

PROCEEDINGS OF THE 69th ANNUAL MEETING OF THE



Entomological Society of Alberta

15-16th October 2021 (Online)

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The Entomological Society of Alberta

The Entomological Society of Alberta (ESA) was organized November 27, 1952, at a meeting held in Lethbridge, Alberta, as an affiliate of the Entomological Society of Canada. A certificate of incorporation was obtained under the *Societies Act* on February 19, 1953.

The membership of about 70 paid-up members at that time consisted mainly of Dominion (Federal) entomologists at the Science Service Laboratories in Lethbridge (now Lethbridge Research and Development Centre of Agriculture and Agri-food Canada), Suffield Research Station, the Forest Zoology Laboratory in Calgary, and students and staff from the University of Alberta.

The object of the ESA shall be to foster the advancement, exchange, and dissemination of the knowledge of insects in relation to their importance in agriculture, horticulture, forestry, public health, industry, the environment, and for its own sake, among the people of the province of Alberta.

Membership is open to anyone interested in Entomology. Annual dues are \$20.00 (\$10.00 for students). Membership application is available at <https://entsocalberta.ca/about-the-esa/become-a-member/>

Entomological Society of Alberta Board of Directors 2021

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Conference Organizing Committee

For the second year in a row, concerns about the COVID-19 pandemic resulted in the decision to hold the ESA conference and Annual General Meeting on-line.

The conference organizing committee did a masterful job of managing a successful on-line event. Thanks are due to the following individuals:

- Bette Beswick (Chair)
- John Swann (Scientific Program)
- Sam Robinson (Venue and Logistics)
- Micky Ahn (Website)
- Ken Fry and Caroline Whitehouse (Registration)

PROGRAM

The Entomological Society of Alberta Annual Meeting October 15-16, 2021

Friday Oct. 15, 2021	event/speaker	Talk #	Poster #
09:00-09:30	President's opening remarks	N/A	
	Local organizing committee		
09:30-09:45	opening remarks	N/A	
9:45-10:00	Jimenez & Frost		1
10:00-10:15	Brownoff, et al.		2
10:15-10:30	Jackson, et al.		3
10:30-10:45	BREAK	N/A	
10:45-11:00	Pizante, et al.		4
11:00-11:15	Summers, et al.		5
11:15-11:30	Punko, et al.		6
11:30-11:45	Robinson, et al.		7
11:45-13:00	Lunch and poster session		
	Stormer & Proctor		1
	Neame, et al.		2
	Vermaak, et al.		3
	Aquatics Symposium		
13:00-13:15	Abraham, et al.	8	
13:15-13:30	Grams & Proctor	9	
13:30-13:45	Moore & Ciborowski	10	
13:45-14:00	Sutherland, et al.	11	
14:00-14:30	BREAK		
14:30-15:30	Plenary Address Dr. H.C. Proctor	12	
15:30-15:50	Lapierre, et al.	13	
15:50-16:10	Acorn & Cerezke-Riemer	14	
16:10-16:25	Vercruysse & Ciborowski	15	
16:25-16:45	Swann, et al.	16	
End of Day 1			
Saturday Oct. 16, 2021			
9:00-9:05	Call to order		
9:05-9:20	Fry, et al.	17	
9:25-9:40	Senevirathna & Mori	18	
9:40-9:55	Domnich & Evenden	19	
9:55-10:10	LaForest & Mori	20	
10:10-10:25	Musso, et al.	21	
10:25-10:40	BREAK/Final Prize Draws		
10:40-until the bovids come home	AGM		

Presentation and Poster Abstracts

Regular Oral Papers Friday October 15, 2021 09:45-11:45

Talk #1 Title: Effects of herbaceous versus treed field margins on abundance and movement of ground beetles and spiders between canola fields and their non-crop margins in Aspen Parkland.

Presentation type: Oral

Authors: Jimenez, I.P.¹, and Frost, C.¹

¹ University of Alberta- Department of Renewable Resources, Edmonton

Predatory ground beetles (Carabidae) and Spiders (Araneae) contribute positively to agricultural ecosystems by consuming herbivores. Different field margin types can increase predator abundance by the provision of suitable habitat. I investigated the effects of herbaceous versus treed field margins on spider and ground beetle diversity, abundance and movement into and out of canola fields. I installed paired directional pitfall traps along transects adjacent to and within canola fields at both herbaceous and treed margins on eleven canola fields. The pitfall traps had plastic shields that allowed me to measure movement in the margin-to-crop direction and in the crop-to-margin direction. I collected trapped arthropods every two weeks between May - October 2021 in the Aspen Parkland Region around Edmonton, Alberta. Preliminary results show that the abundance of spiders was higher in margins than in field interiors early in the growing season across all sites in both types of margins (herbaceous and treed), being slightly more abundant in treed margins. Carabid abundance was highest in treed margins. However, there was no significant effect of margin type or location (field margin vs. interior) on beetle abundance. Early in the season, spiders tended to move from the canola crop towards the herbaceous margin, while carabids moved most from the treed margin to the crop, though these movement patterns were also not statistically significant. Knowledge about how different types of margin vegetation sustain ground dwelling predators and how they move into canola fields will allow farmers to manage field margin vegetation to provide the most beneficial arthropods to crops.

Talk #2 Title: Contributions to the spider fauna of New Caledonia with a description of a new species and new genus and family records

Presentation type: Oral

Authors: Brownoff, F.¹, Pinzon, J.^{1,2}, and Frost, C.¹

¹ University of Alberta, Department of Renewable Resources

² Natural Resources Canada, Northern Forestry Centre, Edmonton

The current state of New Caledonian spider fauna is likely a gross underestimate of the diversity that exists within its borders. This contrasts with the extensive amount of taxonomic reference material for spiders in nearby locations, such as Australia and New Zealand. Unfortunately, very few keys exist for a limited number of New Caledonian spider taxa and more comprehensive taxonomic literature is lacking in detail for identification. From fieldwork carried out in late 2015, I identified specimens to the lowest taxonomic level possible. From this, I am in the process of describing a new species in the family Zodariidae Thorell, 1881,

provisionally assigning it to the genus *Neostorena* Rainbow, 1914. I have also provided six additional records for genera (*Episinus* and *Phycosoma*) and families (Hahniidae, Mimetidae, Theridiosomatidae, and Symphytognathidae) previously unreported in New Caledonia. I will also discuss several interesting specimens in this same collection, though their taxonomic placement requires further study. This dataset offers many opportunities to increase our knowledge of the spider fauna in New Caledonia.

Talk 3 Title: Using morphometric software to quantify variation in the great spangled fritillary (Lepidoptera: *Speyeria cybele*)

Presentation type: Oral

Authors: Jackson, L.G.¹, Campbell, E.², and Sperling, F.A.H.¹

¹ University of Alberta, Department of Biological Sciences, Edmonton, Alberta, T6G 2R3 Canada

² Canadian Food Inspection Agency, Ottawa, Ontario

Morphological identification of the great spangled fritillary butterfly (*Speyeria cybele*) has been a challenge due to substantial variation in size, colour, and wing patterning across the eastern and western North American portions of its range. This morphological complexity makes this species of interest to biologists and citizen scientists alike. Recent work has additionally revealed potentially substantial genomic divergences within this species that correspond to broad morphological differences between eastern and western-distributed subspecies, however this variation has not been explicitly assessed. In this project, wing shape of *S. cybele* was analyzed to determine whether morphological clusters of *S. cybele* are consistent with genetic clusters, and to assess which wing characters exhibit the most variation between subspecies. This project will further our understanding of morphological variation in *S. cybele* and other non-model organisms.

Talk #4 Title: Effects of canola bloom, floral availability, and field margin type on hover fly abundance in the Aspen Parkland

Presentation type: Oral

Authors: Pizante, R.¹, Acorn, J.¹, and Frost, C.¹

¹ University of Alberta, Department of Renewable Resources

Hover flies (Diptera: Syrphidae) are important pollinators for flowering crops such as canola. However, crops cannot provide all the resources a hover fly will need during its life cycle. In agricultural landscapes, field margins are often the only non-crop habitats available, and they provide larval and floral resources when the crop is not in bloom. The objective of this study is to examine how hover fly abundance, species richness, and species composition change with canola bloom, field margin type, and floral availability. At ten sites, I established four 30m transects: one in an herbaceous margin, one in a treed margin, and two 100m into the canola field from each marginal transect. With another observer, I walked each transect for 30 minutes and collected all insects that visited flowers. We also counted and identified flowers along each transect. I found that overall hover fly abundance decreased during canola bloom and that hover fly abundance was highest in herbaceous margins. After species-level identifications are complete, this study will provide a better idea of which hover fly species are potentially pollinating canola and which species use which wildflowers, providing both an agricultural and conservation perspective on hover flies in canola in Aspen Parkland.

Talk #5 Title: A collaboration in creating digital natural history collections: A case study of Alberta native bees

Presentation type: Oral

Authors: Summers, M.¹, Alexander, R.², Demarse, A.³, Eggermont, M.⁴, Galpern, P.¹, Hurrell, C.², Kaing, E.⁵, McLernon, D., Ranjit, K.², Theodor, J.¹, and Vamosi, J.¹

¹ Department of Biological Sciences, University of Calgary

² Libraries and Cultural Resources, University of Calgary

³ Department of Integrative Biology, University of Guelph

⁴ Department of Mechanical and Manufacturing Engineering, University of Calgary

⁵ BCSLA, CSLA, CLRA/ACRSD

At the University of Calgary, a collaboration among staff and students in the Department of Biological Sciences, Department of Mechanical Engineering, and Libraries and Cultural Resources, sought to explore how we could make our Biological Sciences natural history collections (invertebrate, vertebrate, and herbarium) accessible to a range of diverse stakeholders interested in biodiversity conservation. Using native bees as a case study, we digitized over 230 species of bee, producing 368 public records that includes three photographs of each bee specimen: lateral, anterior, and dorsal, along with associated metadata. This work involved the launch of a biodiversity website and digital collections where these photographs and student-created natural history illustrations are now available as open-educational resources. Our digitization work is continuing for bees as well as other insect groups, and we are currently expanding our digitization capabilities to create 3D models. These 3D models will be annotated for students in biology and engineering courses, and used to train both students and citizen scientists in insect identification. Our collaboration has generated campus-wide interest in bees, with recent collaborations with the Office of Sustainability leading to the University of Calgary becoming a BeeUniversity and the start of the Calgary Pollinator Count citizen-science initiative.

Talk #6 Title: Epidemiology of *Nosema* spp. and the effect of indoor and outdoor wintering on honey bee colony population and survival in the Canadian Prairies

Presentation type: Oral

Authors: Punko, R.N.¹, Currie, R.W.¹, Nasr, M.E.², and Hoover, S.E.³

¹ Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada

² Alberta Agriculture and Forestry, Government of Alberta, Edmonton, Alberta, Canada (retired)

³ Department of Biological Sciences, University of Lethbridge, Lethbridge, Alberta, Canada

The epidemiology of *Nosema* spp. in honey bees, *Apis mellifera*, may be affected by winter conditions as cold temperatures and differing wintering methods (indoor and outdoor) provide varying levels of temperature stress and defecation flight opportunities. Across the Canadian Prairies, including Alberta, the length and severity of winter vary among geographic locations. This study investigates the seasonal pattern of *Nosema* abundance in two Alberta locations using indoor and outdoor wintering methods and its impact on bee population, survival, and commercial viability. This study found that *N. ceranae* had a distinct seasonal pattern in

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Alberta, with high spore abundance in spring, declining to low levels in the summer and fall. The results showed that fall *Nosema* monitoring might not be the best indicator of treatment needs or future colony health outcomes. There was no clear pattern for differences in *N. ceranae* abundance by location or wintering method. However, wintering method affected survival with colonies wintered indoors having lower mortality and more rapid spring population build-up than outdoor-wintered colonies. The results suggest that the existing *Nosema* threshold should be reinvestigated with wintering method in mind to provide more favorable outcomes for beekeepers. Average *Nosema* abundance in the spring was a significant predictor of end-of-study winter colony mortality, highlighting the importance of spring *Nosema* monitoring and treatments.

Talk #7 Title: Livin' on the edge: precision yield data shows evidence of ecosystem services from field boundaries

Presentation Type: Oral

Authors: Robinson, S.V.J.¹, Nguyen, L.H.¹, and Galpern, P.¹

¹ Biological Sciences, University of Calgary

Field boundaries can improve crop yields by creating better conditions for crop growth (moisture, temperature), and can act as refuges for beneficial arthropods. This suggests that beneficial crop boundaries may create an intermediate hump-shaped increase in crop yield, where negative edge effects are cancelled out by increased ecosystem services (pollination or pest control) from the field boundary. Precision yield data represents a huge potential source of data to answer this question, as the equipment is commonly measured by growers. In this study, we used 252 field-years of yield monitor data from three crops – wheat (*Triticum aestivum*), canola (*Brassica napus*), and peas (*Pisum sativum*) – recorded across Alberta, Canada, and modelled how yield varied with distances from common crop boundary types. Average yield tended to increase with distance from boundaries before plateauing at about 50 m, and yield variability tended to decrease with distance. There was evidence of an intermediate increase in yield for wheat away from shelterbelts, and a weak increase in canola, but this was not seen for other crop types or boundary types. This study represents one of the first uses of precision yield data to measure ecosystem service provision at large spatial scales.

Regular Posters Friday October 15, 2021, 11:45-13:00

Poster #1 Title: Distribution and Diversity of Terrestrial Isopods (Oniscidea) and their Symbionts in Alberta

Presentation type: Poster

Authors: Stormer, H.G.¹, Proctor, H.C.¹

¹ Department of Biological Sciences, University of Alberta, Edmonton, AB

Woodlice (Isopoda: Oniscidea) have been introduced to North America from Europe throughout the past several centuries. Woodlice have symbiotic associations with a variety of organisms, including parasites that have vertebrates as final hosts (Acanthocephala), and many species of woodlice inhabit urban environments. Although woodlice are undeniably present in Alberta, there are no published records of woodlice from Alberta or other Canadian prairie province as of this date. It is also not known whether any woodlouse-associated symbiotic species have been introduced to the province. Our preliminary collections have revealed four

terrestrial isopod species in the Edmonton area (*Cylisticus convexus* (De Geer), *Trachelipus rathkii* (Brandt), *Porcellio spinicornis* Say, *Porcellio scaber* Latreille). The two potentially symbiotic taxa we have seen so far (Acari and Nematoda) likely represent phoretic and trophic relationships respectively. Future work includes broader surveys of the province to determine if other woodlouse species are present in Alberta, and to evaluate whether woodlice in Alberta are restricted to urban environments. Collected woodlice will be examined for symbionts to determine whether any non-native symbiotic species are present, and whether woodlice may be acting as hosts for any native symbiont species.

Poster #2 Title: Bumble bees of Calgary: A key and illustrated guide for identification of the bumble bee species found in Calgary, Alberta

Presentation type: Poster Presentation

Authors: [Neame, T.](#)¹, Ritchie, S., and Summers, M.¹

¹ Department of Biological Sciences, University of Calgary

Bumble bees of Calgary is a new illustrated guide to introduce students and citizen-scientists to bumble bee identification. Our work includes an overview of bumble bee natural history, conservation considerations, how to photograph bumble bees for identification, and a step-by-step process for identifying bumble bees from other insects and sexing bumble bees. Using 2765 specimens collected in Calgary, we created a matrix key with annotated illustrations for bumble bee identification. We also created pages for 15 species and 22 morphotypes that include distribution maps and known plant associations. To encourage wide-spread use, ***Bumble bees of Calgary*** is an open-educational resource with illustrations licensed under creative-commons available through the University of Calgary invertebrate digital collections. The full guide has been downloaded >1000 times since its publication in June 2021. This guide is intended to support future citizen-science and educational projects, with the goal of increasing data collection and our understanding of Calgary's bees.

Poster #3 Title: Insect Pollinator Diversity and Native Plant Associations in the City of Calgary, Alberta

Presentation Type: Poster Presentation

Authors: [Vermaak, S.K.](#)¹, [Seal, M.](#)¹, Ford-Sahibzada, T.D.¹, and Summers, M.¹

¹ Department of Biological Sciences, University of Calgary

Insects pollinate roughly 75% of Earth's flowering plants, and while Calgary hosts a large number of diverse insect pollinators, its insect diversity and plant associations had not yet been cataloged. This study sought to document the diversity of Calgary's insect pollinators and determine which native plants support them.

We observed and combined observations of plant-pollinator relationships collected through iNaturalist (3168 observations) from 2008-2021, physical collections and observations from specific plants in 2020 (1840 observations), and observations of insects visiting flowers during transect (294 observations) and quadrat (225 observations) surveys in 2021. We compared the number and association type for 59 native plants, and nine major insect groups (flies, beetles, true bugs, wasps, solitary bees, butterflies, ants, bumble bees, and honey bees). We identified 63 families, 148 genera, and 194 species of insects. We found the greatest number of species and plant-pollinator associations for flies and solitary bees, followed by bumble bees and butterflies. We also identified ten native plants that were associated with the

greatest number of major insect groups.

The results of this project will aid conservation and restoration efforts by providing guidance to city planners, landscape designers, and gardeners on which plants best support our city's pollinators.

Aquatics Symposium Oral Papers, Friday October 15, 2021, 13:00-17:00

Talk #8 Title: Adaptive Evolution and Phylogenomics of shore flies (Diptera: Ephydriidae)

Presentation type: Oral Presentation

Authors: Abraham, S.M.¹, Flynn, M.R.², and Sperling, F.A.H.¹

¹ Dept. Biological Sciences, University of Alberta, Edmonton, AB.

² Dept. Mechanical Engineering, University of Alberta, Edmonton, AB.

Shore flies (Ephydriidae) are a diverse, taxonomically challenging group of higher flies that often inhabit extreme aquatic environments such as hot springs and hypersaline lakes. Shore fly lifestyles range from fully terrestrial to diving and foraging underwater as adults, and their morphological adaptations have generated multidisciplinary interest (e.g. mechanical engineering of life in hot water). Consequently, there is potential utility in developing a genetic framework to study shore fly evolution. I will develop a reference genome for the species *Paracoenia bisetosa*, and then use whole genome resequencing of specimens from other locations to examine population differences in *P. bisetosa* from high stress environments compared to more typical semiaquatic locations. This should reveal genetic clues to adaptive evolution, as well as providing environmental bioindicators and insight into the conservation ramifications of natural fragmentation of stress tolerant species' ranges. My work will also expand the taxonomic diversity of sequenced genomes to include maximal representation of western Canadian Ephydriidae. From these data, I will perform phylogenomic analyses to determine evolutionary relationships within the family Ephydriidae, which will be the first large scale molecular assessment of this ecologically diverse, extraordinarily adaptable group of insects.

Talk #9 Title: Impacts of an annelid cleaning-symbiont on crayfish fecundity and range expansion

Presentation type: Oral presentation

Authors: Grams, C.S.¹, and Proctor, H.C.¹

¹ Department of Biological Sciences, University of Alberta, Edmonton AB

Branchiobdellid worms are common symbionts of freshwater crayfish. These tiny, leech-like clitellates rely on their host's cuticle to provide a secure surface on which to live and deposit eggs. Although the advantages branchiobdellids gain from this arrangement are well understood, the effect of branchiobdellid presence on crayfish fitness has been more difficult to quantify. Recent progress has been made by measuring the rate of crayfish growth under different worm loads. Results suggest that branchiobdellids are mutualists that remove fouling organisms from the host's cuticle and gills. However, this partnership is highly sensitive to host and symbiont species and environmental context, and may transition to parasitism if branchiobdellids resort to consuming host tissue. Although crayfish growth is an informative metric, it is not a comprehensive measure of host fitness, and additional variables should be

considered to clarify the nature of this complicated symbiosis. We plan to expand on previous studies by measuring the influence of the branchiobdellid worm *Cambarincola vitreus* on the reproductive output of the northern crayfish, *Faxonius virilis*. Preliminary field work has shown that *C. vitreus* is an abundant symbiont of *F. virilis* in numerous water bodies in Alberta. Additionally, *C. vitreus* populations survive well under laboratory conditions, persisting on crayfish hosts several months after collection from the field. These features make *F. virilis* and *C. vitreus* a useful study system for laboratory experiments. We plan to directly measure the effect of *C. vitreus* on *F. virilis* reproductive fitness by quantifying gamete production and offspring survival under varying worm loads. This research will contribute not only to our limited knowledge of this freshwater symbiosis, but also to our understanding of the role branchiobdellids have played in the recent range expansion of northern crayfish into Alberta.

Talk #10 Title: Successional and disturbance controls on macroinvertebrate community composition in young boreal wetlands

Presentation type: Oral

Authors: Moore, E^{1,2}, and Ciborowski, J.J.H.¹

¹ Department of Biological Sciences, University of Calgary

² Present Address: Department of Earth and Environmental Sciences, University of British Columbia (Okanagan)

The identification of environmental thresholds at which species composition begins to change has important implications for developing reclamation strategies in areas experiencing intensive disturbance, such as Alberta's oil sands region. After mining is complete, oil sands companies are required to reclaim the landscape to the equivalent ecological capabilities that existed pre-mining disturbance. Despite this, reclaimed sites often contain residual constituents of tailings such as salts, naphthenic acids and polycyclic aromatic compounds, whose potential toxicity may limit reclamation success. Aquatic invertebrates are excellent indicators of ecosystem health and their relative diversity and abundance can therefore be used to assess the trajectory of newly reclaimed wetlands. To identify the thresholds at which invertebrate communities experience differences in composition, I analyzed aquatic invertebrate community data previously collected from boreal wetlands surrounding Fort McMurray, AB, using Threshold Indicator Taxon Analysis (TITAN). The response of macroinvertebrate communities to the parameters of wetland age, conductivity (a measure of salinity), pH, and concentrations of naphthenic acids and sulfate were investigated for the presence of thresholds. Thresholds above which multiple (sensitive) species did not occur were identified for two parameters: conductivity (1200 $\mu\text{S}/\text{cm}$) and pH (8.1). Similar thresholds were observed in data from another invertebrate study in the Prairie Pothole Region which experiences similar types of disturbance (Preston et al. 2018), validating the occurrence of community change at these locations along a conductivity and pH gradient. Overall, elevated conductivity may influence the composition of aquatic invertebrate communities in young wetlands forming in reclaimed landscapes.

Talk #11 Title: Aquatic Invertebrate Field Sampling Comparison: Developing Adaptive Methods

Presentation type: Oral

Authors: Sutherland, A., Wrona, F., and Barrett, D.

(All University of Calgary)

Developing responsive environmental monitoring programs for river systems often reveals tensions surrounding implementation of conventional versus experimental field methods. Early stages of adaptive monitoring programs aim to maximize use of techniques that are targeted, efficient, and feasible through comprehensive method testing. Method testing, with the intention of forming a robust toolbox, is integral to a current multi-year project aiming to develop an environmental monitoring program for the Bow River. One important outcome of the program's development has been identified as characterizing changes in benthic communities and basal food web structures in the Bow River around anthropogenic wastewater inputs (primarily of stormwater and treated sewage effluent). This will include a methods comparison for three to four different aquatic invertebrate sampling techniques performed in both the Bow River and the Advancing Canadian Wastewater Assets (ACWA) experimental streams. A comparison of the communities established through these methods, alongside a food web analysis, will provide relevant information to the establishment of a Bow River specific adaptive environmental monitoring program. The goal of this presentation will be to share the experimental set-up for this comparison as an example of the early stages of an adaptive monitoring program, through the lens of aquatic invertebrate sampling.

Talk #12 Title: Water mites: gateway drugs to Acarology.

Presentation type: Oral (plenary for the aquatic entomology symposium)

Authors: Proctor, H.C.¹

¹ Department of Biological Sciences, University of Alberta, Edmonton, AB

Water mites (Acariformes: Parasitengona: Hydrachnidia) are the most species-rich group of arachnids to return to an aquatic lifestyle. There are more than 6000 described species of water mites in 57 families. They occupy all aquatic habitats ranging from torrential waterfalls to temporary pools; some water mites have even invaded the ocean. Like their terrestrial relatives, velvet mites and chiggers, water mites have a complex life cycle involving parasitic larvae and predatory nymphs and adults. They are unusual among freshwater arthropods in often being brightly coloured - this attractive colouration together with relatively large size and sprightly activity make the Hydrachnidia one of the most accessible groups of mites for budding acarologists to study. In this talk I will review what is known of the diversity of water mites in Alberta, discuss interesting aspects of their morphology and behaviour, and point out gaps in our knowledge of their biology that provide many research opportunities for academics of all ages.

Talk #13 Title: Beyond Biomonitoring – How the ABMI Supports Entomological Research

Presentation type: Oral

Authors: Lapierre, A.¹, Hinchliffe, R.¹, Tebby, C.¹, and Cobb, T.¹

¹ Alberta Biodiversity Monitoring Institute, CW 405 Biological Sciences, University of Alberta, Edmonton AB, T6G 2E9

The Alberta Biodiversity Monitoring Institute (ABMI) is a large-scale biodiversity monitoring program that evaluates ecosystem intactness and long-term trends in biodiversity across Alberta. Datasets required to meet the ABMI's ambitious ecological goals require strong taxonomic support and generating these datasets simultaneously advances taxonomic understanding. Through our wetland monitoring activities over the past 13 years, we show how the ABMI effort has already enhanced our knowledge of aquatic insect biodiversity through the expansion of research collections, the discovery of new species records for Alberta, and the development of updated regional identification keys.

Talk #14 Title: Aquatic insect sounds: established natural history or baffling new frontier?

Presentation type: Oral

Authors: Acorn, J. H.¹, and Cerezke-Riemer, Y.¹

¹ Dept. of Renewable Resources, University of Alberta

Aquatic insect stridulations have been recognized since the mid 1800s, and they are increasingly of interest to aquatic biologists pursuing soundscape ecology, e.g., in the context of fisheries biology. However, while the sounds of some insects were characterized decades ago, most species' calls (if they call at all) are still unknown, and recordings that are carefully associated with particular species are scarce. Thus, this aspect of descriptive natural history is unfinished work. Fortunately, high quality hydrophones, recording equipment, and analytical freeware are now readily available, and affordable. Using such gear, we documented the sounds of only three species of local corixid bugs, along with extensive field recordings that cannot be confidently assigned to particular species. As well, we documented, for the first time, corixid stridulations under thick ice in late winter. While making these recordings, we also encountered two rather prominent sounds, neither of which seems to have been recognized by other workers: 1) localized but dramatic sounds produced by fine bubble streams emanating from tissue damage in photosynthesizing macrophytes, and 2) loud, snapping-shrimp-like sounds under the ice in Lake Wabamun, the source of which is still unclear to us. Apparently, much work remains before we can confidently characterize the diversity of sound production in Alberta freshwater environments.

Talk #15 Title: Implications of Salinity in Influencing the Macroinvertebrate Community in Natural Wetlands of the Alberta Oil Sands Region

Presentation type: Oral

Authors: Vercruysse, B.¹, and Ciborowski, J.J.H.¹

¹ Department of Biological Sciences, University of Calgary

Before the onset of oil sands mining in northern Alberta, wetlands accounted for nearly 65% of Alberta's northern boreal landscape, with peatlands comprising about 90% of those wetlands. In recent decades, reclaimed wetland projects have been successful (Sandhill fen watershed, Nikanotee Fen), however, due to sodic shale in the overburden, and the use of Sodium

Hydroxide during extraction, conductivity continues to be a concern for reclaimed landscapes. While many naturally occurring peatland ecosystems in the region contain freshwater, saline fen systems are not uncommon. In order to understand how conductivity influences macroinvertebrate community composition in natural systems, a saline fen complex containing a gradient of conductivity ranging from 3000 $\mu\text{S}/\text{cm}$ to 20000 $\mu\text{S}/\text{cm}$ was used as a study site. Triplicate macroinvertebrate samples were collected from 52 unique wetted areas evenly distributed along the log transformed conductivity gradient, ranging from 3757 $\mu\text{S}/\text{cm}$ to 20170 $\mu\text{S}/\text{cm}$ using a D-net sweep sampler and the community composition of each sample was then analyzed. Threshold Indicator Taxon Analysis (TITAN) identified 20 indicator taxa, with 10 taxa decreasing along the conductivity gradient and 10 taxa increasing, yielding a community level threshold occurring between 6 300 and 9 300 $\mu\text{S}/\text{cm}$. Taxa identified as tolerant indicators include Culicidae and Corixidae, while the sensitive indicators include members of Odonata, Gastropoda and *Dixella*. Thus, increased levels of conductivity in reclaimed landscapes may influence the resulting invertebrate community composition within these landscapes.

Talk #16 Title: The Odonata of Beauvais Lake Provincial Park: A model for accurate odonate surveys?

Presentation type: Oral

Authors: Swann, J.E.¹, Swann, C.C.H.¹, Beswick, B.²

¹ ABI Environmental Services Ltd., 3911 Varsity Drive NW, Calgary, AB

² bette.beswick@gmail.com, Calgary, AB

Odonata — dragonflies and damselflies — are a distinctive and taxonomically relatively well-defined group of insects which are excellent bio-indicators of wetland water quality and are important in biodiversity conservation of wetland habitats. The literature lists 52 species of dragonflies and 25 species of damselflies as occurring in Alberta, with several listed as endangered or species of concern. From our Beauvais collection, we have identified 24 species of dragonflies and 11 species of damselflies. Traditional surveys for odonates in Alberta provincial parks have consisted of single season aerial netting of taxa while the collector(s) walked transects spring and late summer/fall in one season. We will present the results we have found over multiple seasons collecting with aerial nets and the non-traditional use of Malaise traps at Beauvais Lake which has resulted in a much more comprehensive list than from any other Alberta provincial park. Our list includes species at risk/of concern and one species that indicates a particular site within Beauvais Lake Park boundaries merits more protection from occasional 'cattle forays' into the park.

Regular Oral Papers Saturday October 16, 2021 09:05-11:45

Talk #17 Title: Alien Invasive Species Surveillance in Alberta - A Review

Presentation type: Oral

Authors: Fry, K.M.¹, Feddes-Calpas, J.², and Kimoto, T.³

¹School of Life Sciences & Business, Olds College, Olds, Alberta

²Society to Prevent Dutch Elm Disease

³Canadian Food Inspection Agency

The establishment and expansion of the global marketplace has resulted in an increased risk of introduction to Canada of alien invasive species threatening our urban forests. The Society to Prevent Dutch Elm Disease has collaborated with the Canadian Food Inspection Agency to establish an invasive alien species surveillance network in Alberta over the past 10 years to detect introductions that may be harmful to urban, rural, and unmanaged stands of trees. Up to fifteen trapping sites identified as highest risk introduction sites for alien invasive species each had four separate Lindgren funnel traps set up and serviced bi-weekly from May 1 to September 30 of each year for a total of one hundred and fifty trap dates and six hundred total trap collections. The four traps were baited as follows; Ipsenol, Ethanol, α -pinene, or a Sirex lure (2010-2014), or Monochamol + Ipsenol, α -pinene, and Ethanol on one pair of traps and Fuscamol, Fuscamol Acetate, and Ultra High Release Ethanol on another pair of traps per site (2015-2021). This suite of lures specifically targets *Monochamus* species, a group of significant concern, all while also providing a broad spectrum of attraction so as to lure in as many wood-boring species as possible. Traps residues were processed and specimens in the following taxa were extracted and identified to Genus or species; Cerambycidae, Buprestidae, Siricidae, and Scolytinae. The results of the trapping will be described, including total number of taxa, abundance of selected taxa, and lure efficacy/selectivity. No alien invasive species were detected.

Talk #18 Title: Assessing genetic structure and reconstructing invasion routes of insect pests on the Canadian prairies

Presentation type: Oral

Authors: Senevirathna, K.M.¹ and Mori, B.A.¹

¹ Department of Agricultural, Food, and Nutritional Science, 4-10 Agriculture/Forestry Centre, University of Alberta, Edmonton, AB, T6G 2P5

Population genomics can be an important tool to help identify patterns of movement and potential routes of invasion of agricultural pests. Identifying potential corridors of movement and population interconnections can help develop strategies to prevent further invasions or movement of these pests. In recent years, significant damage by wheat midges (*Sitodiplosis mosellana*), a pest of wheat (*Triticum aestivum*), has been reported in Alberta, Saskatchewan, Manitoba, Minnesota, North Dakota, and Idaho. Long-range dispersal events through wind or anthropogenic activities may have contributed to the current wheat midge distribution on the Prairies. However, understanding the movement of the wheat midge is difficult as several different processes may dictate their movement (e.g., short-range, stepwise, wind-mediated). In this study, we will reconstruct the route(s) of invasion of wheat midge on the Prairies and determine the origin of wheat midge in North America by assessing genome-wide population

Proceedings of the 69th of the Entomological Society of Alberta Annual Meeting

structure using a restriction site-associated DNA sequencing (RADSeq) approach. In addition, we will compare wheat midge populations to identify possible signatures of selection between invaded (North America) and native (Europe) regions, and areas of recently introduced (the Peace Region of Alberta) and established (Central Alberta) populations. Overall, this work will provide essential genomic resources for future researchers working on wheat midge. Understanding how diverse wheat midge populations are in North America and their interconnectedness may contribute to the management of this pest species using wheat midge tolerant wheat and insecticides as both can create high levels of selection pressure on midge populations. The ultimate goals of these studies are to use this knowledge to mitigate wheat midge damage through integrated pest management and enhance both the quality and quantity of wheat production in the Canadian Prairies.

Talk #19 Title: Assessment of current and future needs for entomological extension in agriculture in Alberta

Presentation type: Oral

Authors: Domnich, I.¹ and Evenden, M.¹

¹ University of Alberta

Recent discussions around extension activities in Alberta have demonstrated that a major challenge agricultural producers face today is to get new the knowledge and technology from researchers and extension entomologists. In order to improve the coordination of extension activities, it is necessary to understand the needs of producers and evaluate the effectiveness of current extension efforts. This project will involve the design and implementation of scientific surveys that target agricultural producers to better understand their use of agricultural extension tools and resources. These surveys will evaluate the various modes of communication used by producers to acquire and exchange new knowledge, as well as the priorities and needs of producers in terms of extension education. The questionnaires will assess producer's views on the effectiveness of current extension strategies, their preferred mode of information exchange, and the most pressing entomological issues that they face. The aim of this research is to develop a template that can be adopted for a variety of extension purposes.

Talk #20 Title: A multiplex PCR approach to identify weed seed predation by carabids in hemp and wheat in central Alberta

Presentation type: Oral

Authors: LaForest, N.B.¹, and Mori, B.A.¹

¹ Department of Agricultural, Food, and Nutritional Science, University of Alberta

Each year Canadian producers spend thousands of dollars on herbicides to reduce severe crop losses caused by weeds. As a result of herbicide use, the number of herbicide resistant weed species continues to increase. Due to resistance and potential harmful environmental effects of herbicide usage, alternative options are needed to suppress weeds. Ground beetles (Coleoptera: Carabidae) have a continuum of diets which range from specialist to generalist, and carnivore to omnivore to herbivore. There are hundreds of carabid species in Canada, and previous research has shown weed seed consumption in laboratory trials, and an increased presence of carabids near weed patches. However, there is a lack of research demonstrating if weed seed predation is occurring in the field. To investigate the feeding behaviour of carabids

in hemp and wheat, molecular gut content analysis will be used to identify plant DNA within field captured carabids. To identify plant material within carabids, PCR will be performed with plant-specific primers designed using the *rbcL* and *matK* regions. The results of this study will contribute to the understanding the role of carabids in agroecosystems as weeds seeds predators.

Talk #21 Title: Lodgepole and jack pine terpene response at different stages of mountain pine beetle mass attack.

Presentation type: Oral

Authors: Musso A.E.¹, Huber D.P.W.², Carroll A.L.³, Evenden M.L.¹

¹ University of Alberta, Edmonton AB

² University of Northern British Columbia, Prince George BC

³ University of British Columbia, Vancouver BC

Insect herbivores must contend with constitutive and induced plant defences. The mountain pine beetle (*Dendroctonus ponderosae* Hopkins; MPB) has expanded its range east of the Rocky Mountains into the boreal forest in Alberta and is encountering evolutionarily naïve lodgepole and jack pines. Previous studies have examined terpene profiles prior to (constitutive) and just after (induced) mass attack but the terpene profile of trees post-overwintering is unknown. We manipulated mass attack densities in lodgepole and jack pines in the field and measured individual and total terpene amounts and diversity in phloem pre-attack, post-attack, and post-overwintering. Total terpenes as well as many individual terpenes increased at the post-attack stage and were significantly higher post-overwintering in both lodgepole and jack pines. Chemical diversity was not different at the different stages of attack, but individual trees had distinct chemical communities. Lodgepole pines had greater amounts of total constitutive terpenes compared to jack pine, but jack pine had higher induced terpenes compared to lodgepole pine. Since phloem terpene content is increased post-overwintering, trees that survive minor attacks or are “strip attacked” could be more toxic to MPB that try to colonize in the subsequent year.

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**Entomological Society of Alberta
Annual General Meeting Agenda
16 October 2021 @ 10:40 am
Online (Zoom)**

1. Call to Order (Terry Eberhardt)
2. Approval of agenda
3. Approval of minutes of 2020 AGM (circulated by email)
4. Report from Secretary (Lisa Lumley, Annex 1)
5. Report from Treasurer and presentation of audited 2020 financial statement (Caroline Whitehouse, Annex 2)
6. Appointment of society financial auditors (Caroline Whitehouse)
7. Report from Webmaster (Micky Ahn, Annex 3)
8. Report from Directors:
 - a) Director to ESC (Boyd Mori, Annex 4)
 - b) Northern Director (Ronald Batallas, Annex 5)
 - c) Central Director (Tobin Benedict, Annex 6)
 - d) Southern Director (Piratheepa Jegatheeswaran, Annex 7)
 - e) Outreach Director (Ilam Domnich, Annex 8)
 - f) Social Media Director (Valentina Ibarra, Annex 9)
9. Report from Editor (Bette Beswick, Annex 10)
10. Business arising from previous meetings
11. Nominations and Election (Dan Johnson)
12. Resolutions
13. New Business
 - a) Undergraduate Student Award (Sarah McPike)
 - b) Carr Award (John Acorn)
 - c) Location of the 2022 AGM and Conference (Terry Eberhardt)
 - d) ESC JAM 2025 (Boyd Mori)
14. President's Address (Terry Eberhardt, Annex 11)
15. Adjournment

Minutes
Annual General Meeting
16 October 2021 @ 10:40 am
Online (Zoom)

Terry Eberhardt called the meeting to order @ 10:47 am.

Dan Johnson approved the agenda, Ken Fry seconded, motion carried

John Swann moved to accept the AGM 2020 minutes, Ken Fry seconded, motion carried

Secretary's Report: Lisa Lumley delivered her report (Annex 1).

Treasurer's Report: Caroline Whitehouse delivered her report (Annex 2). Boyd Mori asked about the amount in cash – is it worth investing so that we at least cover inflation? Further discussion about options. Sam Robinson mentioned that there are short term accounts that could provide some interest (at least to cover inflation), Ken Fry mentioned to make sure to maintain a float for expenses for next year's meeting. Caroline Whitehouse moved to invest 50% of the cash funds, seconded by Ken Fry, motion carried.

Webmaster's Report: Micky Ahn delivered his report (Annex 3). Maya Evenden wondered if there was interest in creating a twitter handle for ESA. Micky said that's up to social media director. Micky recognized importance of it and Instagram. Valentina Ibarra will likely address later. Boyd Mori asked, in the past there used to be an honorary member page and wondering if Cedric Gillott had approached Micky as he was wondering why it wasn't there anymore. Micky said it is still there, but might be more difficult to find. Micky provided the direct link in the chat.

Regional Director's Report: Boyd Mori delivered report (Annex 4).

Northern Director's Report: Ronald Batallas absent (see Annex 5). Maya Evenden added via chat that: Asha also received the UAlberta Faculty of Science Dissertation Award for her outstanding thesis.

Central Director's Report: Tobin Benedict absent, no report.

Southern Director's Report: Piratheepa Jegatheeswaran delivered report (Annex 7).

Outreach Director's Report: Ilan Domnich delivered report (Annex 8). In regards to finding facilities for workshops, Micky Ahn mentioned that Telus Spark might be a good facility for a pinning workshop in Calgary (so maybe something like this also exists in Edmonton) and that he would be willing to help get a workshop going in Calgary.

Social Media Director Report: Valentina Ibarra delivered report (Annex 9). She added that she will look into adding a twitter account.

Proceedings Director Report: Bette Beswick delivered report (Annex 10).

Dan Johnson lead the nominations of board. Dan moved, John Swann seconded, motion approved.

New Business: Sarah McPike presented the Undergraduate Student Award to Olivia DeBourcier. Sarah McPike presented the Carr Award to David Lawrie and John Acorn provided additional information on Dave's background for which he was nominated.

Terry Eberhardt – the 2022 AGM will be in the southern region.

Boyd Mori announced that the 2025 ESC JAM will be in Alberta. Next year we will need to strike up a committee to start thinking about organizing this meeting. Ken Fry mentioned that ESC has a very streamlined system now so it's not as imposing for the LOC to organize, and that there is training for Code of Conduct that will be required. Kevin Floate mentioned that the Code of Conduct training can often be given by the local security that's in place in institutions.

Terry Eberhardt motioned that the reports be accepted as given, Boyd Mori seconded, motion approved.

Terry Eberhardt gave President's Address (Annex 10).

Terry Eberhardt motioned adjournment at 11:52 am. Boyd Mori seconded.

List of Annexes

ANNEX 1: Secretary's report

The ESA email account has been quite active this year with:

- around 120 email strings from 1 January to 13 October (not including junk mail).
- around 40% were requests to distribute information to the membership (e.g. virtual seminars, ESC, COSEWIC, Biological Survey of Canada, citizen science projects requesting assistance, photo contests, student opportunities).
- around 10% were requests for id's or information: spiders, ants, butterflies, lawnsrimp!
- around 5% were requests from media for interviews: mainly mosquitos.
- one request for mentorship in Calgary.
- remaining ~45% of communication were emails related to ESA business (e.g. Annual Conference/AGM, Registries, spring and fall executive meeting planning, outreach planning).

Submitted by Lisa Lumley, ESA Secretary

ANNEX 2: Treasurer's report

Treasurer's Report Annual General Meeting – October 7, 2021

Prepared by Caroline Whitehouse

Member Status 2020

Type	In good standing	Delinquent but on the books
Free library	20	--
Library	--	1
Honourary	3	--
Regular	39	28
Retired	2	2
Student	31	32
Total	95	63

AGM 2020 overview – virtual

Registration	1,675.00
Awards	(1,200.00)
Net	475.00

AGM 2020 estimated attendance

Honourary	1
Member	
Regular	21
Student/Retired	28
Non-member	
Regular	3
Student/Retired	1
Total	54


Member Status 2021 – as of October 11

Type	In good standing	Delinquent but on the books
Free library	20	--
Library	--	1
Honourary	3	--
Regular	38	29
Retired	1	2
Student	29	43
Total	91	75

AGM 2021 estimated attendance

Honourary	1
Member	
Regular	16
Student/Retired	22
Non-member	
Regular	2
Student/Retired	-
Total	41

Income Statement
Entomological Society of Alberta
Reporting period: 2020-01-01 to 2020-12-31

<u>Accounts</u>	<u>Balance</u>
Revenue	
AGM - Registrations	1,675.00
Dividends - Common shares	25.53
Donations	4,000.00
Interest - GIC Term Deposits	330.68
Membership Dues	1,720.00
Total Revenue	7,751.21
 GROSS PROFIT	7,751.21
Operating Expenses	
Awards, Grants & Scholarships	1,200.00
Mini-JAM 2019 proceed share to Ento Soc Sask	647.67
Paypal fees	180.93
Bank service charges	7.50
Total Operating Expenses	2,036.10
NET PROFIT	5,715.11

Approved by Auditor:

Erin Campbell

Printed name

Erin Campbell

Signature

06/10/2021

Date

Approved by Auditor:

Ronald Batallas

Printed name

Ronald Batallas

Signature

06/10/2021

Date

Balance Sheet
Entomological Society of Alberta
As of: 2020-12-31

<u>Account</u>	<u>Balance</u>
Asset	
Cash on Hand	16,332.58
Common Shares	867.38
GIC Term Deposits	16,661.20
Paypal	+ 117.88
Total Assets	33,979.04
Liability	
Total Liabilities	-
Equity	
Previous Year(s) Earnings	28,263.93
Current Year Earning	5,715.11
Total Equity	33,979.04
Total Liabilities and Equity	33,979.04

Submitted by Caroline Whitehouse, ESA Treasurer

ANNEX 3: Webmaster's Report

Webmaster Report

- 2 requests for opportunities placed on website. Both requests have been for graduate student positions
- 1 'blogpost' for 2021 Insect Appreciation Day
- Online tools for registration and membership appear to be working smoothly – both on free and subscription version
- Proceedings are now up to date, and we are awaiting approval of the 2020 proceedings prior to upload.

Submitted by Micky Ahn, ESA Webmaster

ANNEX 4: Regional Director's Report

Regional Director's Report

Entomological Society of Alberta

14 October 2021

Prepared by: Boyd Mori, ESC Regional Director (Term 2019-2022)

Meetings attended:

Board meetings:

14 October 2020

27 April 2021

29 June 2021

13 October 2021

Meetings of the Regional Entomological Societies:

5 March 2021

Upcoming ESC Joint Annual meetings:

BC: ESC-ESBC-ESA: 13-18 November 2022

SK: 2023

QB: 2024

AB: 2025

New information from the ESC:

Code of Conduct: A meeting Code of Conduct has been introduced and will be followed at all future meetings. There is current work on a general Code of Conduct for all ESC work (e.g. board meetings, etc).

Annual Meetings: Due to the uncertainties around COVID, and now the on-going 4th wave, the ESC-ESO Joint Annual Meeting was moved to an online format (with both pre-recorded and live presentations). The Meeting will take place 15-18 November 2021.

Upcoming ESC Joint Annual meetings:

BC: ESC-ESBC-ESA: 13-18 November 2022

SK: 2023

QB: 2024

AB: 2025

Equity, Diversity and Inclusion Committee: The ESC formed an EDI committee in 2020, this year there will be several events to promote EDI within the society and the community at large. Dr. Maydianne Andrade (Professor, Vice-Dean and CRC at the University of Toronto, President of the Canadian Black Scientists Network) will speak on EDI at the ESC JAM. A workshop will be offered in late-January on "Increasing diversity in STEM".

The Canadian Entomologist: Starting in 2022, The Canadian Entomologist will offer discounted open access (OA) fees for members of the Entomological Society of Canada. The approximate OA fees will be \$3000 CAD for non-members and \$1800 CAD for members.

Volunteer with the ESC: The ESC is always looking for volunteers to serve on various committees, if interested please reach out to the ESC or me and I can put you in touch with the appropriate person.

The ESC Bulletin: The Bulletin is published quarterly and each quarter I am asked to provide information on what our members and what they have been up to. Please let me know if you have anything to report. Long time editor Dr. Cedric Gillott will be resigning as of the June 2022 issue, Dr. Bernie Roitberg will take over after that.

ANNEX 5: Northern Director's Report

Northern Director's Annual Report, October 6, 2021

October 2020 – October 2021

Compiled by Ronald Batallas, ESA Northern Director

Entomological Graduate Thesis Defences:

August 9, 2021. **Asha Wijerathna** (Evenden Lab, University of Alberta) defended her Ph.D. thesis: Interactions of pea leaf weevil (Coleoptera: Curculionidae) with its primary and secondary host plants in Alberta.

June 23, 2021. **Flavio Petri** (Evenden Lab, University of Alberta) defended his M.Sc. thesis: The influence of larval diet and microsporidian infection on life history traits of the forest tent caterpillar, *Malacosoma disstria* Hübner (Lepidoptera: Lasiocampidae).

April 30, 2021. **Zac MacDonald** (Nielsen Lab, University of Alberta) defended his Ph.D. thesis: From species to genes: ecological and evolutionary mechanisms structuring diversity in space and time.

December 17, 2020. **Janet Sperling** (Magor Lab, University of Alberta) defended her Ph.D. thesis: Assessment and diversity of tick bacterial microbiomes.

November 30, 2020. **Connor Nelson** (Frost Lab, University of Alberta) defended his M.Sc. thesis: Effects of linear anthropogenic corridors on insect pollinator movement and diversity, and understory shrub fruit production in the boreal forest of northeastern Alberta.

Entomological Journal Publications:

Riva, F., & Nielsen, S. E. (2021). A functional perspective on the analysis of land use and land cover data in ecology. *Ambio*, 50(5), 1089-1100.

Nelson, C. J., Frost, C. M., & Nielsen, S. E. (2021). Narrow anthropogenic linear corridors increase the abundance, diversity, and movement of bees in boreal forests. *Forest Ecology and Management*, 489, 119044.

MacDonald, Z. G., Deane, D. C., He, F., Lamb, C. T., Sperling, F. A., Acorn, J. H., & Nielsen, S. E. (2021). Distinguishing effects of area per se and isolation from the sample-area effect for true islands and habitat fragments. *Ecography*.

French, R. L., Bell, A. J., Calladine, K. S., Acorn, J. H., & Sperling, F. A. (2021). Genomic distinctness despite shared colour patterns among threatened populations of a tiger beetle. *Conservation Genetics*, 1-16.

Shegelski, V. A., Campbell, E. O., Thompson, K. M., Whitehouse, C. M., & Sperling, F. A. (2021). Source and spread dynamics of mountain pine beetle in central Alberta, Canada. *The Canadian Entomologist*, 153(3), 314-326.

Grossi, A., & Proctor, H. (2021). Variation in Ectosymbiont Assemblages Associated with Rock Pigeons (*Columba livia*) from Coast to Coast in Canada. *Diversity*, 13(1), 9.

Mori, B. A., Coutu, C., Chen, Y. H., Campbell, E. O., Dupuis, J. R., Erlandson, M. A., & Hegedus, D. D. (2021). De Novo Whole-Genome Assembly of the Swede Midge (*Contarinia nasturtii*), a Specialist of Brassicaceae, Using Linked-Read Sequencing. *Genome biology and evolution*, 13(3), evab036.

Events and Extension:

August 11, 2021. **Family Nature Night: Beautiful Bugs!** hosted by Nature Alberta at Twin Brooks District Nature Park, Edmonton. Extension event for families with small children. Entomologists showcase pinned insects and take the kids on a short nature walk to find insects in the park

August 4, 2021. **Family Nature Night: Urban Critters.** Extension event hosted by Nature Alberta at Jackie Parker Park, Edmonton. Entomologists showcase pinned insects and take the kids on a short nature walk to find insects in the park.

June 8, 2021. **Insect Appreciation Day.** Ilan Domnich prepared a scavenger hunt sheet for kids to promote the event.

March 26, 2021. **Strickland Memorial Lecture 2021.** Invited guest: Dr. Rachael Winfree, Professor, Department of Ecology, Evolution and Natural Resources, Rutgers University. Lecture: "Do we need pollinator biodiversity for pollination services?"

March 12-13, 2020. **Strickland Memorial Lectures 2020.** Invited guest: Dr. Jennifer Thaler, Professor, Department of Entomology, Ecology and Evolution, Cornell CALS. Lectures: "Ecology of fear across scale" and "Ecology of fear in pest management."

Awards and Recognitions:

November 2021. **Asha Wijerathna** and **Antonia Musso** (Evenden Lab, University of Alberta) were selected to present at the Graduate Student Showcase Symposium at the ESC-ESO 2021 JAM.

October 2021. **Asha Wijerathna** received the Faculty of Science Dissertation Award at the University of Alberta.

November 2020. **Asha Wijerathna** was awarded the prestigious Dr. John H. Borden Scholarship from the Entomological Society of Canada. This scholarship is awarded to graduate student that conduct research in Integrated Pest Management with an entomological emphasis.

ANNEX 6: Central Director's Report

None Provided

ANNEX 7: Southern Director's Report

SOUTHERN DIRECTOR REPORT FALL 2021

ENTOMOLOGICAL SOCIETY OF ALBERTA

Submitted by Piratheepa Jegatheeswaran, ESA Southern Director - October 16th, 2021

The COVID-19 pandemic has continued to limit access to Agriculture and Agri Food Canada laboratories. University of Lethbridge started in-person classes from this fall term.

Graduating students:

- **Asha Wijerathna** successfully defended her PhD thesis: *"Interactions of pea leaf weevil (Coleoptera: Cuculionidae) with its primary and secondary host plants in Alberta"*. August 09th, University of Alberta. Her field work was based in southern Alberta at the AAFC laboratories with Hector Carcamo and Dr. Maya Evenden of Department of Biological Sciences at the University of Alberta.
- **Sydney Backmeyer** is in the final stages of writing up her MSc thesis. Her research examines the toxicity to dung-breeding insects, of residues in dung of cattle treated with the parasiticide, LongRange® eprinomectin. She is co-supervised by Dr. Kevin Floate (AAFC, Lethbridge) and Dr. Cam Goater (University of Lethbridge).

News:

- Technician **Cheryl Chelle** retired last fall after 27 years with AAFC. She had special expertise on cereal leaf beetle and rearing its parasitoid.
- New technician **Tim Skuse** was hired this summer to a permanent position in Haley A. Catton's Cereal Crop Entomology program at AAFC-Lethbridge. He did his MSc with Rob Bouchier on biological control of weeds.
- **A new AAFC field guide** was just published on pest wireworms on the Prairies, co-authored by Haley A. Catton, Wim van Herk, Julien Saguez and Erl Svendsen.
<https://publications.gc.ca/site/eng/9.900365/publication.html>

- As was the case in 2020, covid restrictions prevented Ent. Soc. of Alberta members in southern Alberta from hosting Insect Discovery Day at the Alberta Bird of Prey Center in Coaldale, AB (<http://www.burrowingowl.com/>). This annual event is normally held in August to introduce the general public (with a focus on children) to the wonderful world of insects.

Events:

University of Lethbridge researcher **Dr. Shelley Hoover** and producer Kevin Nixon talked about “Why the Health of Agriculture Depends on Keeping Honey Bees Alive” in uLethbridge Agri-food summer speaker series on August 31, 2021.

ANNEX 8: Outreach Director’s Report

2021 Entomological Society of Alberta

Report from the Outreach Director

National insect appreciation day (NAIAD) was held on June 8. The ESC is hosted an online insect picture challenge for NAIAD. Social media posts of insect photos were encouraged, with the accompanying hashtags #NationalinsectDay and #InsectPictureChallenge.

In addition, I included last year’s “Insect Safari” that Sarah and I developed, designed to encourage a non-entomologist audience to go outside and learn about the arthropods (and evidence of their activity) outdoors. Please share this with anyone you think may enjoy it.

I have been doing regular presentations (usually bi-weekly) for Edmonton Public Schools via the Career Pathways initiative for students of all ages. During these presentations I promote entomology, discuss the importance of insects, and introduce students to the variety of careers that involve entomology.

Micky brought up a great idea of potentially hosting an “insect pinning for the home” workshop once things are in-person again. This could include a short tutorial on how to spread and pin flying insects as well as provide some ideas for creating a display (see my instagram @crude_organism for some ideas of what these displays may look like). To this extent, I’ve been working on organizing an insect pinning workshop here in Edmonton for 10-12 people. I’ve ordered butterflies online that I will rehydrate, and I’ll be ordering other materials for this workshop. Not including a venue, the total cost is estimated to be ~\$400, which will be recovered from the admission price. The price of the venue rental will come out of the outreach grant. Open to ideas for venue location.

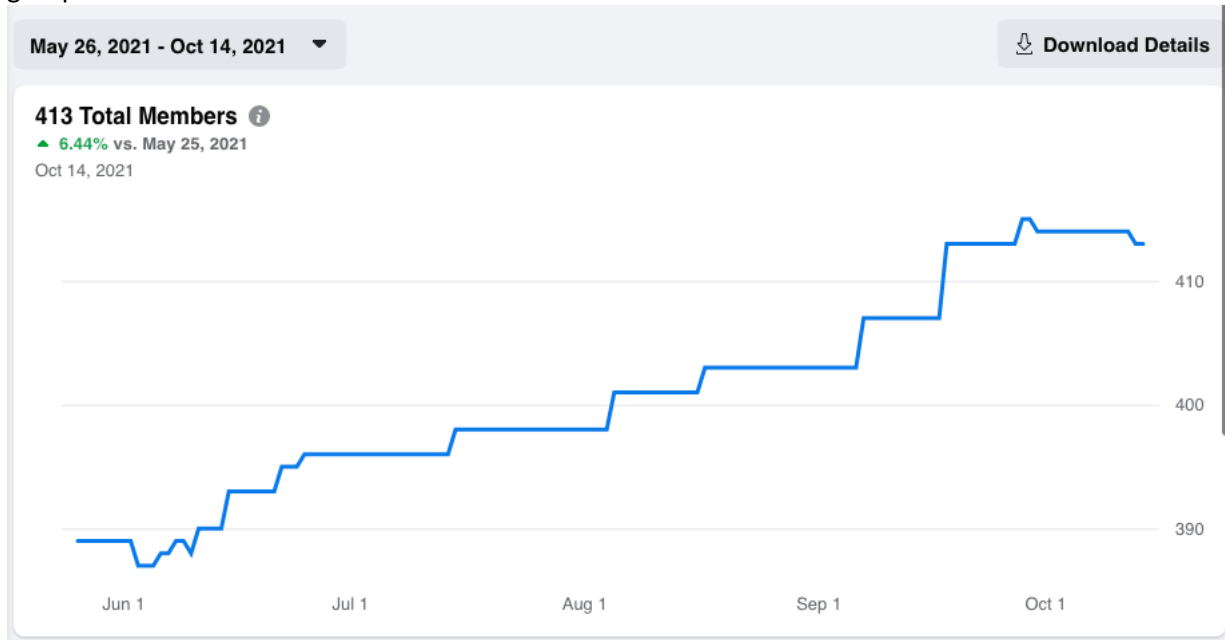
Submitted by Ilan Domnich, ESA Outreach Director

ANNEX 9: Social Media Director's Report

ESA Social Media Report – May 2021-October 2021

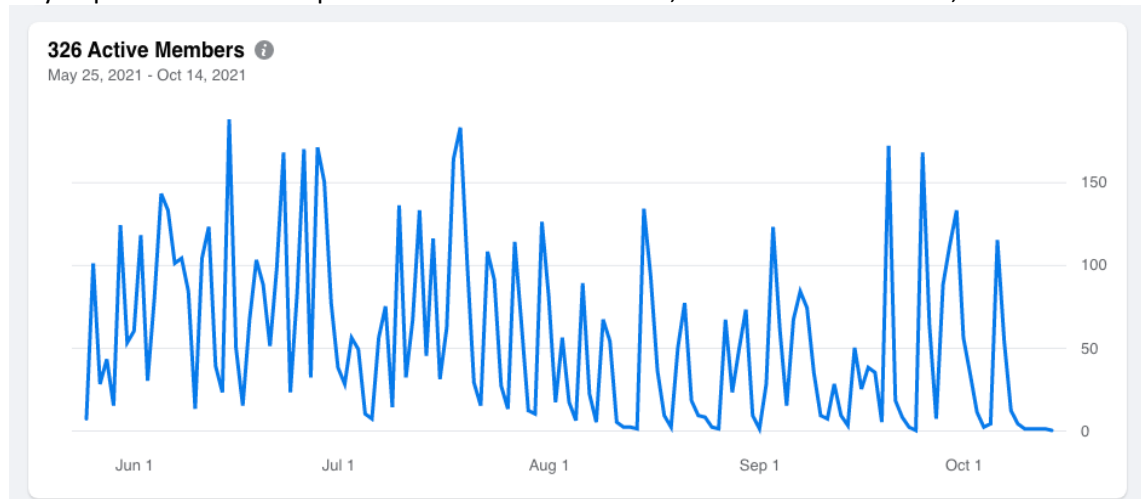
Facebook Activity:

Between May 25, 2021, and October 14, 2021, the Facebook group has gained 30 new members. We are up from 389 members to 413 as of October 14, 2021. Approved members have been entomology enthusiasts, members of the Alberta Bugs and Insects Facebook group and other entomology related groups.



Facebook Group Engagement

Group Engagement has been relatively consistent between May 25, 2021, and October 14, 2021. The majority of posts consist of requests for insect identification, event announcements, and insect facts.



Plans moving forward:

- The webmaster, outreach director and social media director are in the process of creating an Instagram page for the society. The objective is to increase engagement within the community.
- We are currently in the process of collecting photographs from scientists and enthusiasts to have sufficient content for regular posts.
- Engage with labs and students around the province to promote research projects related to entomology in Alberta.

ANNEX 10: Proceedings Editor Report

2021 Entomological Society of Alberta

Report from the Proceedings Editor

I am happy to report that we're up-to-date with compiling the Proceedings from previous years conferences and Annual General Meetings. The 2020 Proceedings will be completed once the minutes of the 2019 AGM are approved at the 2020 AGM.

In addition, the Bylaw revisions which were passed in 2019 and then approved with a Special Resolution at the 2020 AGM have now been properly registered with the provincial government.

Proceedings Editor
Bette Beswick

ANNEX 11: President's Report

President's Report 2021 to the Entomological Society of Alberta

It has been my privilege to serve as President of the ESA this year. I would like to sincerely thank Bette Beswick, Lisa Lumley, Boyd Mori, Dan Johnson, Sarah McPike and Caroline Whitehouse for their guidance, reminders and tips throughout the year. I am acutely aware my lack of availability due to my work commitments put pressure on you, but you took the reins as necessary when I couldn't, and I am truly grateful. It is a distinct pleasure to work with all of you on the board.

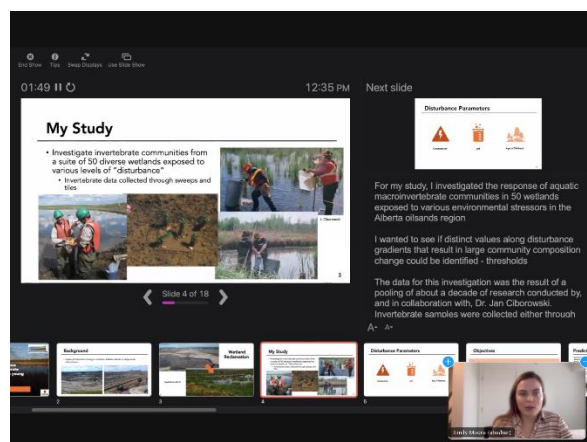
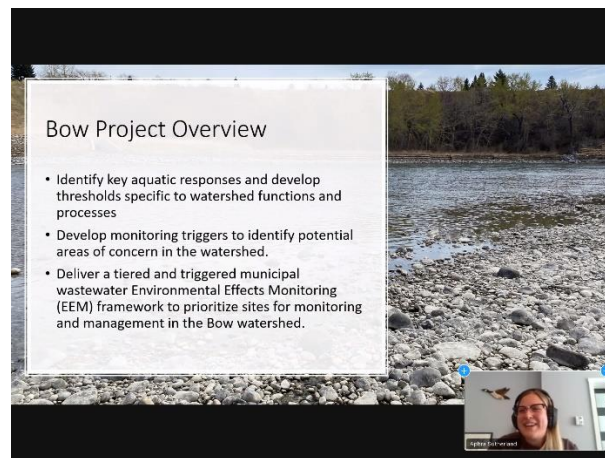
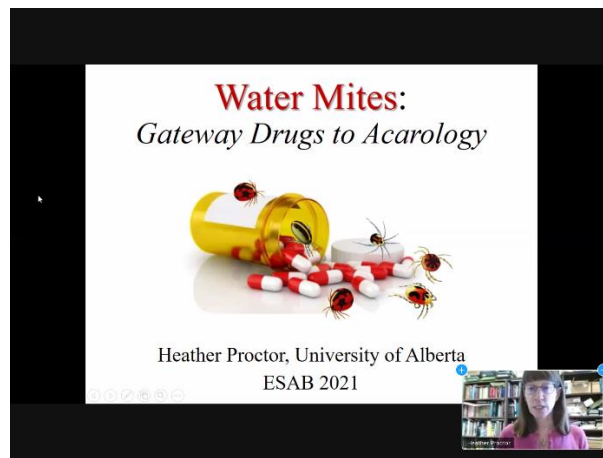
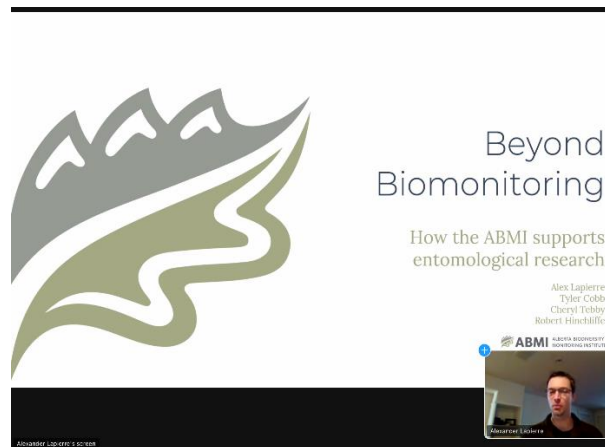
I attended the meeting of the Entomological Societies of Canada on 05 March 2021 via Zoom, on behalf of our Society. As we had to cancel the Joint Annual Meeting that was scheduled to be held in Calgary in 2020, the ESC re-organized the rotation of future JAMs so that our Society could be accommodated as soon as possible. We are now scheduled to co-host the Jam in 2025 and the ESC has formally accepted our invitation.

It is wonderful that we are still able to have our annual conference while we cannot meet in person. It reassures me greatly to see the entomology work and research that continues and the enthusiasm of the students, and indeed all the presenters, is palpable even through the screen.

I look forward to serving on the board as Past President in 2022.

Terry Eberhardt

Screenshots from the 2021 Entomological Society of Alberta Conference and Annual General Meeting



Ephydriidae, the shore flies

- Acalyptrate flies in the same superfamily as *Drosophila*
- Mostly semiaquatic
- Super diverse life histories!

Variation of Aquatic Macroinvertebrate Community Composition Along a Gradient of Salinity in a Boreal Saline Fen

Brentan Vercautryse & Jan Ciborowski
University of Calgary
Boreal Wetland Reclamation Assessment Program
Entomological Society of Alberta Annual Meeting
October 30, 2021

A collaboration in creating digital natural history collections: A case study of Alberta native bees

Rob Alexander, Kathryn Ruddock, Mindi Summers

A multiplex PCR approach to identify weed seed predation by carabids in hemp and wheat in central Alberta

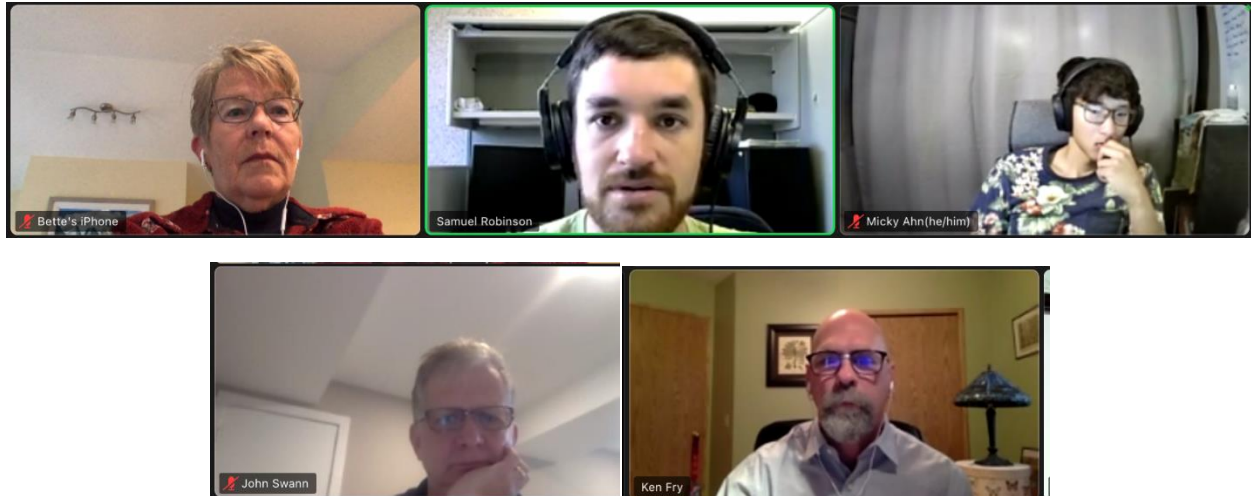
Natalie LaForest & Boyd Mori
Department of Agricultural, Food, and Nutritional Science
University of Alberta

Assessing genetic structure and reconstructing invasion routes of insect pests on the Canadian Prairies

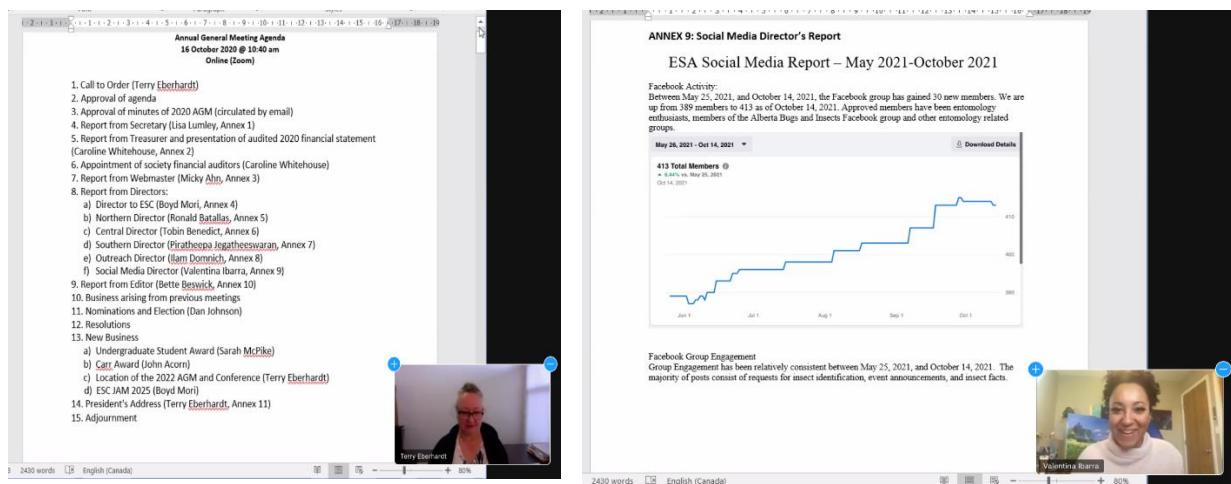
Kanishka M. Seneviratna and Boyd A. Mori
Department of Agricultural, Food, and Nutritional Science,
Agriculture/Forestry Centre,
University of Alberta, Edmonton,
AB, T6G 2P5

Species of Interest

- *Monochamus alternatus* - Japanese Pine Sawyer
- *M. sutor* - Small White-Marmorated Longicorn
- *M. urusovi* - White Mottled Sawyer



The conference organizing committee: Bette Beswick, Sam Robinson, Micky Ahn, John Swann and Ken Fry. Missing: Carolyn Whitehouse.



The Annual General Meeting was attended virtually by 35 participants. Terry Eberhardt (President) and Valentina Ibarra (Social Media Director) were among the directors who presented.

2021 Entomological Society of Alberta Membership List

Last Name	First Name	Institution	Location
Honorary Members			
Byers	Bob	AAFC Research Centre	Lethbridge, AB
Fry	Ken	Olds College	Olds, AB
Shemanchuk	Joseph		Lethbridge, AB
Regular Members			
Acorn	John	University of Alberta	Edmonton, AB
Barr	William		Edmonton, AB
Batallas	Ronald	Biological Sciences, University of Alberta	Edmonton, AB
Benedict	Tobin	University of Calgary	Calgary, AB
Beswick	Bette		Calgary, AB
Briere	Charity		
Cale	Jonathan	University of Alberta	Edmonton, AB
Cárcamo	Héctor	AAFC Research Centre, Crop Sciences Section	Lethbridge, AB
Catton	Haley	Agriculture and Agri-Food Canada	Lethbridge, AB
Ciborowski	Jan	University of Calgary	Calgary, AB
Cuny	Robert	Lakeland College	Lloydminster, AB
Dechene	Andrea		
DeClerck-Floate	Rosemarie	AAFC Research Centre	Lethbridge, AB
Domnich	Ilan		
Eberhardt	Terry		Cochrane
Elliott	Christina	Grant MacEwan University	Edmonton, AB
Evans	Megan	University of Calgary	Calgary, AB
Evenden	Maya	Biological Sciences, University of Alberta	Edmonton, AB
Fasunwon	Bamidele		
Flaherty	Leah	Grant MacEwan University	St. Albert, AB
Floate	Kevin	AAFC Research Centre	Lethbridge, AB
Friesen	Kevin	Grant MacEwan University	Edmonton, AB
Frost	Carol	University of Alberta	Edmonton, AB
Fulkerth	Christine	Olds College	Olds, AB
Gabert	Keith	Canola Council	Innisfail, AB
Glasier	James		
Hebbard	Wade		
Hilchie	Gerald	Biological Sciences, University of Alberta	Edmonton, AB
Hole	Jim	Atlas Growers	
Hoover	Shelley	University of Lethbridge	Lethbridge, AB
Hunter	Andrew		
Johnson	Dan	University of Lethbridge	Lethbridge, AB
Klutsch	Jennifer	University of Alberta	Edmonton, AB
Lakshmi	K. Vijaya	Jayashankar Telangana State Agricultural University	
Lee	Seung-Il	Canadian Forest Service-Northern Forestry Centre	Edmonton, AB

Last Name	First Name	Institution	Location
Lemmen-Lechelt	Joelle		
Longair	Robert	University of Calgary	Calgary, AB
Lumley	Lisa	Royal Alberta Museum	Edmonton, AB
Marshall	Valerie	University of Alberta	Edmonton, AB
McGowan	James	Lavellan Pest Solutions Inc	Calgary, AB
Meers	Scott		Brooks, AB
Mori	Boyd	University of Alberta	Edmonton, AB
Morris	Matthew	Ambrose University	Calgary, AB
Mousseau	Tonya	Mount Royal University	Calgary, AB
Nwankwo	Ogonna	University of Calgary	Calgary, AB
Oliver	Mark		Calgary, AB
Oxamitny	Mark		
Pittel	Hilary	Royal Alberta Museum	Edmonton, AB
Pohl	Greg	Department of Natural Resources, Canadian Forest Service, Northwest Region	Edmonton, AB
Proctor	Heather	Biological Sciences, University of Alberta	Edmonton, AB
Punko	Rosanna		
Reddy	Somireddy Srinivasa	Jayashankar Telangana State Agricultural University	
Reid	Mary	University of Calgary	Calgary, AB
Robinson	Samuel	University of Calgary	Calgary, AB
Rueppell	Olav	University of Alberta	Edmonton, AB
Sathish	Ravulapenta	Jayashankar Telangana State Agricultural University	
Sexsmith-wes	Maureen		
Sjolie	Dylan	Biological Sciences, University of Alberta	Edmonton, AB
Sperling	Felix	University of Alberta	Edmonton, AB
St Jean	Erin		
Stoyke	Godo		Edmonton, AB
Summers	Mindi	University of Calgary	Calgary, AB
Swann	John	University of Calgary	Calgary, AB
Thysse	Adrian	University of Alberta	Edmonton, AB
Vasudev	Arti		
Velasco	Felipe		Calgary, AB
Whitehouse	Caroline	Alberta Agriculture and Forestry	Edmonton, AB
Zantoko	Lubaki	Environment and Natural Resources , GNWT	Yellowknife, NT
Retired Members			
Cartar	Ralph	Biological Sciences, University of Calgary	Calgary, AB
Dolinski	Michael		Edmonton, AB
Dunn	Pat	Edmonton Nature Club	Edmonton, AB
Student Members			
Abraham	Shawn	University of Alberta	Edmonton, AB
Achal	Siena	University of Alberta	Edmonton, AB
Ahn	Micky	University of Calgary	Calgary, AB
Algadzis	Elanta	Ambrose University	Calgary, AB

Last Name	First Name	Institution	Location
Antochi-Crihan	Georgiana	University of Alberta	Edmonton, AB
Backmeyer	Sydney	University of Lethbridge	Lethbridge, AB
Bainbridge	Jessie	Lethbridge College	Lethbridge, AB
Bezanson	Giselle	University of Lethbridge	Lethbridge, AB
Brownoff	Ferf	University of Alberta	Edmonton, AB
Campbell	Erin	University of Alberta	Edmonton, AB
Cauette	Alexandre	MacEwan University	Edmonton, AB
Clake	Danielle	University of Calgary	Calgary, AB
Cook	Andrew	University of Alberta	Edmonton, AB
Correa Ramos	Joseph	University of Edmonton	Edmonton, AB
Dimase	Marcelo	University of Alberta	Edmonton, AB
French	Rowan	University of Alberta	Sherwood Park, AB
Glinka	Jayden	University of Cumbria	
Grossi	Alexandra	University of Alberta	Edmonton, AB
Henley	Candase	Olds College	Olds, AB
Hervet	Vincent		Lethbridge, AB
Holmes	Gregory	University of Athabasca	Lethbridge, AB
Ibarra Galvis	Valentina	University of Lethbridge	Lethbridge, AB
Jackson	Leah	University of Alberta	Edmonton, AB
Jegatheeswaran	Piratheepa	University of Lethbridge	Lethbridge, AB
Jimenez	Irene	University of Alberta	Edmonton, AB
Jones	Kelsey		
Kannan	Sunanda	University of Alberta	Edmonton, AB
Kent	Kirra	University of Alberta	Edmonton, AB
Kulkarni	Sharavari	University of Alberta	Edmonton, AB
Laforest	Natalie	University of Alberta	Edmonton, AB
Lemke	Emily	Agriculture and Agri-Food Canada	Kamloops, BC
Lortie	Max	University of Alberta	Edmonton, AB
MacDonald	Maggie	University of Alberta	Edmonton, AB
MacDonald	Zachary	University of Alberta	Edmonton, AB
MacLeod	Lisa	University of Alberta	Edmonton, AB
McGlashan	Maria		
McLean	Mary Ann	St. Mary's University	Calgary, AB
Mcpike	Sarah	University of Alberta	Edmonton, AB
Moore	Emily	University of British Columbia (Okanagan)	Kelowna, BC
Morrice	Samantha	University of Saskatchewan	
Murphy	William	University of Calgary	Calgary, AB
Musso	Antonia	University of Alberta	Edmonton, AB
Neame	Tobyn	Biological Sciences, University of Calgary	Calgary, AB
Nelson	Connor	University of Alberta	Edmonton, AB
Nelson	Tyler	University of Alberta	Edmonton, AB
North	Calnek	Olds College	Olds, AB
Oliver	Tom		Calgary, AB
Pizante	Rachel	University of Alberta	Edmonton, AB
Preti	Flavio	University of Alberta	Edmonton, AB

Last Name	First Name	Institution	Location
Purvis	Emily	University of Calgary	Calgary, AB
Rampton	Rowan	University of Calgary	Calgary, AB
Reid	Michelle	University of Alberta	Edmonton, AB
Retzlaff	Jennifer	University of Calgary	Calgary, AB
Rios Martinez	Aldo	University of Alberta	Edmonton, AB
Roy	Brendan	Lethbridge College	Lethbridge, AB
Scallion	Matthew	University of Alberta	Edmonton, AB
Senevirathna	Kanishka	Agricultural, Food and Nutritional Science, University of Alberta	Edmonton, AB
Shegelski	Victor	University of Alberta	Edmonton, AB
Shivananjappa	Sunil	University of Lethbridge	Lethbridge, AB
Snape	Kyle	University of Alberta	Edmonton, AB
Sperling	Janet	University of Alberta	Edmonton, AB
Stormer	Hannah	University of Alberta	Edmonton, AB
Sutherland	Aphra	University of Calgary	Calgary, AB
Thacker	Allan	Ambrose University	Calgary, AB
Thompson	Benjamin	University of Alberta	Parkland County
Trevoy	Stephen	University of Calgary	Calgary, AB
Vercruysse	Brenten	University of Calgary	Calgary, AB
Vermaak	Sarah		
Waytes	Riley	University of Calgary	Calgary, AB
Wijerathna	Asha	University of Alberta	Edmonton, AB
Wilches Correal	Diana Maria	Agriculture and Agri-Food Canada	Lethbridge, AB
Wingert	Brittany	University of Alberta	Edmonton, AB
Worthy	Sydney	University of Alberta	Sherwood Park, AB
Wright	Marnie	University of Alberta	Edmonton, AB