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PROCEEDINGS OF THE 68th ANNUAL MEETING OF THE

Entomological Society of Alberta

22-23rd October 2020 (Online)

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 2020

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In early 2020, COVID-19 was detected in the province of Alberta. By early March, public health measures were enacted to limit its spread. On March 15, schools and daycares were closed and on March 27, a limit of 15 people was placed on gatherings. Masking and social distancing became the norm and it became apparent that the traditional in-person Entomological Society of Alberta symposium and Annual General Meeting would need to pivot to a virtual event.

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

- Boyd Mori, Tobin Benedict (Co-Chairs)
- Micky Ahn (Website and Registration)
- Caroline Whitehouse (Registration)
- Sarah McPike (Student Competition)

68th Annual Meeting of the Entomological Society of Alberta
22-23rd October 2020 (Online)
Schedule

Thursday October 22, 2020

Time	Speaker	Title
13:00	Opening Remarks	
13:15	Backmeyer, S.	Assessing the non-target effects of LongRange® eprinomectin on dung-breeding insects
13:30	Dimase, M.	*Helicoverpa zea* (Boddie) larval dispersal in caged environment containing seed blends of Agrisure Viptera® corn: implications for resistance management
13:45	Jegatheeswaran, P.	Impact of land-cover types and cropping history on lygus abundance in canola in Alberta
14:00	Lemke, E.	Efficacy of synthetic *Limonius* sex pheromone on trap captures of four *Limonius* spp. (Coleoptera: Elateridae) in various locations across North America
14:15	Antochi-Crihan, G.	Functional response of two parasitoid wasps *Diadegma insulare* (Hymenoptera: Ichneumonidae) and *Diadromus subtilicornis* (Hymenoptera: Ichneumonidae) on diamondback moth, *Plutella xylostella* (Lepidoptera: Plutellidae)
14:30	BREAK	
14:45	Reid, M.	Monitoring insect diversity and parasitism levels in alfalfa seed production fields in western Canada
15:00	Clake, D.	Landscape characteristics influence bumble bee abundance and species richness in the Alberta Rocky Mountains
15:15	Worthy, S.	Native plant-pollinator communities in a Canadian grassland are resilient to the addition of honey bees
15:30	Purvis, E.	Wild bee community recovery in restored grassland-wetland complexes of prairie North America
15:45	MacDonald, M.	The Peace region: diversity and dimorphism of *Pterostichus melanaius* (Ill.) (Coleoptera: Carabidae)
16:00	Posters*	
	Hassink, N.	A Methodological Approach Towards Determining the Impact of Microclimatic Forcings on the Thermal Biology of Surface-Dwelling Montane & Alpine Arthropods
	Robinson, S.	Grasslands and wetlands act as reservoirs for generalist predatory arthropods in southern Alberta

	Stormer, H	The utility of 16S rRNA for identifying tick-borne *Rickettsia* (Rickettsiales: Rickettsiaceae)
	Wright, M.	Comparison of autosomal vs Z-linked DNA divergences in the spruce budworm species complex (Lepidoptera: Tortricidae: *Choristoneura*)

**Posters are available for viewing online:*
https://drive.google.com/drive/folders/1H71HJwZxL5O5prPS_tgZ1xtxmd1i2RI2

Friday, October 23, 2020

Time	Speaker	Title
13:00	Opening Remarks	
13:15	Abraham, S.	Msc Proposal: Molecular Phylogenetics and Setation of the Ephydridae of Western Canada
13:30	Wingert, B.	Assessing species boundaries of crescent butterflies (Nymphalidae: *Phyciodes*) in Alberta using DNA and morphology
13:45	Wijerathana, A.	State-dependent plasticity affects pea leaf weevil (Coleoptera: Curculionidae) host acceptance and feeding preference
14:00	Achal, S.	The effect of landscape spatial structure on pea leaf weevil, *Sitona lineatus* L. (Coleoptera: Curculionidae) abundance in Alberta, Canada
14:15	Rios-Martinez, A.	Dispersal to predator-free space counterweighs fecundity costs in alate aphid morphs
14:30	BREAK	
14:45	Musso, A.	Description of mountain pine beetle mass attack in novel host jack pine
15:00	Ibara, V.	AAFC Research Staff Survey: Career Development
15:15	Kent, K.	Lots of Lovely Legs: An Illustrated Spider Diversity Book for Children
15:30	Johnson, D.	Grasshopper survey data and recent cage studies suggest that parasitism might be avoided in a species with two-year oscillations
15:45	Lumley, L.	Oribatid mites as bioindicators for environmental monitoring
16:00	AGM	

Meeting Access:

The meeting will take place using Zoom. All presenters are asked to familiarize themselves with the screenshare feature as you will be required to share your presentation from your own computer. It is recommended that you install the Zoom Desktop application prior to the meeting.

Day 1:
Join Zoom Meeting
https://ualberta-ca.zoom.us/j/95859219065?pwd=RjdJdlV4MjZ2aXZ2YmlGck5zR1A2UT09
Meeting ID: 958 5921 9065
Passcode: 494956

DAY 2:
Join Zoom Meeting
https://ualberta-ca.zoom.us/j/96585855012?pwd=a0M3Nkw3aldNVWNGaDhhTW9wdnFYdz09
Meeting ID: 965 8585 5012
Passcode: 310721

Contributed Abstracts (Alphabetical by presenting author)

ORAL PRESENTATIONS

1. Msc Proposal: Molecular Phylogenetics and Setation of the Ephydridae of Western Canada

Abraham, S.M.[1], Sperling, F.A.H.[1]

1. Department of Biological Sciences, University of Alberta

Shore flies (Ephydridae) are a diverse, ecologically interesting, and taxonomically challenging group of higher flies. Herein I describe my MSc proposal, which focuses on producing a two part framework to study them. The first part will use DNA data to determine relationships among them, as most previous study used morphology. The second part will examine the distribution of setulae, small hairs on the legs and thoraces of the flies within a phylogenetic context that will aid interpretation of their relationships in the context of the extreme environments some species live in. These include hot springs and highly alkaline lakes that adult flies may dive into to feed. This research should have impacts in phylogenetics and build a foundation for the examination of shore fly distribution and diversity in Alberta and Canada, which could have applications in conservation. This work will also parallel research in fluid physics and engineering being done by Dr. Morris Flynn (U. of Alberta Dept. of Mechanical Engineering) and his lab on the link between surface attached bubbles and fluid transport efficiency.

2. The effect of landscape spatial structure on pea leaf weevil, *Sitona lineatus* L. (Coleoptera: Curculionidae) abundance in Alberta, Canada

Achal, S.S.[1], Evenden, M.L.[1]

1. Department of Biological Sciences, University of Alberta

The pea leaf weevil, *Sitona lineatus* L. (Coleoptera: Curculionidae) is an economically important pest of field pea (*Pisum sativum*) and faba bean (*Vicia faba*). The pea leaf weevil is native to Europe and North Africa, but has expanded its range to North America and other pulse growing regions. The pea leaf weevil was first established in southern Alberta, Canada in 1997, and populations have since spread into central and northern Alberta. Previously, we tested a pheromone-based monitoring method using the male aggregation pheromone (4-methyl-3,5-heptanedione) during the 2 adult activity periods in pulse growing regions of central and northern Alberta. We found a significant effect of the baited traps on pea leaf weevil trap catch, indicating that it is an effective methods to sample adult populations. To further understand pea leaf weevil population dynamics, here we examine the spatial effects of agricultural landcover covariates on adult pea leaf weevil abundance in Alberta. Preliminary results were modeled using buffers around pea leaf weevil trap locations and the abundance was compared to the proportion of landscape covariates. Findings from the study add to the current knowledge of pea leaf weevil population dynamics and will help the development of an alternative monitoring tool to sample this pest for an integrated pest management strategy.

3. Functional response of two parasitoid wasps *Diadegma insulare* (Hymenoptera: Ichneumonidae) and *Diadromus subtilicornis* (Hymenoptera: Ichneumonidae) on diamondback moth, *Plutella xylostella* (Lepidoptera: Plutellidae)

Antochi-Crihan, G.[1], Evenden, M.[1], Kulkarni, S.[1]

1. Department of Biological Sciences, University of Alberta

Diamondback moth, *Plutella xylostella* L. is a serious pest of cruciferous crops globally. In western Canada, moth influx with wind currents from the United States can result in significant economic damage to canola. Quantification of contributions of natural enemies in biological control can help strengthen integrated management of *P. xylostella*. Calculating functional response of parasitoids is crucial for making better decisions towards biological control. *Diadegma insulare* (Ichneumonidae) and *Diadromus subtilicornis* (Ichneumonidae) are two prominent parasitoids of DBM. Females of *D. insulare* and *Diadromus subtilicornis* were exposed to different densities of *P. xylostella* larvae and pupae, respectively, for 24 hours. Preliminary results suggest a weak Type III functional response for *D. insulare* and a Type II functional response curve for *Diadromus subtilicornis*.

4. Assessing the non-target effects of LongRange® eprinomectin on dung-breeding insects

Backmeyer, S.[1,2], Floate, K.[1], Goater, C.[2]

1. Lethbridge Research and Development Centre, Agriculture and Agri-Food Canada
2. Department of Biological Sciences, University of Lethbridge

LongRange® eprinomectin (LR) is a novel dual-phase and extended-release parasiticide product applied to cattle. Treated animals faecally excrete insecticidal residues with peak residue excretion occurring approximately 1- and 12-weeks post-injection. Our objective was to address the concerns of this formulation having potentially detrimental effects on non-target insects who breed and develop in dung. In this study, we assessed the effect of residues on the number of insects emerging as adults from dung of cattle treated with LR 0 (control), 1, 2, 4, 8, 12, 16, and 25 weeks previously. We placed artificially molded dung pats in the field for 10 days to be colonized by local dung insects before inserting the pats into individual emergence cages. Preliminary results show whereas 71 *Sepsis* flies emerged from the average control pat, no *Sepsis* flies were recovered from any treatments pats 4 weeks following the pat colonization period. Data for other species is still being collected. This result is consistent with a previous study and indicated that LR-treated cattle excrete residues for at least 175 days post-treatment at levels sufficient to completely suppress development of certain dung-breeding insects.

5. Landscape characteristics influence bumble bee abundance and species richness in the Alberta Rocky Mountains

Clake, D. J.[1], Galpern, P.[1]

1. Department of Biological Sciences, University of Calgary

Bumble bees are important pollinators in montane habitats, and many populations are declining due to climate and landscape changes. Landscapes can be altered through the loss and/or fragmentation of habitat, which can be measured by the amount and arrangement of specific land cover types.

While habitat loss is largely detrimental, the effects of habitat fragmentation can be more variable. Our objective was to determine whether bumble bee abundance and species richness are correlated with these habitat characteristics in a largely natural montane environment. To do this we sampled bumble bees (*Bombus sp.*) at 40 sites over roughly 10,000 square km across protected areas in the Rocky Mountains of Alberta and adjacent foothills. Sites were selected to minimize correlations between the amount and arrangement of habitat. We collected over 20 different species of bumble bees and found that bumble bees were more abundant where nesting and foraging habitats were adjacent. This effect was consistent across species. We also found a negative impact of having grassland meadow habitat split into more patches. Our results suggest that some, but not all, aspects of fragmented habitats may be beneficial to bumble bees, and can help inform landscape planning.

6. *Helicoverpa zea* (Boddie) larval dispersal in caged environment containing seed blends of Agrisure Viptera® corn: implications for resistance management

Dimase, M.[1], Oyediran, I.[2], Brown, S.[3], Walker, W.[3], Guo, J.[4], Yu, W.[5], Zhang, Y [2], Chen, J.[2], Wen, Z.[2], Huang, F.[5]

1. Department of Agricultural, Food, and Nutritional Sciences, University of Alberta
2. Syngenta Crop Protection LLC, Research Triangle Park, USA
3. Northeast Region, Louisiana State University Agricultural Center, USA
4. Institute of Plant Protection, Gansu Academy of Agricultural Sciences, China
5. Department of Entomology, Louisiana State University Agricultural Center, USA

Seed blend refuges are used to host susceptible insects for Bt corn insect resistance management. One major concern is that larval movement among non-Bt and Bt plants could cause additional mortality of susceptible populations. Three caged-field experiments were conducted to assess larval movement and survival of *Helicoverpa zea* (Boddie) in eight seed blends containing Cry1Ab/Vip3A corn with 0-30% non-Bt refuges. Plots were infested on the ear silks of the center plant at R1 stage with 35 F1 neonates of field-collected *H. zea*. No live larvae or kernel damage were observed on Bt plants. In pure non-Bt plantings, 64.8% of the larvae recovered moved away from the infested ears and survived on other plants. Larval survival and occurrence were similar among seed blends with non-Bt plants centers plants. Overall, larval recovery from non-Bt central plants was 27.5% lower in seed blends compared to pure non-Bt plantings. Recovered larvae developed similarly across treatments. Results suggest that larval movement in seed blends could significantly reduce refuge populations of *H. zea* compared to structured refuges. Additional studies are needed to understand how the reduction of *H. zea* susceptible larvae in seed blends impacts its resistance development to Bt corn.

7. AAFC Research Staff Survey: Career Development

Ibarra, V.I.[1]

1. University of Lethbridge CO-OP student with Agriculture and Agri-Food Canada (AAFC)

The AAFC Research Staff Survey was developed as part of a student engagement activity to inform undergraduate and graduate students about how they can continue to develop their careers in science. The primary objective of this questionnaire was to encourage students to reflect upon their careers moving forward. The survey includes questions about the level of enjoyment of research related tasks, staff hiring preferences and advice to students. There were a total of 24 respondents for each of the 25 survey questions. Answers and recommendations varied between research scientists and technicians.

8. Impact of land-cover types and cropping history on lygus abundance in canola in Alberta

Jegatheeswaran, P.[1], Carcamo, H.[2], Johnson, D.[1], Byrne, J.[1], Meers, S.[3], Kruiper, E[4]

1. Department of Geography and Environment, University of Lethbridge
3. Lethbridge Research and Development Centre, Agriculture and Agri-Food Canada
2. Alberta Agriculture and Forestry, Crop Diversification Centre South
3. Department of Chemistry, University of British Columbia Okanagan

Lygus bugs are intermittent pests in canola. Lygus abundance and timing are difficult to predict due to multiple generations, species complex, and wide host range. Nymphs and adults cause damage by sucking on meristematic tissue, which can lead to flower and pod abscission and shrunken seeds in canola. Biological control is a potential strategy to reduce dependency on chemical control. Several studies have reported that surrounding land cover types might influence insect pests and natural enemy populations. This study aimed to understand the impact of surrounding land cover and cropping history on lygus abundance in canola. Lygus abundance was estimated by sweep net sampling. Species and developmental stages were determined for each site. Land-cover types were documented from ground-truthing surveys, and digital maps were constructed in ArcGIS Pro. Crop history data was extracted from an online annual crop inventory by AAFC. From the resulting data and maps, the proportion of various land-cover types and non-crop habitats were calculated. The results will test the relationship between surrounding land cover types and lygus population in canola fields, support development of hypotheses regarding mechanisms, and help to improve Lygus management programs in the Prairies.

9. Grasshopper survey data and recent cage studies suggest that parasitism might be avoided in a species with two-year oscillations

Johnson, D.[1], Meers, S.[2], Barnes, C.[1]

1. Department of Geography and Environment, University of Lethbridge
2. Alberta Agriculture and Forestry (currently, Mayland Consulting, Alberta)

Sustainable crop protection depends on evidence-based decision making, including surveys of insect abundance, species, and condition. Multi-year trend analysis can reveal unexpected connections. We assembled a database of ca. 75,000 Alberta grasshopper survey observations for 1970-2019. Mapping and analysis of medians, means, variance, time series, and aggregation statistics provided a background for comparisons of populations. Most regional populations show increases and declines over several years. A clear two-year oscillation is apparent in the Peace River region in Alberta, mainly for one species, *Melanoplus bruneri*. We initiated studies of species, numbers, pathogens, weather, and parasitism. Parasitism by Diptera has been shown to affect grasshopper survival and recruitment. At least five species of *Melanoplus* are parasitized by Diptera, mainly Sarcophagidae, typically at rates of 2-8%. Bandwinged grasshoppers are also parasitized, with *Camnula pellucida* having high rates, up to 1:1 in samples of n=30 in 2020. In a peak year, 2019, in the Peace River region, we collected over 500 adults and over 100 late-instars of *M. bruneri*, to be kept in lab cages July 31 to late September, 2019. No parasites emerged during that time, an unprecedented low rate. The two-year cycle may confer some protection from parasitism.

10. Lots of Lovely Legs: An Illustrated Spider Diversity Book for Children

Kent. K.[1]

1. Department of Biological Sciences, University of Alberta

Spiders are disliked by the general population. Much of this is likely due to the media portrayal of spiders, and a significant amount of confusion on which species are dangerous. The aim of this book is to create more spider-positive media, of which there is very little. With semi-realistic watercolour illustrations and cute digital figures, spiders are rendered from the perspective of someone who adores them, not abhors them. The book primarily focuses on Albertan fauna, but much of this diversity is shared across North America. Ideally, this book, which I am initially creating as part of an individualized project course at the University of Alberta, will be basic tool that lets kids (age 12-16) identify spiders to the family level. Accompanying facts about each family's biology aim to promote fascination instead of fear. Sections on where to look, and tips for keeping spiders as pets are also included. This book is being created with the hope that engaging with these creatures helps kids realize they aren't scary.

11. Efficacy of synthetic *Limonius* sex pheromone on trap captures of four *Limonius* spp. (Coleoptera: Elateridae) in various locations across North America

Lemke, E.[1,2], van Herk, WG.[2], Catton, H.[3], Meers, S.[4], Wanner, K.[5], Cooper, R.[6], Serrano, J.[6], Rashed, A.[7], Smith, J.[8], Gries, R.[1], Alamsetti, SK.[1], Gries, G.[1]

1. Department of Biological sciences, Simon Fraser University
2. Agassiz Research and Development Centre, Agriculture and Agri-Food Canada
3. Lethbridge Research and Development Centre, Agriculture and Agri-Food Canada
4. Mayland Consulting, Calgary, Alberta, Canada
5. Department of Plant Sciences and Plant Pathology, Montana State University
6. USDA-ARS Temperate Tree Fruit and Vegetable Research Unit, USA
7. Department of Entomology, Plant Pathology and Nematology, University of Idaho
8. University of Guelph, Ridgetown Campus

Wireworms, the larval form of click beetles (Elateridae), are significant agricultural pests of cereals, potato, corn, vegetable, sugarcane, and other crops. With pest populations on the rise throughout Europe and North America, and control options limited, there is an ever-increasing need to develop novel, earth-friendly monitoring and control tactics. Pheromone-based monitoring of elaterid populations would reveal their geographic distribution and local abundance, help predict crop damage, and time insecticidal control measures. In Europe, female sex pheromones of most economically important click beetle species have been identified and are currently used to survey for the presence and abundance of species. In North America, pheromone research on important click beetle species is underway and has recently resulted in the identification of the (long elusive) sex pheromone of female Pacific Coast wireworms (*Limonius canus* LeConte) and female sugarbeet wireworms (*L. californicus* Mann.). Here, we report on the efficacy of synthetic *Limonius* sex pheromone on captures of the four dominant *Limonius* pests in various locations across North America: *L. canus*, *L. californicus*, *L. infuscatus*, and *L. agonus*.

12. Oribatid mites as bioindicators for environmental monitoring

Lumley, L.M.[1]

1. Royal Alberta Museum, Edmonton

Oribatid mites are among the most abundant and diverse soil mesofauna, and are used as bioindicators to monitor changes in soil. The Alberta Biodiversity Monitoring Institute (ABMI) has monitored oribatid mites across Alberta for more than a decade, along with other flora and fauna. The ABMI uses specific protocols to collect organic soil, from which oribatid mites are extracted and identified to species-level at the Royal Alberta Museum (RAM). The ABMI has developed biodiversity metrics to use this species-level data to provide information on taxon intactness, richness, uniqueness, relative abundance in reference and current conditions, and species' responses to habitat and human footprint types. In parallel, the mites are curated and accessioned into the RAM Invertebrate Zoology collection, thereby available for future examination, and taxonomic resources have been developed to aid identification and to maintain records of oribatid species documented in Alberta. Overall, ABMI's inclusion of oribatid mites provides a bioindicator specific to monitoring soil, helps us to document their diversity, ecology, and trend in response to environmental change, and increases their functionality as indicators in other monitoring and research efforts.

13. The Peace region: diversity and dimorphism of *Pterostichus melanaius* (Ill.) (Coleoptera: Carabidae)

MacDonald, M.[1], Evenden, M.[1]

1. University of Alberta, Department of Biological Sciences

The pea leaf weevil (PLW), *Sitona lineatus* L. (Coleoptera: Curculionidae), is a significant pest of field pea, *Pisum sativum* L. (Fabaceae), and faba bean, *Vicia faba* L. (Fabaceae), that has recently invaded the Canadian Prairie Provinces. Semiochemical-based monitoring can detect PLW population spread and local movements but results in significant ground beetle bycatch including capture of the invasive *Pterostichus melanarius* (Ill.) (Coleoptera: Carabidae) that is native to Europe. This invasive species is commonly found in agroecosystems and other disturbed habitats. The first record of *P. melanarius* in Alberta was in Edmonton, but we captured high numbers of *P. melanarius* in PLW pitfall traps throughout Alberta, with the exception of the Peace region. Dispersal by flight promotes high proportions of the macropterous *P. melanarius* morph in newly colonized regions. In comparison, established populations have more of the brachypterous morph. The impact of this invasive species on native ground beetle species and agricultural pests in agroecosystems is largely unknown. The objective of this study is to assess carabid community diversity in the Peace Region as compared to that in other pulse-growing regions of Alberta and make inferences about the impact of *P. melanarius,* and its spread and invasiveness.

14. Description of mountain pine beetle mass attack in novel host jack pine

Musso, A.E.[1], Carroll, A.L.[2], Evenden, M.L.[1]

1. Department of Biological Sciences, University of Alberta
2. Department of Forest and Conservation Sciences, University of British Columbia

Mountain pine beetle (MPB) *Dendroctonus ponderosae*, has expanded its range into Northern and Central Alberta, where it has attacked the novel host jack pine. Using pheromone-mediated mass attack, MPB are capable of overwhelming vigorously defended trees (≈40 beetles/m^2). Past this mass attack threshold, brood success increases until the optimal attack density is reached (≈60 beetles/ m^2). Above the optimal attack density, brood success declines with competition for finite resources under the bark. Our current understanding of MPB mass attack dynamics originates from studies performed in historic host lodgepole pine. Jack pines are not adapted to MPB attack like lodgepole pines. To quantify mass attack dynamics in jack pine, we manipulated attack densities in jack pines in the field. We mass reared and released MPB under caged tree boles. After the attack period we harvested manipulated trees, brought bolts to the lab and measured the number of offspring and gallery characteristics. The mass attack threshold and optimal attack densities are lower in jack pine compared to lodgepole pine, and gallery characteristics differ greatly. Understanding how mass attack dynamics differ in jack pine will allow us to predict the long-term population dynamics of MPB in its expanded range.

15. Wild bee community recovery in restored grassland-wetland complexes of prairie North America

Purvis, E.E.N.[1], Vickruck, J.L.[1,2], Best, L.R.[1], Devries, J.H.[3], Galpern, P.[1]

1. Department of Biological Sciences, University of Calgary
2. Fredericton Research and Development Centre, Agriculture and Agri-Food Canada
3. Ducks Unlimited Canada, Stonewall, Manitoba

Agricultural intensification is a global driver of wild bee decline that subsequently threatens the associated provisioning of pollination services. In the Prairie Pothole Region, wetlands surrounded by grassland were once abundant on the landscape, but now generally exist within a matrix of agriculture. We assessed whether restoration of these grassland-wetland complexes from cropland could be used as a potential tool for mitigating wild bee decline based on resemblance of wild bee communities to a reference state (i.e. remnant native grassland-wetland habitats). We found bee diversity increased following restoration and approximated reference sites after 1–4 years, while the diversity of non-Bombus species analyzed separately resembled reference sites after around 5–10 years. Changes to bee species composition were driven more by floral species composition than time since restoration. Our results suggest that restored grassland-wetland complexes are able to provide habitat resources to bees within agriculturally dominated landscapes, and that restoration can recover wild bee communities to a reference state. On a broader scale, they underscore the utility of retaining patches of non-cropped and restored land within agroecosystems as a pathway for mitigating pollinator decline.

16. Monitoring insect diversity and parasitism levels in alfalfa seed production fields in western Canada

Reid, M.[1], Cárcamo, H.A.[2], Mori, B.A.[1]

1. Department of Agricultural, Food and Nutritional Science, University of Alberta
2. Lethbridge Research and Development Centre, Agriculture and Agri-Food Canada

Alfalfa is a widely grown crop around the world as it is an excellent source of high protein feed for livestock. North America is the largest producer of alfalfa seed. The productivity of these fields is threatened by an invasive insect, the alfalfa weevil, *Hypera postica* (Gyllenhal) (Coleoptera:

Curculionidae). Alfalfa weevils have been found in Alberta since 1954 and have spread into Saskatchewan and Manitoba. The aim of this study is to assess the current insect diversity found within alfalfa fields of southern Alberta. In addition, we will assess parasitism and insecticide resistance levels within the weevil populations. In 2020, insect collections were taken from 9 fields at three crop stages: bud, flower and seed. Insect samples were then sorted by Order. Concurrently larvae were sampled throughout the region and will be assessed for parasitism levels with a multiplex PCR designed to identify the two prominent parasitoids, *Bathyplectes curculionis* and *Oomyzus incertus*. Thus, our study will improve our knowledge on the spatio-temporal distribution of these natural enemies. The results from this study will inform the alfalfa seed growers of southern Alberta as they strive to develop more sustainable management strategies.

17. Dispersal to predator-free space counterweighs fecundity costs in alate aphid morphs

Ríos-Martínez, A.F.[1], Costamagna, A.C.[2]

1. Department of Agricultural, Food and Nutritional Science, University of Alberta
2. Department of Entomology, University of Manitoba

Specialization in dispersal by alate aphids often imposes constraints on fecundity due to wing development. Short-distance flight to uninfested plants may provide temporary predator-free space, compensating for low fecundity. However, this theoretical prediction has not been explored experimentally. To test this hypothesis, a field cage experiment was conducted in which *Aphis glycines* populations initiated with controlled proportions of apterous and alate individuals were exposed to predation, while predator-free space was accessible only through flight. It was predicted that an investment in alate individuals would benefit a population under predation, regardless of costs to fecundity. As expected, a strong trade-off was observed between fecundity and wing development. However, populations initiated with a fixed proportion of alate individuals showed no reductions in final population size compared with populations initiated with apterous individuals exclusively. Moreover, the initial presence of alate individuals in the populations increased aphid prevalence (i.e. proportion of plants colonized). Similarly, both increased population size and prevalence were observed when predator-free space was accessible through flight. These results show that despite high costs to fecundity, an investment in alate individuals is neither beneficial nor detrimental to population size when predator-free space is accessible, but increases aphid prevalence.

18. Assessing species boundaries of crescent butterflies (Nymphalidae: *Phyciodes*) in Alberta using DNA and morphology

Wingert, B.D.[1], Campbell, E.O.[2], Acorn, J.H.[3], and Sperling, F.A.H.[1]

1. Department of Biological Sciences, University of Alberta
2. Department of Agriculture, Food, & Nutritional Science, University of Alberta
3. Department of Renewable Resources, University of Alberta

The four species of the *Phyciodes tharos* species group include some of the most common butterflies in Alberta, yet some of the most difficult to identify. Variable wing patterning has resulted in a complicated taxonomic history and species boundaries remain unclear. Previous molecular studies demonstrated that the mitochondrial COI gene does not resolve species boundaries in this group, particularly for the two species exhibiting the greatest geographic overlap across North America. Our study focuses on Alberta, the only place where all four species occur and no other species of the genus are present. We use an integrative phylogenetic approach by employing genome-wide single

nucleotide polymorphisms (SNPs) and part of the COI gene. We also quantitatively examine the utility of 18 morphological characters for identification. Our genomic SNP data resolves clear species boundaries for all but one species and shows evidence of introgression in a few individuals. Our COI results confirm that mitochondrial DNA is not reliable for identification but does provide evidence of how some of the species interact. Analysis of morphological characters shows that not all individuals can be reliably identified in Alberta.

19. State-dependent plasticity affects pea leaf weevil (Coleoptera: Curculionidae) host acceptance and feeding preference

Wijerathna, A.[1], Cárcamo H.A.[2], Evenden M.L.[1]

1. Department of Biological Sciences, University of Alberta
2. Lethbridge Research and Development Centre, Agriculture and Agri-Food Canada

Reproductive state can induce phenotypic plasticity in foraging and host-finding behaviour of an organism. This within generation plasticity to host response can influence how well an organism adapts to its habitat. It can increase the fitness of invasive species and increase their probability of establishment in new environments and their range expansion. *Sitona lineatus* L. (Coleoptera: Curculionidae), is an invasive pest of field pea (*Pisum sativum*) and faba bean (*Vicia faba*). Adults feed on the foliage of host plants and larvae feed on *Rhizobium* bacteria associated with root nodules. Spring and fall dispersing adults are at two different physiological stages. In spring, adults are reproductively active while, fall dispersing adults are not reproductively active. We investigated the effects of pea leaf weevil reproductive state on host acceptance and feeding preference. We exposed adults to field pea and faba bean seedlings in a series of choice and no choice tests and we counted the feeding notches on leaves after five days. We repeated the test with a secondary host plant, alfalfa (*Medicago sativa*). We discovered a state-dependent response to host plants. Spring dispersing reproductively active weevils exhibited a preference for faba bean over field pea, while no preference was evident in fall dispersing reproductively inactive weevils. Access to the secondary host, alfalfa, however, altered this state-dependent plasticity in host selection. These findings highlight the importance of the host type and weevil physiological state in shaping the pea leaf weevil population dynamics.

20. Native plant-pollinator communities in a Canadian grassland are resilient to the addition of honey bees

Worthy, S.[1], Acorn, J.[1], Frost, C.[1]

1. Department of Renewable Resources, University of Alberta

The grasslands region of southern Alberta, Canada is dominated by agroindustry, and to facilitate the pollination of crops, honey bees are utilized in great numbers: approximately 3.75 billion individuals per season. Honey bees, which are super-generalists, have been known to compete with native pollinators and may contribute to the decline of wild pollinator diversity and richness. I examined the potential effects of honey bees on a native grassland community by experimentally introducing honey bee hives to a rangeland in southern Alberta, where I sampled the plant-pollinator mutualist interactions over two summer seasons. I established eighteen transects at distances of 100 m, 500 m, and 5000 m from three clusters of honey bee hives and sampled the floral insect visitors at each transect weekly. Visitors were then identified, along with their floral mutualists, and compiled into a plant-pollinator network, for which I analyzed species diversity metrics. Findings indicate that honey

bees do not have a strong relationship with wild pollinator abundance, richness, diversity, or species composition, excepting a positive relationship with beetles and butterflies. Instead, flower species often explained the variance in pollinator abundance, richness, and diversity, especially for bees. This study suggests that honey bees may not negatively impact native plant-pollinator communities in all contexts, and what effects they do have may be less profound than is generally assumed.

POSTER PRESENTATIONS

1. A Methodological Approach Towards Determining the Impact of Microclimatic Forcings on the Thermal Biology of Surface-Dwelling Montane & Alpine Arthropods

Hassink, N.J. [1], Johnson, D.L. [1], Bonnaventure, P.P.[1]

1. Department of Geography & Environment, University of Lethbridge

The frequency, intensity and persistence of surface-level thermal conditions strongly influences the life history of ecologically and economically important terrestrial arthropod species. Despite adaptive life history strategies, behavioural modifications and cellular adaptations, mountain arthropods (including representatives of Coleoptera, Orthoptera, Araneae, and Grylloblattodea) are reliant upon finding thermally suitable microhabitats in order to survive the winter, progress through developmental stages and eventually complete their life cycle. In the context of arthropods inhabiting the ground surface layer, thermal conditions often deviate from conditions in the lower atmosphere due to the insulating properties of the physical environment (snow, vegetation, topography, etc.). This disconnect between lower atmospheric conditions and surface-level conditions is extremely important in the context of heterogeneous terrain that is inherent within mountain environments as microclimatic forcings can lead to large changes in surface-level temperatures over short horizontal distances. The proposed methodology aims to use winter basal temperature of snow (BTS) measurements in combination with surface temperature loggers and air temperature loggers as a means to calculate transfer functions (N factors) between the lower atmosphere and the surface. In heterogeneous environments, the distribution of ecologically significant temperatures at or near the surface can be measured and modelled to explain variability in arthropod development rates and survival.

2. Grasslands and wetlands act as reservoirs for generalist predatory arthropods in southern Alberta

Robinson, S.[1], Edwards, D.[2], Vickruck, J.[1], Best, L.[3], Galpern, P.[1]

1. Department of Biological Sciences, University of Calgary
2. Ambrose University & ABI Environmental Services Ltd
3. Oregon State University

Ground-dwelling arthropods are important generalist predators in agroecosystems, and can use noncrop features as overwintering habitats. However, it is unclear which types of landscape features constitute useful habitat, and at what spatial scale organisms gather resources. Additionally, arthropods may spill over from a given landscape feature at different times of the year, but this is rarely considered. We modeled pitfall trap catches of four highly-abundant species of predatory arthropods using functional regression, simultaneously modeling habitat preferences and the timing of spillover. Arthropods tended to move into canola crops (*Brassica napus* L.) early in the season, and back into grasslands and wetlands later in the season, suggesting that some beneficial arthropods aggregate in the crop but use non-crop features as overwintering habitat. *Pterostichus melanarius* (carabid beetle) moved into grasslands and wetlands during the fall, while *Pardosa distincta* and *Pardosa moesta* (wolf spiders) moved into wooded areas and roadside margins. We conclude that non-crop features act as reservoirs for generalist predatory arthropods, and that agricultural practices should consider preserving existing grasslands and wetlands in order to maintain background levels of pest suppression in croplands.

3. The utility of 16S rRNA for identifying tick-borne *Rickettsia* (Rickettsiales: Rickettsiaceae)

Stormer, H.G.[1], Sperling, J.L.H.[1], Sperling, F.A.H.[1]

1. Department of Biological Sciences, University of Alberta

Rickettsia are obligate endosymbiotic bacteria found intracellularly in many kinds of organisms, including arthropods. Some species of arthropod-borne Rickettsia can cause diseases in humans when transferred via an infected arthropod vector, for example through a bite from a tick. Tick-borne Rickettsia include species that cause various types of spotted fever, and so knowing what species of Rickettsia are present in ticks from a particular region can be used for assessing risk of particular tick-borne rickettsial diseases. When sequencing uncultured Rickettsia directly from ticks, partial sequences of genes are often used, and so it is important to ensure that the most informative part of the gene is included. While the genes used in this process vary, the 16S rRNA gene is usually included. To assess the effectiveness of 16S for identification of Rickettsia species, all available 16S Rickettsia sequences of all official Rickettsia species over 1400 bp in length were downloaded from GenBank and used to reconstruct a maximum likelihood tree. Early results suggest that the full 16S gene performs well in distinguishing between the species available on GenBank. Further research will focus on determining which region of 16S is most useful for identifying species of Rickettsia.

4. Comparison of autosomal vs Z-linked DNA divergences in the spruce budworm species complex (Lepidoptera: Tortricidae: *Choristoneura*)

Wright, M.A.[1], Vernygora, O.V.[1], Sperling, FAH[1]

1. Department of Biological Sciences: University of Alberta

Genes that differentiate closely-related species are disproportionately located on the Z chromosome in some Lepidoptera (Sperling, 1994 Can. Entomol. 126:807). The spruce budworm complex is a group of moths that includes the forestry pest *Choristoneura fumiferana*. Using preexisting genome-scale data, including a draft genome assembly (Cusson et al. unpublished) and linkage map (Picq et al. 2018 *G3* 8:2539) for *C. fumiferana*, I am comparing autosomal and Z-linked sequences to determine if this disproportionate Z chromosome involvement applies to the spruce budworm complex. I partially assembled shotgun sequences from eight species of *Choristoneura* using the *C. fumiferana* assembly as a reference. I then identified a set of lepidopteran orthologs in the data. Finally, I will compare the frequency of divergent regions on the autosomes and Z chromosome based on scaffolds identified using the Picq et al. (2018) linkage map. Although the contiguity of the *C. fumiferana* reference genome has recently been improved, my analysis reveals regions of high repetition in the scaffolds. Furthermore, both the *de novo* and reference-guided assemblies of the remaining species were more fragmented than the reference. Nevertheless, I expect the data to remain usable for identifying divergent regions between the species of the spruce budworm complex.

Index to Authors

Minutes of the 2020 Fall Executive Board Meeting

Entomological Society of Alberta

Conference Call Meeting held on 23 October 2020, via Zoom

1. Participants

- Sarah McPike (SM) (President)
- Lisa Lumley (LL) (Past President)
- Terry Eberhardt (TE) (Vice President)
- Hector Carcamo (Hector) (Secretary)
- Caroline Whitehouse (CW) (Treasurer)
- Diana Wilches (DW) (Southern Director)
- Jennifer Klutsch (JK) (Northern Director)
- Boyd Mori (BM) (Regional Director to the ESC)
- Bette Beswick (BB) (Proceedings Editor)
- Micky Ahn (MA) (Webmaster)
- Ilan Domnich (ID) (acting/Outreach Director)

Online via Zoom

https://us02web.zoom.us/j/6728259709?pwd=S050Q0ZRbTdOdDM2N1VzUDNtZldPZz09

Meeting ID: 672 825 9709
Passcode: ARKing2020

1. Meeting called to Order by President Sarah M. at 12:12
2. Approval of Agenda, moved by Boyd and seconded by Bette; passed.
3. Approval of Minutes of April 30, 2020 spring executive teleconference meeting: moved by Bette, seconded by Sarah; passed
4. Old Business
    a. AGM Arrangements
        i. Nominations for Board positions (Terry Eberhardt):
            1. VP, Secretary, Social Media, South and North Directors. Dan Johnson to be asked to stand for VP and Lisa to be asked to replace Hector as Secretary. Ilam Domnich was suggested to fill the position of Outreach Director. For Southern Director two candidates that could replace the irreplaceable Diana Wilches could be: Valentina Ibarra or Piratheepa (Theepa) Jegatheeswaran. The former may not be able to do it because she may be moving out of Lethbridge but Theepa should be there as a graduate student for at least two more years.

ii. Suggestions for Auditors: Erin Campbell and Ronal Batallas were suggested as possible auditors
iii. Resolutions Committee: Samuel Robinson has done a good job in the past and should be approached to draft the "Thank you Resolution".
iv. Photographer to capture screen shots for Proceedings. Hector suggested that someone should be designated to take screenshots of the proceedings.
v. Other old business:
    1. The outreach grant from the ESC was received and $200 were made available, but not sent yet, to the Alberta Bee Council. The ESC should be acknowledged in outreach materials.
    2. A well-received Bug Safari was organized as part of the summer outreach activities for Insect Appreciation Day. There are about $1400 left in the funds received for Outreach.

5. New Business
    a. Location of the 2021 AGM: it would still be the Central Region's turn to organize the meeting because the JAM did not happen in Calgary in 2020.
    b. Other? President Sara M. will write a letter to thank the ESC for the $4,000 donation received in lieu of the revenue lost by not having a JAM in 2020.

6. Meeting Adjournment: motion to adjourn by Sarah, seconded by Boyd at 12:42 pm

Minutes of the 68th Annual General Meeting Meeting
Entomological Society of Alberta

23 October 2020
Held Online (via Zoom)

Participants (confirmed using screenshots from the zoom video conference, see below)

Shawn Abraham	Ilan Domnich	Jennifer Klutch	Olav Rueppell
Siena Achal	Terry Eberhardt	Sharavari Kulkarni	Felix Sperling
John Acorn	Maya Evenden	Natalie LaForest	Erin St Jean
Micky Ahn	Kevin Floate	Emily Lemke	Benjamin Thompson
Sydney Backmeyer	Rose De Clerck Floate	Max Lortie	Colin Weir (award recipient guest)
Bette Beswick	Carol Frost	Lisa Lumley	Asha Wijerathna
Erin Campbell	Ken Fry	Maggie MacDonald	Diana Wilches
Hector Carcamo	Keith Gabert,	Sarah McPike	Caroline Whitehouse
Ralph Cartar	Nick Hassink	Boyd Mori	Brittany Wingert
Danielle Clake	Valentina Ibarra	Heather Proctor	Lubaki Zantoko
Sheree Daniels	Dan Johnson	Mary Reid	
Marcelo Dimase	Kirra Kent	Samuel Robinson	

1. Approval of agenda, moved by Bette Beswick, seconded by Terry Eberhardt, passed.

2. Approval of minutes of 2019 AGM; by Bette Beswick, seconded by Terry Eberhardt, passed.

3. Report from Secretary, presented by Hector Carcamo, (**see Annex 1**)

4. Report from Treasurer and presentation of audited 2019 financial statement was done by the Treasurer, Caroline Whitehouse (**see Annex 2**). Antonia Muso and Alexandra Grossi were thanked by the membership for volunteering their time as auditors. Felix Sperling moved acceptance of the Treasurer's report, Erin Campbell seconded, motion passed unanimously.

5. Appointment of society financial auditors: Erin Campbell and Ronald Batallas were appointed as the 2021 Auditors.

6. Micky Ahn presented his Webmaster report (**see Annex 3**)

7. Report from Directors:
   a) The Report by the Director to ESC was presented by Boyd Mori (**Annex 4**)
   b) The Northern Director's report was presented by Jennifer Klutsch by (**Annex 5**)
   c) The Central Director's report was read by the secretary on behalf of Tobin Benedict (**Annex 6**)

d) The Southern Director's report was presented by Diana Wilches (**Annex 7**)
e) The Outreach Director's report was presented by Ilan Domnich (**Annex 8**)
f) The Social Media Director's report was presented by Sarah McPike on behalf of Jennifer Retzlaff (**Annex 9**)

8. The Report from the Proceedings Editor was presented by Bette Beswick (**Annex 10**). The membership profusely thanked Bette for her arduous work to publish the backlog of Proceedings that were missing for 2013, 2014, 2017 and 2018, keeping up with the current proceeding from 2019. Thanks to Bette and our webmaster Micky Ahn they are now available in our website (or will be for 2019).

9. Business arising from previous meetings
   a) New bylaws approved in 2018 were ratified by voting on the following **Special Resolution:** *Be it resolved that revisions to the Bylaws of the Entomological Society of Alberta approved by general motion at the September 29, 2018 Annual General Meeting held in Edmonton be ratified.* Moved by Bette Beswick, and seconded by Ken Fry; it passed. (The final bylaws are reproduced in **Annex 11**)

10. Nominations and Elections were presided by Terry Eberhardt. They proceeded as follows:

- Dan Johnson was nominated for **Vice President** by Hector Carcamo and seconded by Bette Beswick. No other nominations from the floor. Motion for nominations to cease by Bette Beswick, seconded by Hector Carcamo. Acclaimed.

- Hector Carcamo nominated Lisa Lumley for **Secretary** and seconded by Ken Fry. No other nominations from the floor. Motion for nominations to cease by Bette Beswick, seconded by Hector Carcamo. Acclaimed.

- Hector Carcamo nominated Caroline Whitehouse for **Treasurer** and seconded by Lisa Lumley. No other nominations from the floor. Motion for nominations to cease by Bette Beswick, seconded by Hector Carcamo. Acclaimed

- Dan Johnson nominated Piratheepa Jegatheeswaran for **Southern Director** and seconded by Lisa Lumley. No other nominations from the floor. Motion for nominations to cease by Hector Carcamo, seconded by Bette Beswick. Acclaimed.

- Heather Proctor nominated Ronald Batallas for **Northern Director** and seconded by Felix Sperling. No other nominations from the floor. Motion for nominations to cease by Bette Beswick, seconded by Boyd Mori. Acclaimed.

- Diana Wilches nominated Valentina Ibarra for **Social Media Director** and seconded by Kevin Floate. No other nominations from the floor. Motion for nominations to cease by Sarah McPike, seconded by Boyd Mori. Acclaimed.

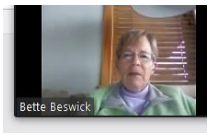
The membership congratulated through a show of the "clapping hand" or "thumps up" emoji in zoom the 2021 Officers and Board of Directors of the Entomological Society of Alberta listed below with their respective year end terms.

Officers (1 year terms):

Past President: Sarah McPike
President: Terry Eberhardt
Vice President: Dan Johnson
Secretary: Lisa Lumley
Treasurer: Caroline Whitehouse

Webmaster: Micky Ahn (2021)
Proceeding Editor: Bette Beswick (2022)
Directors:

Northern: Ronald Batallas (2023)
Central: Tobin Benedict (2022)
Southern: Piratheepa Jegatheeswaran (2023)
Outreach: Ilan Domnich (2022)
Social Media: Valentina Ibarra (2022)

11. The Chair of the resolutions committee, Bette Beswick, 

announced the following resolution:

> This has been a very special year, and we are grateful to many people for organizing the Entomological Society of Alberta's first venture into the virtual conference world. Co-chairs Boyd Mori and Tobin Benedict did the heavy lifting to make it happen. Boyd was a masterful session moderator for the presentations, and Asha Wijerathna managed the poster session. Micky Ahn and Caroline Whitehouse handled the registration and website. The student presentations were judged by Terry Eberhardt, Sarah McPike and Hector Carcamo. None of this could have happened without the technology, so thanks to University of Alberta for providing Zoom Access. Be it resolved that we extend a round of (virtual) applause to all these organizers.

12. New Business
    a) Four Student Oral Presentation Awards (cash prizes) were announced by Terry Eberhardt as follows:
        a. Phd students: Antonia Musso (1st), Danielle Clake (2nd)
        b. MSc students: Emily Lemke (1st), Emily Purvis (2nd)
    b) The Entomological Society of Alberta Undergraduate Student Award was presented to Valentina Ibarra of the University of Lethbridge by Lisa Lumley.
    c) The winner of the 2020 Entomological Society of Alberta's Frederick S. Carr Award was Bette Beswick. This award recognizes significant contributions to the promotion of entomology in Alberta by an amateur entomologist. The award was presented by Sarah McPike.
    d) The winner of the 2020 Entomological Society of Canada's Norman Criddle Award was Colin Weir. This award is given in recognition of major contributions in the field of entomology in Canada by a non professional entomologist. Colin is a most deserving recipient for his work hosting and promoting the annual Insect Discovery Day at the Birds of Prey Centre in Coaldale. The award was presented by Diana Wilches, the Southern Director.
    e) Acknowledgement of donation from ESC to ESAb. Sarah McPike informed the members that the Entomological Society of Canada made a donation of $4,000 to make up some of

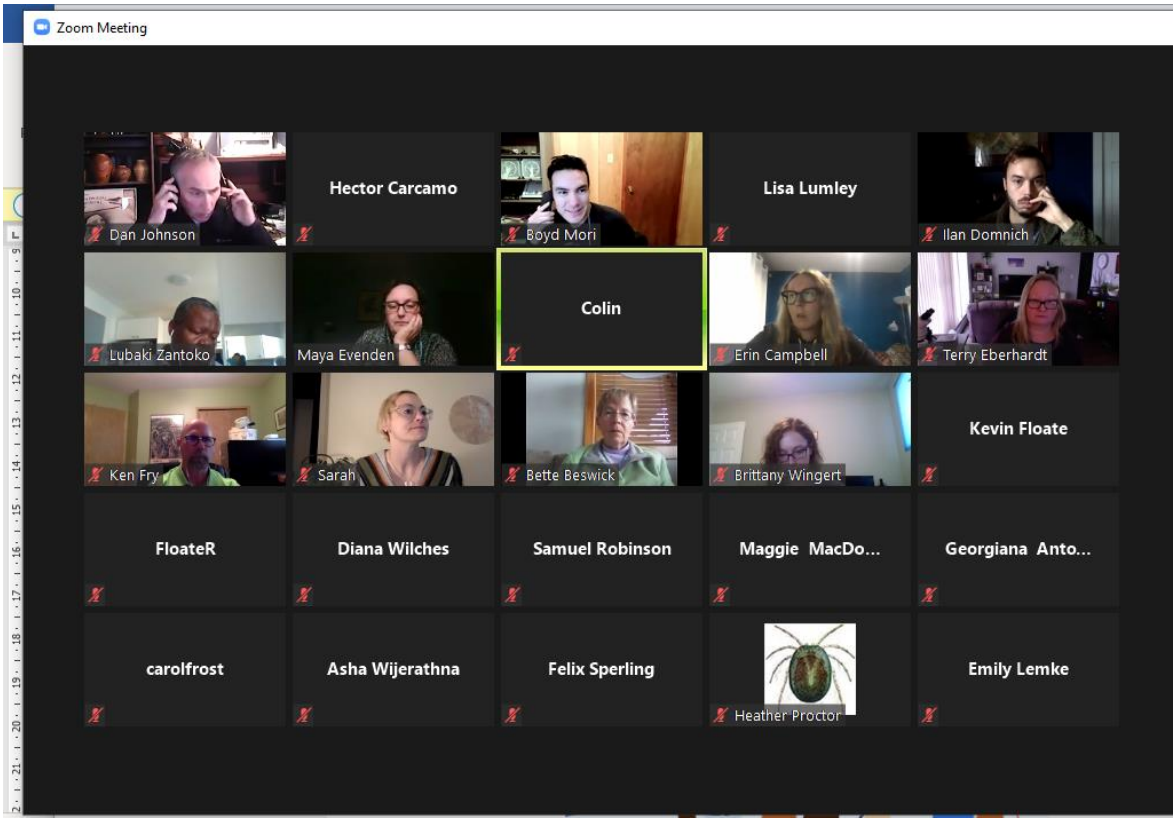
the loss of revenue due to the cancellation of the Joint Annual Meeting as a result of covid19. It was resolved that the president of the society write a letter thanking the ESC for their generous donation.

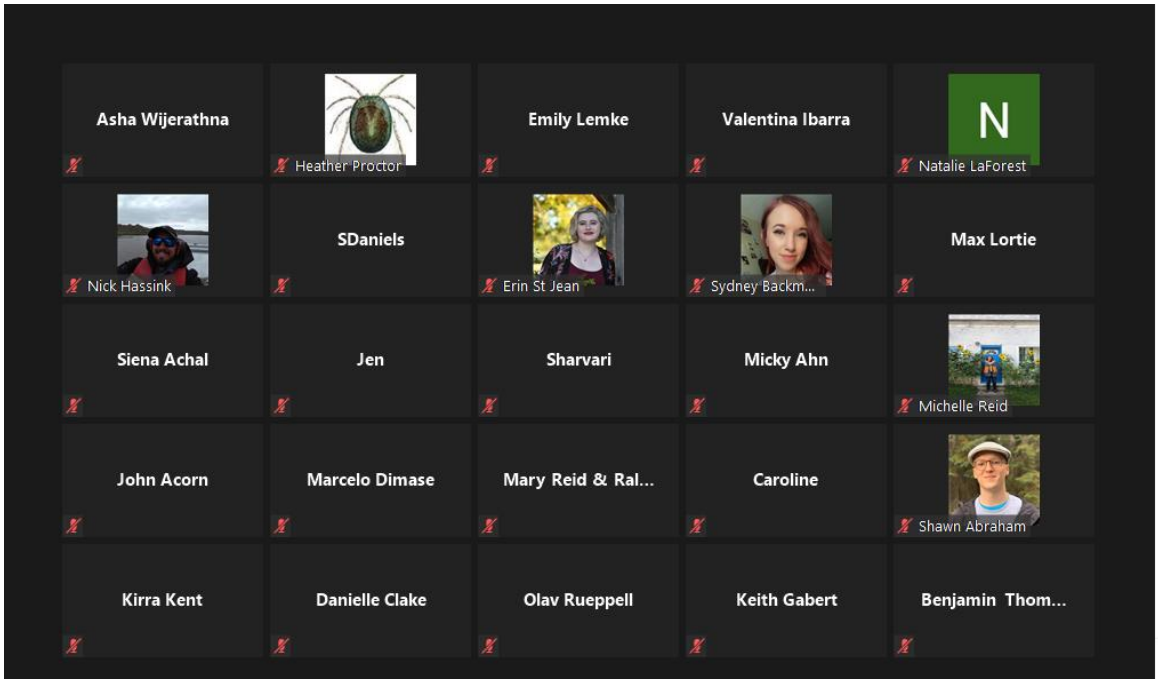
f) The location of the 2021 AGM and Conference in 2021 is expected to take place in the Calgary region around the usual time in the Fall. Bette Beswick, Ken Fry and Micky Ahn offer to help and recruit more volunteers to organize it and we all hope it will be a physical not virtual meeting.

g) Boyd Mori had the pleasure to share some happy news with the membership: the 2020 recipient of the Confederation of Alberta Faculties Distinguish Academic Award is Dr. Maya Evenden. Congratulations to Maya for a well deserved award.

13. In her presidential address, Sarah McPike (Annex 12), thanked all who provided support during her year as president and the organizers of the virtual meeting (Boyd Mori in particular) and reminded us all of the important contributions that scientists make, especially in these uncertain times when many make up their minds regardless of scientific evidence.

14. Motion to adjourn by Sarah McPike at 5:01 pm





ANNEX 1

Secretary's Report to the Entomological Society of Alberta Annual General Meeting, 23 October 2020 (Online)

2020 was a typical year as far as correspondence to our gmail account:

- around 80 messages from 1 January to 21 October
- around 80 % are internal emails related to the Annual Conference/AGM, most of them during the preceding month
- another 10% are requests for id's: hornets were popular, a couple about bees and the usual giant water bug and box elders or lily leaf beetle, no spiders!
- the rest were 2 requests for school talks, a couple internship mentorship requests and one from Pakistan asking for a free honorary membership!

Submitted by Hector Carcamo.

ANNEX 2

Treasurer's Report
Annual General Meeting – October 20, 2020

Prepared by Caroline Whitehouse

Member Status 2019

Type	In good standing	Delinquent but on the books
Free library	20	--
Library	1	--
Honourary	3	--
Regular	33	33
Retired	--	2
Student	27	39
Total	**83**	**74**

AGM 2019 overview – Elkwater, AB

Registration		8,296.00
Expenses - meeting		(6,798.38)
Donations		1,000.00
Awards		(2,300.00)
	Net	**197.62**

AGM 2019 attendance

Day	4
Member	
Regular	38
Student/Retired	24
Non-member	
Regular	5
Student/retired	4
Banquet	12
Total	**87**

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 estimated attendance

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

Income Statement
Entomological Society of Alberta
Reporting period: 2019-01-01 to 2019-12-31

Accounts		Balance
Revenue		
Interest - Bank Account		0.84
Interest - GIC Term Deposits		288.71
Dividends - Common shares		29.57
Membership Dues		847.38
AGM - Registrations and Banquet Ticket Sales		8,296.69
Grant		1,600.00
Donations		1,000.00
	Total Revenue	**12,063.19**
	GROSS PROFIT	**12,063.19**
Operating Expenses		
Awards, Grants & Scholarship Donations		2,300.00
AGM - Room Rental & Hosting, speaker expens		6,798.38
Paypal and Eventbrite fees		615.21
Proceedings printing		150.00
Web hosting services		614.91
Postage and delivery		38.13
	Total Operating Expenses	**10,516.63**
	NET PROFIT	**1,546.56**

Approved by Auditor:

Antonia Musso
Printed name

Signature

29 September 2020
Date

Approved by Auditor:

Alexandra Grossi
Printed name

Signature

29 September 2020
Date

Balance Sheet
Entomological Society of Alberta
As of: 2019-12-31

Account	Balance
Asset	
Cash on Hand	11,091.56
Common Shares	841.85
GIC Term Deposits	16,330.52
Total Assets	**28,263.93**
Liability	
Total Liabilities	**847.60**
Equity	
Previous Year(s) Earnings	26,717.37
Current Year Earning	1,546.56
Total Equity	**28,263.93**
Total Liabilities and Equity	**27,416.33**

Income Statement
Entomological Society of Alberta
Reporting period: 2020-01-01 to 2020-09-30

Accounts	Balance
Revenue	
Membership Dues	430.00
AGM - Registrations and Banquet Ticket Sales	150.00
Total Revenue	**580.00**
GROSS PROFIT	**580.00**
Operating Expenses	
Awards, Grants & Scholarship Donations	200.00
AGM - Room Rental & Hosting, speaker expenses	647.67
Merchant fees	21.11
Total Operating Expenses	**868.78**
NET PROFIT	**(288.78)**

Balance Sheet
Entomological Society of Alberta
As of: 2020-09-30

Account	Balance
Asset	
Cash on Hand	10,323.89
Common Shares	841.85
GIC Term Deposits	16,330.52
Paypal	478.89
Total Assets	**27,975.15**
Liability	-
Total Liabilities	-
Equity	
Previous Year(s) Earnings	28,263.93
Current Year Earning	(288.78)
Total Equity	**27,975.15**
Total Liabilities and Equity	**27,975.15**

ANNEX 3

Webmaster's Report to the Entomological Society of Alberta Annual General Meeting

23 October 2020 (Online)

- No big changes for the website other than an occasional blog post
- Multiple blog posts, and we have been getting some comments that have been useful
- Implemented a new membership and Conference registration software. What did everyone think of the online forms?
- One request to put position on website
- EntSoc BC contacted me about how we implemented a new website! I gave some brief tips re: photos, no professional hired, survey, etc.

ANNEX 4

Regional Director's Report to the Entomological Society of Alberta Annual General Meeting
21 October 2020
Submitted by Boyd Mori, ESA Regional Director to the Entomological Society of Canada

Since the last Annual Meeting, I have been involved with several Board Meetings of the Entomological Society of Canada. This included a special meeting of the Board of the ESC to specifically discuss efforts towards Equity, Diversity and Inclusion (EDI).

The ESC has now created a Director of EDI and an EDI committee to help address EDI throughout all levels of the society. The ESC has also created a Director of Student and Early Professional Affairs. These two new Directors will have full voting rights on the Board and it is hoped will bring forward pertinent information which the ESC can address in regards to concerns for EDI and for SEPAC members.

We are asked to provide information for the Regional Roundup section of the ESC Bulletin (published quarterly: next issue in December). If you have anything for this section, please let me know.

I also want to remind the ESA, that the ESC has changed their public outreach grant. We can apply for the $500 (increased from $200) once per year, but it does not roll over if we do not apply (as was the previous arrangement).

Finally, I also want to draw your attention to a new ESC membership category for "Entomology Enthusiast". This category is for those that are passionate about entomology, but are not professional or student entomologists. The cost is half the price of a "Regular" membership.

Annex 5

Northern Director's Report to the Entomological Society of Alberta 2020 AGM
Compiled and submitted by Jennifer Klutsch, University of Alberta

Recent Graduate Student Defenses:

Victor Shegelski PhD Defence "Mountain pine beetle dispersal: morphology, genetics, and range expansion" Department of Biological Sciences, Supervisor Felix Sperling, 21 July 2020

Kyle Snape MSc Defence: "Population structure and associated larval host variation of the forest tent caterpillar, Malacosoma disstria" Department of Biological Sciences, Supervisors Felix Sperling and Amanda Roe, 7 July 2020

Robin Chen MSc Defence: "Galleria mellonella: A model for studying pathogen virulence and insect immunity" Supervisors Lien Luong and Andrew Keddie, 17 April 2020.

Previous and upcoming events:

Western Forest Insect Work Conference 2020 in Edmonton: Canceled due to precautions and travel restrictions over Covid-19.

Canadian Society for Ecology and Evolution Meeting 2020 in Edmonton: Canceled due to precautions and travel restrictions over Covid-19.

Ecology and Evolution (BIOL 631) Seminar Series at University of Alberta: Dr. Tolulope Morawo, Assistant Professor, Dept. of Entomology and Nematology, University of Florida: "Response of parasitic wasps to host-associated plant odors: A tail of two braconid species" 16 October 2020

fRI Mountain Pine Beetle Research Forum 2020 Webinar: The first one hour presentation starts 17 November and continues every Tuesday at 11am-noon to 16 February. Talks will focus on biology, ecology, and management of mountain pine beetle in Alberta. (https://friresearch.ca/event/research-round-mountain-pine-beetle-research-webinar-series)

Additions to Northern Alberta's Entomology Community!

Congratulations to Dr. Olav Rueppell, a new professor at University of Alberta's Department of Biological Sciences. Dr. Rueppell's research focuses on the social evolution of bees. (https://www.ualberta.ca/science/news/2020/september/new-prof-rueppell.html)

Teaching and Researching during COVID-19

At University of Alberta, classes are virtual for Fall 2020. See a great video by Ronald Batallas Huacon on studying Insect Biology (ENT 220) remotely in Fall 2020 (https://www.ualberta.ca/science/news/2020/august/fall-2020-entomology.html)

Research at the University of Alberta continued but under increased health and safety guidelines.

Annex 6

Central Director Report to the Entomological Society of Alberta Annual General Meeting
Oct 22, 2020
Submitted by Tobin Benedict

- I had a fun time helping with the Fall 2020 Virtual conference, I hope everyone enjoyed it. Big thank you to Boyd, Micky, Caroline and everyone on the organizing committee.
- I reached out to a few entomologists at the University of Calgary who were not aware of our society and were very happy to hear about us! Some were not able to attend the virtual conference but I have directed them to our website and membership option.
- Mindi Summers at the University of Calgary has students working on outreach materials on insects in Alberta. She is interested in connecting with us and seeing what might come of this. She will have more information on this in a couple of months.
- Jan Ciborowski has taken on a new research position at the U of C looking at wetlands forming in oil sands that have been reclaimed and is incorporating aquatic invertebrates as a key measure of wetland conditions.
- From a collections perspective, John Swann at the Collections room at U of C had a 'massive overhaul' of Hymenoptera identified through 2019, along with collections of Paul Galpern's, Ralph Cartar's and Lawrence Harder's materials. He says he is there twice a week if anyone is interested in coming in to take a look.
- I saw an interesting job posting:
    - BASF is looking for somebody with an entomological background for an Agro Professional Development position based in Calgary:
        - "The PDP role is a 24 month rotational program; with terms spent working in field research, technical development or commercial teams focused on crop protection. Participants will explore career options and develop technical and professional decision making skills, while fulfilling specific business needs for the technical and research functions in BASF. The roles will be located across western Canada and will focus on an array of functions such as pathology, entomology, and herbicides."

Annex 7

Southern Director's Report to the Entomological Society of Alberta Fall Board Meeting and Annual General Meeting
October 23, 2020
Submitted by Diana Wilches

With the current COVID-19 crisis the entomology-related operations in Southern Alberta have been limited.

- The University of Lethbridge is opened for research but classes are mainly online with some exceptions. Students with current internships are limited to work remotely.
- Agriculture and Agri-Food Canada in Lethbridge has been gradually opening in phases. During the summer field work was reduced and only a few programs were allowed to be in the building as support of field work. On October 13th, the worksite started a plan for a gradual re-opening for laboratory work.

Student defenses:

- **Rossana Punko** (MSc, University of Manitoba) will defend her thesis this fall on *Nosema* in honey bee colonies. Supervisors: Shelley Hoover (University of Lethbridge) and Rob Currie (University of Manitoba).
- **Sejer Meyhoff** defended his MSc at the University of Lethbridge on March 26. He used field collections, bird crop content analysis, and stable isotope analysis to determine food used by sharp-tailed grouse. Thesis title: "Validation of stable isotope analysis for determining dietary proportions and trophic dynamics in plains sharp-tailed grouse (*Tympanuchus phasianellus jamesi*)". Supervisor: Dan Johnson, University of Lethbridge.

News:

- Alberta Agriculture and Forestry cuts include Apiculture staff in Lethbridge and Edmonton. Moving forward they will cancel all the research programs.
- **Scott Meers**, Insect Management Specialist with Alberta Agriculture and Forestry retired at the end of May. This position has not yet been filled or advertised and it is unclear if it will be, **Shelley Barkley** is continuing the program in the short term.
- **Shelley Hoover** moved from Alberta Agriculture and Forestry to the University of Lethbridge.
- **Cheryl Chelle** (technician at AAFC-Lethbridge with Hector Carcamo and Hailey Catton) is retiring after 27 years of service to AAFC. She specialized in rearing the Tetrastichus julis biocontrol agent for cereal leaf beetle and identifying insects and spiders.
- **Colin Weir** operator of the Birds of Prey Centre in Coaldale will be receiving the Criddle Award from the Entomological Society of Canada. Colin has hosted the Insect Discovery day organized by the Entomological Society of Alberta since 2011.

ANNEX 8

Report of the Outreach Director to the Entomological Society of Alberta Annual General Meeting
Oct 22, 2020
Submitted by Ilan Domnich

Since my appointment in 2019, I have worked on the Insect Safari/Bug Hunt activity for National Insect Appreciation day, creating a printout for kids or amateur entomologists to use for finding native insects in the backyard.

I have been attending meetings for ESC as a representative of ESAb. Our current project is the creation of an Entomology Career Booklet for those interested in the field, that includes featured entomologist portraits, and the career paths that can result from an entomology background. I will be creating an "Education Pathway" that shows the variety of branching educational paths and where they may lead in an entomological career.

ANNEX 9

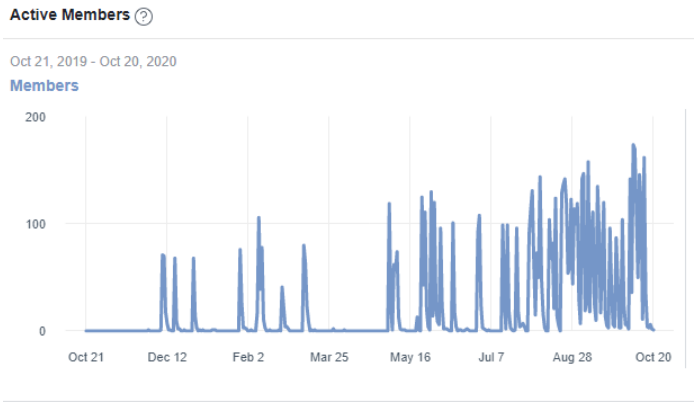
Social Media Director's Report
Submitted by Jennifer Retzlaff

Updates

In the last year (October 21, 2019 – October 21, 2020) the Facebook group has gained over 100 members. We are up from 228 to 344 as of this morning, October 22, 2020. This is a huge jump compared to most years.

Requesting members who I have approved tend to be those who are a member of multiple entomological groups on Facebook such as Lepidopterists guild, Alberta Spider Identification, etc.

Our engagement tends to improve over the summer months with requests to ID insects, as well as meeting announcements, see below:



Suggestions for future social media director:

- Improve the approval process for the page by adding request questions that align with the ESAb's mission for the Facebook page.
- Encourage engagement from labs/offices around the province, sharing photos/blurbs of what they're group is up to in the world of Entomology.

ANNEX 10

Report of the Proceedings Editor to the Entomological Society of Alberta Annual General Meeting
October 2020
Submitted by Bette Beswick

Proceedings for the Entomological Society of Alberta for 2013, 2014, 2017 and 2018 were compiled from files maintained by the ESA Secretary (thank you, Ken and Hector!). The 2019 proceedings are almost completed, pending approval of the 2019 Annual General Meeting's minutes at the 2020 AGM. The completed proceedings have now been posted on the ESA website and have been added to the ESA's files.

ANNEX 11

Final Bylaws to be Ratified by Special Resolution
at the 2020 Entomological Society of Alberta Annual General Meeting

By-laws of the Entomological Society of Alberta

These by-laws were approved by the membership at an Annual General Meeting of the Society on the September 29, 2018.

Article 1 – Title

This society shall be known as "The Entomological Society of Alberta", herein referred to as the "Society", in affiliation with the Entomological Society of Canada. The Society also may be referred to as the "ESA".

Article 2 – Membership

a. There shall be three categories of membership: regular membership, student membership, and honorary life membership, as provided for in the Rules and Regulations of the Society. Any member in any category shall enjoy all the rights and privileges of all other members.

b. Any person interested in entomology may apply to become a regular member. Any person enrolled in a recognized educational institution may apply to become a student member. Prospective regular and student members apply by submitting to the Secretary a completed membership application form and payment of the applicable annual membership fee. Upon approval of the application by the Board of Directors and the payment of the applicable annual membership fee, the applicant shall be admitted as a member.

c. Honorary life membership may be conferred on anyone who has performed long and distinguished service in the field of entomology. Honorary life members shall be exempt from payment of the annual membership fee. All members in good standing are entitled to propose the names of prospective honorary life members, provided each such proposal is supported by two other members, and documentation is submitted in writing to the Secretary at least 30 days prior to the Annual Meeting. Such honorary life members shall be elected at an Annual Meeting. The total number of honorary life members shall not exceed ten percent of the total membership at the time of election.

d. Annual membership fee(s) shall be determined, from time to time, by the members at a general meeting.

e. If any member is in arrears for fees or assessments for any year, such member shall be automatically suspended at the expiration of six months from the end of such year and shall thereafter be entitled to no membership privileges or powers in the Society until reinstated.

f. Any member, upon a majority vote of all members of the Society in good standing at an Annual, General, or Special Meeting may be expelled from membership for any cause that the Society may deem reasonable.

g. A member may withdraw from the Society upon giving written notice to the Board of Directors through its Secretary.

h. Annual membership fees of withdrawn, suspended, and expelled members shall not be refunded.

i. A member who has not withdrawn from membership nor has been suspended nor expelled shall be considered to be in good standing, and shall enjoy full voting privileges and hold office.

Article 3 - Register of Members

The Society shall keep a register of its members that contains the names and contact information of every person who is admitted as a member of the Society.

Article 4 - Board of Directors

a. The Board shall consist of four officers and nine council members, and herein shall be referred to as the "Board". Any six members shall constitute a quorum, and meetings shall be held without notice if a quorum of the Board is present, or in communication by remote access provided, however, that any business at such meeting shall be ratified at the next regularly called meeting of the Board; otherwise they shall be null and void.

b. The officers of the Society shall consist of a President, Vice-President, Secretary, and Treasurer. These officers shall constitute the Executive of the Society with full power to act on behalf of the Society within the bounds of the Society's By-laws and Rules and Regulations, to appoint committees as necessary, and to meet expenses required in the normal operation of the Society.

c. The council shall consist of the Immediate Past-President and eight directors each of whom shall act in one of the following roles: Regional Director to the Entomological Society of Canada, Northern Director, Central Director, Southern Director, Editor,, Webmaster, Social Media Director, and Outreach Director The Northern, Central, and Southern Directors shall represent the various fields of entomology and the geographical areas of Alberta as much as possible.

d. The term of office for all Board positions shall commence at the beginning of the calendar year immediately following election.

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The term of office for Board members shall be:

- The term of office for the Past-President shall be one year.
- The term of office for President shall be one year and not normally be held by the same person for two consecutive years.
- The Vice-President shall normally follow his/her term of office with a term as President.
- The term of office for the Secretary, Treasurer, Webmaster, Editor, Social Media Director and Outreach Director shall be one year and eligible for immediate re-election.
- The term of office for the Regional Director to the Entomological Society of Canada and the Northern, Central, and Southern directors shall be three years and not normally eligible for immediate re-election.

f. Any member of the Board, upon a majority vote of all board members in good standing, may be temporarily suspended from office.

g. Any member of the Board, upon a majority vote of all members in good standing at an Annual, General, or Special Meeting, may be removed from office for any cause which the Society may deem reasonable.

Article 5 - Duties of Board and Council Members

a. The duties of the President shall be: to be charged with the general management and supervision of the Society; to preside at all meetings of the Society and the Board; to be ex-officio a member of all committees; to deliver a President's report at all Annual, General, and Board Meetings; and to perform other duties as provided for in the Society's Rules and Regulations.

b. The duties of the Vice-President shall be: to perform the duties and exercise the powers of the President in the temporary absence or disability of the President; to chair committees as provided for in the Society's Rules and Regulations; and to perform such other duties as shall from time to time be imposed upon the Vice-President by the Board.

c. The duties of the Secretary shall be: to attend all meetings of the Society and Board, and record accurate minutes of same; to send all notices of the various meetings as required; to be the custodian of all current books, papers, records, correspondence, contracts and other documents belonging to the Society, and to forward appropriate material to the Society's archives for storage; and to file the Annual Report as required by the Societies Act.

d. The duties of the Treasurer shall be: to receive all money due or otherwise belonging to the Society, and deposit all monies or other valuable effects in the name and to the credit of the Society in a financial institution selected by the Board; to keep a full and accurate account of all receipts and disbursements of the Society and proper books of account; to disburse the funds of the Society as necessary under the direction of the Board, and render to the Board at their meetings or whenever required, an account of all transactions as Treasurer and of the financial position of the Society; to deliver a Treasurer's report to all Annual, General, and Board Meetings; to ensure that a full and complete annual report covering all financial transactions of the Society during the previous year is submitted at the Annual Meeting; to receive and process all correspondence and documents relating to membership in the Society; and keep an accurate register of Society members.

e. The duties of the Webmaster shall be: to obtain and prepare material for and about the Society, and to make it available on a world wide web site, for access by Society members and the general public.

f. The duties of the Social Media Director shall be: to develop and monitor ESA social media platforms (e.g., Facebook, Twitter).

g. The duties of the Outreach Director shall be: to provide leadership in the development and delivery of resources and activities to engage Albertans in Entomology; liaise with the Entomological Society of Canada to create national programming and promote provincial outreach accomplishments; foster partnerships with relevant organizations that share similar objectives and target audiences; monitor communications with ESA members about potential and ongoing outreach opportunities; prepare a

budget for each outreach proposal, and prepare grant applications as necessary; present outreach submissions to the ESA Board for approval.

h. The duties of the Editor shall be: to prepare material to be included in, and to publish, the Proceedings as directed by the Board; to distribute to each eligible member, organization or other such entity one copy of the current year's Proceedings; and to forward to the Society's archives for storage one copy of the current year's Proceedings.

i. Members of the council shall attend meetings of the Board and Society, and shall have other duties as may be determined from time to time by the Board. A member of council, in the absence of the President, may chair an Annual, General, Special or Board Meeting as directed by the Board.

Article 6 - Signing Officers

The Treasurer and the President shall be designated as the signing officers of the Society. The signature of any one signing officer is sufficient for the Society's cheques and documents.

Article 7 – Auditing

a. The books, accounts and records of the Treasurer shall be audited at least once each year by a duly qualified accountant or by two members of the Society elected for that purpose at the Annual Meeting. In the event of a vacancy, such auditors shall be appointed by the Board. A complete and proper statement of the standing of the books for the previous year shall be submitted by such auditor(s) at the Annual Meeting of the Society. The fiscal year of the Society in each year shall commence January 1 and end December 31.

b. The books and records of the Society may be inspected by any member at the Annual Meeting or at any time within fifteen days of giving notice and arranging a time satisfactory to the officer(s) having charge of same. Each member of the Board shall at all times have access to such books and records after arranging a time satisfactory to the officer(s) having charge of same.

Article 8 – Meetings

a. The Annual Meeting of the Society shall be held on or before December 31 in each year at a time and place suitable to the majority of members for the purpose of considering and transacting any business as may properly come before the Board and the members. The Annual Meeting shall be a General Meeting of the Society.

b. General Meetings of the Society may be called at any time by the Secretary upon instructions of the President or Board.

c. A Special Meeting shall be convened by the President or Secretary upon receipt of a petition signed by no less than one-third of members in good standing, setting forth the reasons for calling such a meeting.

d. Notice of an Annual, General, or Special Meeting shall be given by written notice to the last known address of each member (as recorded in the Society's register of members), delivered by regular mail or electronic mail no fewer than eight days prior to the date of the meeting. A proposed agenda shall be included with the notice. Any member may at any time waive the notice of any such meeting.

e. A minimum of ten percent of members in good standing shall constitute a quorum at any Annual, General, or Special Meeting. If quorum is not present within thirty minutes of the stipulated time of the meeting, the meeting may proceed for information only, but no issues may be decided by vote.

f. Questions arising at a meeting shall be decided by a simple majority vote of the members in good standing. Such votes must be made in person and not by proxy or otherwise. If a tie vote ensues, the President shall cast the deciding vote.

Article 9 – Elections

a. At the Annual Meeting there shall be elected a President, Vice-President, Secretary, Treasurer, Webmaster, and up to eight directors as required.

b. Nominations shall be accepted from the floor, and require a seconder and approval of the person so nominated.

c. Any vacancy in office (except that of President) on the Board that occurs between elections shall be filled by appointment by the President, with the concurrence of the Board, the term of office such coopted member(s) to terminate at the end of the calendar year during which the appointment is made. A vacancy in the office of President shall be filled by the Vice-President who will then serve his/her normal term as President.

Article 10 – Remuneration

Unless authorized at an Annual, Special or General Meeting, no member of the Board and/or the Society shall receive remuneration for his/her services.

Article 11 - Borrowing Powers

For the purpose of carrying out its objects, the Society may borrow, raise or secure the payment of money in such a manner as it thinks fit, and in particular by the issue of debentures, but this power shall be exercised only under the authority of the Society, and in no case shall debentures be issued without the sanction of a Special Resolution of the Society.

Article 12 - Rules and Regulations

a. The Society may adopt such rules and regulations as passed by a majority of not less than two-thirds of such members in good standing who are present at an Annual or General Meeting.

b. Written notice specifying the intention to propose a resolution to adopt, rescind, alter or add rules and regulations must accompany the written notice announcing an Annual or General Meeting.

Article 13 - By-laws

The By-laws may be rescinded, altered, or added to by a Special Resolution passed at an Annual or General Meeting of which not less than 21 days' notice specifying the intention to propose the resolution has been

duly given, and by the vote of not less than three-fourths of members in good standing who are present at the meeting. Written notice specifying the intention to propose a Special Resolution shall accompany the written notice announcing an Annual or General Meeting.

ANNEX 12

President's Report 2020 to the Entomological Society of Alberta

It has been an honour to serve as President of ESA this year. Thank you to past presidents Lisa Lumley, and Bette Beswick for their guidance and mentorship in my entrance to this role.

This year did not go as planned. With the COVID-19 pandemic arising early in 2020,our planned in-person outreach events were cancelled. The Board of Directors also had to make the difficult decision of cancelling the National Conference which we were slated to host, along with ESC, October of 2020.

I attended the teleconference meeting of Entomological Societies of Canada, 4 March 2020 meeting on behalf of our Society.

"National Insect Appreciation Day" was celebrated by our society with an online "Bug Safari" document which was designed by the Outreach Committee, and circulated on social media and promoted the ESC initiative, "insect picture challenge" with the hashtags #InsectPictureChallenge and #NationalinsectDay. There is infinite enjoyment that can be found in small groups, outside, seeking and admiring insects and other arthropods! And we were happy to encourage that.

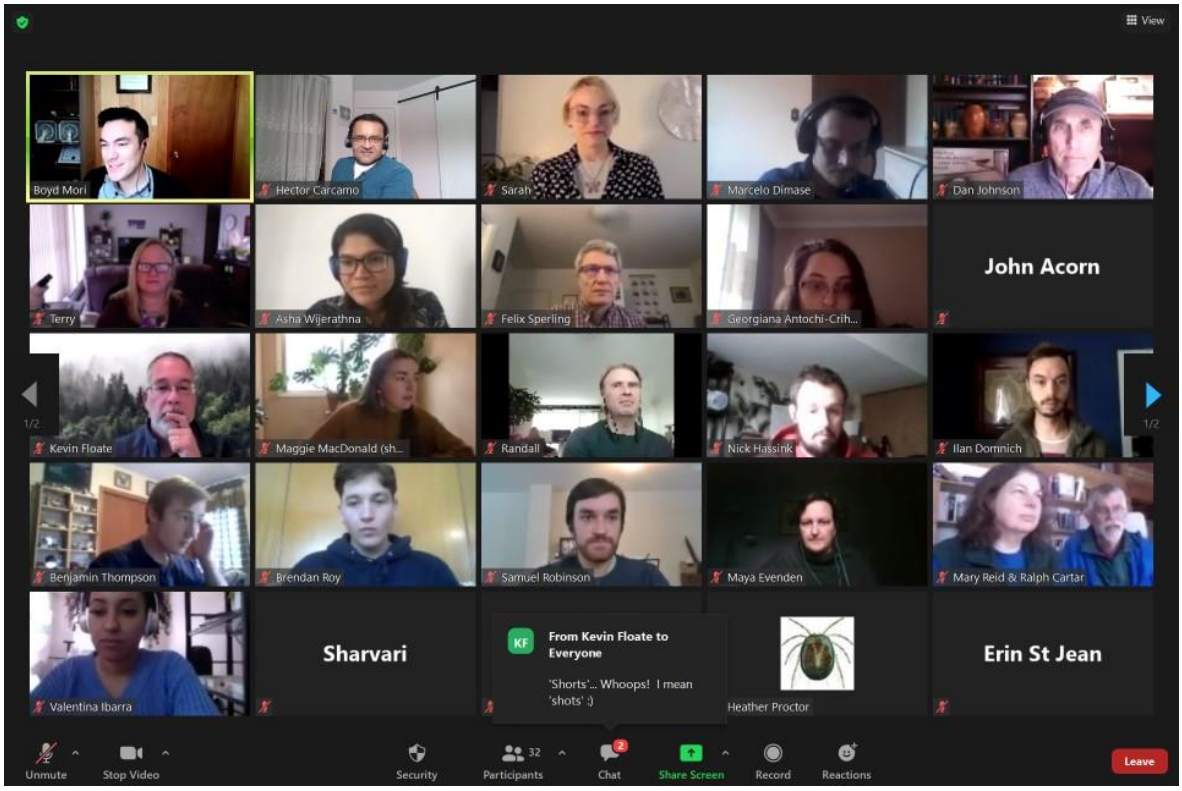
I am so pleased our annual conference is happening, even if in a virtual form, and that we can still "gather" and share the entomological work that has been happening.

Looking forward to continuing to serve on the board as Past President in 2021.

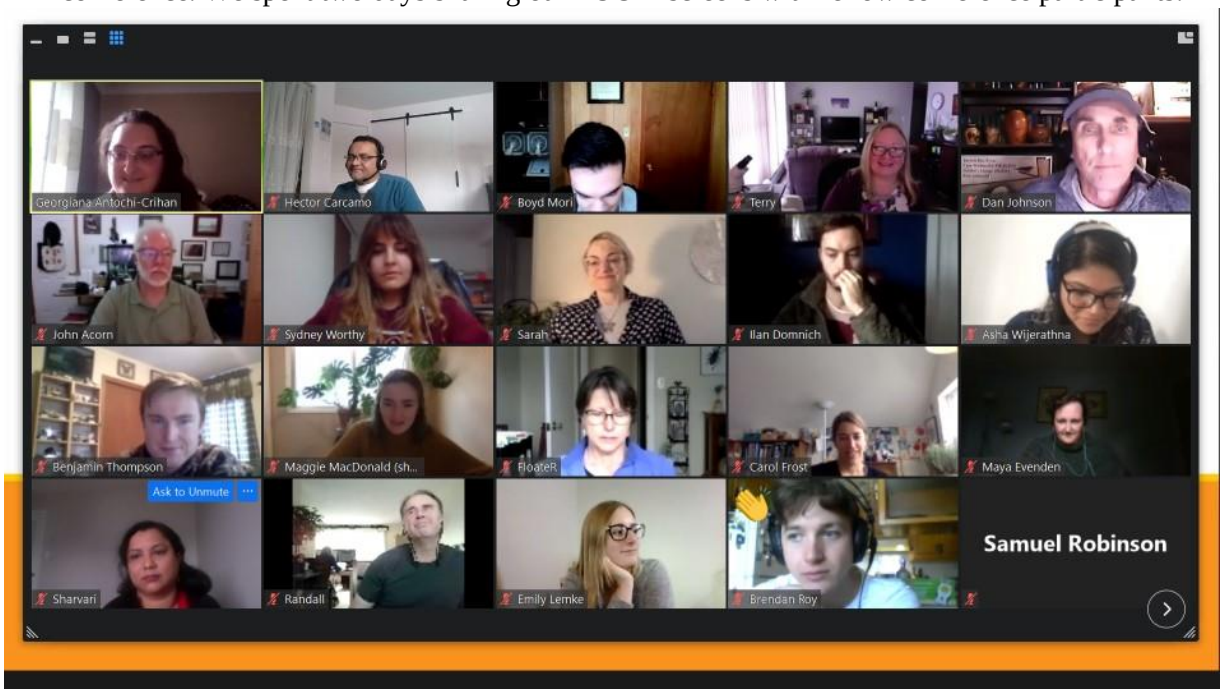
Sincerely,

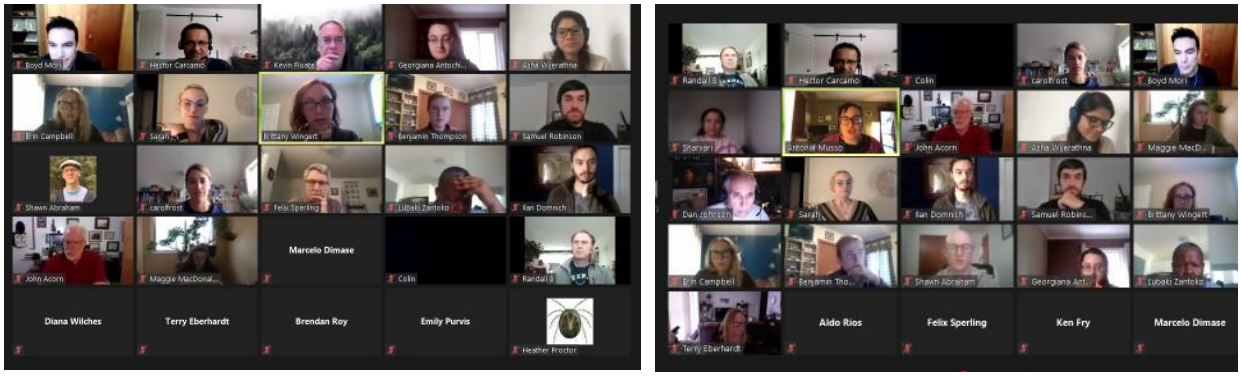
Sarah McPike

Photos of the ESA Conference and AGM
Screen shots taken by Hector Carcamo
22 and 23 October, 2020

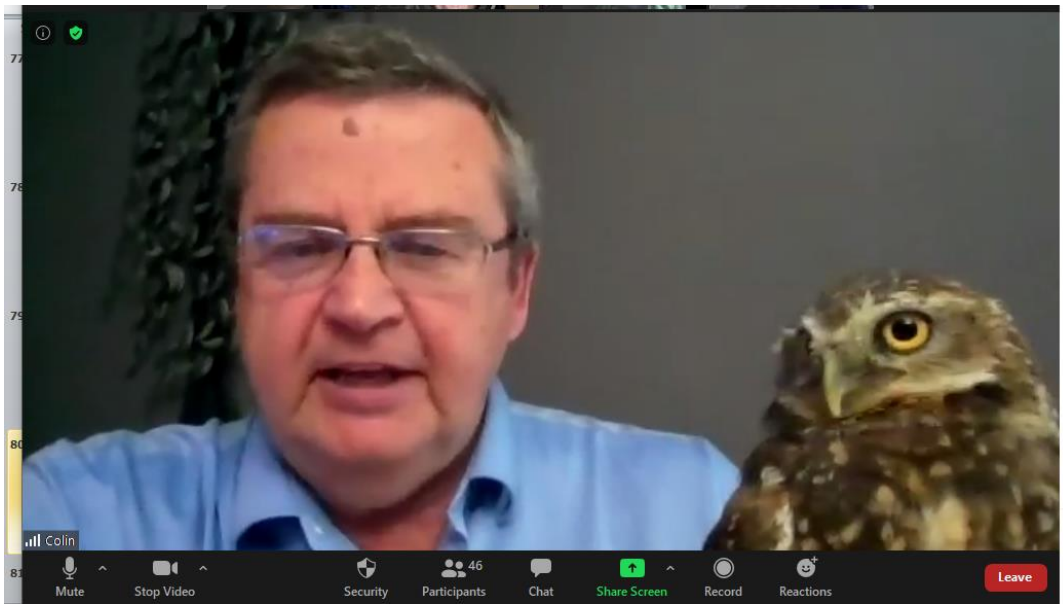


Boyd Mori (upper left corner) masterminded the Entomological Society of Alberta's first virtual conference. We spent two days sharing our ZOOM screens with fellow conference participants.

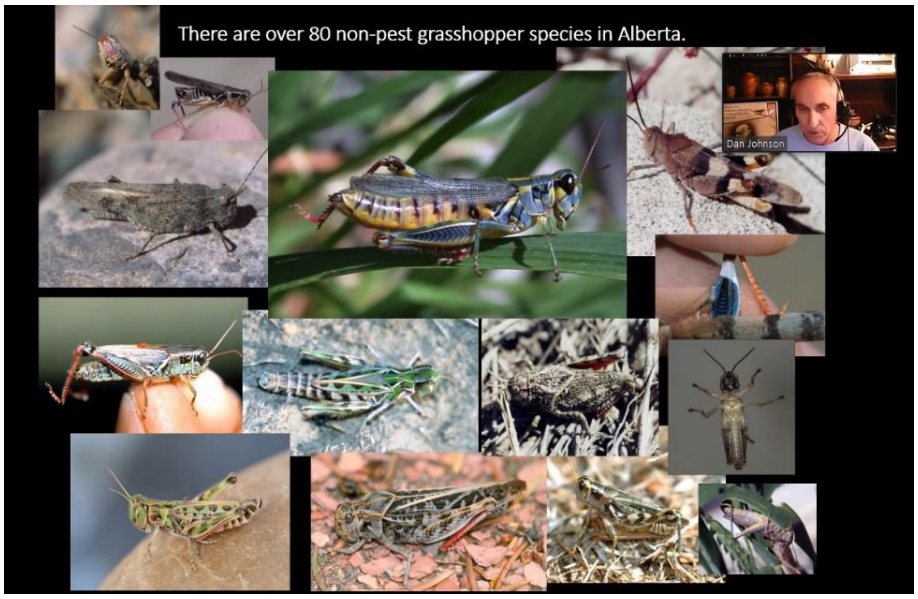




Screen shots of some of the Friday participants

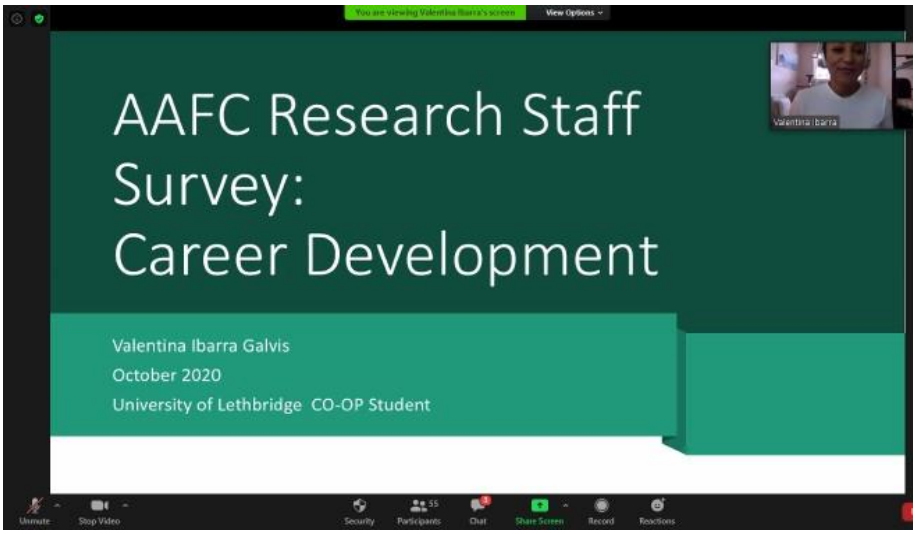


Colin Weir, operator of the Birds of Prey Centre in Coaldale, received the Criddle Award from the Entomological Society of Canada. Colin has hosted the Insect Discovery day organized by the Entomological Society of Alberta since 2011.



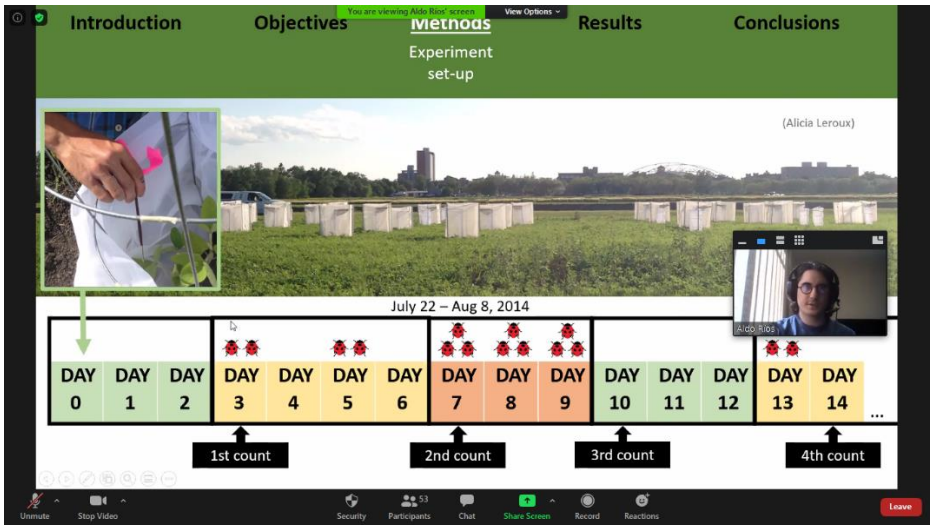
Dan Johnson's grasshopper survey data and recent cage studies suggest that parasitism might be avoided in a species with two-year oscillations.

Kirra Kent described how she is developing a book, *Lots of Lovely Legs: An Illustrated Spider Diversity Book for Children*.

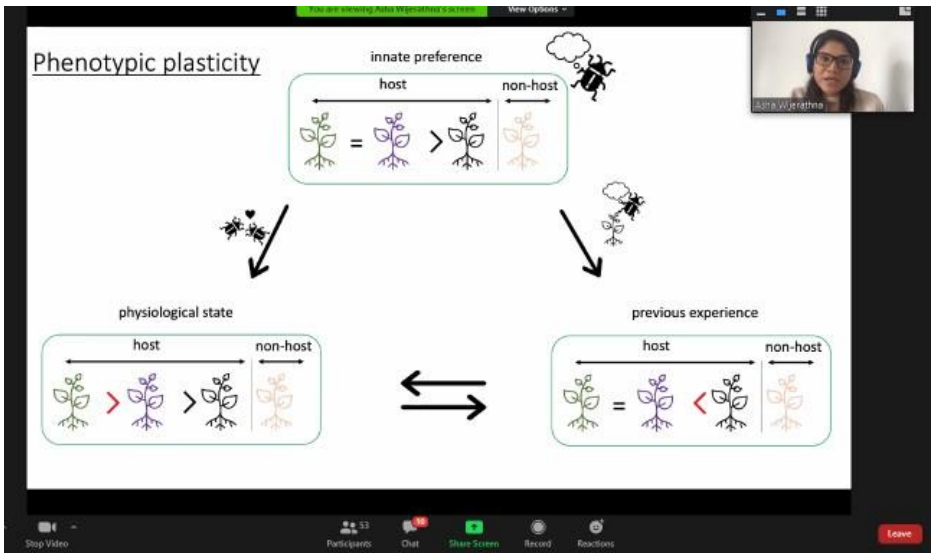


Valentina Ibarra Galvis investigated career development factors for students in science careers.

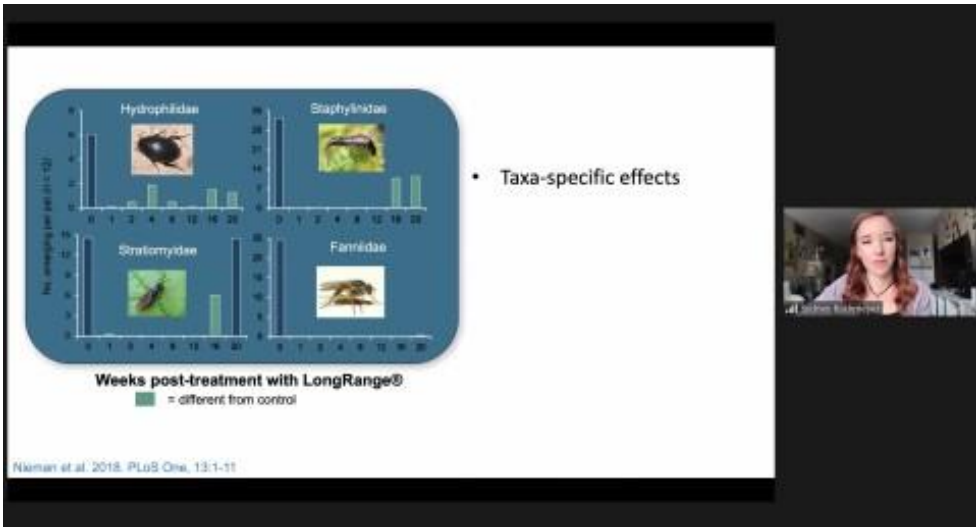
Antonia Musso reported on his research on pine beetle with Allan Carroll and Maya Evenden.



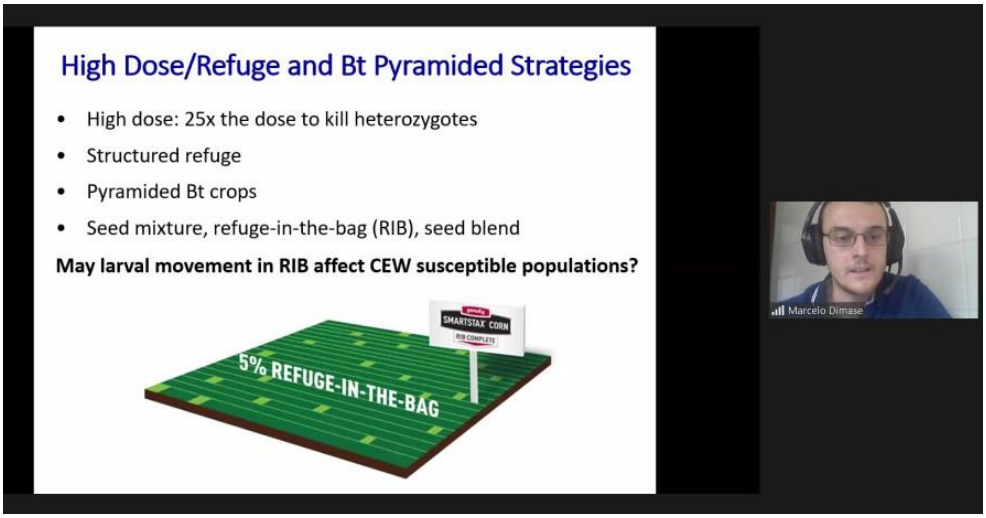
Aldo Ríos-Martínez described his research about the relationship of aphids and their predators.



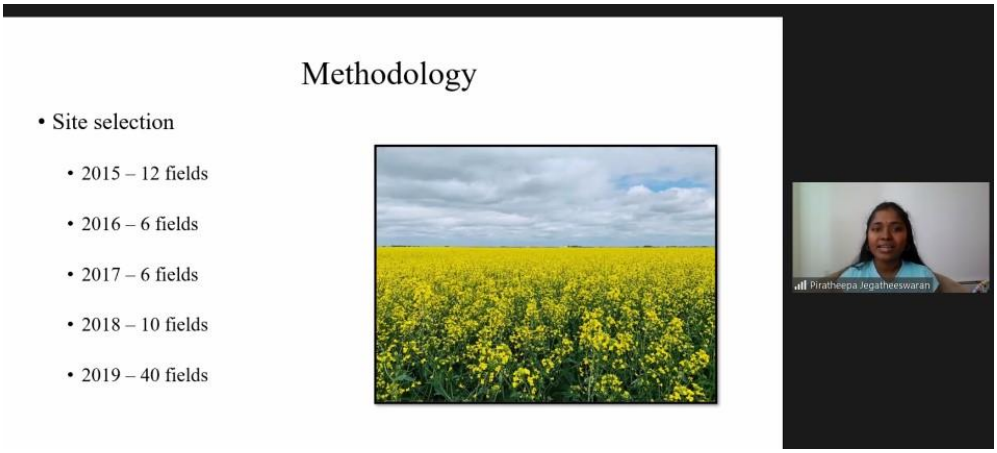
Asha Wijerathna, described her research into pea leaf weevils and their preferences for field peas and faba beans.



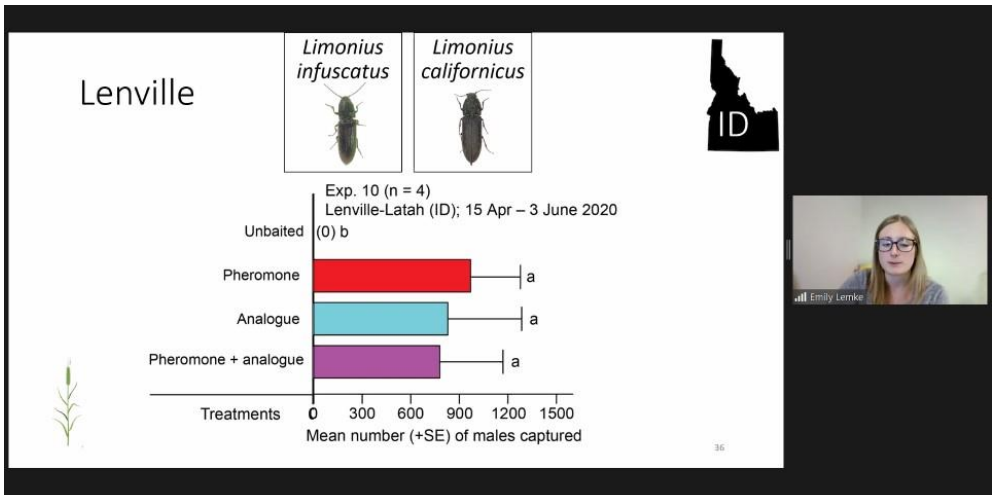
Sydney Backmeyer described her research into the non-target effects of LongRange® eprinomectin on dung-breeding insects.



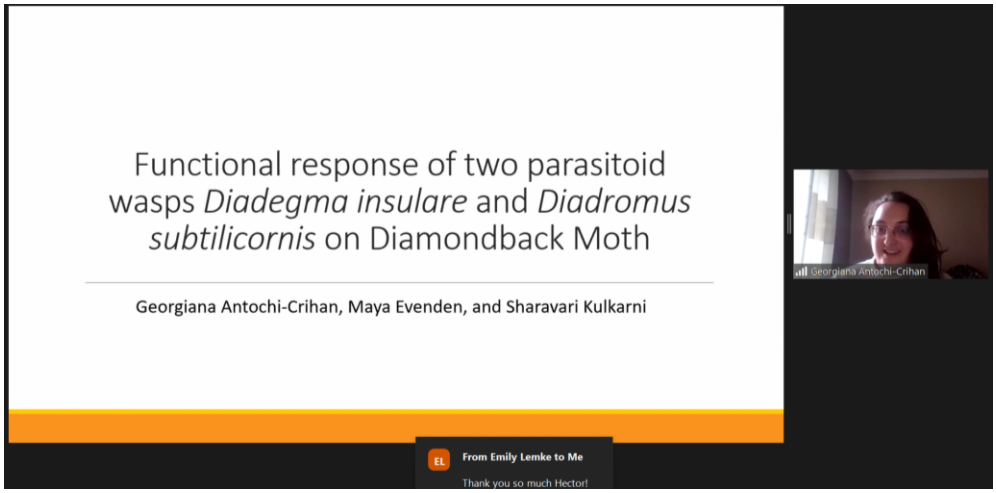
Marcelo Dimase reported on his work on the effects of seed blends of Agrisure Viptera® corn on larval dispersal of *Helicoverpa zea* (Boddie).



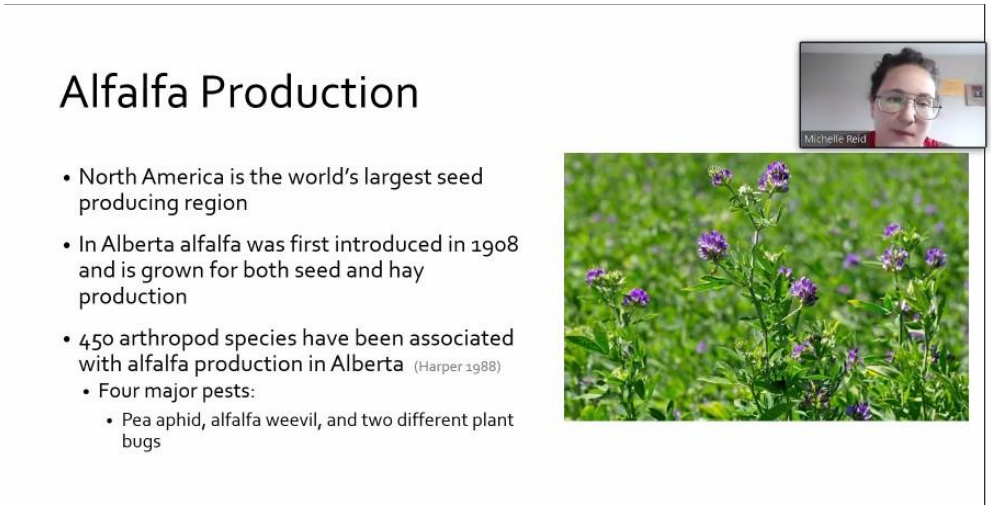
Piratheepa Jegatheeswaran Investigated the impacts of land-cover types and cropping history on lygus abundance in canola in Alberta.



Emily Lemke described the efficacy of synthetic *Limonius* sex pheromone on trap captures of four *Limonius* in various locations across North America



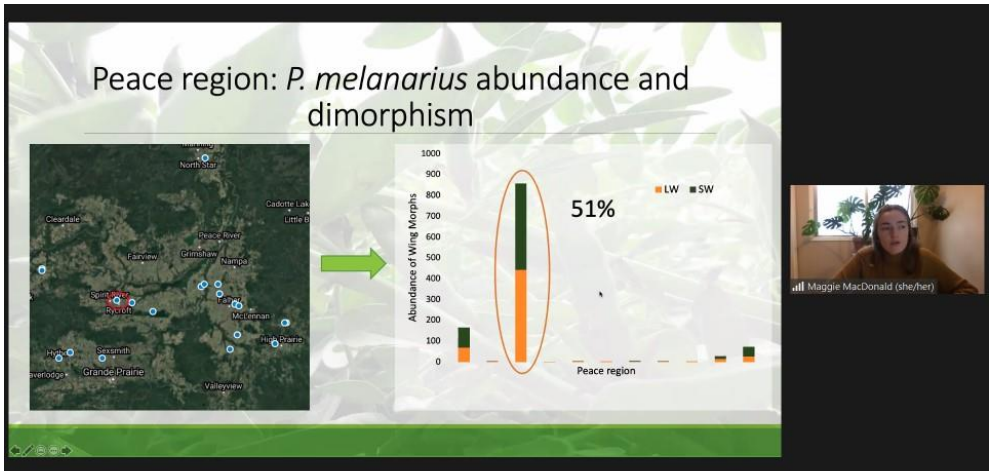
Georgiana Antochi-Crihan outlined her research about parasitoid wasps on diamondback moth.



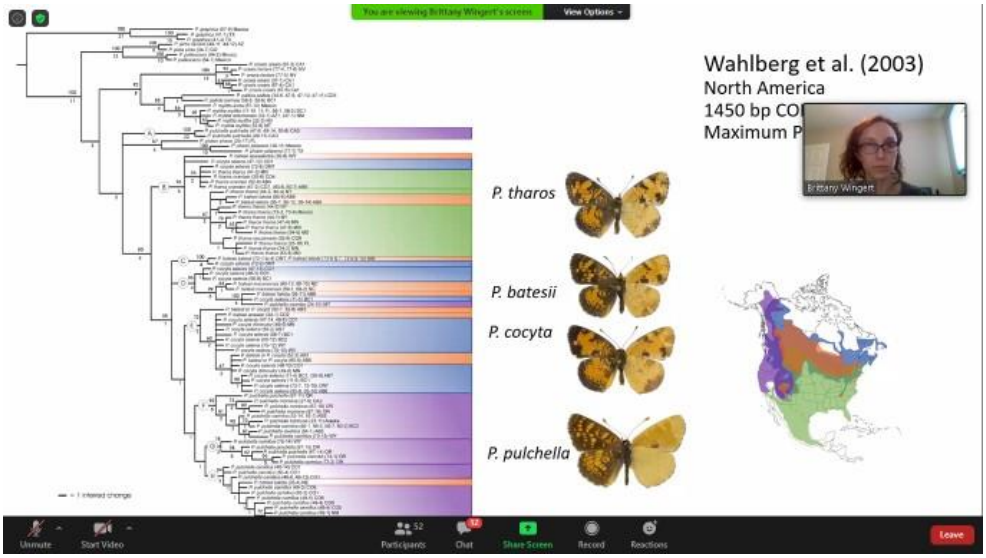
Michelle Reid Monitored insect diversity and parasitism levels in alfalfa seed production fields in western Canada

Danielle Clake described the landscape characteristics that influence bumble bee abundance and species richness in the Alberta Rocky Mountains.

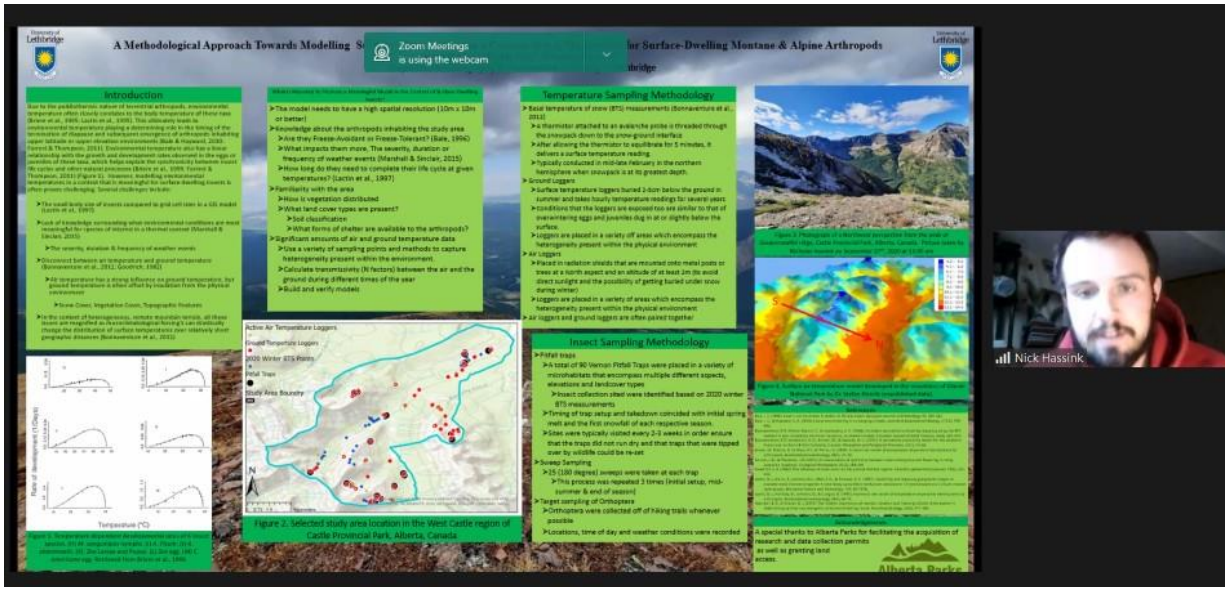
Sydney Worthy described her research into the effects of honey bees on native pollinators.



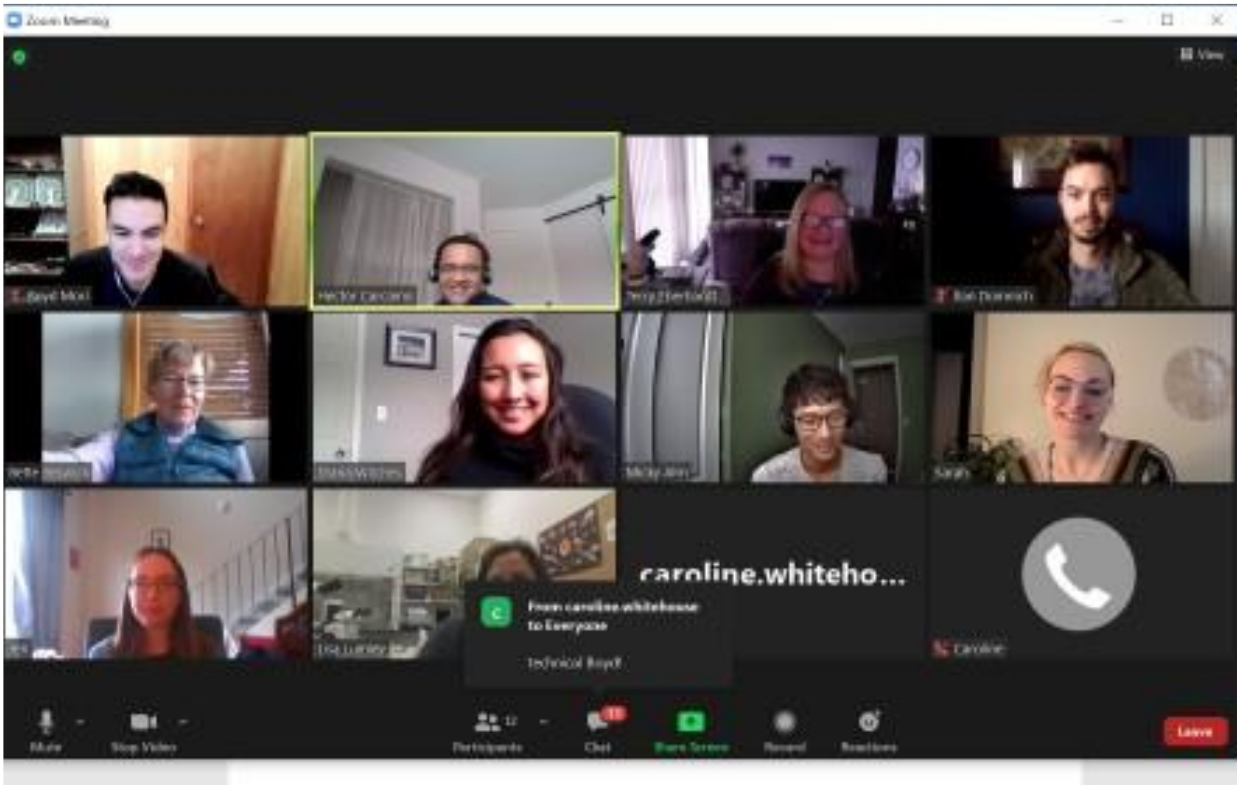
Maggie MacDonald reported on the diversity and dimorphism of *Pterostichus melanaius* (Ill.) in the Peace region.



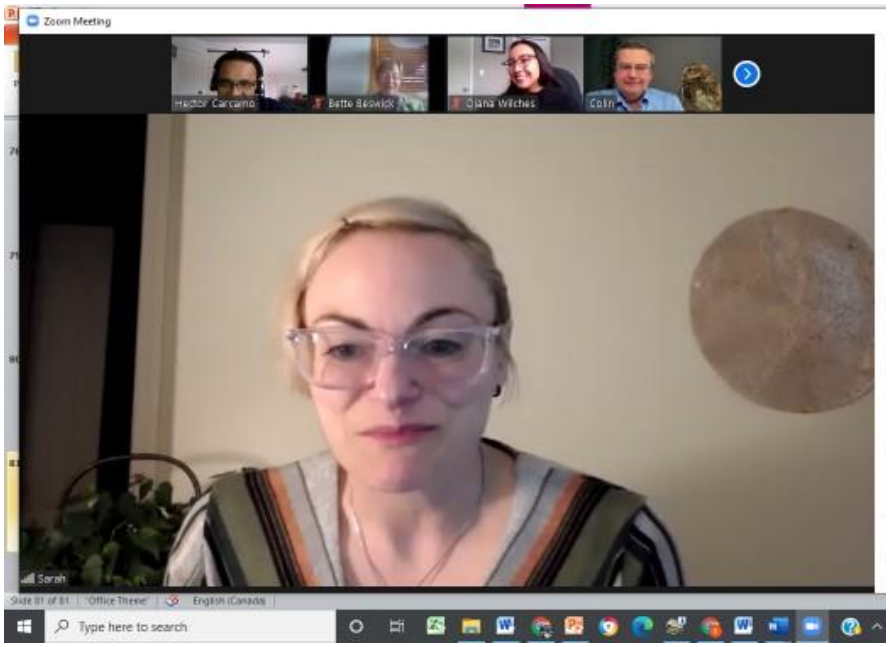
Brittany Wingert assessed species boundaries of crescent butterflies (Nymphalidae: *Phyciodes*) in Alberta using DNA and morphology.



Nick Hassink answered questions about his poster A Methodological Approach Towards Determining the Impact of Microclimatic Forcings on the Thermal Biology of Surface-Dwelling Montane & Alpine Arthropods



The fall ESA Board of Directors met by ZOOM. Boyd Mori, Hector Carcamo, Terry Eberhardt, Ilam Domnich, Bette Beswick, Diana Wilches, Micky Ahn, Sarah McPike, Jenn Klutch, Lisa Lumley and Caroline Whitehouse.



Sarah McPike, Past President, managed the AGM on behalf of Terry Eberhardt (President) who was unable to attend.

2020 Entomological Society of Alberta Membership List

Last Name	First Name	Institution	Location
Honourary Members			
Byers	Bob	Agriculture and Agri-Food Canada	Lethbridge, AB
Fry	Ken	Olds College	Olds, AB
Shemanchuk	Joseph		Lethbridge, AB
Regular Members			
Acorn	John	University of Alberta	Edmonton, AB
Batallas	Ronald	University of Alberta	Edmonton, AB
Benedict	Tobin	University of Calgary	Calgary, AB
Beswick	Bette		Calgary, AB
Briere	Charity		Red Deer, AB
Cárcamo	Héctor	Agriculture and Agri-Food Canada	Lethbridge, AB
Catton	Haley	Agriculture and Agri-Food Canada	Lethbridge, AB
Ciborowski	Jan	University of Calgary	Calgary, AB
Cuny	Robert	Lakeland College	Vermillion, AB
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	Department of Biological Sciences	Edmonton, AB
Flaherty	Leah	Grant MacEwan University	Edmonton, AB
Floate	Kevin	AAFC Research Centre	Lethbridge, AB
Friesen	Kevin	Grant MacEwan University	Edmonton, AB
Frost	Carol	University of Alberta	Edmonton, AB
Gabert	Keith	Canola Council	Innisfail, AB
Glasier	James		
Hunter	Andrew		Regular
Johnson	Dan	University of Lethbridge	Lethbridge, AB
Klutsch	Jennifer	University of Alberta	Edmonton, AB
Lakshmi	K. Vijaya	Jayashankar Telangana State Agricultural University	
Lemmen-Lechelt	Joelle		
Longair	Robert	University of Calgary	Calgary, AB
Lumley	Lisa	Royal Alberta Museum	Edmonton, AB
Mori	Boyd	University of Alberta	Edmonton, AB
Mousseau	Tonya	Mount Royal University	Calgary, AB
Proctor	Heather	Dept. of Biological Sciences	Edmonton, AB
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	Regular

Sperling	Felix	University of Alberta	Edmonton, AB
St Jean	Erin		Regular
Swann	John	University of Calgary	Calgary, AB
Whitehouse	Caroline	Alberta Agriculture and Forestry	Edmonton
Zantoko	Lubaki	Environment and Natural Resources , GNWT	
Retired Members			
Cartar	Ralph	University of Calgary	Calgary, 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
Antochi-Crihan	Georgiana	University of Alberta	Edmonton, AB
Backmeyer	Sydney	University of Lethbridge	Lethbridge, AB
Clake	Danielle	University of Calgary	Calgary, AB
Dimase	Marcelo	University of Alberta	Edmonton, AB
French	Rowan	University of Alberta	Edmonton, AB
Ibarra Galvis	Valentina	University of Lethbridge	Lethbridge, AB
Jegatheeswaran	Piratheepa	University of Lethbridge	Lethbridge, AB
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	Lethbridge, AB
Lortie	Max	University of Alberta	Edmonton, AB
MacDonald	Maggie	University of Alberta	Edmonton, AB
Mcpike	Sarah	University of Alberta	Edmonton, AB
Murphy	William	University of Calgary	Calgary, AB
Musso	Antonia	University of Alberta	Edmonton, AB
Oliver	Tom		Calgary, AB
Purvis	Emily	University of Calgary	Calgary, AB
Reid	Michelle	University of Alberta	Edmonton, AB
Rios Martinez	Aldo	University of Alberta	Edmonton, AB
Roy	Brendan	Lethbridge College	Lethbridge, AB
Scallion	Matthew	University of Alberta	Edmonton, AB
Shegelski	Victor	University of Alberta	Edmonton, AB
Sperling	Janet	University of Alberta	Edmonton, AB
Stormer	Hannah	University of Alberta	Edmonton, AB
Thompson	Benjamin	University of Alberta	Edmonton, 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	Edmonton, AB
Wright	Marnie	University of Alberta	Edmonton, AB

Library	Institution	Location
Archives, Entomological Society of Alberta	Agriculture and Agri-Food Canada	Lethbridge, AB
Athabasca University College Library	Athabasca University College	Athabasca, AB
Augustana University College	University of Alberta	Camrose, AB
Cameron Library	University of Alberta	Edmonton, AB
Concordia University College Library	Concordia University College	Edmonton, AB
Glenbow Alberta Institute	Glenbow Alberta Institute	Calgary, AB
Grande Prairie Regional College Library	Grande Prairie Regional College	Grande Prairie, AB
Lakeland College Library	Lakeland College	Vermillion, AB
Lethbridge Research Centre	Agriculture and Agri-Food Canada	Lethbridge, AB
Medicine Hat College Library	Medicine Hat College	Medicine Hat, AB
N.A.I.T. Library	Northern Alberta Institute of Technology	Edmonton, AB
National Library of Canada	National Library of Canada	Ottawa, ON
Northern Forestry Centre Library	Canadian Forest Service	Edmonton, AB
Olds College Library	Olds College	Olds, AB
Provincial Museum and Archives	Provincial Museum and Archives	Edmonton, AB
Red Deer College Library	Red Deer College	Red Deer, AB
S.A.I.T. Library	Southern Alberta Institute of Technology	Calgary, AB
E.H. Strickland Library	University of Alberta	Edmonton, AB
University of Calgary Library	University of Calgary	Calgary, AB
University of Lethbridge Library	University of Lethbridge	Lethbridge, AB