker 6pm - late	

Time		Friday March 31
7:30		7:30 Registration Table Opens 8:00 CSTWS AGM
9:00		Plenary: Gordon Batcheller, TWS Past-President
9:05		<u>The Wildlife Society: to support wildlife, advance wildlife science, and invest in wildlife professionals.</u>
9:10		The Wildlife Society is an international organization committed to inspire, empower, and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation. This mission transcends political boundaries. Immediate Past-President Gordon Batcheller will explore how TWS can and should meet the needs of all of our members, and specifically how TWS should "step up" our work to ensure that our Canadian members are fully supported in their work to conserve wildlife.
9:15		
9:20		
9:25		
9:25		buffer
9:30	Mod Erin Tattersall	Lauren E. Eckert - Resituating Western Conservation Science: Assessing opportunities to bridge knowledges and reunite humans and ecosystems
9:35		
9:40		
9:45		
9:50		
9:55		
10:00-10:15		Networking & Refreshments
10:15	Moderator Agnes Pelletier	Kevin White - Costs of living dangerously: snow avalanches are a major driver of mountain ungulate population ecology
10:20		
10:25		
10:30		
10:35		
10:40		
10:45		
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10:55		
11:00		
11:05		
11:10		
11:15		
11:20		
11:25		Jonathan Wiens - Creating habitat for a threatened bird on a new transmission line in Manitoba
11:30		
11:45		

11:50		Sharon Kay - Social Group Composition and Body Condition in Northern Resident Killer Whales	
11:55		Alison Gladwell - Motorized vessel behaviour and compliance to Marine Mammal Regulations in Northeast Vancouver Island	
12:00		Lunch on your own	
1:00 - 2:00		Wildlife Health Panel	
2:00	Moderator Cliff Nietvelt	Kaylee A Byers - Rat Management in the Rattiest Cities of Canada and America: A One Health Approach	
2:05			
2:10			
2:15			Qin Xu - Hunter response to changes in Chronic Wasting Disease (CWD) prevalence in Alberta
2:20			Emily Thoroski - Transforming Scientific Research into Audio/Visual Tools to Promote Wildlife Conservation
2:25			Elizabeth Kleynhans - Going up in flames - identifying wildlife habitat at high risk of fire
2:30			Lynsey C. Bent - Evaluating lead exposure in scavenging species linked to big-game hunting in Saskatchewan, Canada
2:35			Ishana Shukla - Humans elicit community change via impacts on keystone species
2:40 - 3:00			Networking & Refreshments
3:00			Moderator Garth Mowat
3:05			
3:10			
3:15	Ilona Mihalik - Modelling connectivity among resource wave hotspots: bears and spawning salmon of coastal British Columbia		
3:20	Deborah A. Jenkins, Bill Harrower & Cole Burton - Carnivore Connectivity in Western Canada – Where Grizzly Still Roam		
3:25	Abbey E. Wilson - Development of a hair hormone profile for long-term health monitoring of grizzly bear populations		
3:30	Jennifer Green - Spatiotemporal and Dietary Responses of American Black Bears to Anthropogenic Disturbance in Yosemite National Park, USA.		
3:35	Garth Mowat - Body condition as a measure of population fitness		
3:40	Sage Raymond - Factors associated with coyote dens and scats could be used to mitigate human-coyote conflict		
3:45			
3:50			
3:55	Rory D. Fogarty - Trapping mortality accelerates the decline of the fisher, an endangered mesocarnivore, in British Columbia, Canada.		
4:00	Kaitlyn Gaynor - The influence of recreation on animal movement in US National Parks		
4:05	Joanna Burgar - Scaling Up from Site to Region: Predicting Fisher Responses to Landscape Change		
4:10	Krystyn Forbes - Haplotype diversity, population structure and sex-biased dispersal in boreal lynx		
4:15	Emerald Arthurs - Cougar response to recreational activities in a wilderness area on southern Vancouver Island		
4:20	Ian Adams - Key Biodiversity Areas in BC: Identifying Sites of Exceptional Conservation Value		
4:25			
4:30			
4:35 - 5:30	Poster Session		
5:30	Dinner on your own		

Time		Saturday April 1
8:00 - 9:00		8:00 Registration Table Opens 8:00 BCTWS AGM
9:00	Cole Burton	Networking & Refreshments
9:05		
9:10		
9:15		
9:20		
9:25		Cole Burton - Camera trapping together for better wildlife management: growing the WildCAM network
9:30 - 11:00		Future Planning Session for Chapters
11:00 - 12:00		Student Awards & Closing Remarks
12:30 - 3:30		UVic TWS Student-led Trivia @ Swan's Pub 12:30pm-3:30pm

Presentation Information:

Plenaries:

Day 1: Plenary and Welcome (March 30)

Alexia Constantinou - 2023 BC TWS President

Bill Harrower -2023 BCTWS Treasurer & Past President (2020)

Day 2: Plenary (March 31)

Gordon Batcheller, TWS Past-President

Gordon is a Certified Wildlife Biologist and TWS Fellow. He was elected to TWS Council in 2019. His prior service with TWS included officer/committee positions in his student chapters (University of Maine, Oklahoma State University), state chapter (New York), and Section (Northeast); six years on the Certification Review Board, and service on the Editorial Advisory Board for *The Wildlife Professional*.

Gordon is a career wildlife biologist with the State of New York, retiring as Chief of Wildlife in 2015. He currently serves as the Executive Secretary for the Northeast Association of Fish & Wildlife Agencies, Inc., and works part time for the Association of Fish and Wildlife Agencies in their legal strategies program. He specializes in wildlife policy at the state, national, and international level. Gordon enjoys fly fishing, and deer and turkey hunting. Besides hunting, Gordon enjoys foraging for wild edible mushrooms, and sailing all types of sailboats, but especially gaff-rigged sloops, including a boat built in 1902 that has been in the family since the early 1920s.

Panels:

Day 1: Together for Wildlife Panel (March 30)

As a result of extensive consultations with First Nations and stakeholders, the BC government announced the 'Together for Wildlife Strategy' in 2020 setting out a bold agenda for wildlife management in British Columbia. The panel discussion will address the goals of the strategy, as well as the issues and opportunities in its implementation.

Moderator:

Dr. Rod Davis

Secretary & Chair, Conservation Affairs Committee

BC Chapter of the Wildlife Society

Panelists:

Dr. Jennifer Psyllakis

Executive Director

Wildlife, Habitat & Species Recovery Branch

Ministry of Water, Land & Resource Stewardship

The Ministry is responsible for the development of water, land and marine use policy and planning as well as biodiversity and ecosystem health, including

species at risk policy and program management. The Wildlife, Habitat & Species Recovery Branch is charged with implementing the Together for Wildlife Strategy. Jennifer has a PhD in natural resource management and environmental studies, and a MSc and BSc in wildlife management

Hunter Lampreau
Indigenous Co-Chair
First Nations – BC Wildlife & Habitat Conservation Forum

The Forum provides advice and recommendations to the Province to fulfill Goal 5 of the Together for Wildlife strategy which states “Collaborative wildlife stewardship advances reconciliation with Indigenous governments”. A priority goal for First Nations forum participants is to support movement towards long-term co-management and stewardship of wildlife and habitat in BC that is acknowledged and accepted as such by Indigenous governments and the Province. Hunter has a BA in geography & environmental studies and works as a Wildlife Strategic Coordinator for Qwelmintec Secwepemc.

Andrea Barnett
Council Member
Minister’s Wildlife Advisory Council

The Minister’s Wildlife Advisory Council was established by the BC government to support the implementation of the Together for Wildlife strategy. The Council provides independent advice and support to the Minister on strategic issues and priorities which strengthen stewardship of wildlife and habitat in B.C. In particular, the Council focuses on oversight of government work to implement the Together for Wildlife Strategy including advice on legislation and policy. Andrea works as a sessional lecturer at Thompson Rivers University where she teaches Natural Resource Policy and Planning. Her academic background includes a Political Science and Philosophy degree from the University of Victoria and a Master’s degree in Public Policy from Simon Fraser where she studied natural resource policy and economics and researched different approaches to habitat mitigation in BC and across Canada.

Jesse Zeman
Executive Director
BC Wildlife Federation
Representing the BC Fish, Wildlife & Habitat Coalition

The Coalition was formed to advocate for biodiversity and ecosystem health including the restoration and long-term sustainability of fish, wildlife and habitat in British Columbia. It is comprised of 25 groups with over 206,000 members across British Columbia, including environmental non-government organizations, hunting and angling guides, conservation organizations, wildlife viewing, ecotourism, naturalists, hunters, anglers, and trappers. The BC Wildlife Federation is a key

member of the Coalition and is the province's largest and oldest conservation organization with over 43,000 members. Jesse holds a BBA (Hon) and a MA in sustainability.

Day 2: Wildlife Health in BC Panel (March 31)

Moderators:

Alexia Constantinou
President
BC Chapter of the Wildlife Society

Bill Harrower
Treasurer and Past President (2020)
BC Chapter of the Wildlife Society

Panelists:

Caeley Thacker
Caeley Thacker is the BC Wildlife Veterinarian. She leads the BC Wildlife Health Program in the Fish and Wildlife Branch of the BC Ministry of Forests. Caeley grew up on Vancouver Island and has had a love for wildlife and wild places from a young age. After a brief stint in wildlife biology in BC, she moved to New Zealand for vet school and then to work in mixed animal clinical practice. She's never really been able (or willing) to stay away from wildlife in BC and has worked with the BC Wildlife Health Program in various capacities since 2008. Her role as BC wildlife veterinarian began in 2020. When not working, Caeley spends her time trail running or out on the ocean around the gulf islands

Cait Nelson
Cait Nelson is a Wildlife Health Biologist with the BC Wildlife Health Program, based in Nanaimo on Vancouver Island. She joined the BC Wildlife Health Program in 2006 and now leads priority wildlife disease surveillance programs such as Chronic Wasting Disease and Bovine Tuberculosis. Cait is dedicated to working with First Nations, stakeholders, agencies, and researcher collaborators to ensure that all have access to current and accurate facts on priority wildlife health issues and an opportunity to provide input on wildlife health initiatives in B.C.

Shari Wilmott

Maeve Winchester

Film Screening - Transmission:

Doctors, farmers, biologists, & volunteers come together to fight a deadly disease threatening both wild & domestic sheep, in this feature-length documentary.

Mycoplasma ovipneumoniae (MOVI) is a bacteria that has led to the pandemic spreading through wild sheep. TRANSMISSION looks at the people on the front lines fighting the disease, the people on the ground working for a better future for our wild - and domestic - sheep populations.

One of those people is the subject of the film, BC wildlife veterinarian Dr. Helen Schwantje. Helen is a sheep nut. While studying as a wildlife biologist, she majored in wild sheep studies and now raises sheep on her farm. TRANSMISSION follows Helen on what could be the most important pursuit of her career; finding a cure for MOVI.

The standard method of dealing with MOVI is to capture wild sheep, test them, and then cull the positive ones before they can infect others. The physically and emotionally draining exercise drives Helen and her team to take a different approach... to eliminate MOVI at the source. This is where our film begins.

Succeeding in this experimental treatment in BC will mean having a conservation model that all the world could follow. But doing this takes a delicate balance of science and politics. It takes relationships with farmers and wild sheep advocates. It will cause controversy. Frustration. Good science. Hard work. Patience. Heartbreak. And hope. We'll meet the colleagues helping her with her work, the community invested in finding a cure and the farmers who only want what is best for their animals. Their passion and expertise craft a story about the future - not just for wild sheep - but for the wild places we still have left

CONTRIBUTED TALKS (Alphabetical order)

Key Biodiversity Areas in BC: Identifying Sites of Exceptional Conservation Value

Ian Adams. Wildlife Conservation Society Canada. Cranbrook, BC.

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One of the most effective ways to safeguard wildlife and wild places is through the improved management and protection of areas of special importance. Key Biodiversity Areas (KBAs) are sites that contribute to the persistence of biodiversity nationally and globally. Found across land, freshwater, and marine environments, KBAs are sites that support rare and threatened species and ecosystems, as well as key natural processes, and are identified using a standardized, quantitative approach. Canada is one of the first countries to mount a comprehensive program to identify all of its KBAs. To date, close to 200 KBAs have been identified in BC, drawing on the expertise of regional taxonomic experts, ecologists and other knowledge holders. KBAs will help inform land use planning processes, identify new protected areas and provide opportunities for meeting conservation targets. I will describe the participatory process used to identify, delineate and review KBAs in Canada, and give an overview of the KBAs identified to date in BC. These range from small to large, from urban areas to wilderness sites, and are being identified for everything from threatened ecosystems such as Garry Oak communities, to aggregations of sea birds, to rare slugs, and other species-at-risk.

Reflecting on Benchmarks and Shifting Baselines in a Western Rattlesnake (*Crotalus oreganus*) Population in British Columbia

Authors: Atkins, M.A., P. Govindarajulu, and K.W. Larsen

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In Review – Ichthyology and Herpetology

The Western Rattlesnake (*Crotalus oreganus*) is threatened in Canada, yet limited data exists on population sizes and dynamics. We replicated a widely-cited study on Western Rattlesnakes (*Crotalus oreganus*) from the 1980s to quantify population change over time and space, and how that differed between areas under different landscape management regimes. Historically, the entire study area was managed for cattle-grazing, but shortly after the 1980s study, the landscape was divided such that a portion continued with cattle-grazing (Ranch), while the remainder was designated as a protected area focused on conservation and recreation (Park). Using mark-recapture data, we constructed a Jolly-Seber log-linear model to estimate population sizes. Our analysis suggests the combined population declined an estimated 40% from historic levels, with seemingly greater declines observed within the Park. However, rattlesnake density was appreciably greater than other areas in the region, highlighting the dangers of using single point-source estimates for conservation and management. Present-day rattlesnakes were also in overall better body condition, despite the population declines. Our results highlight the need to (i) revisit populations for which historical data exists, (ii) collect baseline demographic data in diverse locations across the species range, and (iii) temper the reliance on protected areas for conservation.

Camera trapping together for better wildlife management: growing the WildCAM network.

Authors: Cole Burton¹ and WildCAM² Network Contributors

¹ Department of Forest Resources Management, University of British Columbia;

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² <https://wildcams.ca>

Abstract: Camera traps are a powerful survey tool with great potential to provide standardized data on wildlife populations and communities across large spatial scales. Yet this potential remains largely unmet as most surveys are conducted in relative isolation, with limited standardization, synthesis, or sharing of knowledge. The WildCAM network (Wildlife Cameras for Adaptive Management, <https://wildcams.ca>) was initiated in 2018 to bring together camera trap practitioners and projects in western Canada and facilitate more effective applications at regional scales. The network is growing and now includes more than 240 members running nearly 7000 camera traps in over 75 projects. In this presentation, I outline key goals of WildCAM; highlight recent progress in areas such as methodological tools, data syntheses, and management applications; and discuss future directions for the network to increase value for its members and maximize impact for wildlife management and conservation during this time of rapid environmental change.

Keywords: wildlife methodology; mammal monitoring; camera traps; data synthesis; regional management

Rat Management in the Rattiest Cities of Canada and America: A One Health Approach

Kaylee A Byers, Michael J Lee, Maureen H Murray, Chelsea G Himsworth

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Abstract: Urban rats are some of our closest neighbours, living alongside people in cities all around the world. As carriers of several bacteria and viruses that make people sick, municipalities are tasked with managing rats and the health and economic risks associated with them. But rat management remains challenging. A lack of best practices and a disconnect between management approaches that align with the underlying issues that promote rats (i.e., access to food and harbourage) and those that are feasible due to financial and resource limitations, results in a system where there are few indicators of success. In this talk, we will share a decade of research on rat and pathogen ecology in Vancouver, Canada, a multi-city perspective on rat management approaches in the United States, as well as lessons learned from research on human experiences with rats in Chicago, Illinois. Bringing together information on rats, humans, and their shared environment, we use a One Health lens to explore how this research can be integrated within municipal rat control policy and programming to leverage opportunities and overcome barriers to sustainable rat management.

Key Words: Community Reporting; Ecology; Pest Management; Rats; Zoonoses

Resituating Western Conservation Science: Assessing opportunities to bridge knowledges and reunite humans and ecosystems

Authors: Lauren E. Eckert, Andrea J. Reid, Jared Gonet, Sara Cannon, Ishana Shukla, Chris T. Darimont

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Abstract: Modern conservation sciences share common goals, among them preventing declines in biodiversity, halting extinction, and protecting ecosystems while supporting human well-being. Despite conservation successes, conservation scientists are increasingly called to improve research by i) further incorporating social sciences, ii) engaging in equitable research addressing historical inequities, and iii) bridging Indigenous and Western knowledges. These calls to action for better science abound, and provide opportunity for more effective research, advocacy, and “crisis response” in an era of need. However, we assert that limitations in the foundations and current understandings of conservation science hamper the ability of Western-trained scientists to rise to these calls.

Herein, we call for a resituating of Western conservation science. We emphasize that all science and knowledge accumulation is culturally-situated, and invite fellow Western conservation scientists to reconsider the epistemologies and cultural frameworks that inform Western science, reassess science’s values and biases, and re-examine the Western constructs that divide humans and natural systems. We also examine how ignorance to Western epistemologies and cultural contexts harms scientists, research, practice, and communities. Finally, we determine how a resituating of Western conservation science’s biases and benefits can make for better science and outcome, and open the door to knowledge-bridging opportunities.

Keywords: Indigenous knowledge, equitable research, human dimensions, knowledge-bridging, conservation

Building Indigenous community & youth connections through science, story, and reciprocity: a wildlife scientist's journey to doing community-valued research

Authors: Sydney Goward¹, Steve Andersen², Jason T Fisher¹, Trevor Lantz¹,

¹*University of Victoria, School of Environmental Studies*

²*Gwich'in Renewable Resources Board*

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Abstract: The Northern Richardson Mountains (Gwich'in Settlement Area; NWT) are home to a population of Dall's sheep, a species of significant cultural importance. This population has experienced dramatic fluctuations over the past 40 years, but exceptionally low numbers in 2014, limited demographic data, and a multitude of threats (exacerbated with rapid climate change in the area), has prompted significant local concern. This concern has led to the establishment of an Indigenous-led community-based monitoring program for Dall's sheep, which includes both scientific and traditional knowledge gathering.

Through local partnerships and novel methods in remote camera trapping, my research focuses on the science: investigating Dall's sheep population demography and the broader mammal community ecology. However, my community-valued approach to knowledge gathering and sharing transcends the bounds of historical scientific research. Youth are the heart of community yet rarely involved in scientific research. To truly pull together for wildlife, youth must be included in community-appropriate knowledge sharing and relationship building. I recently sought special funding and visited approximately 180 youth in the classrooms of three communities in the Gwich'in Settlement Area. These efforts, their impact, and the philosophy of this community-valued scientific approach will be the focus of my proposed talk.

Keywords: reciprocity, youth, camera trapping, wildlife ecology, community-based monitoring

Variation in Western Rattlesnake (*Crotalus oreganus*) migratory tactics in British Columbia

Authors and Affiliations: Howarth, Chloe R. (*presenting*), Bishop, Christine A., Larsen, Karl W.

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2 Wildlife Research Division, Environment and Climate Change Canada, Delta, BC Canada

3 Department of Natural Resource Sciences, Thompson Rivers University, Kamloops, BC Canada

Abstract: Migration is central to many animals' ecology, allowing individuals to respond to changing resource availability and exploit habitats favourable for critical life-history processes. Yet, migratory behaviour is not always ubiquitous within populations: multiple migratory phenotypes may exist. Western Rattlesnakes (*Crotalus oreganus*) in British Columbia undertake seasonal migrations between hibernacula and summer ranges. Multiple studies by our group have revealed immense variation in migratory behaviour and habitat use within and between populations, although the extent and drivers of this variation remain unclear. Using radio-telemetry data from multiple sites collected over 15 years, we are quantifying unique migratory phenotypes and considering whether differing tactics appear linked to site, landscape characteristics, and coarse scale habitat features, with the ultimate goal of developing a conservation planning tool. Further, we are considering whether ontogenetic shifts in migratory strategies occur in our study populations. We compared juvenile radio-telemetry data collected in 2021 to existing adult radio-telemetry data at the same site. Our results indicate that the variation seen in adult rattlesnake migration is also present in juveniles, though on a spatially reduced scale. This work is providing vital information for developing conservation strategies that recognize varying types of migratory behaviour in a threatened species.

Key words: Western Rattlesnake, migration, ontogeny, *Crotalus oreganus*, radio-telemetry

Mountain Goat (*Oreamnos americanus*) Seasonal Habitat Use and Population Dynamics in Southwestern British Columbia

Authors: Clifford Nietvelt¹, Ministry of Forests, Steve Rochetta, Ministry of Water, Land, and Resource Stewardship, Darryl Reynolds, Ministry of Forests, John Kelly, Ministry of Forests

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In 2018 and 2019, we collared 31 mountain goats (*Oreamnos americanus*) in the Mount Meager complex (10 males and 21 females) to study this population after the 2015 wildfires. We found home range size for females were much smaller than males, and summer home range size was several times higher, with seasonal shifts in elevation occurring for both sexes. Winter habitat selection indicates two ecotypes, interior and coastal, although most goats exhibited a coastal behaviour. In both models, steep slopes and warm aspect were selected for, and the use of old forests was in the top model of the coastal ecotype. Summer habitat selection was characterized by steep slopes as well as proximity grass and herbaceous meadows. We found mortality rates for goats of both sexes high with female survivorship at 0.56, and males at 0.40. While the population increased 138% from in 2009 and 2016, we estimated the population to be declining at approximately 10% to 16% per year since 2016. We suspect this increase was due to an influx of goats from other winter ranges due to the 2015 fires. While the proximate causes of decline were difficult to assess, approximately 40% of these goats were killed in avalanches.

Key Words: mountain goats, habitat use, survivorship, population, climate change

Factors associated with coyote dens and scats could be used to mitigate human-coyote conflict

Authors: Sage Raymond, Colleen Cassady St. Clair

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Abstract (198 words): Urban coyotes (*Canis latrans*) are associated with both physical conflict (e.g., attacks) and zoonotic disease risk, including the zoonotic tapeworm *Echinococcus multilocularis* present in coyote scats. Both forms of conflict might be mitigated by understanding how the unique ecology of urban coyotes causes humans and coyotes to overlap. We identified coyote dens and scats in Edmonton, Alberta where the tapeworm is especially prevalent, and compared both to environmental predictors and reports of coyote conflict. We also tested a subset of scats for infection with the tapeworm. Among 120 dens, we found few broad scale predictors, but a preference for dense vegetation and east-facing slopes, and more reports of conflict. Among 1263 scats, deposits were common near human residences, often contained anthropogenic food, and were sometimes fed upon by magpies (*Pica hudsonia*), which may redistribute tapeworm eggs. Among 269 tested scats, infection was more common in scats that contained anthropogenic food or were deposited near compost. Our results provide environmental predictors that might be used to mitigate risk of human-coyote conflict, such as by thinning vegetation that could promote denning, securing compost, and educating the public about the potential for tapeworm eggs to accumulate in locations frequented by coyotes.

Key words: Coyote, Disease Ecology, Habitat Selection, Human-wildlife Conflict, Urban Ecology

Investigating Spatial and Temporal Factors Driving Human-Wolf Interactions in Coastal British Columbia, Canada

Authors: Jenna K. Scherger¹, Todd Windle², Dr. Yuri Zharikov², Dr. Adam T. Ford¹

¹*Wildlife Restoration Ecology Lab, Department of Biology, University of British Columbia Okanagan, Kelowna BC,*

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Abstract: Human-carnivore conflict affects human safety, livelihoods, animal welfare, carnivore population stability, and ecological integrity. Understanding factors associated with conflicts may help to identify management actions that better support the safety of people and wildlife. Over the past few decades, interactions between people and wolves (*Canis lupus*) in Pacific Rim National Park Reserve, Canada have resulted in attacks on people, pets, and the death of wolves. To understand the drivers of conflict, we used data from 125 camera traps (2018-2022) to quantify spatial and temporal factors affecting wolf relative activity. We then used these activity models as predictor variables to understand the timing and distribution of 282 reported human-wolf interactions that occurred between 2017-2021. Our analyses suggested that wolf activity was consistently greater near rocky coastlines and recreational trails, and away from highways. We found a seasonal shift in wolf activity near rivers during autumn and winter. The predicted probability of human-wolf interactions increased near highways and beaches, and wolf activity had a relatively low and weak effect. Our results will provide management recommendations for establishing seasonal conflict mitigation strategies in areas with spatial overlap and where predicted probability for human-wolf interactions is highest.

Key Words: human-wildlife interactions; spatial ecology; carnivore ecology; remote camera traps; protected areas

Effectiveness of road mortality mitigation for at-risk snakes in the South Okanagan

AUTHORS

1) Spruyt, Jade A., 1) Matson, Michelle K., 1) Larsen, Karl W., 2) Bishop, Christine A.
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ABSTRACT: Reptiles are extremely vulnerable to demographic consequences of road mortality, so mitigation measures are becoming increasingly common to combat road mortality and aid in habitat connectivity. However, in-depth analyses of their effectiveness on reptile species remain rare. This study assesses the immediate impact of recently installed ecopassages and drift fencing on a Western Rattlesnake population in British Columbia. Using road survey, traffic monitoring, and mark-recapture methods, we analyze trends in the roadkill rates and population size throughout the periods before, during, and after mitigation measures were installed. Wildlife cameras in ecopassages allow us to quantify use by rattlesnakes, and compare detection frequencies to other at-risk snake species in the area. Rattlesnake roadkill rates have decreased after mitigation installation, despite there being an increase in traffic. However, rattlesnakes were less likely to use ecopassages than colubrids in the same community, and population estimates do not indicate a clear trajectory of recovery. This study highlights the short-term effects of road mortality mitigation on this threatened species, improves our understanding of how they adjust to changes in their environment, and emphasizes that long-term monitoring is necessary in order to detect changes in ecopassage use and population size past the initial implementation phase.

Keywords: herpetology, snakes, road ecology, conservation, ecopassages

Conservation of the Critically Endangered Vancouver Island Marmot (*Marmota vancouverensis*)

Speaker: Adam Taylor, Executive Director¹

Malcolm L. McAdie, Captive Breeding Coordinator / Project Veterinarian²

Marmot Recovery Foundation

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ABSTRACT

The Vancouver Island marmot (*Marmota vancouverensis*, VIM) is a fossorial, sciurid endemic to the subalpine meadows of central Vancouver Island. In the mid-1980s, there were an estimated 300 to 350 wild individuals. Beginning in the late 1980s a precipitous decline in this already rare species was observed and by 2003 the number of wild marmots was below 30.

In response to this dramatic collapse, the non-profit Marmot Recovery Foundation was established to support and implement recovery objectives, which emphasized captive breeding and reintroduction. Since its inception, this project has involved three Canadian zoological institutions and the construction of a dedicated facility at Mount Washington on Vancouver Island. Reintroductions began in 2003 and 587 marmots have been released to the wild as of 2022. Although recovery efforts have significantly increased the wild population, conservation of VIM still involves a concerted program of *ex situ* management, reintroductions, and translocations.

This talk will provide an overview of this conservation project, including a summation of how public engagement, funding and partnerships have supported long-term recovery efforts, and a description of captive management, reintroduction, and translocation efforts. It will also discuss the VIM's current status, and outline risk factors, management considerations, and future conservation plans for this uniquely Canadian species.

KEY WORDS: Captive Breeding, Endangered, Marmot, Non-profit, Reintroduction

Transforming Scientific Research into Audio/Visual Tools to Promote Wildlife Conservation

Authors: Emily Thoroski¹, Rick Baydack, ¹, Erin C. McCance², , and Jill Oakes¹,

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This research aims to investigate why wildlife matter to biologists and students, as well as to investigate how audio/visual can be used to help promote wildlife conservation. A major component of the research focused on identifying which communication tools are beneficial to educate the public on scientific research. Study methods included conducting interviews, completing a literature review, as well as creating audio/visual tools to display the results found in the data. Results from the analysis of the study identify themes and highlights critical information found within the research. Data from the interviews and literature review were analyzed and created into video and songs to easily display the information to a diverse audience. This unique research initiative identified several significant findings, to include that wildlife matter to biologists and students for a variety of reasons such as personal perspectives on how they play a direct role in their life, as well as the role wildlife play as part of the world's ecosystems providing balance and stability to nature's processes. As a songwriter, musician, and wildlife biologist, this multidisciplinary research bridges several disciplines to better understand human motivations toward environmental conservation.

Key Words: Human Dimensions, Environmental Communication, Audio/Visual Tools, Media, Environmental Education

Costs of living dangerously: snow avalanches are a major driver of mountain ungulate population ecology

Kevin White^{1,2,3}, Eran Hood², Erich Peitzsch⁴, Gabriel Wolken^{5,6}, and Chris Darimont¹

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Although snow avalanches represent a widespread and seasonally dynamic landscape-altering force in mountain environments, we know little about how they affect population dynamics of mountain wildlife. We used a long-term data set (2005-2022) collected from GPS/VHF radio-marked mountain goats (n=434) in four study areas in coastal Alaska combined with a spatially-explicit avalanche hazard model to quantify seasonal use of avalanche terrain and examine associated implications for mountain goat population ecology. We found avalanches to be a major source of mountain goat mortality (mean=36%, n=240) that varied spatially and temporally in relation to geographic, climatic and ecological characteristics of regional study areas (range, study area=23-63%). Seasonal patterns of mortality were also linked to use of avalanche terrain, with animals that died in avalanches showing significantly higher use of such features (61±4%, n=69) than those that did not (47±2%, n=225). At the population level, reductions in annual survival resulting from avalanche-caused mortalities ranged between 0-24% suggesting that interannual variability in winter weather conditions and resulting snowpack stability may affect mountain goat population dynamics in more complex ways than previously known. Combined with previous research, these findings advance our understanding of how projected changes in the mountain cryosphere may influence mountain ungulate populations – species that are recognized as sentinels of mountain ecosystem health and productivity.

Key words: avalanche, climate, mountain goat, population ecology, snow

Creating habitat for a threatened bird on a new transmission line in Manitoba

Authors:

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The golden-winged warbler (*Vermivora chrysoptera*) is a migratory North American ground-nesting songbird listed as Threatened under the Canadian federal *Species at Risk Act* and the Province of Manitoba's *The Endangered Species and Ecosystems Act*. In Canada, breeding habitat is often regenerated by natural and human disturbances, including transmission line corridors, if they are maintained in a manner that retains shrubs and grasses along forest edges.

During a recent transmission line project, Manitoba Hydro recognized that a portion of the proposed route intersected an area defined as critical habitat for the golden-winged warbler. In fulfilment of regulatory requirements, a golden-winged warbler right-of-way habitat management plan was developed. Right-of-way vegetation was selectively cleared of trees in the winter, with shrubs and grasses maintained using an integrated vegetation management approach to enhance long-term habitat suitability, but also allow safe and reliable operation of the Project.

To monitor project effects, pre-construction (2017 and 2019) and post-construction (2020 and 2021) vegetation and point count surveys were conducted to monitor changes in warbler preferred breeding habitat and breeding pair occupancy on and adjacent to the right-of-way.

Post-construction results indicated that habitat regrowth appeared to be slower than expected and the planned objective of retention of understory shrub habitat during clearing was not fully achieved. Although habitat mitigation did not appear to meet all objectives of immediately enhancing or maintaining golden-winged warbler breeding habitat throughout the right-of-way, post-construction breeding pair occupancy was maintained. When considering pre- and post- construction occupancy monitoring with control sites, this study identified no apparent effects on golden-winged warbler breeding pair occupancy.

Keywords: threatened species, golden wing warbler, Canada, utility, habitat

RAPID FIRE TALKS (Alphabetical order by first author last name)

Home Range and Movement Patterns of Released and Wild Vancouver Island marmots (*Marmota vancouverensis*)

Authors: Haley Andersen^{1,3}, Malcolm McAdie², Jamie Gorrell¹

¹ Biology Dept, Vancouver Island University

² Marmot Recovery Foundation

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The release of captive-bred individuals into the wild has been used to re-establish small populations that have faced severe declines and are no longer viable on their own. The captive breeding of Vancouver Island marmots (VIM) has been underway for the last two decades to help the species recover from a population bottleneck. In this study, we compared home range estimates and survival of wild-established and newly released VIM to measure the success of released individuals establishing in the wild. We used radiotelemetry to track individuals over their 5-month active period and estimated home ranges using daily GPS locations. Newly released marmots had greater home ranges than wild marmots, and home range size decreased with age. However, home range size did not vary between males and females, nor between marmots that survived until hibernation and those that did not. Furthermore, contemporary marmots displayed decreasing home range sizes compared to historical estimates. This indicates the captive-breeding and release program has been successful over the last two decades but leaves room for more questions about the behaviour of newly released marmots.

Keywords: Endangered species, marmot, home range, radiotelemetry, captive release

Cougar response to recreational activities in a wilderness area on southern Vancouver Island

Author Name: Emerald Arthurs

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Establishing protected areas is one of the main methods for biodiversity conservation, but such spaces are often established with a dual mandate to provide recreational activities and support conservation. Recreational activities have been shown to induce fear responses in carnivores — displacing them spatially and temporally — which can have cascading effects on the wider ecological community. This research aims to quantify the spatial and temporal responses of cougars to recreation in the Sooke Hills Wilderness Area Regional Park on southern Vancouver Island. To quantify spatial response to recreation, camera trap data were modeled using generalized linear mixed models, while temporal response was estimated using activity pattern analysis. Preliminary results indicate that significant spatial avoidance is absent, however, there is little temporal overlap between recreationalists and cougars. These results may indicate that cougars are using temporal avoidance as a response to recreationalists, and space use may be impacted by the large amount of viable habitat in proximity to the study area. Insights on how cougars are responding to recreation activities can help to inform management and policies within the park and ensure that recreational activities are remaining compatible with conservation efforts.

Key words: human-carnivore interactions, cougar, wildlife ecology, conservation ecology, spatiotemporal interactions

Large-scale anthropogenic and natural landscape traits entrain different mammalian responses to local anthropogenic disturbance

Authors: Andrew F. Barnas, Andrew Ladle, Joanna M. Burgar, Cole Burton, Mark S. Boyce, Laura Eliuk, Fabian Grey, Nicole Heim, John Paczkowski, Frances E.C. Stewart, Jason T. Fisher

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Abstract: In the western Nearctic boreal system, many studies focus on a single landscape examining species-stressor relationships, but these may vary among landscapes. Large-scale syntheses of camera data can identify generalizable trends and interactions between site (e.g. disturbance at camera sites) and landscape level (e.g., cumulative landscape disturbance, productivity levels) effects. We collected images from 957 camera sites across 9 landscapes in Alberta from 2009-2020, representing 380,635 camera trap days, and fit GLMs examining occurrence for 11 mammal species. White-tailed deer preferred higher disturbed sites within lower disturbed landscapes ($\beta = -0.28 [-0.4 - -0.15]$), whereas moose preferred higher disturbed sites within higher disturbed landscapes ($\beta = 0.2 [0.09 - 0.31]$). Higher productivity habitats in high disturbance sites were preferred by black bears ($\beta = -0.24 [-0.46 - -0.01]$), lynx ($\beta = -0.75 [-1.08 - -0.41]$), and wolves ($\beta = -0.51 [-0.79 - -0.24]$), but opposite for mule deer ($\beta = 0.77 [0.39 - 1.14]$), and white-tailed deer ($\beta = 0.24 [0.01 - 0.47]$), with a higher probability of occurrence in low productivity habitats with increasing site disturbance. Large-scale syntheses can identify generalized trends for some species, but fail to do so for others, indicating more specific conservation interventions may be required.

Keywords: camera-trap, synthesis, anthropogenic disturbance, resource extraction, boreal forest

Molecular systematics of enteric parasites in the Vancouver Island marmot

Authors: McIntyre Barrera, Jasmine Janes, and Jamie Gorrell

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Isolation on islands can simultaneously accelerate genetic divergence and threaten the persistence of endemics when their limited habitat is disrupted. Similarly, parasite lineages may be shaped or constrained by the phylogeography of their hosts. Here, we assessed the divergence of two enteric helminth parasites in the Vancouver Island (VI) marmot and reconstructed their phylogenetic relationships using Bayesian and maximum parsimony approaches. We produced and aligned the first genetic sequences from *Baylisascaris laevis* and *Diandrya vancouverensis* with congeneric sequences from GenBank. Mean pairwise sequence divergence between *D. vancouverensis* and *D. composita* ($9.06 \pm 1.94\%$) surpassed commonly accepted thresholds for species delimitation, whereas pairwise divergence between VI and mainland populations of *B. laevis* ($1.12 \pm 0.78\%$) was comparable to (or sometimes greater than) divergence between other *Baylisascaris* species. This study provides evidence for at least one endemic parasite in the VI marmot and is a crucial first step in characterizing the phylogeography and systematics of two understudied species. Further analyses of population genetic structure for both parasites, in concert with long-term monitoring of their effects on the VI marmot, may contribute to new paradigms for conservation of all three species.

Keywords: Coevolution; Phylogeography; Island biogeography; Cryptic biodiversity; Parasite conservation

Conflict and Coexistence with Mountain Goats in a Protected Alpine Landscape

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Achieving human-wildlife coexistence in protected areas requires an understanding of how human activities influence the biological interactions between wildlife and their habitats. Cathedral Provincial Park (CPP), located in the southern interior of British Columbia, Canada, is one such protected area where human activities may be influencing the spatial ecology of mountain goats (*Oreamnos americanus*). Mountain goats are known to be sensitive to human disturbance, and the herd in CPP is subject to year-round disturbance from recreation (e.g., hiking, camping, mountaineering) and helicopter activity. These disturbances can initiate changes in goat behaviour, such as displacement from suitable habitat or altered daily movement patterns. We explored the impacts of human activity on goats in CPP from 2019-2021 using GPS location data from 11 collared goats. We formulated seasonal Resource Selection Functions (RSFs) and estimated seasonal home ranges. As well, we measured the response of goats to helicopter activity. Our results indicated significant seasonal shifts in habitat selection towards areas associated with humans. Further, we found that mountain goats modified habitat selection and movements in response to helicopter activity. Our results will help inform guidelines and practices on helicopter and recreation management in mountain goat range.

Keywords: mountain goat, protected areas, spatial ecology, helicopter disturbance, habitat selection

Squeezing biologically relevant visits out of camera traps: A comparison of independent visits to total images

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Abstract: The use of camera traps to survey wildlife has gained popularity over the years. Camera trap researchers encounter many challenges when studying unmarked individuals, which are not easily distinguishable. By temporally grouping series of images together, researchers can define an independent visit to study wildlife visitation patterns. In a review of camera trap papers, we discovered that the time thresholds used to define independent visits were often arbitrary and did not consider the study or species specifics. Using camera trap data, we monitored moose visitation to a roadside mineral lick in north-central British Columbia, Canada, from 2020-2022. We compared different threshold times and image combination methods to define a biologically relevant independent visit length for moose. Our findings suggest that there is a strong correlation between camera visits of varying lengths and the overall number of images at that camera location. This suggests that the number of images could be used as an index of the magnitude of use of a mineral lick by moose, effectively saving time needed to classify wildlife images. These results are specific to moose at roadside areas in north-central BC but have wide applicability to other camera trap studies, particularly those monitoring wildlife use of transportation corridors.

Key words: *camera trap, moose, mineral lick, roadside, independent visit*

Risk-prone maternal resource selection linked to survival of older moose calves across disturbed landscapes

Authors: Nicole Boucher, Chris Procter, Morgan Anderson, Shelley Marshall, Gerald Kuzyk, Brian Starzomski, Jason Fisher

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Abstract: Maternal habitat selection in ungulates shapes juvenile survival, leading to interindividual variation in recruitment success. Mothers must balance resource availability and predation risk when selecting habitat, impacting their ability to allocate energy to offspring. Using resource selection functions, we examined seasonal habitat selection of radio-collared adult female moose in relation to their success in recruiting older calves from approximately 8-months to 1-year of age across two different biogeoclimatic zones in western Canada. We also compared maternal body condition and previous success between successful (recruited calf to 1 year) and unsuccessful (calf mortality prior to 1 year) females. Seasonal habitat selection reflected changing maternal energy requirements through the year, with increased resource prioritization during energy-intensive periods like lactation. Patterns in habitat selection differed between successful and unsuccessful female moose, and study areas. While we expected unsuccessful females to exhibit riskier habitat selection, the opposite was true. Generally, successful mothers exhibited riskier behavior, selecting for polygonal disturbances (e.g., cutblocks and burned habitat) with reduced cover but increased potential forage. Conversely, unsuccessful mothers selected habitat for more hiding cover but less foraging potential, possibly leading to poorer nutrition. Risky behavior by mother moose likely offset nutritional deficits, allowing for increased energy allocation into recruiting young.

Key words: moose, ungulates, juvenile survival, recruitment success, maternal habitat selection

Scaling Up from Site to Region: Predicting Fisher Responses to Landscape Change

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Abstract: Fishers (*Pekania pennanti*), a housecat-sized relative of wolverines and martens, are declining and at high risk of extirpation in the Central Interior of British Columbia, due to extensive habitat disturbance from forest harvest. A lack of coordinated landscape level planning has led to diminishing opportunities to maintain the limited remaining habitat. To quantify responses to different management scenarios, we combine Individual-Based Modelling with spatially discrete event simulations (SpaDES) to follow generations of individual fishers through key life-history stages. By ‘scaling up’ existing knowledge that describes individual fisher habitat relationships, these models allow us to evaluate, understand, and predict changes to local fisher populations caused by management decisions (e.g., trapping closures, forest harvesting and development, designation of conservation areas). To support sustainable populations of fishers into the future, we are using this modelling approach to: 1) understand the amount and arrangement of forests fishers need; 2) guide decision-makers when identifying areas for development and protection, that minimize disturbance and maximize protection of fisher habitat and populations; and 3) guide the retention of fisher habitat in timber harvest allocations so that sufficient habitat is conserved at regional scales.

Key Words: fisher, Individual-Based Model, SpaDES, predictive modelling, forest harvesting

Get out of the heat: Can we attract Western Rattlesnakes to artificial refugia?

Authors:

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Abstract

The extirpation of certain species from areas of development may be preventable if proper mitigation efforts are employed. The co-existence of people and snakes (particularly venomous ones) can be especially challenging. Techniques that allow snakes to persist in the face of development include the installation of culverts, highway passages, and exclusion fencing. In Osoyoos BC, the latter is used to minimize Western Rattlesnake (*Crotalus oreganus*) intrusion into a campground resort. However, altered movement patterns and prolonged exposure to intense heat along the fencing appear to increase snake mortality. We will report on an attempt to prevent these deaths using underground refugia installed along a snake fence between 2020-2022, including a test to determine whether refugia colonization by snakes could be hastened through the establishment of conspecific scent trails into some of the refugia. Camera monitoring suggests higher usage rates in treated refugia, with overall usage in 2022 triple that seen in 2020, suggesting time is needed to ensure local populations become familiar with refugia. This study provides an example of how the effects of one mitigation tactic needs to be, in turn, mitigated. Ultimately, reducing animal mortality in areas of development will require research and thoughtful application of mitigation tools.

Key Words: artificial refugia, exclusion fencing, mitigation efforts, Species-at-risk, human-wildlife conflict

Causes and Consequences of Social Cohesion in Sable Island Horses: From the Individual to the Population Level

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Animals tend to form complex social relationships within their societies, which creates both costs and benefits for their individual fitness and reproductive success. Furthermore, interactions within and between groups can be scaled up for their influence on population-level dynamics. With this study, I am willing to explore the patterns of social affiliations between Sable Island feral horses (*Equus feral caballus*) and their influence on individual fitness and population metrics. Preliminary analysis of spatial proximity data shows that horses associate non-randomly with members of their groups, preferring those of the same sex and similar age. I aim to further investigate how genetic relatedness, dominance rank, boldness as a personality trait, and duration of band membership shape affiliative relationships within bands. I will then examine the links between social metrics and measures of parasite loads and female fecundity. Finally, using average scores of social cohesion between members for each band, I will explain larger scale variation in the band- and population-level parameters relative to limiting factors such as population density, habitat quality, and adult sex ratio. This research will have important implications for conservation and management in terms of keeping the most appropriate social structure for the studied species.

Key words: sociality, fitness, social behaviour, population dynamics

Tires vs tracks: Linear features explain mammal distributions better than motorized recreation in Alberta's Rockies

Authors: Laura Eliuk (MSc student) and Dr. Jason Fisher

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Abstract: Human development has restructured natural landscapes, causing range contractions and population declines in many mammals. Linear features in the form of roads, trails, and cutlines carve through forested areas, creating means for human access to natural landscapes. The differential impacts of landscape change vs human activity on mammal distributions are unclear; studies have found that some mammals avoid humans, but whether this avoidance scales up to impact distributions is unclear. To assess the impact of motorized activity on the distributions of mammal species, we used wildlife cameras to model both mammal distributions and motorized activity across Alberta's Bighorn Backcountry. Situated in Alberta's central Rockies, this region is popular for motorized recreation, while providing habitat to a relatively intact mammal community. We used generalized linear models to assess whether motorized use intensity outweighs natural or anthropogenic landscape features in explaining species occurrence. We predicted that motorized recreation would explain the distributions of disturbance-sensitive species (wolves, grizzly bears) but not human-tolerant species (black bears, deer). We found that motorized recreation did not have strong explanatory power for any species; anthropogenic landscape features had the strongest explanatory power. These results indicate that species avoidance of human activity may not scale up to distributions, but motorized recreation helps maintain a linear feature network that affects species distributions.

Key words: Mammals, Camera trap, recreation ecology, wildlife management, biodiversity

Birth control for deer? The effectiveness of non-lethal population reduction methods for urban deer management in Victoria, BC

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Abstract: Urban wildlife management has historically focused on culls for population reduction, yet shows questionable cost- and outcome-effectiveness as it regularly results in population rebounds. Within the Oak Bay municipality of Victoria, British Columbia, a non-lethal population control study on the native Columbian black-tailed deer (*Odocoileus hemionus columbianus*) has been taking place over the last 3 years that offers insights for more effective urban wildlife control. Through the combined use of camera traps and GPS collars, we have found that deer tend to have relatively small home ranges (0.14 km²) compared to their non-urban counterparts, and that they tend to select for green spaces and large, lush lots that provide a significant source of supplemental non-native browse. Concurrently, we are showing that the application of immunocontraception to >63% of the doe population (in our case 60 does) has decreased fawn abundance by 58% after one year of contraception with Zonastat-D (PZP vaccine). Immunocontraception, in tandem with methods to decrease deer access to supplemental urban food sources, shows promise for effective non-lethal population control, saving both effort and cost to municipalities.

Keywords: urban wildlife, wildlife management, ungulate, population control

Boreal mammal declines with cumulative effects of development: Why are they happening?

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Abstract: The mammal wildlife living in Canada's western boreal – from squirrels to moose – are dealing with the cumulative effects of resource development. These effects violate Treaty 8 rights and so are a prime focus for wildlife and landscape planners. But what are the mechanisms behind these relationships? I synthesize a decade of research on mammals in the western boreal based on camera-trapping in multiple landscapes, from high to low development. Two trends emerge from the complexity of boreal systems. First, herbivores are exploiting the resource subsidies generated by converting old forest to new. Second, predators and competitors are exploiting those herbivores, which provide their own form of resource subsidy. A third major system shift – reduction of top predators, wolves – changes this hustle even further, as subordinate competitors are free to exploit new resources. I show how Indigenous-led research can examine these complex relationships into the future, and what wildlife managers can gain from collaborative multi-landscape research that examines entire communities.

Keywords: landscape ecology, mammals, carnivores, ungulates, boreal.

Trapping mortality accelerates the decline of the fisher, an endangered mesocarnivore, in British Columbia, Canada.

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Abstract: Understanding the key factors driving the population dynamics of endangered species is critical to effective conservation. Habitat loss, fragmentation, and trapping all have been linked to declines in the endangered population of fishers (*Pekania pennanti*) in central British Columbia (BC), Canada. Although the commercial trapping season for fishers has recently been closed in central BC, the animals are still taken in traps legally set for other furbearing species, and with this continuing source of mortality the sustainability of this vulnerable population remains unclear. We constructed population viability models in program Vortex to evaluate the specific impacts that trapping mortality would have on Columbian fisher population persistence under different trapping scenarios. Our modeling predicted that current mortality sources, including deaths in traps set for other species, will cause the population to disappear within 11 years. With no additional fur harvest mortality, the Columbian population appeared unlikely to persist beyond 37 years. Our analysis provides evidence that along with the continued trapping closure for fishers in central BC, it is likely necessary to modify trapping regulations and methods for other furbearers in the region to sufficiently reduce mortality from bycatch and help prevent extirpation of the population in the very near future.

Keywords: Fisher; *Pekania pennanti*; Trapping mortality; Population modeling; Extirpation

Haplotype diversity, population structure and sex-biased dispersal in boreal lynx

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The Canada lynx and the snowshoe hare undergo a 10-year population cycle that leads some lynx to disperse large distances across the boreal forest. Previous studies found little spatial genetic structure in lynx but have not considered the phases of the cycle when samples were collected. Additionally, it remains unclear if lynx exhibit sex-biased dispersal and what the consequences of this may be on their population genetics. We sequenced the mitochondrial control region from >250 lynx samples collected from northern British Columbia and the Yukon and discovered 23 unique haplotypes. We will discuss 1) if spatial genetic structure is present, 2) if the phase of the cycle influences the level of structure found, and 3) if there is evidence of sex-biased dispersal. Through mitochondrial DNA we hope to determine how sex-specific dispersal behaviour and the 10-year population cycle affect Canada lynx gene flow, and furthermore, the general ecology of the boreal forest.

Keywords: population genetics, lynx, mitochondrial DNA, dispersal, gene flow

Gaining Traction on Conservation Action: Modifying Human Behaviour for Fisher Habitat Conservation

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Abstract: In the world of conservation biology, how do we turn knowledge into action? Effecting conservation action often requires changing the behaviour of the people whose decisions on the landscape are impacting the species we are trying to conserve. Extension is an informal educational process directed towards a target audience with the objective of changing their knowledge, skills, and attitudes to bring about desirable change in their behaviour. The BC Fisher Habitat Working Group has applied an extension framework to disseminate the findings of over thirty years of fisher (*Pekania pennanti*) research across the province to enhance the capacity of forestry practitioners to maintain fisher habitat throughout the timber harvesting process. By identifying our target audience, developing conservation tools and guidance specific to their abilities, and disseminating our knowledge of fishers and the role that forestry can play in maintaining fisher habitat, we have facilitated forestry practitioners to incorporate fisher habitat needs into their decision-making process. Throughout this process, we have also identified limitations to turning knowledge, skills, and abilities into voluntary change, with important considerations on the need for legal tools to effect action towards species and habitat conservation.

Keywords: *Pekania pennanti*; habitat conservation; human behaviour; forestry; extension

Anthropogenic footfall contrasts anthropogenic footprint in predicting fisher (*Pekania pennanti*) occurrence across diverse Albertan landscapes.

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Abstract: Species distribution models (SDMs) are one method used to explain and predict animal occurrences. Occurrence is influenced by multiple ecological processes that vary across landscapes, leading to misrepresentation of the importance and strength of distribution drivers. Fishers (*Pekania pennanti*) are a mesocarnivore known to favour forests with complex structure, yet the influence of other factors driving their distributions varies among studies. We aimed to determine the strongest predictors of fisher occurrence by evaluating the strength of; (1) natural landcover; (2) anthropogenic landscape disturbances; (3) snow and topography; and (4) co occurrence of competitors, predators, and prey. We sampled fisher occurrence using camera traps deployed across three markedly different landscapes in Alberta, Canada.

Anthropogenic landscape disturbance most strongly predicted fisher occurrence. Occurrence was negatively explained by the “footfall” of anthropogenic disturbance (actively used features), and positively by the “footprint” (inactive features). Natural landcover was not the strongest predictor of occurrence; however, fishers were positively associated with all available habitat types. SDMs must consider the relative strength and direction of distribution predictors when isolated from regional habitat availability constraints by including multi-landscape observations.

Developed landscapes have severe implications for sensitive species, thus multi-landscape inferences are required for conservation and management objectives.

Keywords: Anthropogenic disturbance, Camera traps, Fisher, Species distribution models, Threatened species.

The influence of recreation on animal movement in US National Parks

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Abstract: Many protected areas are tasked with the dual mandate of conserving wild places and wildlife within them, while providing recreation opportunities for visitors. The recent, rapid growth of outdoor recreation has raised questions about trade-offs inherent to the dual mandate, including concerns about the effects of recreation on wild animals. In spring 2020, the COVID-19 pandemic led to the temporary closure of many US National Parks, generating a unique natural experiment that allowed us to examine the effects of recreation on wildlife and tease apart impacts of human infrastructure and presence. With collaborators across NPS, state wildlife agencies, and academic institutions, we compiled GPS tracking data from 2019 and 2020 from 304 individual animals across 11 large mammal species (5 carnivores and 6 ungulates) in 17 national parks. We used Bayesian Resource Selection Functions (RSFs) to quantify the influence of recreation infrastructure on animal movement in and outside of the park closure periods. Our results suggest a diversity of responses to human infrastructure and to park closure across species, individual animals, and parks. This study contributes to our growing understanding of the complex interactions between recreation and large mammals and sheds light on mechanisms for human-wildlife coexistence in protected areas.

Keywords: recreation, human-wildlife interactions, movement ecology, protected areas, large mammals

Motorized vessel behaviour and compliance to Marine Mammal Regulations in Northeast Vancouver Island

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Abstract: Vessel disturbance and collisions comprise the most frequent human-caused threats to marine mammals, having significant impacts on individuals, populations, and boater safety. In a 2022 pilot season (n = 156 observation hours, 144 interactions between marine mammals and boats), we assessed motorized vessel compliance with federal marine mammal distance regulations relating to humpback and killer whales in the Johnstone Strait region of Northeast Vancouver Island. Generally, we found variation in distance to marine mammals across sites, vessel types, species, behaviour, and time of day. Most non-compliance events occurred around humpback whales and by recreational vessels. Results from this work will identify geographic and practical areas of focus for education and enforcement to advise DFO and help inform the Marine Education and Research Society's "See a Blow, Go Slow!" campaign and online boater education course. More broadly, the findings can inform regulations considered in other areas towards standardizing policy across jurisdictions for these highly mobile marine mammal species.

Key Words: Marine mammals; Regulations; Vessel management measures; Conservation tools; Vessel strikes

Spatiotemporal and Dietary Responses of American Black Bears to Anthropogenic Disturbance in Yosemite National Park, USA.

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Abstract: Management of black bears (*Ursus americanus*) in Yosemite National Park, USA, has been effective in reducing human-bear incidents over time. However, black bears, by nature, are susceptible to habituation and food conditioning. Anthropogenic and non-native foods, such as human food waste and cultivated apples, remain available to bears near developed sites. Further, COVID-19 park closures in 2020 provided a change in human visitation that may have affected current bear behavior and increased habituation. In a new research collaboration between UBC and NPS, our team aims to analyze bear GPS collar data before, during, and after COVID closures in the park to understand bear spatiotemporal patterns and habitat selection in relation to human presence, infrastructure, and resource availability. Additionally, we will likely conduct a scat analysis to understand bear diets in the valley and deploy camera traps to study bear activity in fruit orchards and near campsites. By conducting this study, we strive to obtain the knowledge to reduce human-bear incidents in the park, and improve outcomes for both bears and visitors.

Key words: Human-wildlife conflict, foraging behavior, movement ecology, protected areas, habituation

A snapshot of the dietary breadth of introduced European wall lizards (*Podarcis muralis*) in urban Victoria, British Columbia

Anticipated final authorship*

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Abstract

Where a significant overlap in niche exists, invasive introduced species with superior adaptations and generalists' tendencies have the potential to competitively exclude native species from their habitats. Since 1970, the range expansion of invasive European wall lizards (*Podarcis muralis*) throughout southern Vancouver Island, British Columbia (BC), has raised concerns about their impacts to native fauna. In this analysis of the diet of the species in BC, we collected presence/ absence data of prey items found in the digestive tracts of 90 dissected specimens of wall lizards collected in urban Victoria, BC, in late summer, 2022. Our preliminary findings show evidence of diverse feeding habits matching previous accounts of opportunistic feeding behaviour observed in their native range of the animal, with ants being the most common item. We also found several instances of apparent cannibalism. Although very limited in scope, this study highlights the potential for the European wall lizard to act as driver of change in trophic systems in its BC range. Future diet studies should be wider in scope and may employ molecular analysis tools to compare the diets of wall lizards with sympatric species, thus revealing further the degree to which European wall lizards compete with native fauna.

Keywords: introduced species, diet, lizards, competition, *Podarcis muralis*

Hare population cycles impact lynx genetic diversity and gene flow

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The iconic Canada lynx – snowshoe hare population cycle is a key predator-prey process regulating biodiversity in the boreal forest of North America. As snowshoe hare populations rise and fall over 10-year periods, populations of lynx follow suit. Past genetic work has indicated that lynx populations are nearly panmictic at the continental scale. However, some lynx disperse vast distances as hare populations decline, suggesting that population structure and diversity may vary during different phases of the cycle. We used thousands of genome-wide markers to analyze lynx diversity, relatedness, and population structure across phases of the most recent cycle in the northwest boreal region. We identified a significant proportion of close relatives (~10%) across different localities, indicating recent long-distance dispersal events. All sampled lynx belonged to a single genetic cluster regardless of cycle phase, which is likely a result of increased dispersal and gene flow during cycle declines. Finally, we found that diversity increased over the course of the cycle, which may be driven by bottleneck-induced inbreeding at the beginning of the cycle and subsequent recovery as the population grows. These results highlight the cycle as an important mechanism influencing lynx dispersal and genomic patterns of structure and diversity.

Keywords: lynx, predator-prey, genetic diversity, dispersal, gene flow

Patterns of endoparasitism in the Vancouver Island marmot

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Enteric parasites of small mammals can have wide-ranging effects throughout an ecosystem, often driving co-evolutionary and ecological processes. The Vancouver Island marmot (VIM), *Marmota vancouverensis*, is an endangered alpine rodent endemic to Vancouver Island, British Columbia, Canada. The objective of this study is to describe the diversity, prevalence, egg abundance, and monthly variation of enteric parasites in the VIM. Fecal samples were collected from wild and captive marmots and were analyzed using a modified McMaster fecal egg floatation technique to estimate parasite presence and relative abundance. Three parasite taxa were identified in wild VIM: a protozoan *coccidia* not previously described in the VIM (prevalence: 68%), an ascarid nematode *Baylisascaris laevis* (prevalence: 82%), and an anoplocephalid cestode *Diandrya vancouverensis* sp. nov. (prevalence: 8%). Comparisons revealed variation in parasite burden among colonies, between sexes, and between wild and captive VIMs. Finally, captive VIMs displayed significant monthly variation in parasite egg abundance. This information is important for future research investigating the ecology, health, and conservation of the VIM.

Keywords: Endangered species, marmot, parasites, fecal egg counts

Using Camera Traps to Model Recreation Impacts on Cougars on Southern Vancouver Island

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Abstract:

As outdoor recreation increases, the concern of its impact on carnivores is regarded as an important conservation issue. Recreation activities such as hiking and cycling have been shown to cause temporal and spatial avoidance of human-used areas. Cougars (*Puma concolor*) are particularly susceptible to these impacts due their need for high-quality habitat with minimal disturbance to successfully hunt and den. Therefore, it is important to understand potential impacts of recreation on cougar spatial distribution and habitat use patterns for proper management. The objective of this study is to identify suitable cougar habitat and assess cougar spatial dynamics in response to recreation. We examine this in a complex array of publicly and non-publicly accessible cougar habitat on southern Vancouver Island, an area with the highest density of cougars in North America. Using data from an array of 50 camera traps showing the location and timing of both cougar and recreationist observations, we are looking to apply habitat suitability and occupancy modeling for visualizing areas critical for protection and quantifying cougar space use. Preliminary findings from a subset of camera traps reveal no significant spatial avoidance but indicate possible temporal avoidance with minimal temporal overlap between human and cougar use of areas.

Key words: camera traps, cougar, habitat suitability, occupancy, human-carnivore interactions

Carnivore Connectivity in Western Canada – Where Grizzly Still Roam

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Abstract: Restoring and conserving ecological connectivity has become a global priority - recognized as governing species persistence. In this study we propose to model and map carnivore connectivity, to identify critical areas for conservation and help abate the decline of biodiversity. We focus on southwestern British Columbia, where high species diversity includes multiple mammalian carnivores, vulnerable to habitat loss and fragmentation owing to intrinsic biological traits, and their requirement for large intact and connected spaces. Using an agnostic multi-species approach, we test how connectivity for carnivores is influenced by natural and anthropogenic features. Specifically, our approach captures multiple carnivore species of similar ecological requirements, uses natural and anthropogenic features to build cost surfaces, and applies Circuit Theory to model and map ecological connectivity. By pinpointing movement pathways and barriers, our maps can help guide the restoration and protection of important carnivore linkages, advancing connectivity conservation for the survival and persistence of keystone species across western Canada.

Keywords: Ecological connectivity, Circuit Theory, movement corridors, carnivores, conservation

Habitat viability of a mountain ungulate under climate change

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Abstract

Understanding changes in wildlife distributions associated with climate change is a key element of management for maintaining the resilience of populations. We investigated potential changes in habitat for a culturally and ecologically important species, the mountain goat (*Oreamnos americanus*), in the Territory of the Kitasoo Xai'xais First Nation (KXFN) on the Central Coast of British Columbia, Canada. We conducted aerial surveys during the summers of 2019 and 2020 and applied an occupancy modeling framework to determine how habitat features, including elevation, ruggedness, and temperature, influenced habitat selection by goats. Available goat habitat will likely decline with increased warming, and low-elevation mountain complexes that characterize coastal ecosystems are unlikely to provide sufficient altitudinal (thermal) refugia. We contextualize our results in coastal ecosystems, such as Kitasoo Xai'xais Territory, where extirpations may occur more likely if threats to goats (e.g. high elevation logging, hunting) persist. We suggest that cautious stewardship approaches, like those illustrated by the KXFN, provide the most promising outlook for species likely to be adversely affected by climate change.

Keywords: Mountain goat, *Oreamnos americanus*, mountain, climate change, occupancy model

Social Group Composition and Body Condition in Northern Resident Killer Whales

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Abstract: Conservation and management of small populations is challenging, given the large effects of single births or deaths on population dynamics. In such cases, evaluating the physiological health of individuals might provide early signals of population increase or decline. Previous work has shown how body condition of Southern Resident Killer Whales, scored from aerial images, were associated with mortality probability and salmon availability. Little is known, however, about the possible influence of social group composition, given prey-sharing behavior between group members. Using drones, we collected aerial images to estimate body condition of Northern Resident Killer Whales over nine years (2014-2022) to evaluate the health of individuals, some across multiple years (n = 204 individuals; 126 individuals and 25 matrilineal subject to multi-year estimation) in a population of 335 whales. Our objective was to examine the association between the body condition of individuals and the structure of their familial social groups (matrilines), while accounting for salmon availability. We found variation in body condition among age classes, years, and social groups, revealing how not only food availability but also sociality can influence individual health. More broadly, our approach considers how the health of individuals and their social relationships can link to population health and conservation.

Key words: killer whale, drone, body condition, sociality, prey sharing

Going up in flames - identifying wildlife habitat at high risk of fire

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Abstract: Wildfire is a natural but highly unpredictable phenomenon altering forest structure and thus wildlife habitat. Species that rely on structures in old forest stands (like fisher, or northern goshawk) or that are sensitive to early seral forest (like caribou) are highly impacted by fire because it alters the abundance of critical habitat types. Climate change is projected to increase fire frequency and severity across western north America further jeopardizing these habitats. We developed a statistically based fire simulation model to explore how fire could influence the availability of forest habitat across British Columbia into the future. Our model is based on observations of fire ignitions and burn polygons collected between 2002 – 2021 and is parameterized using information on vegetation, climate, human density, and landscape topographic characteristics. By simulating fire ignition, escape, and spread across the landscape hundreds of times we can identify low and high fire risk areas. To project fire risk into the future, we update our model with future climate data. We will present preliminary results on trends in fire risk across BC identifying refugia and high-risk areas and present this in relation to wildlife habitat that is critical to species such as caribou, fisher, and goshawks.

Keywords: fire risk, wildlife habitat, fire simulation, climate change

The Use of Artificial and Semi-Natural Nest Structures in Raptor Mitigation Projects: A Review of Applications, Efficacy and Future Directions

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ABSTRACT: The south coast of British Columbia harbours the greatest densities of both breeding and wintering raptors anywhere in Canada. It also supports some of the highest densities of human population in western North America. As a result, the potential for urban-raptor conflicts are much greater than many other places in Canada, and with the return of once threatened species, such as the Bald Eagle, there have been an increasing number of permit applications for nest removals or relocations. With only three known nests in the Vancouver area in the early 1950s, this species has become increasingly adapted to urban encroachment, with the region now supporting upwards of 500 nesting territories of Bald Eagles throughout the Fraser Valley. This exceptional recovery and adaptation to disturbed landscapes has resulted in an increasing number of permit applications and affiliated mitigation plans, often involving the use of artificial stick nests or nesting platforms. Here, we review nearly two decades worth of nest designs, site selections, outcomes and environmental variables that impact mitigation success as well as developing best practice approaches to raptor mitigation that we suggest should also include ecological valuations and offsets, we hope to see implemented in the future.

Keywords: mitigation, Bald Eagle, raptors, Fraser Valley

Sun Hats for Bat Boxes: Mitigating the risk of overheating at northern latitudes

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Conventional thinking suggests that bat boxes at northern latitudes be entirely black to help bats thermoregulate. We suspected that long summer daylight in subarctic Canada might elevate temperatures in black boxes above 42°C, the upper thermoneutral limit for Little Brown Myotis (*Myotis lucifugus*), the most common northern bat. With assistance of farmers, we investigated whether replacing the black roof with a white one, akin to a sun hat, would alleviate overheating risk without compromising roost temperatures especially at night. The internal temperature of completely black boxes exceeded 42°C on some days in 2 summers. Substituting the black roof with a white one consistently reduced the maximum daily roost temperature to below 42°C, but resulted in a slightly lower minimum roost temperature at night. The white roofs' reduction in maximum daily roost temperature was larger on warmer days when risk of overheating was greatest. Replacing black roofs with white ones can mitigate risk of overheating in subarctic latitudes, and likely many temperate latitudes. However, completely black boxes are still necessary to enhance the thermal environment for roosting bats. We suggest that providing bats with options, such as adjacent black-roof and white-roof boxes, is better than just single black boxes.

Key Words: bat box; Little Brown Myotis; overheating; temperature; Yukon

Modelling connectivity among resource wave hotspots: bears and spawning salmon of coastal British Columbia

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Understanding how important areas are connected can provide key information for the management of wildlife and their habitat. For example, the spatial arrangement of landscape features can either promote or deter movement among resource patches by mobile consumers. In this work, we modeled movement by grizzly and black bears (*Ursus arctos horribilis* and *U. americanus*) among aggregations of spawning salmon (*Oncorhynchus* spp.). Using circuit theory and least cost paths, we predicted movement among these important resource patches within a 17,000km² study area. Variables affecting bear movement were identified and parameterized drawing on associated literature and in collaboration with the Heiltsuk Integrated Resource Management Department (HIRMD), thereby incorporating Indigenous and local knowledge. The modelled current flows using Circuitscape, validated with recapture data, suggested important areas of high predicted connectivity between salmon spawns within and among watersheds. Furthermore, least cost paths analysis identified principal routes, which we ranked to identify potential corridors for consideration for protection by HIRMD. Broadly, this work unites connectivity modelling with resource wave theory to consider movement among food patches, and directly informs conservation planning by the Heiltsuk First Nation.

Key Words: functional connectivity, Circuitscape, least cost paths, resource waves, corridors

Body condition as a measure of population fitness

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Body condition of individual large mammals is a highly labile parameter that is influenced by the recent nutritional plane, the seasonal hormonal cycle, intrinsic traits such as age and reproductive status, food availability and quality, and extrinsic stress factors such as predation risk, social dominance or human disturbance. Body condition thus integrates many population and individual level factors into a single measure of performance which makes it ideal for long-term population monitoring. Long-term longitudinal studies are often the best way to learn about how the vagaries of the environment affect population performance because they can contrast short-term fitness with interesting covariates across time. In temperate environments climate and weather interact to create good and bad periods for animals that are often autocorrelated. Large mammals in temperate environments bet-hedge against future stress periods by storing energy, usually as fat. It is now possible to index body condition of individual bears using photographs which allows the comparison of body condition among individuals, seasons, and populations through time, while also considering the variation within the sample. The option to collect many samples should enable the examination of novel aspects of the dynamics of population fitness of bears, and perhaps other species.

Keywords: bears, remote cameras, Ursus, population monitoring, fat index

When is the ‘right’ time to have kids?: The impact of nest timing and urban living on Mountain Chickadee nestling care.

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Predators need to synchronize the high energy demands of offspring with the peak abundance of prey. A misalignment between the availability and demand of food would disrupt foraging opportunities, reducing foraging efficiency. We compared nest timing with prey emergence (using vegetation proxies) from April - July 2022 on Mountain Chickadees (*Poecile gambeli*) in Kamloops, BC, experiencing various degrees of urban influence. Chickadees target high-protein prey items such as Arachnids (low carotenoid content) and Lepidoptera (high carotenoid content), the latter of which have emergence triggered by warming temperatures. Chickadees experiencing the urban heat island effect tend to advance nesting, so young hatch earlier than their rural counterparts. Anecdotal observations on 6- and 12-day-old nestlings suggest early hatching nests tended to have abnormally dull-coloured mouthparts, potentially indicating parents were obtaining low carotenoid prey items. Insect surveys conducted around individual nests during day 12 of hatch suggest decreased Lepidoptera larvae, with mild weather delaying emergence. We will use data collected from Radio Frequency Identification (RFID) readers placed on nest boxes in the 2022 field season to compare feeding rates. We aim to discuss whether asynchronous prey emergence impacts foraging behaviour and whether the influences of urban living impact the rate of nestling care.

Keywords: Avian, Foraging, Carotenoids, Diet, Phenology

Is forage quality limiting for moose (*Alces alces*) in a logged landscape?

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Abstract: Many moose populations in British Columbia have declined in tandem with intensive salvage logging following a mountain-pine beetle epidemic. Cutblocks are typically considered beneficial to moose because they provide early seral forage. However, cutblocks receive more sunlight than forests and plants can use this energy to produce tannins, defensive compounds that reduce protein digestibility. We investigated whether forage in cutblocks provide less digestible protein than in forests, and whether logged landscapes can support healthy moose. We tracked the foraging sites of collared female moose in south-central British Columbia over two years, collected plant samples, and determined protein and tannin content. We also tracked pregnancy, body fat, calf:cow ratios, and survival. Plants in cutblocks produced more tannins and had lower digestible protein than plants in forests. Digestible protein was adequate in early summer but fell below minimum requirements in August in cutblocks and September in forests. Moose body fat indicated nutritional limitation according to one index, but pregnancy, calf:cow ratios, and survival were not depressed, implying adequate nutrition. Thus, decreased forage quality in cutblocks is likely not the principal driver behind declines in this region, but protein-limitation in late summer may play a role alongside other factors such as climate change.

Key words: moose, *Alces alces*, nutrition, condition, forestry

Humans elicit community change via impacts on keystone species

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Abstract: Worm and Paine (TREE 2016) proposed that humans are hyperkeystone species - agents that impact other keystone species and thus ecological communities. Here, we test this hypothesis and examine keystone vulnerability in relation to human disturbance. To comprehensively address this hypothesis, we first conducted a systematic literature search to create an evidence-informed list of keystone species, then conducted a clustering analysis to elicit any primary keystone archetypes. We quantified various community responses (e.g., changes in geochemical, cycling, biodiversity, landscape cover, etc.) to human-caused declines of keystone species using a log risk ratio to standardize the magnitude of diverse community responses.

We found evidence for 158 keystones, which occurred on every continent except Antarctica. Our clustering analysis revealed three main keystone archetypes: 1) large-bodied, consumer, mammalian keystones, 2) consumer piscine keystones, and 3) small-bodied ecosystem modifiers. We also found that these smaller-bodied mammals elicited a larger magnitude of community response in their absence ($x = -0.12599$, 95% CI [-0.18, -0.06]). Collectively, these patterns showing the prominence of small-bodied taxa suggest a reconsideration of what species and processes are involved in keystone interactions, as well as highlight the myriad ways in which humans impact ecological communities via keystone species.

Keywords: keystones; community ecology; human disturbance; conservation; predator-prey

Understanding Roosevelt Elk on Vancouver Island: habitat selection, migration, and dispersal

BRUSH

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Efforts to manage biodiversity in Canada have focused on identifying causes of decline, but few systems reveal the ecological basis for recovery - particularly for large mammals where the populations of many well-studied species have been trending downwards. Roosevelt elk on Vancouver Island, British Columbia (BC), are one of the few success stories for large mammal conservation in Canada. From a low population of ca. 2700 animals and restricted distribution of ca. 23,000 km² in the 1980s, elk are now expanding throughout their historical range, presenting a rare conservation success story for the ecosystems that they support, as well as for the Indigenous and non-Indigenous communities that harvest elk. However, elk are still listed as “vulnerable” in BC, and the landscape on which they live is undergoing rapid changes caused by resource extraction. We are developing models of habitat selection and movement ecology to quantify elk use of habitat and projected changes in distribution. This will help fill knowledge gaps in current elk management and planning, while also providing an opportunity to study the ecology of a recovering species. This research will provide Indigenous rightsholders and non-Indigenous stakeholders with the knowledge needed to support the recovery of elk.

Keywords: Roosevelt Elk, habitat selection, forestry, landscape change, distribution change

Looking at the big picture: using wildlife camera traps to understand the impacts of human disturbances on large mammals in and around Canada's Mountain National Parks

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Abstract: A key approach to conserve wildlife amid prolific landscape alteration from resource extraction and urbanization is through the establishment and long-term maintenance of protected areas (PAs). Little to no landscape alteration is permitted to occur within PA boundaries and as such, PAs have been denoted a “cornerstone of conservation”. PAs are of particular importance to large mammal species because they require large areas of undisturbed habitat to persist. Continuous habitat in PAs, however, is only one component of the complex, heterogeneous landscape that wildlife utilize. For example, timber extraction in B.C. often occurs adjacent to the boundaries of PAs and PA mandates frequently emphasize the importance of these areas for public enjoyment, providing many opportunities for recreation and in turn, disturbing wildlife. My research seeks to understand the relative impacts of human disturbances inside (e.g., recreation) and outside (e.g., resource extraction) of PAs on large mammals through the use of wildlife camera traps deployed across Canada's Mountain National Parks. I am using large mammal detections obtained from these cameras to model species occurrences with natural landscape features, human footprint features, and human presence data to improve our understanding of the role of PAs in terms of the greater landscape.

Keywords: protected areas, human disturbance, recreation, large mammals, landscape ecology

Small mammal composition in novel climate-focused silviculture treatment sites in northern British Columbia

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Small mammal composition is differentially altered by landscape disturbances, with some species benefitting from disturbances and others not. Diverse landscapes can support greater species diversity, allowing for a more complex community structure and often providing greater opportunity for niche occupancy. John Prince Research Forest, North of Fort St. James, BC, implemented the Adaptive Silviculture for Climate Change project in 2021, an experimental project designed to enable forests to respond to a changing climate. This project includes three treatments of varying basal area retention (5-8m²/ha, 10m²/ha, 15m²/ha), control, and clear-cut. Each plot type has four replicates, for a sample size of twenty 10-ha plots. To assess small mammal biodiversity, we used three Bushnell game cameras in each plot (May-July 2022) placed 1-1.5ft away from a birdseed, peanut butter, and alfalfa mix. Cameras were used instead of live trapping to assess the viability of this method for identifying presence while reducing stress, injury, and mortality to individuals. Cameras proved effective at detecting and identifying rodents in several Families, and small mammals were detected in all plot types. We will present comparisons of diversity and abundance across treatments to determine if increasing tree retention creates more habitat opportunities for small mammals.

Keywords: biodiversity, game camera, silviculture, small mammal, partial retention

Creating Space for Inclusive Wildlife Stewardship through the Together for Wildlife Strategy

Presenters: Karlee Snetsinger, Together for Wildlife Lead for Thompson Okanagan Region and Anna McIndoe, Together for Wildlife Lead for Kootenay Boundary Region – Both with WLRS

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The Ministry of Water, Land and Resource Stewardship launched the Together for Wildlife strategy in 2020, which works to improve wildlife and habitat stewardship across BC. One of the actions and commitments of the strategy is to create or expand Regional Wildlife Advisory Committees (RWACs). There are limited opportunities for Indigenous and non-Indigenous people to come together at a regional scale to collaborate at an operational and technical level on shared wildlife and habitat stewardship priorities. Through RWACs, we hope to build new partnerships and work more effectively together through inclusive and cooperative governance structures and improved transparency. RWACs will provide opportunities for dialogue with provincial government programs, industry, stakeholders, local governments, Indigenous governments, and the public that complement the government-to-government relationships the Province is committed to pursuing with Indigenous governments. The Thompson-Okanagan Region and Kootenay-Boundary Region have been the first to initiate the committees and have learned important lessons about building these relationships with our indigenous partners and how to think creatively when faced with complex situations around shared stewardship. During a 5min rapid fire talk, we would like to share the concept of the RWACs and some of the unique approaches we are using in our regions to establish these RWACs.

Key Words: Collaboration, Indigenous, Learnings, Inclusive, Management

Wildlife activity: Is it a useful and informative metric?

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Abstract: A recent explosion in the use of biologging technologies (cameras, collars, etc.) for monitoring wildlife has provided many new opportunities for measuring activity. Stemming from this has been a plethora of studies highlighting that considerable activity variation exists within any given species and between species. Much of this variation appears to be in response to changes in the environment from anthropogenic effects to climate change. But while documentation of such variability is easy, interpretation of what it means is difficult. Questions like is a change in activity a good or a bad thing, and does a change in one species impact other species have emerge as unknowns. While activity is promising as an informative measure for monitoring wildlife, its actual usefulness requires us to first improve our understanding of the theory behind activity and its role in shaping ecosystems. Here, I will highlight why we need to better explore the long standing assumptions behind activity, and work to develop new theory about what the causes and consequences are of activity in wildlife.

Keywords: behaviour, ideas, activity, species interactions, ecology

Infertility or embryonic mortality? The importance of investigating hatching failure in avian populations

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Abstract: Ten percent of all bird eggs fail to hatch, yet reasons for hatching failure in wild populations are still poorly understood. Inviability is a result of either infertility or embryonic mortality. It is important to distinguish between types of inviable eggs because while infertility is usually linked to poor sperm or genetic compatibility, embryonic mortality may indicate insufficient environmental breeding conditions. Historically, infertility has been overestimated in avian populations because researchers are limited in their capacity to examine unhatched eggs in the field.

Determination of infertility requires confirmation that sperm did not fuse with the ovum. I am using a fluorescence microscopy technique to quantify fertility in a population of tree swallows breeding west of Prince George, British Columbia. I am also investigating factors contributing to embryonic mortality in eggs that are confirmed fertile.

In this presentation, I will explain why it is important to distinguish between infertility and embryonic mortality and the various factors that may contribute to different types of egg inviability. I will introduce techniques other avian researchers can use to quantify fertility and embryonic mortality within their own study populations.

Keywords: avian reproduction, egg viability, hatching failure, fertility, embryonic mortality

Free rein: Are feral horses competing with native ungulates in the Chilcotin Plateau of BC?

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Abstract:

The Chilcotin Plateau in west-central BC has been home to a large population of feral horses (*Equus caballus ferus*) for the last 250 years, but the impacts of this population on the ecosystem are not well understood. There is potential for competition between horses and native ungulates for food, habitat, and water resources as has been documented in the western United States. There is particular concern about competition between feral horses and moose (*Alces alces*), an important cultural and game species in the region that shares a preference for wetland habitats with the horses. My in-progress research uses camera traps to evaluate evidence of competitive exclusion of moose and mule deer (*Odocoileus hemionus*) by feral horses at three scales: 1) broad-scale spatial avoidance through habitat selection, 2) finer-scale spatiotemporal avoidance of horses, and 3) fine-scale avoidance in time through shifts in daily activity patterns. This research will fill empirical knowledge gaps on the community dynamics of feral horses in BC and inform appropriate management of this feral horse population.

Key words: Feral horses, moose, competition, camera trapping, habitat use

Passive Acoustic Recording as A Potential Tool for Monitoring Individual Barred Owls

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Abstract: Many studies suggest acoustic recording of owls coupled with identification of individuality in vocalizations can be used to monitor populations, though, few explicitly test this potential. We assessed the prospect of identifying individual Barred Owls (*Strix varia*) through detections using passive acoustic monitoring. We set up autonomous recording units from Feb. to April 2021 throughout the John Prince Research Forest (54° 27'N, 124° 10'W, 700 m a.s.l.) and surrounding area. The study area is 357 km² with a minimum of 2km between the 66 recording stations. During this period, we collected 454 Barred Owl calls from 10 recording stations. We measured 30 song features, 12 temporal features and 18 frequency features, from each song. Using forward stepwise discriminant function analysis, the model correctly identified 84.4% of the songs based on a 5-fold cross validation. The model achieved a Kappa statistic of 0.77, which showed substantial agreement between predicted individual versus observed individual categorization. The most important discriminating features include song length, interval between the 4th and the 5th notes, interval between the 6th and 7th notes, and the duration of the 8th note. Our results suggest that passive acoustic monitoring can be an effective tool for identifying individual Barred Owls and be useful for population censusing.

Key words: identification, bird, sound recordings, owls, conservation

Conservation Challenges and Successes for Amphibians during Road Construction on the West Coast of Vancouver Island.

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The need to find effective ways to mitigate the adverse effects of roads on wildlife is paramount as global biodiversity continues to decline and road networks expand. A road upgrading project on the west coast of Vancouver Island, BC presented the opportunity to use and test various mitigation approaches aimed at increasing the survival of amphibians both during construction and over the long-term. With support from the Huu-ay-aht First Nations, and in collaboration with industry, we put work windows and temporary road closures in place to protect amphibians dispersing/migrating across the road en route to and from an important breeding site. This resulted in a two-month closure that allowed tens of thousands of post-metamorphic Western Toads (*Anaxyrus boreas*) to disperse. We organized pre-construction salvage of amphibians that included sweeps of ponded and dry roadside verges before ditching, grubbing, and replacing culverts. Approximately 900 individuals from seven species of amphibian were relocated or held and then released. After collecting three seasons of data on the location of amphibian crossings, we were able to direct the repair/replacement of drainage culverts and the installation of new box culverts and fences to provide underpasses to reduce road mortality of Western Toads. This was particularly important as traffic is expected to increase once the road is improved. Wildlife cameras will be used to verify the long-term effectiveness of the underpasses for migration and dispersal of adult and post-metamorphic toads, respectively.

Motion-triggered video monitoring to observe *Platanthera* orchid pollination in British Columbia

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Abstract: The pollination of plants via insects represents a valuable mutualistic relationship and a vital ecosystem service. Documenting plant-pollinator interactions is important from economic, conservation, and natural history perspectives. *Platanthera* orchids (Asparagales: Orchidaceae) are an understudied group, and for many of these orchid species, pollinators and the level of pollinator specificity are undocumented in British Columbia (BC). *Platanthera dilatata* and *P. aquilonis* are believed to be lepidopteran-pollinated and to self-pollinate, respectively. A third species, *P. huronensis*, is hypothesized to have hybrid origins from the former two orchids, and may outcross and/or be autogamous. How pollen is moved between the putative parent species is unknown. Using motion-triggered Raspberry Pi diurnal and nocturnal cameras, pollinators of the three species were filmed in Mount Robson Provincial Park in July 2022. Analysis showed sphingid moths, papilionid butterflies, and bumblebees interacting with the orchids and removing orchid pollen. This filming method was also used with three other orchid species on Vancouver Island. Methods to address the knowledge gaps surrounding insect-plant relationships are vital given ongoing and increasing climate change that can cause phenology shifts. This method of video observation has been demonstrated to successfully document these relationships in a genus with little baseline data.

Keywords: Pollination, orchids, insects, video-observation, methodology

Mule Deer (*Odocoileus hemionus*) Birth Site Selection in southern interior British Columbia

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Abstract: Mule deer in southern interior British Columbia are in decline. Females and their neonates are highly vulnerable during parturition. The habitat the female selects for during birth can mitigate this risk. We used GPS collar data from 59 adult females and 79 separate birth events from 2019 - 2021 to explore movement rates surrounding parturition and determine what habitats parturient deer selected for at birth. We visually identified potential birth clusters during the parturition window (May 28th - June 17th, 2019 - 2021), and then confirmed parturition by systematically grid-searching the clusters to locate neonates. We wanted to determine if birth clusters could be identified through movement characteristics alone. We used changes in daily step-length (mean distance between consecutive fixes, fix rate = 75 minutes) to determine if deer reduced movement rates on the day of parturition. Females reduced their step lengths from 167m on the day before parturition to 69m on the day of parturition, a 59% decrease. We modelled birth site selection using a resource selection function, with fixes within the nursery cluster as used points. Results from this study will help managers determine birth events each year using GPS data, and determine what habitats are crucial for the recruitment of mule deer.

Key words: mule deer, birthing habitat, habitat selection, GPS data

Moose (*Alces alces*) response to two major wildfires in Interior British Columbia

All Authors:

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Abstract:

In the face of climate change, many animal populations are increasingly forced to respond to natural events such as wildfires. While previous studies have examined ungulate response through changes in habitat use and home range size pre- and post-wildfire, little is known about how species respond during the actual wildfire event. This study used GPS location data from 20 female moose (*Alces alces*) to understand their movements during the progression of the 2021 Tremont Creek and Sparks Lake wildfires in Interior British Columbia. Of the 20 individuals studied, 10 had home ranges lying within the fire perimeters and 10 outside, allowing for comparison of individuals unaffected and affected by wildfire. Individual changes in space use were studied throughout six time periods during the fire progression. The moose within the fire path did not appear to significantly shift their space use in response to wildfire, remaining in the same locations despite the immediate threat. In addition, no fire related mortality occurred among studied individuals, regardless of remaining the same locations. This study provides preliminary insight into the response of moose during wildfire events, and as such improves our understanding of how these events impact individual animals.

Key words: Moose, *Alces alces*, wildfire, space use, response

Seasonal movements of Painted Turtles within a complex of water bodies: are there discernable patterns?

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Abstract: Seasonal movements of individual animals between resources are important to consider when assessing the conservation status of a species, and comparing movements from year to year can provide further insight. For female turtles, movements between resident habitat and nesting sites are often at the forefront of conservation assessments. However, such movements may not be direct, involving more complex routes and habitat use than simply travelling from point A to point B. This project focused on a population of Western Painted Turtles (*Chrysemys picta*) in Baynes Lake British Columbia, monitoring their summer movements within an assemblage of water bodies, in both 2021 and 2022. Twenty-five total gravid female turtles were radio-tracked, eight in 2021, and 17 in 2022. In both years, most were observed moving away from their resident habitat to nest. They followed an indirect route from their overwintering habitat to other water bodies, and temporarily resided in smaller ephemeral ponds where they laid their eggs. Four turtles tracked in both years showed similar behaviour relating to reproductive status and movement, but did not follow identical routes. Additional studies should be conducted to determine if turtles will continue to nest near ephemeral ponds and to further investigate patterns of fidelity.

Key Words: Western Painted Turtle (*Chrysemys picta*), movement, nesting, fidelity, ephemeral pond

Development of a hair hormone profile for long-term health monitoring of grizzly bear populations

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Abstract: As infrastructure and industry continues to grow in Canada's western and northern landscapes, effective approaches to monitor wildlife health and the effects of anthropogenic change are urgently needed. However, wildlife monitoring programs typically do not include measurements of physiological biomarkers that could provide insight on the health status of individual animals. Our primary objective for this study was to develop and validate a targeted metabolite profile to measure multiple hormones in 173 hair samples collected from free-ranging grizzly bears (*Ursus arctos*) in Alberta, Canada (2008-2019). Approximately 25mg of hair (equivalent to about 80 guard hairs) was washed with methanol, homogenized, and extracted for liquid chromatography-mass spectrometry analyses. We detected and quantified 24 hormones related to reproduction, nutrition, and stress in hair samples. By using this metabolomic approach, we determined that multiple steroid hormones that are related to key physiological states can be measured with high precision and accuracy in a single hair sample collected non-invasively (i.e., barbwire hair snag). We are now collaborating with several government wildlife agencies in western Canada to apply and validate this methodology within existing grizzly bear conservation programs.

Key words: grizzly bear, health, metabolomics, hormones, monitoring

Does Removing Predators Increase Predation? Re-examining the Evidence for Social Disruption

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Removing predators to reduce livestock losses or to support species-at-risk recovery efforts is a controversial practice. Some studies have concluded that removing predators can actually cause an increase in predatory losses, due to disruption of wolf or cougar social systems. I re-examined evidence for this effect using causal inference methods and found three specific issues with the conclusions. First, because predator population size was an unobserved confounder in most studies, the causal effect of removals on subsequent predatory losses was not identifiable. Where predator population size was available and included in a causal model, the effect of removals on losses was not significant. Second, using a lagged indicator of predatory losses to infer a causal relationship with predator removals was both a statistical and substantive misrepresentation of the time series data. Third, social disruption wasn't measured, lending no support for this mechanism as the cause of the observed correlations. I suggest that the claim that predator removals cause increased predatory losses meets the definition of a "stylized fact," where a simple association attributed to an untested mechanism persists as a plausible explanation because it serves a broader normative cause; in this case, widespread ethical concerns about predator control.

Key words: predation, wolf, cougar, species-at-risk, predator control

Non-Invasive Sampling to Assess the Impacts of Recreation on Mountain Goats in Banff and Yoho National Parks

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Abstract:

Mountain goats (*Oreamnos americanus*) have been found to be sensitive to human disturbance, but the effects of non-motorized recreational activities on mountain goats are still not well understood. Mountain goats are an alpine ungulate found throughout the mountainous regions of western North America, including Banff and Yoho National Parks. These parks have extensive trail networks, and are sought out by millions of visitors each year. Increased human activity within goat habitat may trigger changes in goat behaviour, such as altered daily activity patterns, and increased stress. My in-progress research investigates the impacts of recreation on mountain goats in Banff and Yoho National Parks using wildlife camera traps (CTs) and stress hormone sampling. CTs have been deployed both on and off-trail across sites with varying levels of recreation pressure. I will use image data to assess if goats are avoiding humans in space or time as a strategy to minimize overlap with humans. Fecal pellets will be collected to assess if goats in high human-use areas have elevated stress compared to those exposed to minimal human activity. I aim to improve our understanding of the impacts of recreation on mountain goats and inform recreation management within and outside of parks.

Key words: Mountain Goats, Recreation, Camera Traps, Stress, Non-Invasive

How Habitat Use Impacts Mule Deer Survival in South-Central British Columbia, Canada

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Mule deer (*Odocoileus hemionus*) populations across much of southern British Columbia are declining, the causes of which are not clear due to multiple stressors including resource extraction and wildfires. To disentangle the mechanisms driving deer populations in southern BC, we GPS collared 252 adult female, 195 juvenile, and 135 neonate mule deer during 2018-2021. To determine how habitat use and weather affected survival, we quantified time spent in cutblocks and burns, and weather variables within 30, 7, and 2-day time scales during summer and winter. We used Cox Proportional Hazards models to determine which covariates were important for each temporal scale and age class. Survival modeling results differed based on the time scale and age. For example, for adults in the summer at a 2-day time scale, mortality risk decreased by 30% for deer that spent 100% of their time in a recent cutblock compared to deer that spent no time in a recent cutblock ($\beta = -0.36$, 95% CI = -0.69 – -0.03). For juveniles in the winter at a 30-day time scale, survival decreased as the number of cold days (max temp $\leq 0^{\circ}\text{C}$) increased ($\beta = 1.34$, 95% CI = 0.91– 1.78). These results can provide habitat management recommendations that could increase survival rates amidst a changing landscape and climate.

Key words: Mule deer, survival, habitat use, landscape change, wildfire

Hunter response to changes in Chronic Wasting Disease (CWD) prevalence in Alberta

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Abstract (200 words limitation): Chronic Wasting Disease (CWD) has the potential to diminish deer populations and affect various segments of society including recreational hunters. Hunter harvest programs can be a cost-effective and socially acceptable approach to CWD management. However, there is little information on hunter behavioral response to CWD and whether they will be willing to play this role as the prevalence of CWD increases. Our study estimates the effect of CWD prevalence, mandatory zone designation, and other factors, on hunter applications for draw licenses for mule deer (*Odocoileus hemionus*). License applications reflect the first step in hunter demand for deer. We use aggregate application data across 37 Wildlife Management Units (WMUs) in Alberta from 2006-2022. Two-way fixed effects models are employed to identify the relationship between CWD prevalence at various levels and draw applications. Preliminary results indicate that applications for mule deer decline when CWD prevalence rates increase. For example, the applications for antlered mule deer licenses are estimated to decline by 6.6% if CWD prevalence rates increase from 10% to 20%. Our findings suggest there may be limitations regarding the extent to which hunters may be willing to participate in CWD management.

Key words: Chronic Wasting Disease (CWD), hunter behavior, licence applications, wildlife management implications

POSTERS

Eastern Meadowlark (*Sturnella magna*) Habitat Restoration: Lessons Learned from Ontario

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Ecological restoration requires ongoing evaluation of a project's success; collectively, this will accumulate a canon of knowledge for planning projects. Restoration can be used to minimize net habitat loss for species at risk, such as Eastern Meadowlark (*Sturnella magna*). Projects have been undertaken in Ontario to restore habitat for this species (i.e., tallgrass prairie), either directly or indirectly. There does not appear to have been a consolidated discussion on the outcome of these projects. Our objectives are to determine: 1) what restoration strategies are currently being employed in Ontario for tallgrass prairies and/or Eastern Meadowlark? and 2) how can future tallgrass prairie restoration projects be improved to better target Eastern Meadowlark? An online questionnaire was developed to address these questions and evaluate the success of relevant past restoration projects. Subject experts on Eastern Meadowlark, grassland birds, and/or tallgrass prairies in Ontario were invited to participate in the study. The findings will highlight target areas for future Eastern Meadowlark restoration, potential future partnerships, and logistical and technical improvements to future projects.

Keywords: Eastern Meadowlark, Ontario, restoration, tallgrass prairie, species at risk

Early insights into the impacts of recreational activities on the behaviour of large carnivores within a temperate forest ecosystem protected area

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Abstract: Despite ongoing growth and diversification of nature-based recreation, impacts of such activities on carnivore behavioral ecology inside protected areas are not well understood. Carnivores enact behavioral strategies to mitigate human encounters through altered habitat selection, movement behaviour and activity patterns. Among sympatric carnivores, human disturbance can further alter resource partitioning, increase intraguild competition and disrupt ecological processes. As such, recognizing mechanisms of human-carnivore coexistence in this context represents a critical conservation focus. To address this, my ongoing PhD research develops a cohesive multi-species research framework, suitable for examining behavioural co-adaptations for mitigating human-carnivore interactions inside a large, protected area on Vancouver Island. Using camera trap data, this work attempts to disentangle the relative impacts of intraguild competition, recreation and environmental factors on the behaviour of black bears (*Ursus americanus*), cougars (*Puma concolor*) and wolves (*Canis lupus crassodon*). An integrated spatial-temporal analytic approach comprised of hierarchical regression and time-to-event models is utilized. This research will make appreciable contributions to the natural sciences by offering a novel analytic framework with broad applications for evidence-based wildlife management in multi-use landscapes. In an applied context, this work will identify the relative importance of factors influencing carnivore behaviour to identify areas for conservation prioritization.

Key words: human-carnivore coexistence, conservation biology, carnivore behavioural ecology

Evaluating lead exposure in scavenging species linked to big-game hunting in Saskatchewan, Canada.

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For free-ranging animals, chronic exposure to lead, a toxic heavy metal, can manifest in discrete physiological changes, alter behaviours, and contribute to increased mortality. In Canada, although lead ammunition has been banned for hunting waterfowl, carrion contaminated with lead fragments from bullets used in rifle-hunting remains a potential source of exposure for wildlife, particularly scavenging species. Data to quantify lead exposure in these species related to hunting activities in most of Canada, however, are lacking. The main goal of my thesis research is therefore to evaluate the risk of lead exposure to scavenging wildlife as a result of big-game hunting in Saskatchewan, Canada. By quantifying lead mass in hunted animal remains (i.e., viscera and organs), and evaluating scavenger community assemblages feeding at kill sites, I aim to achieve two main objectives: (i) enhancing techniques to quantify lead in large tissue samples by bridging the gap between traditional (medical radiography) and advanced (synchrotron based) imaging technologies and (ii) identifying spatial and temporal factors that affect scavenger community composition. My findings will contribute important information to the continuous assessment of terrestrial lead and its potential impact on wildlife.

Keywords: Lead Ammunition, Scavengers, Hunting, Medical X-ray, Biomedical Imaging and Therapy

The IUCN Rewilding Thematic Group's work on rewilding principles and guidelines.

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Rewilding has become increasingly popular in recent years as an approach to ecosystem restoration. Since its inception in North America in the 1990's it has become more complex and more difficult to define as rewilding evolved and became conceptually more diverse. Therefore, the IUCN Commission on Ecosystem Management commissioned the Rewilding Thematic Group (RTG) in 2017 to establish a globally accepted definition and guiding principles for rewilding and identify links with other ecosystem conservation and management initiatives within IUCN and elsewhere. In this talk I will briefly introduce the concept of rewilding and the work of the Rewilding Thematic Group. The RTG conducted surveys of rewilding pioneers and held several workshops which resulted in a definition and 10 guiding principles. Core members of the RTG also edited a Handbook of Rewilding which was published by Routledge last November with contributions from more than 60 authors (including from Canada). The book covers the history of rewilding, ecological theory and practice, rewilding ethics and philosophy and case studies from around the world. The RTG is currently developing guidelines for rewilding for the IUCN and participants of this conference are welcome to join the discussion around rewilding and share their experiences.

KEYWORDS: Rewilding, ecological restoration, IUCN, ecosystem management, conservation

Density estimation using camera traps: what is possible?

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Estimates of population density (i.e., abundance per unit area) are critical for wildlife stewardship. Unlike other metrics, density can be compared across space, species and time without bias – and so is important for monitoring and managing populations, as well as assessing management actions. In BC, government wildlife biologists use standard protocols to measure ungulate density, with aerial surveys recommended for most species. Ungulates have been surveyed by air for decades – but aerial surveys have important limitations, including cost, danger to observers, disturbance to animals and limited scope. Such disadvantages have led some practitioners to ask: could camera traps be a better tool for ungulate density estimation in BC? Here, we summarize “what is possible” in terms of camera trap-based density estimation: which models have been developed/adapted for use with camera trap data, what kinds of inputs are needed, model assumptions, and advantages/limitations. Bringing this information together is the first step in determining whether camera traps are a “better” density estimation tool – and could begin the process of shifting deep-rooted paradigms in wildlife management, transforming the way we steward wildlife in BC and beyond.

Determining the adjusted detection area of remote camera traps to increase the reliability of likelihood-based density estimators

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Researchers strive to develop and adapt methods of passively monitoring wildlife populations. Remote camera traps remain a dominant, non-invasive tool for scientists, colonial governments, and Indigenous Nations to manage wildlife. The use of likelihood-based density estimators through camera traps have become increasingly popular for large mammal density estimation in recent decades. Such techniques, however, have shown inconsistencies in generating estimates that align with other methods, e.g., aerial flight surveys. To estimate density (# animals/unit area) one needs to be precise in their estimate of area. Thus, a critical component of many of these models, e.g., Time in Front of Camera model, Random Encounter Staying Time model, is quantifying the physical space in front of cameras where animals are detectable. We tested a protocol that provides a kernel-based estimate of photographic capture to determine the approximate area in front of camera traps with perfect detection—an adjusted detection area. We use our calculations of adjusted detection area to improve the reliability of density estimates generated by the Random Encounter Staying Time model. Our work aims to facilitate wildlife co-management by providing non-colonial stakeholders with an accessible, reliable framework for large mammal density estimation.

Keywords: camera trap, motion sensor photography, capture probability, detection probability, density estimate

The short- and long- term impact of a novel disease, Rabbit Hemorrhagic Disease, on a free-living population of European Rabbits

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Abstract: In February 2018, the first Canadian case of Rabbit Hemorrhagic Disease (RHD) in a free-living population of rabbits was detected on the campus of Vancouver Island University (VIU), Nanaimo, BC. A close working relationship between a VIU academic department and the BC Ministry of Environment allowed for early detection of the disease. Pre-existing collaborations and relationships among academic and non-academic departments on campus resulted in a unique opportunity to document short- and long-term population impacts of the disease; undergraduate students had been monitoring the campus rabbit population size of the rabbits since 2008 as part of their coursework.

During the first four weeks of the RHD outbreak, the population size of campus rabbits decreased > 85%, from an estimated 138 rabbits (95% CI: 135 – 146) to 19 (95% CI: 7 – 26). Finer scale data shows the spread of the disease between different areas of campus over a two-week period. Low rabbit population size persisted until 2019; since January 2019 the rabbit population has been increasing exponentially to 36 rabbits in January 2022 (95% CI: 36 – 43). In addition to the numerical impact of RHD, a substantial decrease in the diversity of rabbit coat colour within the population was documented.

Keywords: Rabbit Hemorrhagic Disease; Rabbits; Population Ecology

Factors that affect the genetic diversity and distribution of coastal wolves in Northern British Columbia

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Abstract: Previous studies have identified diverged populations of wolves in coastal British Columbia and Alaska, raising concerns about the need to list certain subpopulations as at-risk. A recent petition to list coastal wolves in southeast Alaska under the Endangered Species Act has sparked an urgency to gain a more refined understanding of the spatial extent and genetic connectivity among subpopulations in southeast Alaska and northwest British Columbia. The objectives of this study are to examine landscape connectivity between coastal wolf subpopulations in northern British Columbia and identify corridors and geographical features that may influence genetic continuity between subpopulations. To accomplish this, genetic samples collected using non-invasive hair snag boards and scat will be sent for DNA extraction and genotyping. I will use Omniscape to model connectivity and examine predicted corridors. I will then use STRUCTURE and genotype data to identify subpopulation differentiation for the study area. The results of this study will inform the petition for listing in Alaska, which has management implications for the subspecies as a whole, and used to collate data being collected in Alaska to produce a transboundary understanding of this subspecies to enhance the management and conservation of the subspecies as a whole.

Keywords: Coastal wolf, corridors, genetic connectivity, nuclear DNA, Endangered Species Act

Migratory connectivity and annual cycle contaminant exposure in Horned Grebe (*Podiceps auritus*) breeding in Canada

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Abstract: Over the course of their annual life cycles, migratory birds use a variety of habitats and are exposed to a wide range of environmental conditions, which can influence population demographics and species abundance in subsequent seasons. Identifying key habitats and potential sources of threats is essential for effective species management. Within Canada, some indicators suggest that breeding populations of Horned Grebe (*Podiceps auritus*) have significantly declined since 1970, yet factors influencing populations and reasons for the apparent declines remain unknown. This study aims to address these knowledge gaps by assessing (i) use of non-breeding areas and (ii) exposure to contaminants throughout the annual life cycle. Using two disparate breeding populations from Yellowknife, NT and St. Denis, SK, individuals will be assigned to a wintering location using geolocators and stable isotope values (^{13}C , $\delta^{15}\text{N}$, $\delta^{34}\text{S}$) derived from feathers. To assess contaminant exposure, fecal samples will be analysed for current use insecticides, and egg samples will be analysed for persistent organic pollutants. The data gathered in this study will provide new insights on annual life cycle factors affecting breeding populations of Horned Grebe in Canada, which will inform conservation strategies for this species and their critical habitats.

Key words: Horned Grebe, migratory connectivity, stable isotopes, persistent organic pollutants, pesticides

Nesting Ecology of Barn Swallows on Agricultural Lands in Yukon

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Barn Swallow (*Hirundo rustica*) abundance has declined in North America since the 1980s leading to designation as a species-at-risk. With collaboration of farmers, we investigated nesting ecology of Barn Swallows in Yukon Territory, near the northern extent of their range, and in a region of expanding agriculture. Fifty-six percent of initial nesting attempts were inside buildings with permanently open entrances; other nests were on outside structures. Temperatures at nests, usually near building roofs, averaged 1.6°C warmer than ambient outside temperatures. In both 2019 and 2020, we documented double brooding by three pairs including fledging of the second brood. Barn Swallow reproductive output was similar to temperate latitudes: first clutches ranged from three to six eggs (means: 4.8 (2019); 4.2 (2020)); mean number of fledglings per nest was 3.3 in 2019 and 3.0 in 2020. Twenty-one percent of nests failed, by falling off a vertical wall or being predated by deer mice, Black-billed Magpies, or domestic cats. We also assessed the use of artificial nest structures (platforms and cups) intended for Barn Swallows and found that the swallows did not nest on platforms (n=63 platform-years) or cups (n=20 cup-years). However, evaluation of use requires further monitoring.

Key Words: Barn Swallow; nesting; farm; double brooding; Yukon

Beneficial Management Practices for Wildlife Species at Risk on Agricultural Lands in Yukon

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Various species-at-risk inhabit northern farms and provide services of pest control and pollination. To influence land planning and stewardship on and near Yukon farms, we compiled a set of Beneficial Management Practices for these listed species: Barn Swallow, Bank Swallow, Rusty Blackbird, Little Brown Myotis, Gypsy Cuckoo Bumble Bee, Suckley's Cuckoo Bumble Bee, Yellow-banded Bumble Bee, and McKay's Bumble Bee. The BMPs aim to sustain shelter, food sources, and minimize toxicity of agrochemicals. Land planning needs to keep buffered water bodies outside agricultural land allocations. Comprehensively valuable Practices include minimizing use of herbicides, pesticides, and fungicides, along with retaining diverse native plant communities within the matrix of cleared lands. Other BMPs are more species specific. Provision of appropriate nesting and roosting structures, with connectivity to feeding sites near wetlands and livestock, can benefit swallows and bats. Retention of floral patches provides food to bumble bees when crops (e.g. berries) are not in bloom. Native bumble bees are at risk from indiscriminate use of domesticated bumble bees and honey bees, - species that can spread disease and compete for food. These species-at-risk appear relatively robust in Yukon at present, but their future depends on pro-active stewardship.

Key Words: practices, agriculture, swallows, bumble bees, Yukon

Understanding the effects of ecological uncertainty on neophobia.

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Faced with a rapidly changing natural environment, many animals are experiencing increasing amounts of novelty and uncertainty in general. Here, we explored how prey manage uncertainty associated with predation risk in the environment using convict cichlids (*Archocentrus nigrofasciatus*). For 3 days, we repeatedly exposed cichlids to incomplete information about risk that varied in reliability. The information came in the form of either damage-released alarm cues from conspecifics (high reliability), heterospecific alarm cues (low reliability), non-injury-released conspecific disturbance cues (low reliability), or a water control. Subsequently, we tested cichlids for neophobia (i.e., fear of novelty) using a novel species odour (lemon). Larger neophobic responses (and longer retention of the responses) indicated increased certainty that novelty was a predation risk in the environment. Such studies on uncertainty and neophobia may be valuable in understanding how prey manage novel predation risks such as invasive predator species or novel anthropogenic impacts, which may be particularly relevant in animal reintroductions.

Keywords: Neophobia, Cue Reliability, Uncertainty, Phenotypic Plasticity, Convict Cichlids

Effects of experimental climate-focused silvicultural treatments on snowshoe hare detections

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Forestry practices greatly reduce animal biodiversity in forest ecosystems by removing tree biomass and reducing available habitat. Among those animals affected are snowshoe hares (*Lepus americanus*). Hares require dense understory cover for browsing and protection from predators, which is largely removed after logging, thus reducing suitable habitat. The John Prince Research Forest near Fort St. James, BC has implemented a program called Adaptive Silviculture for Climate Change (ASCC) to help forests adjust to the pressures of climate change. This program includes three silvicultural treatments with different levels of basal area retention (5-8m²/ha, 10m²/ha, or 15m²/ha), clear-cuts and mature forest controls, with each category having 4 sites for a total of 20 sites being sampled. To measure hare presence/absence in the ASCC trials, from May – July 2022 we put up Browning trail cameras baited with birdseed, alfalfa, and peanut butter. Preliminary results showed greatest detections of hares in forest controls, but intermediate levels of detections in 10m²/ha and 15m²/ha retention patches, and lowest levels in 5-8m²/ha and clear cuts.

Keywords: silviculture, snowshoe hare, retention, presence/absence, ASCC

Equitable data stewardship in collaborative wildlife research

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Abstract: In wildlife research, collaborations with Indigenous communities ensure that stewardship recommendations are holistic and culturally relevant. As (primarily) non-Indigenous wildlife researchers seeking to create ethical research space, it is critical we consider how to affirm Indigenous sovereignty as it extends to wildlife data. Principles of Indigenous Data Sovereignty (IDS) promote Indigenous self-governance through the assertion of authority over data collected about their communities, lands, and resources. Discussions of IDS in environmental research are emerging, but to our knowledge, explicit applications of IDS to wildlife research by western scientists is still lacking. Here, we consider IDS as it relates to equitable stewardship of wildlife data collected in partnership with Indigenous communities. Through reviewing literature and collaborating with Indigenous partners on Indigenous Protected and Conserved Areas in the Northwest Territories, we aim to 1) understand risks of only considering western scientific perspectives of data stewardship, 2) document how IDS principles can be applied to wildlife data to improve partnerships, and 3) share procedural recommendations with western scientists to ensure equitable data stewardship in collaborative wildlife research. Results will be a guide for western scientists seeking more equitable data stewardship in collaborative wildlife research and working toward learning together about shared conservation priorities.

Key Words: wildlife data, Indigenous Data Sovereignty, data stewardship, collaborative research, Indigenous Protected and Conserved Areas

Comparing the detection ranges of AudioMoth models 1.2.0 and 1.1.0 in differing habitat types using playback trials.

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Autonomous recording units (ARUs) are commonly used to conduct passive acoustic surveys to monitor animal behaviour and presence. Landscape characteristics and habitat complexity combined with distance from sound source greatly influences the ARUs ability to detect animal vocalizations. This results in varying detection ranges in different habitat types. However, the detection ranges across ARUs in different habitats have not been standardized. Therefore, results of acoustic surveys using ARUs are not readily comparable. The detection ranges of two AudioMoth ARU models, 1.2.0 (new) and 1.1.0 (old), were determined and compared using playback surveys in three habitat types: mature forest, partial cut, and clearcut. Playback trials were conducted near Fort Saint James, BC. A playback file consisting of Northern Cardinal (*Cardinalis cardinalis*) songs was played at 50m, 75m and 100m intervals from two Audiomoths, old and new. Playback trials were conducted in 3 cardinal directions to capture sound travelling to the front, side, and back of the AudioMoths. BirdNet software was used to determine the confidence of species detection for each AudioMoth at each distance. Preliminary results have shown differences in confidences between AudioMoth models. We predict that new AudioMoths will have significantly larger detection ranges relative to the old AudioMoths.

Keywords: AudioMoth, detection range, playback, habitat type, ARU