Natural Resources Canada | Ressources naturelles Canada

Issue 54, June 2025

e-Bulletin

The Great Lakes Forestry Centre (GLFC)

Comings and Goings

We welcome two new term employees to the Great Lakes Forestry Centre (GLFC).

Cristina Agatep – is working with the fire group as a Fire Science Analyst supporting research on forest fire danger rating. She recently moved to the Soo from Ottawa, previously working at Statistics Canada and the Bank of Canada. Cristina has been taking advantage of the heavy winter on her snowboard, and in the summer will be desperately trying to find people to hike and play spikeball with her.

Kevin Siu – is working with the fire group as a Fire Analyst Programmer supporting research and applications in forest fire danger rating. His academic background is in math and physics, which has allowed him to follow his curiosity into many different research fields. He has experience from his undergraduate degree working in a quantum computing physics lab, an icebreaker ship engineering team, and a glaciology research group. He is excited to learn more about forest fires and environmental science while helping to improve our understanding of fire danger.

Canada welcomes delegation from France to advance collaboration under the Declaration of Intent on Wildland Fires

Visit from French delegation provides opportunity for Canada to advance its wildfire management capabilities through international collaboration.

In November 2024, Canada welcomed a French delegation to advance collaboration under the Declaration of Intent on Wildland Fires, signed earlier in April 2024. The visit featured a three-day agenda at the GLFC from November 18-20, alongside additional visits to the Laurentian Forestry Centre (LFC) and le Société de protection des forêts contre le feu (SOPFEU), Quebec's fire agency.

The visit began at GLFC, with an overview of key areas of interest, including the upcoming WildFireSat mission, followed by presentations and networking opportunities that focused on ongoing wildfire research. Day two emphasized the Canadian Forest Fire Danger Rating System (CFFDRS), with detailed presentations on updates to the Fire Weather Index (FWI) and Fire Behavior Prediction (FBP) systems, as well as discussions on fire risk assessment. The final day included meetings with Ontario's Aviation, Forest Fire and Emergency Services (AFFES) where presentations on airtanker research, fire operations, and a tour of the hangar and flight simulator took place.

The delegation's engagement at GLFC and with Ontario's AFFES allowed Canadian researchers and fire managers to share insights on key innovations, while also receiving valuable feedback. Joint discussions provide Canada with opportunities to validate and adapt its methodologies by incorporating international perspectives, potentially making its tools more robust and applicable to diverse wildfire scenarios.

This visit holds significant benefits for Canada, particularly in advancing its wildfire management capabilities through collaboration with France. Canada gains access to international expertise, innovative approaches, and lessons learned from France's experiences in managing wildfires. This collaboration provides opportunities to refine Canada's wildfire prevention, detection, and response strategies, ensuring they remain at the forefront of global best practices.

This collaboration also fosters stronger ties between Canadian and French researchers, fire managers, and policymakers, creating a network for ongoing exchange of ideas, data, and innovations. Such partnerships can lead to co-developed technologies, shared resources for wildfire research, and improved training methodologies for fire response teams.

The visit positions Canada as a leader in international wildfire management collaboration, enhancing its global reputation and attracting further opportunities for partnerships and innovation in this critical area. Canada would therefore be better prepared to address the growing challenges posed by wildfires in an era of climate change, allowing it to safeguard its forests, ecosystems, and communities.

The Insect Production and Quarantine Laboratories

The Insect Production and Quarantine Laboratories (IPQL) looks to expand its client base.

The Insect Production and Quarantine Laboratories at GLFC are an essential component of the native and exotic forest entomology research carried out by Natural Resources Canada, Canadian Forest Service (see Frontline Express Bulletin 94). In addition to the large domestic zone where native forest pests are reared, such as the spruce budworm (*Choristoneura fumiferana*), IPQL also contains a PPC-2a quarantine facility which allows for rearing and conducting experiments on high- risk invasive species. Access to a quarantine facility has allowed researchers to gain knowledge on new and emerging invasive species to inform risk and management approaches in advance of their arrival in Canada.

To promote the availability of research insects worldwide, Misha Demidovich and Sarah Sims recently attended the Entomological Society of America conference in Phoenix, Arizona. They focused on promoting IPQL's products to academic and industrial clients, expanding the client base beyond internal researchers within the Canadian Forest Service. Insects that are currently available from IPQL include the Asian long-horned beetle (*Anoplophora glabripennis*), emerald ash borer (*Agrilus planipennis*), spruce budworm (*Choristoneura fumiferana*), western spruce budworm (Choristoneura occidentalis), and cabbage looper (*Trichoplusia ni*). Not only are insects for purchase, but also prepared diets, diet ingredients and diet cups are available.

For institutions involved in rearing multiple species, effective monitoring and communications requires standardized naming and nomenclature. Dr. Amanda Roe has established standardized naming conventions which are discussed in the article "Origins and History of Laboratory Insect Stocks in a Multispecies Insect Production Facility, With the Proposal of Standardized Nomenclature and Designation of Formal Standard Names". These standardized names help clients clearly document their insect sources and leads to better recognition of IPQL as a supplier of these research subjects while highlighting IPQL's impact on the wider research community.

For information sheets on products available or more details on IPQL contact Misha Demidovich or visit the IPQL website.

New capacity at GLFC to study the visual and chemical ecology of insects

Determining which chemicals insects are attracted to and what visual stimuli influence their behavior will lead to improved trap efficiency for target taxa.

A new lab has recently been established at GLFC where Dr. Quentin Guignard, under the supervision of Dr. Jeremy Allison, is studying the chemical and visual ecology of insects. Insects typically use olfactory and visual cues and signals to obtain information about their environment.

In the quarantine lab, an electroantennogram has been set up to measure the reaction of insect antennae to separate compounds (e.g., pheromones) by measuring minute changes in the electrical current that is passed through the antennae. If there is a change, it indicates that the insect can smell the compound. Compounds that elicit responses in the antennae are then identified and synthesized for use in traps if they are behaviorally active.

Similarly, an electroretinogram has also been set up that can transmit different wavelengths (colours) of light through the eye of an insect to see how they respond. Humans can distinguish all the colors of the rainbow, whereas insects, though they may struggle to differentiate them all, possess the ability to see in the ultraviolet spectrum. Insects tune their visible range and sensitivity to different parts of the spectrum. Understanding these differences among species can help us improve the selectivity of traps to control pest insects. In addition, most of the work on visual ecology has been done on pollinators and dragonflies, but very little is currently known about the visual ecology of forest insects.

In addition to physiological measurement, genes involved in olfaction and colour vision are studied. Soon, a behavioral platform (track sphere, flight tunnel) will also be set-up to test the effect of different visual and chemical stimuli on insect behavior. Ultimately, understanding the genetic, physiological and behavioural basis of colour vision and olfaction in insects will facilitate more predictive, reactive and efficient monitoring and surveillance programs for forest insects. This work also contributes to broader ecological and evolutionary studies, shedding light on the evolution of eyes and color vision in different species. Finally, this work fosters a greater appreciation of nature, highlighting the intricate ways insects interact with their environment.

Dr. Guignard is currently working on data for the Japanese beetle (Popillia japonica) and two biological control agents of the hemlock woolly adelgid (*Adelges tsugae*); *Laricobius nigrius*, a beetle that is being released in Nova Scotia, and *Leucotaraxis argenticollis* and *piniperda*, two flies being considered for release.

This will establish GLFC as a leader in a very narrow field of expertise. As well, the lab is the only one located in a quarantine facility in Canada which enables the study of invasive species. Future work will include species that are being reared by the Insect Production and Quarantine Laboratory, such as the Asian long horn beetle, spongy moth, and more forest insect pests.

For more information contact Quentin Guignard or Jeremy Allison.

Future research plans to support forest carbon policy in Canada

Key priorities for forest carbon research in the next decade identified in five essential research areas.

In GLFC e-Bulletin #52 an article was included on the "2023 Blueprint for Forest Carbon Science in Canada". This document is a recently updated, ten-year plan that was developed in a collaborative effort with the forest carbon science and policy community in Canada which identifies research priorities meant to guide Canadian forest carbon research over this decade. The Blueprint serves as a guide for the development of research supporting policies that continue to foster sustainable forest management, maintain and enhance collaborative carbon research in Canada.

A recently published article entitled "Future research plans to support forest carbon policy in Canada" outlines the key priorities, goals and visions for forest carbon research over the next decade in five essential research areas: a) understanding human impacts on forest carbon; b) exploring foundational forest carbon dynamics; c) assessing climate change mitigation strategies; d) promoting reconciliation and including Indigenous Knowledges(sic) in meaningful and authentic ways; and e) contextualizing carbon within the broad range of forest values.

As part of the construction of the updated forest carbon blueprint, the CFS worked with Dr. Jessica Ford, an Inuk originally from Qamani'tuaq (Baker Lake, NU) who now lives in southwestern Ontario. She reviewed online CFS forest carbon reports and met with a small forest carbon team from CFS. The consulting work completed by Dr. Ford was: "to offer an Indigenous perspective (one, as the author cannot speak on behalf of others) on how the CFS's work regarding Indigenous Voices and Forest Carbon Research can offer opportunities to include Indigenous voices and experiences, including the methodology and application of approaches to address reconciliation, Indigenous co-management, and incorporation of traditional knowledge in the area of forest carbon."

Key research area in the new Blueprint leads to Indigenous Knowledge Circles hosted at GLFC

Indigenous Knowledge circles were held at CFS to support one of the key research areas in the 2023 Blueprint for Forest Carbon Science.

In May 2023, following her review of online CFS forest carbon reports and meeting with a small forest carbon team from CFS, Dr. Jessica Ford provided recommendations that:

- CFS seek out a multitude of voices and representation of Indigenous Peoples from across Canada;
- To have authentic reconciliation with Indigenous Peoples, CFS needs to work towards Indigenous-led projects with reciprocity and OCAP (ownership, control, access, and possession) principles at the forefront;
- CFS include Indigenous Peoples in all aspects of the proposed projects utilizing Indigenous Methodologies.

In response to these recommendations, the CFS hosted two workshops (with a mix of virtual and in-person participants) at GLFC on November 12 and 26, 2024 with Dean Assinewe, RPF (Sagamok Anishnawbek) as the moderator. Isabell Souliere from the CFS coordinated the

discussion with online participants. Stephanie Seymour, Heather MacDonald, and Claudette Trudeau from GLFC and Carolyn Smith from Pacific Forestry Centre (PFC) helped organize the workshops.

There were nine workshop participants from Tribal industrial investment organizations, Tribal Councils, businesses, representatives from Indigenous Nations, and other organizations from Ontario, Quebec, and Saskatchewan, as well as nine CFS participants from the Indigenous Seed Collection Program, the Sistering Indigenous and Western Science Program (SINEWS), GLFC, and PFC.

Following an offering of tobacco at GLFC on November 12, 2024, Elder Dean Sayers, Former Ogama (Chief) of Batchewana First Nation provided the opening and closing prayers.

Participants were invited to reflect and provide guidance concerning the following questions:

> "How can understanding of forest carbon be expanded through Indigenous-led research that is centred on Indigenous voices and experiences and application of Indigenous Knowledge Systems?"
>
> and "What should be the next step(s)?"

A summary report is being drafted by CFS researchers, Dr. Ford and Dean Assinewe. In the spirit of authentic reconciliation with Indigenous Peoples, a provisional copy of the report was shared with workshop participants in early January 2025 to gather feedback. Together at the third workshop held on January 28, 2025, the key themes and recommendations from the group were presented. The goal was to develop consensus on forest carbon research themes, and/or applications of interest, and recommended next steps. The cover of the report is a piece of visual art by artist Misko Banaishe Kicknosway.

For further information contact Dr. Heather MacDonald or Claudette Trudeau.

Historical Review of White Spruce is published

The third and final Information Report from the series, based on the work of the late GLFC scientist, Dr. Roy Sutton, published.

This is the third and final Information Report from the series on white spruce that are based on the lifetime of work and passion of the late Dr. Roy F. Sutton from GLFC. The historical review brings together a vast amount of information about white spruce (Picea glauca) and it is also a testament to Dr. Sutton's long and dedicated efforts. The third and final report includes a comprehensive review of injurious influences or constraints on white spruce establishment and the silvicultural requirements for its successful growth by artificial or natural regeneration, tending and harvesting.

The three information reports are:

1) White Spruce: Taxonomy, Phylogeny, Biosystematics and Plant Geography. A Historical Review by Dr. Roy F. Sutton GLC-X-32;
2) White Spruce: Botany, Physiology / Nutrition, A Historical Review by Dr. Roy F. Sutton GLC-X-33; and
3) White Spruce: Injurious Influences and Silviculture, A Historical Review by Dr. Roy F. Sutton GLC-X-34

For further information contact Stan Phippen.

Research and Recolonization at Burnt Cape Ecological Reserve (BCER), in northwestern Newfoundland

Sue and Dr. Bill Meades have been keeping an eye on the Burnt Cape area for many years and were instrumental in the formation of the Burnt Cape Ecological Reserve (BCER).

Burnt Cape is located in the most arctic portion of Newfoundland at the tip of the Great Northern Peninsula. Rapid changes in temperature, frequent fog and strong winds are typical of this area. Cold temperatures, strong winds and a short growing season contribute to the unique flora. Winter winds and frost pruning prevents woody plants from growing above the snow cover.

Burnt Cape is composed of three layers of Ordovician limestone and is only 3.8 km long by 1.1 km wide. It is unique due to the high calcium carbonate content of its limestone bedrock compared to coastal limestones, which makes it very desirable for gravel quarrying. Most of the plants growing on gravel are calciphiles (limestone-loving) such as reddish sandwort (*Sabulina rubella*) and butterwort (*Pinguicula vulgaris*).

Sue and two friends first visited Burnt Cape in 1994 after hearing about some rare species there. They saw how much damage active quarrying was causing and, after finding several very rare species, decided they had to do something to stop it and started writing letters with community support in Sept 1994. They gave a presentation to government officials on the unique flora of the cape and by Dec 1994, the Wilderness and Ecological Reserves Committee had supported their suggestion that Burnt Cape be declared an Ecological Reserve.

Quarrying permits were shut down to halt further destruction, then an anonymous donation of $100,000 through the Nature Conservancy of Canada was given to the Newfoundland government to support rehabilitation efforts. With this support, the government declared Burnt Cape a provisional Ecological Reserve in 1997 and permanent Ecological Reserve status was granted in 2000.

A crew of seven local residents was hired to do the rehabilitation work and Sue oversaw the rehabilitation and documented the flora of the proposed reserve. During the summer of 1998, she developed a vegetation map of BCER, showing the location of rare plant communities and disturbed areas. Over 300 vascular plants were recorded from the 4 km^2 site.

In 2021, Sue was appointed to the Species Specialist Advisory Committee, which assesses the status of rare species. As BCER was the only location in Newfoundland where the dwarf hawksbeard (*Askellia pygmaea*) occurs, she wrote a status report which is needed to obtain official protection, on this species. Population counts are needed to assess the size and viability of a population and Sue and Bill conducted their first population count on the known *Askellia* population in 2022. This species was assessed as Threatened rather than Endangered as its location is protected within the BCER. The status report is now before the Minister of Environment and Climate Change in Newfoundland for signature.

Sue and Bill continue to track recolonization of the BCER by comparing older pictures of sites to their current condition.

For more information please contact Sue Meades.

Dwarf hawksbeard (*Askellia pygmaea*, formerly known as *Crepis nana*).