

Ecological Restoration

The Tree and Stand Simulator (TASS)

Adaptation Learning Network's Work on Climate Change

COLLEGE MATTERS

Volume 13 // Issue 2 // November 2021



The Climate Change Issue

We respect and acknowledge that the College's office and its registrants operate within the traditional territories of the Indigenous Peoples of BC.



COLLEGE OF
APPLIED BIOLOGY
Professional Accountability

Continuing Professional Development

Shona Lawson, M.Sc., RPBio
Registrar/Director of Compliance & Practice

The College's webinar on the new CPD tracking module from June 23 is now available for viewing here: <https://www.cab-bc.org/news/cpd-tracking-webinar-recording-now-available>. It covers the basics of the CPD program, including some common activities that can be claimed towards the CPD requirement. The webinar also provides a demonstration about how to record activities in the CPD tracking module in the registrant portal.

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ABOUT US

The College of Applied Biology is the regulator of applied biology professionals in British Columbia. Established by government legislation in 2003, the College protects the public interest by ensuring that applied biology professionals – Registered Professional Biologists (RPBios), Registered Biology Technologists (RBTEchs) and Applied Biology Technicians (ABTs) – meet rigorous standards of professional and ethical competency.

OUR VISION

Responsible resource management supported by accountable and trusted professionals.

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Cover image: Mount Assiniboine in foggy autumn morning at provincial park, BC, Canada, by Mumemories.

*Disclaimer: the opinions expressed in *College Matters* do not necessarily represent those of the College, its Council, or other registrants.



By Brian Clark, RPBio, President

Presidential Ponderings: What about Climate Change?

IN THE MID-NINETIES, myself and other government reps were reviewing a draft ski hill/resort proposal with the proponents and their consultants. Some of the larger issues identified were encroachment on mountain goat kidding areas, lack of suitable water supply, social impacts on the local community, economic feasibility—the usual stuff. Then, near the end of that initial meeting, a federal colleague asked, “What about climate change?” Silence filled the room. Finally, the proponent asked what his proposal had to do with climate change. My colleague offered that he was just pointing out that within the lifetime of the project, there might not be enough snow for a viable ski hill and there should be some contingencies to deal with that possibility. The meeting ended, the proponent complained to the higher ups, and a contingency for climate change was not included in the final design.

Fifteen years later, we were importing snow for the 2010 Olympics.

With the passing of the amendment to the Applied Biologists Regulation that enables reserved practice, there will be high expectations of the College and its registrants. As world-firsts, our actions will be judged by the public, governments, and

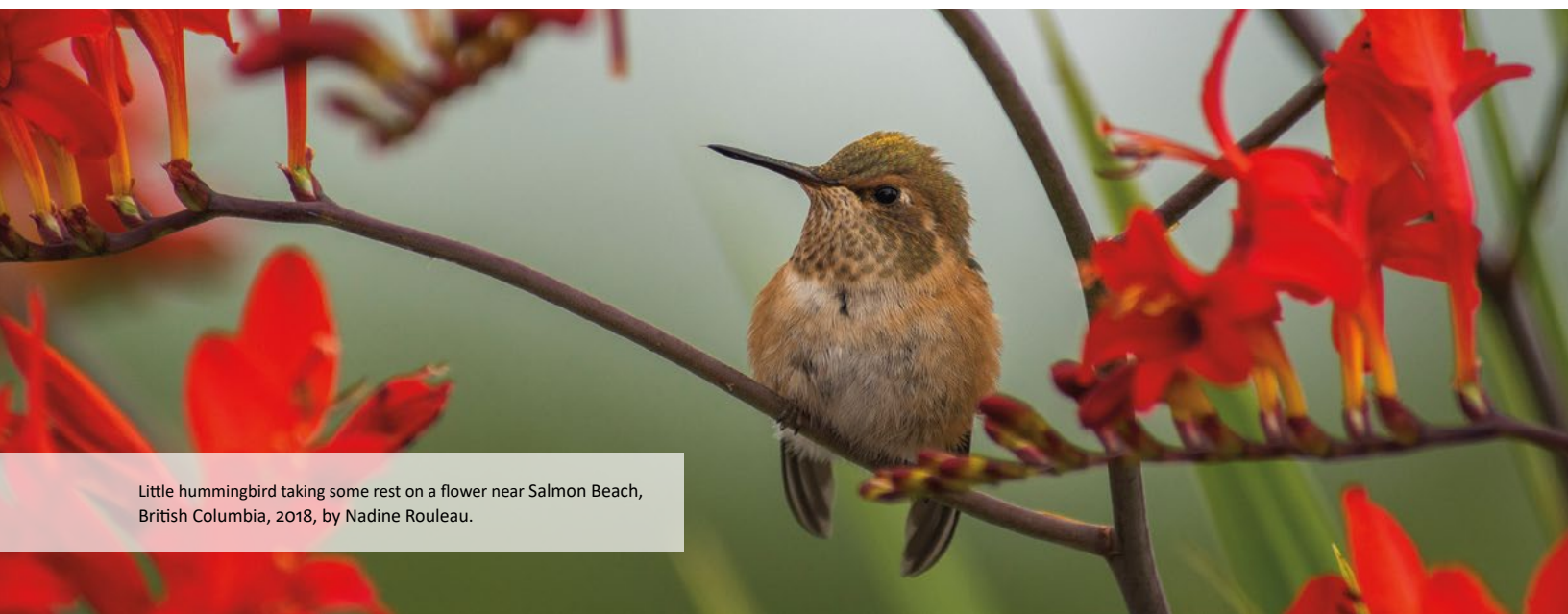
industry here and elsewhere. And, while we are bound by the Act, our Code of Ethics and Professional Conduct, standards and practices, project and contract scopes, let us not be limited by them, let us not “just do our job”.

Our Principles of Stewardship provide guidance on things outside the box of normal job descriptions and project scopes. While meeting the needs of your contract or employer, are

“As world-firsts, our actions will be judged by the public, governments, and industry here and elsewhere.”

there additional things you can suggest to minimize harm, identify reasonable alternatives, maintain resilient ecosystems and future options in the surrounding region? Before you sign off on something, have you offered options that might make a difference in this province—in this world!—30 years from now? Have you asked the question “What about...?” CM&E

Little hummingbird taking some rest on a flower near Salmon Beach, British Columbia, 2018, by Nadine Rouleau.





An Important Milestone in Protecting the Public Interest

By Chistine Houghton, Chief Executive Officer

“reserved practice” means a regulated practice for which the right to practice is reserved for registrants of a regulatory body (*Professional Governance Act*)

ENVIRONMENTAL LEGISLATION IN British Columbia does not have a long history. Arguably the first piece of environmental legislation was in 1911 when the *Park Act* was passed in the provincial legislature, establishing Strathcona as the first park or protected area in the province. In 1912, the provincial government followed with the *BC Forest Act*, which predominately dealt with the economics of forest management.

While there were amendments to these Acts, and other statutes enacted that touched on mitigating impacts of resource management, the focus was clearly on maximizing economic return, such as the *Mineral Act*, or minimizing economic losses, such as the *Drainage, Ditch and Dyke Act*. It wasn't until 1977 when the *Pesticide Control Act* was brought into effect that there was a statute that had as its primary purpose mitigating harm to the receiving environment.

Obviously there have been many pieces of legislation that have been introduced and passed since 1977 that cover a wide range of resource management activities, which have included measures that limited the impact of human activity on ecosystems. To be in compliance with those laws, employers—both private and public—found that they were requiring the services of professionals whose expertise was based on biological sciences (botany, zoology, ecology, biochemistry,

and microbiology) and related to aquatic or terrestrial ecosystems or the living organisms, habitats, or processes of those ecosystems. Those people are registered applied biology professionals.

In 2003, the government recognized the importance of those professionals by bringing in the *College of Applied Biology Act*—the first in the world—to give exclusive title rights to applied biology professionals. This was an important step—but it didn't go far enough. While many saw the value in employing professionals, and many provincial and municipal laws required the use of a registered professional, there were still significant gaps in the overall system that allowed unregistered practitioners to continue to make critical recommendations and decisions in resource management.

While individual practitioners may be qualified and highly ethical, there was no professional regulatory backstop to ensure the three basic tenets of professionalism to protect the public interest:

1. Academic and experiential standards that are verifiable and rigorous,
2. Ongoing continuing professional development regime that is subject to audits, and



The College of Applied Biology recognizes and respects that Indigenous traditional knowledge and professional applied biology are complementary practices in managing and protecting natural resources.



3. A fair and transparent investigations and discipline process that is based on the principles of administrative justice.


That gap has now been closed. The new ***reserved practice regulation***—once again the first in the world—now requires employing a registered applied biology professional for any activity that falls within that definition. The Province has recognized the profession of applied biology as full partner in resource management working alongside other regulated professionals.

To be clear, not all activities require a registered professional. We all have a role to play in ensuring that we manage our resources sustainably. There are also pathways for practitioners who may not yet be registered to do so with the College. The intent is not to prohibit qualified individuals from working in resource management—but to ensure that those individuals are not only qualified, they are also accountable.

And most importantly, the College unequivocally recognizes and respects Indigenous traditional knowledge and

professional applied biology as complementary practices in managing and protecting natural resources.

But without doubt, this is a significant step for the profession, for the Province, and crucially the public, whose interest we are here to protect. To get to this point, we have been working for the past three and a half years, consulting with registrants and other practitioners, reviewing and improving standards, processes and governance structures, and constructively engaging with our regulatory partners and the Office of the Superintendent of Professional Governance.

Finally, I would like to thank the volunteers and staff who have worked so long and hard to make this happen. Whether you were on Council, a committee, or task force, if you toiled away on the innumerable versions of regulations, bylaws, standards, and policies, or if you participated in our many in-person and online engagement sessions, this is your moment—and it's a big one. Celebrate! 

PROVINCE OF BRITISH COLUMBIA
ORDER OF THE LIEUTENANT GOVERNOR IN COUNCIL
Order in Council No. 517, Approved and Ordered
September 13, 2021

APPENDIX 3 to the Applied Biologists Regulation: https://www.bclaws.gov.bc.ca/civix/document/id/oic/oic_cur/0517_2021

- 1 ***Section 1 (1) of the Applied Biologists Regulation, BC Reg. 13/2021, is amended by adding the following definitions:***

“biology objective” means the restoration, retention or enhancement of, or the mitigation of impacts on, the receiving environment, and the living organisms, habitats or processes within ecosystems in relation to

- conservation,
- protection, or
- wild terrestrial or aquatic species management;

“impact” includes

- the harming or removal of living organisms, including by gathering, collecting, hunting or angling,
- the effect of a contaminant or other circumstances affecting the environment, including light or noise, or
- the damage or loss of a habitat;

“protective purposes” means the safety, health and welfare of the public, including the protection of the environment and the promotion of health and safety in the workplace.

- 2 ***The following section is added:***

Reserved practice

- 4 For the purposes of section 51 (1) (b) [reserved practice] of the Act, the practice of applied biology is a reserved practice that may only be carried out by or under the supervision of a registrant, if the practice relates to providing advice or another service for a biology objective that, having regard to the protective purposes, requires the experience or technical knowledge of a registered professional biologist or registered biology technologist.



The College Continues to Modernize

By Shona Lawson, MSc, RPBio, Registrar/Director of Compliance & Practice

WE ARE IN an exciting time for the College as we continue to modernize our mandatory requirements, while increasing the efficiency and effectiveness of our processes and programs. College Council, statutory committee members, and staff have spent the last few years working hard to modernize our processes and programs to align with the *Professional Governance Act* requirements, changes to the profession and technological advancements. These recent modernizations include digital seals, an online Continuing Professional Development (CPD) tracker, and streamlining and moving the Audit Program online.

In November 2020, College Council approved replacing physical seals with digital seals to all new Registered Professional Biologist (RPBio) and Registered Biology Technologist (RBTech) registrants. On August 16, 2021, digital seals became available for purchase for all RPBio and RBTech registrants at a cost of \$35 through their profile in the College's portal.

In January 2021, Council approved the deferral of the 2021 audit cycle from January until the fall, when both a CPD tracker and the Audit Program would be accessible online through the College's [database/portal](#) for auditees (registrants) and audit assessors (formerly auditors). Good news: the CPD tracker went live this spring. The College hosted a CPD webinar on how to access and use the tracker and published a frequently asked CPD questions document. Both are available on our website. If you attended or watched the webinar at a later date, you can claim one CPD hour under the CPD Informal Learning category. The Audit Program will go live in early October with the following modernizations approved by Council:

1. The audit process is now fully online. This means:
 - > The audit and CPD modules are now linked through the College's database;

- > An auditee (registrant) will answer all the audit questions and have access to their audit results online through their profile on the College's portal; and
 - > Audit assessors will conduct the audit review online including their assigned auditee's CPD record and answers to audit questions.
2. An annual audit target of 3%. This means 3% of eligible registrants will be audited each year.

“College Council, statutory committee members, and staff have spent the last few years working hard to modernize our processes and programs to align with the *Professional Governance Act* requirements, changes to the profession and technological advancements.”

3. There are now two levels of audits: Level I and Level II.
 - > A Level I audit is a review of an auditee's (registrant's) declared area(s) of practice, CV/ résumé, three years of CPD records, and answers to two compliance questions regarding legal requirements and obligations as a regulated professional with the College. The reviews are conducted by College Staff, appointed as assessors, who will provide a recommendation to the Audit and Practice Review Committee (APRC), who then, based upon the assessor's recommendation, will make a final determination of the audit outcome.

- > A Level II audit is a review of an auditee's (registrant's) declared area(s) of practice, CV/résumé, three years of CPD records, and answers to series of compliance questions regarding legal requirements and obligations as a College registrant and the seven professional practice competencies as outlined in the [Professional Practice Competencies and Competence Standard](#). Reviews are conducted by the College appointed volunteer audit assessors, who will provide a recommendation to the APRC, who will make a final determination of the audit outcome based upon the assessor's recommendation. The Level II audit is similar to the audit process the College has historically conducted.

as a regulated professional and be able to meet all the audit requirements.

- > All Biologist in Training (BIT), RBTech in Training/ Trainee RBTech, and ABT in Training/Trainee registrants will only be eligible for a Level I audit, providing an introduction to requirements as a regulated professional and the College's audit process.

This modernization journey will continue as we move forward and look to the future with the implementation of Reserved Practice (aka Practice Rights) and other initiatives such as limited licenses. [CM](#)

4. Eligibility:

- > All active registrants, RPBio, RBTech, and Applied Biology Technician (ABT), are eligible to be audited after being registered with the College for three years. This allows active registrants time to gain experience



What stays the same

Registrant seals:

RPBio and RBTech registrants can still purchase a physical seal through Beaver Stamp Works at an additional cost of \$37.75 plus shipping and taxes. The College verifies all physical seal requests by registrants with Beaver Stamp Works prior to the seals being issued.

Continuing Professional Development (CPD) Program:

All active and in training registrants are required to comply with the CPD Program, which is still mandatory for registrants to be able to comply with the Audit Program and process.


Audit Program:

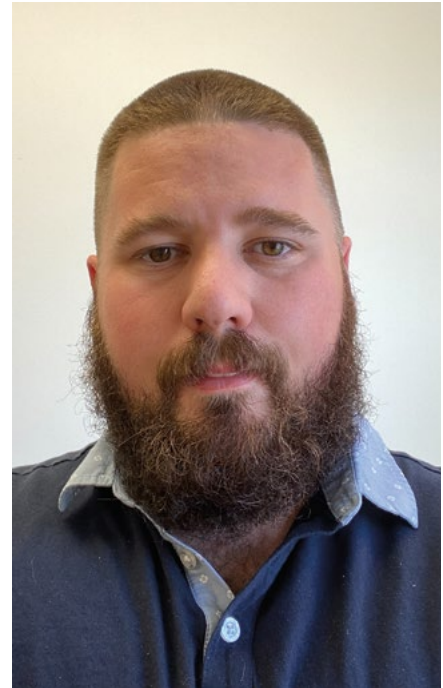
All active and in training registrants are eligible to be audited. It is still mandatory for registrants to comply with the Audit Program and process, and CPD records are still a requirement of the Audit Program.

Introducing New College Staff

Cam Dexter joined the staff at the College in 2021 as Manager, Registrations and Compliance. In his role with the College, Cam assists the Registrar in the processing and approval of certain applications and supports the complaints and investigations process. He is also the staff lead for the Registered Biology Technologist and Applied Biology Technician Scope of Practice Task Force.

Before beginning his time at the College, Cam worked in his capacity as a Registered Biology Technologist in environmental monitoring for major construction projects in intertidal, subtidal, and freshwater environments covering the forestry, oil and gas and general infrastructure sectors. His work took him up and down the west coast to localities such as Prince Rupert and Kitimat, the Sunshine Coast, Vancouver Island, and the Lower Mainland.

Cam was born in Terrace and hails from Port Alberni, completing his schooling at Vancouver Island University. He has recently moved back to Victoria. When he's not walking his two pit bull crosses or looking after his nephews, Cam can be found behind the shutter; his passion for wildlife photography means that he often spends his time launching drones, snorkeling with underwater camera housing, or simply wandering in nature with his Sony α7 III camera. While the inability to travel has limited his photography somewhat, he looks forward to the day when he can visit tropical locations again, camera in hand. 



Have a favourite field photo? We're seeking cover shots for *College Matters*.

We'd like to display our registrants' talents by featuring their photos or artwork in future editions of *College Matters*. Contributors will be attributed and should be prepared to grant both copyright and moral rights to the College for the use of the submissions, in the event that editing is required. Please submit your images in as high a resolution as possible (ideally at least 2 MB file size and 300 ppi) to admin@cab-bc.org.

One Year of the Online Application Process

By College Staff

For just over a year now, the College's registration application process has been online. Applicants have been able to complete all the required steps for registration including references through the online application portal. The College has been very pleased with the performance of the portal, which was overseen and implemented by Derek Marcoux, the former Registrar. The online portal has many benefits to the application process: it is fair and transparent, provides increased effectiveness and delivers efficiencies, all which support protecting the public interest.

“The biggest benefit of the online application portal is the efficiency in how applications are processed.”

Benefits

The biggest benefit of the online application portal is the efficiency in how applications are processed. Having all applicant documents available to reviewers digitally in one easy-to-access place—as well as having an automated notification system—allows the process to be more efficient and effective and it allows College staff and volunteer credential assessors to better manage their time. Since fully migrating the application process to the online portal, we have noticed this system is smoother and easier for applicants to use, with the same stringent level of review and high entrance standards. In addition, the online application has helped streamline the information the College is looking for from references to support an applicant. The online portal also enables College staff to better track trends in applications and registrations and helps facilitate improvements. Tracking certain trends from the data produced through the online portal will

allow the College to focus on any areas of improvement such as outreach for registrant categories and their associated requirements.

Fair and transparent

With applications being done through the online portal, it is easier for credential assessors to evaluate applications against the credentialing requirements. Furthermore, applicants can visually track, in real time, the status of their application from the moment they submit it to being registered, each step of the way. The online application process is very direct and limits the necessity to assess based on subjective material as all material entered is directly related to the credentialing requirements. This process helps applicants be clearer on what to enter and discuss in their application. In addition, once an individual is registered in a new category through the portal, such as a new registrant or when going on leave, the College's register is automatically updated to reflect the changes to the individual's registration status.

Future improvements

As with any customized software platform, there is the ability to continually evolve and improve the usability and stay up to date with any modernizations or requirement changes. College staff work in the online portal on a day-to-day basis and are always looking at ways to improve the efficiency and effectiveness of the portal. This approach resulted in the recent improvements to the database which now allow registrants to track their CPD within the portal and allow the audit process to occur online. [CM](#)



COLLEGE MATTERS



The **Clim**ate **Change** Issue

FEATURE ARTICLES

Article notes & references are on page 22

How does the Tree and Stand Simulator (TASS) Consider Climate Change?

By Jeff Stone, PhD, RPF, RPBio
Stand Development Modelling Research Scientist, Ministry of Forests, Lands,
Natural Resource Operations and Rural Development (MFLNRORD)

CLIMATE CHANGE AND its implications are increasingly part of our management considerations, even if it is only a recognition of future uncertainty. Given the complexity around climate change, we look towards tools and models to help us understand the current and future implications.

A year ago, I returned to the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) team that maintains and develops the forest growth and yield (GY) model commonly called the Tree and Stand Simulator (TASS). As TASS is the model underlying¹ most managed (post-harvest) stand yield projections used in BC for strategic decisions, I have often been asked how TASS considers climate change. Like many questions we receive as professionals, we need to explore first what is behind the question, and secondly, provide sufficient background to help questioners understand our response.

Questioners have different perspectives on what is changing in climate change. For some, the interest is climate attributes, for example, temperature and precipitation, whereas for others, it is in factors resulting from climate changes, such as drought, insects, pathogens, fire, or species migration. Similarly, questioners have varying knowledge of and expectations about how GY models, and models in general, are used. Therefore, the response to how TASS considers climate change may differ depending on who asks.

TASS was envisioned (see text box) not just to address timber yield projections, but to aid in the understanding of stand development and the implications of stand-level treatments and disturbances. Consequently, TASS was developed as a process model based upon “growing” individual trees whose crowns compete spatially. This explicit spatial consideration differs from most other individual tree models and enables exploring more complex stand dynamics. To address different needs, TASS traditionally has been an “in-house” model² where

Dr. Ken Mitchell, in his 1975 Forest Science Monograph 17³ describing TASS, stated:

“This approach was chosen as the most promising means of predicting yield because it mimics the actual system with greater detail and fidelity than other methods. The concern for detail, and models that can cope with it, is founded on the belief that second-growth forests will respond profitably to initial spacing, thinning, genetic selection, fertilization, and other treatments, and that damage by insects, diseases, animal, weather, and fire will be of mounting concern as the consumption of wood approaches the productive capacity of forests on a national scale. Consequently, the ability to incorporate the impacts of these factors into decisions will be of utmost importance to society and will almost certainly be guided by sophisticated models.”

a user would work with the TASS team to address their needs, which may include modifying TASS. As such, the applicability of TASS is broader than simply the currently available options.

TASS conceptually has many possible linkages (e.g., site index, mortality) to climate change attributes and resulting factors (e.g., insects) where these landscape-level changes can be scaled to or applied at a stand-level. For example, changing TASS's site index input is operationally possible and may be useful for investigating landscape-level changes in site productivity (e.g., climate change impacts to biogeoclimatic subzones). However, for another user looking at the development of a specific stand, simply changing site index input might be insufficient as the underlying height-age function (site index curves) remains static.

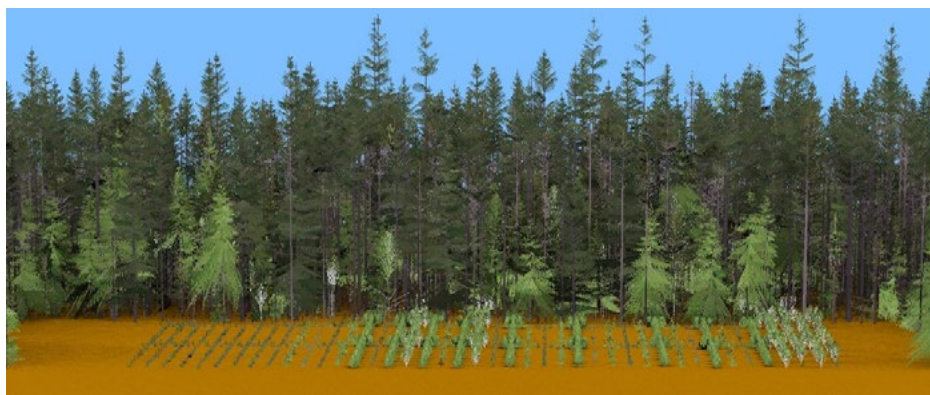
FLNRORD researchers Greg O'Neill and Gord Nigh⁴ took a more complex look at linking climate attributes to height-age functions within TASS by developing a height transfer function for lodgepole pine derived from the Illingworth provenance study (i.e., 140 tree provenances planted at 62 sites measured over 3 decades). For the researchers, this tool was useful for understanding, but they also identified limitations to general application. To address one limitation, University of British Columbia (UBC) graduate student Kate Peterson, in conjunction with the Canadian Forest Service (CFS) and FLNRORD researchers, is investigating complementary survivability transfer functions to include in TASS.

TASS's model structure is highly compatible for including a forest health disturbance event as demonstrated by past

work on several forest health (FH) issues (e.g., spruce weevil, stem gall rust). Such work typically has involved significant collaboration among the TASS team and forest health researchers to shape existing data and knowledge into a model useful for understanding. However, further research and collaboration are needed for developing existing and new modules for FH agents to incorporate both single-agent impacts and interactions with other FH agents and forest stand health.

The need for climate-sensitive growth and yield models is not unique to BC. This year, the CFS interviewed and led sessions with provincial modeling teams about how they were addressing climate sensitivity in GY models and if there was a need for a coordinated effort to address this issue. A draft summary report by Margaret Penner identified that across Canada there is high interest for climate-sensitive GY models, but no jurisdiction yet has an operational climate-sensitive model. Given the many different GY models, model structures, and model objectives, it is unlikely that there is a single solution to addressing all the needs for climate-sensitive GY models.

The bottom-line answer to how TASS considers climate change depends on who is asking the question and for what purpose. For many, TASS will not be useful as it is not a push-the-button tool for climate change but, for others, with the help of the TASS team, TASS might be a valuable tool for understanding stand development implications related to some attributes of climate change. [CM](#)



Models such as TASS can aid in the understanding of stand development expectations. The silviculture trial at Burton Creek (MFLNRORD Experimental Project 1191), modelled by TASS, provided researchers growth performance, considering not just the species but also gradient of light duration related to spatial design of a north-south clear cut within a mature tree plot buffer.

Ecological Restoration as a Solution to Climate Change

By David Polster, MSc, RPBio, CERP

ECOLOGICAL RESTORATION IS the process of assisting the recovery of an ecosystem that has been damaged, degraded, or destroyed (SER 2004). This definition suggests that the best we can do in terms of restoring sites is to “assist” what nature is doing in any case. Therefore, the most effective way to restore disturbed sites is to look at how natural systems are trying to restore the site. When we look at naturally disturbed sites such as the Hope Slide or the Frank Slide, what is seen is that the initial vegetation is composed of pioneering species, such as balsam poplar, willows, alder, and others. The photographs below show the pioneering species colonizing the bare rock on these two slides. These species create conditions that foster the growth of later successional species, such as Douglas fir, spruce, and others. A study conducted at the Quinsam Coal Mine found that the later successional conifers grew better with a cover of pioneering species (Polster and Dubois 2007), in this case, red alder (*Alnus rubra* Bong.).



Pioneering species colonizing the bare rock on the Hope Slide and the Frank Slide.

The pioneering species that start the process of recovery have evolved to create conditions for the later successional species. This process has been going on for millions of years and, by looking at the species and processes that occur on these sites, one can use the same species and duplicate benefits from these same processes. The pioneering species grow

quickly and sequester huge amounts of carbon thus can help prevent climate change. When one works to restore the many disturbed sites around BC with these same pioneering species, one can contribute to the health of our province as well as the climate of our world.

How do the pioneering species build soils on sites with no soil? All of these pioneering species are deciduous, so they lose their leaves every fall. The leaves fall into the crevices between the rocks and start the process of building soils. This is a very slow process, but over many years, soils are built up by the pioneering species that then will support later successional conifers. The conifers

create conditions where soil profiles are developed, including building soil profiles where the acidic leaf litter from the conifers causes a leaching of organic matter down into the soil profile. The colours of a podzolic soil come from the leaching caused by the acids associated with the conifer needles. All of these things work together to create conditions that are resilient to climate change. Keeping our forests in good shape will help us defend against climate change.

The world needs effective restoration of damaged sites. If one thinks of all the mines in BC that have been treated with a few agronomic grasses and legumes while the compacted dump surfaces and slopes remain in place, there is much work to be done. Effective restoration of these sites could return productive habitats for the animals that had called these sites home. Re-

sloping waste rock dumps and making the surfaces rough and loose creates conditions that promote recovery of these sites (see photographs below). Notice how there is a diversity of moisture conditions on the rough and loose site. Creating these conditions allows the natural processes to restore the sites so we soon get willows and other pioneering species moving in. These species then start the successional process that ends up with the site being vegetated by a later successional conifer forest. Effective restoration can help to address climate change. [CM](#)



“Re-sloping waste rock dumps and making the surfaces rough and loose creates conditions that promote recovery of these sites.”

Q&A with David Polster

By Raychl Lukie, RPBio, Editorial Board Co-Chair

David Polster is recently retired but has been working in the field of ecological restoration for approximately 44 years. He has been involved in a variety of ecosystem restoration projects, ranging from dams to mines, to oil and gas sites. David has actively worked in projects located throughout Canada and in the northwestern United States. He has also participated in Society for Ecological Restoration (SER) conferences all over the world, including places such as South Africa, where he has presented papers, given talks, and delivered courses.

Q When did you first start to actively consider climate change in ecosystem restoration planning? Why do you think climate change is an important consideration? How has climate change affected this area of practice?

A Climate change is a relatively recent occurrence, but it probably started to influence the way I looked at sites about ten years ago or so. However, I have always looked at how natural conditions restore sites.

As an example, in the case of selecting suitable species to promote ecological restoration I would plant alder over cedar. Alder is a pioneering species and cedar is a late successional species. In these types of situations, you are being influenced by climate change, in that you need to consider which species would be most suitable, but it is not really changing the way in which you are looking at the situation. One of the things I have noticed in recent years is that cedar trees are starting to suffer in response to our changing climate. Therefore, I would not plant

cedar on a site because if you want it to grow up to be an old tree, it is not going to make it.

In terms of some techniques, I have played around with considering climate change influences on ecological restoration—mainly on ocean shoreline restoration. You have dune rye grass (*Elymus mollis*), growing in with the logs, and it creates a buffer for the ocean. If you use this technique in somewhat of a stacked way so that it builds up over the years, you can create a condition that is resilient to climate change for many years.

Climate change is one of many important considerations in my work as a restoration ecologist. Other important considerations include things like steep slopes. I restored the cliffs at the University of British Columbia (UBC) many years ago using a technique called soil bioengineering. This technique uses pioneering species—willows in this case—to start a successional process. Now those cliffs, which have 70-degree slopes, have conifers growing on them. In the absence of considering climate change influences in ecological restoration projects, you would have a failure. The ability to look at a site and see how it's going to evolve as an ecosystem allows you then to assist with that recovery, which is the definition of ecological restoration: the process of assisting the recovery.

Pioneering species such as balsam poplar, which grows all over North America and is found in all sorts of different ecosystems and in wide-ranging conditions, is a tree that is able to accommodate climate change. Therefore, you use those pioneering species that have broad ecological tolerances to start the process of recovery. This can be extended to any other pioneering species such as willows, which grow all over BC. Again, it is looking at the whole process of recovery, and so you start at the beginning of that process with the pioneering species.

Climate change has led to different ways of looking at ecological restoration. If you start with pioneering species that have a wider ecological tolerance, you can use those species in addressing the climate change problem. We must get rid of fossil fuels and other things too, but that is a whole different matter.

Q **What do you consider, and how, when anticipating the potential influence of climate change on ecosystem restoration projects? Can you offer a specific example of an ecosystem restoration project you were involved in that would have failed had you not actively considered climate change in this project?**

A I restored the Heber Dam Site years ago. This site is up by Campbell River. In this case, BC Hydro took out the wooden dam and penstock, and we restored the site. One of the things that I looked at was how the natural successional processes created conditions that allowed the forest in the area to re-develop. In this case, it was red alder that was the pioneering species, and so I did not actually plant anything. What I did was I created a condition that allowed the alder to move into the disturbed sites naturally: I made it rough and loose and scattered woody debris. Within five years, this site was covered in vegetation; we had a site that was totally restored. We had five different conifer species coming up underneath and the alder providing the cover crop for the conifers. Everything worked! We had over 80 different species growing there as a result of our restoration efforts. We made the site rough and loose and

“The ability to look at a site and see how it's going to evolve as an ecosystem allows you then to assist with that recovery, which is the definition of ecological restoration: the process of assisting the recovery.”

scattered woody debris, which provided perching sites for birds that expel the seeds of a variety of species including shrubs like thimbleberry, elderberry, and other species that they had been eating. Natural regeneration processes took over.

One of the ways of looking at ecological restoration sites and determining how to restore them, whether you are considering climate change implications or not, is considering what the naturally occurring species are for a given site. In the Heber Dam case, red alder was all around the site because it naturally occurred there, so we created conditions that would promote alder succession. I think pioneering species can deal with a lot of the issues of climate change because they sequester carbon in big ways as well as provide other benefits. You need to look at the natural processes that are working to restore a site and try to assist those natural processes.

I have seen a lot of cases where late successional conifers have been planted on sites and they have just failed. If you think about the natural processes and how the recovery would naturally happen, then you can avoid those problems.

Q How can we target ecosystem restoration to bolster climate mitigation and promote biodiversity?

Use pioneering species. Think of all the sites in BC that are so poorly restored that you could plant and establish pioneering species on quite easily, and away you go. We have a lot of sites around BC that have not been restored effectively that need to be restored—this is a huge opportunity. We could do that quite effectively, but we would require a program that championed restoration. This includes any sites where you have massive disturbances (e.g., mine sites). Go up to the Northeast Coal Block and have a look: it's all poorly restored. You have a boreal forest and then suddenly you have a site that's got grasses and legumes, if that. One of the first things I realized in my studies of ecological restoration is that the seeding of grasses and legumes prevented the recovery of sites. That's why you have weedy species along highways, under powerlines, etc.

Pioneering species can sequester lots of carbon—you just have to do it. Balsam poplar, willow, red alder are all good pioneering species, but there is a variety of early successional species that establish naturally as things go along (e.g., maples). You just need to create conditions that can allow early successional species to establish.

Looking at how natural systems are working to restore a site can provide lots of information for restoration.

Q What other tools and approaches can be used in conjunction with, and be complementary to, ecosystem

restoration planning and further promote ecological resilience in the face of climate change?

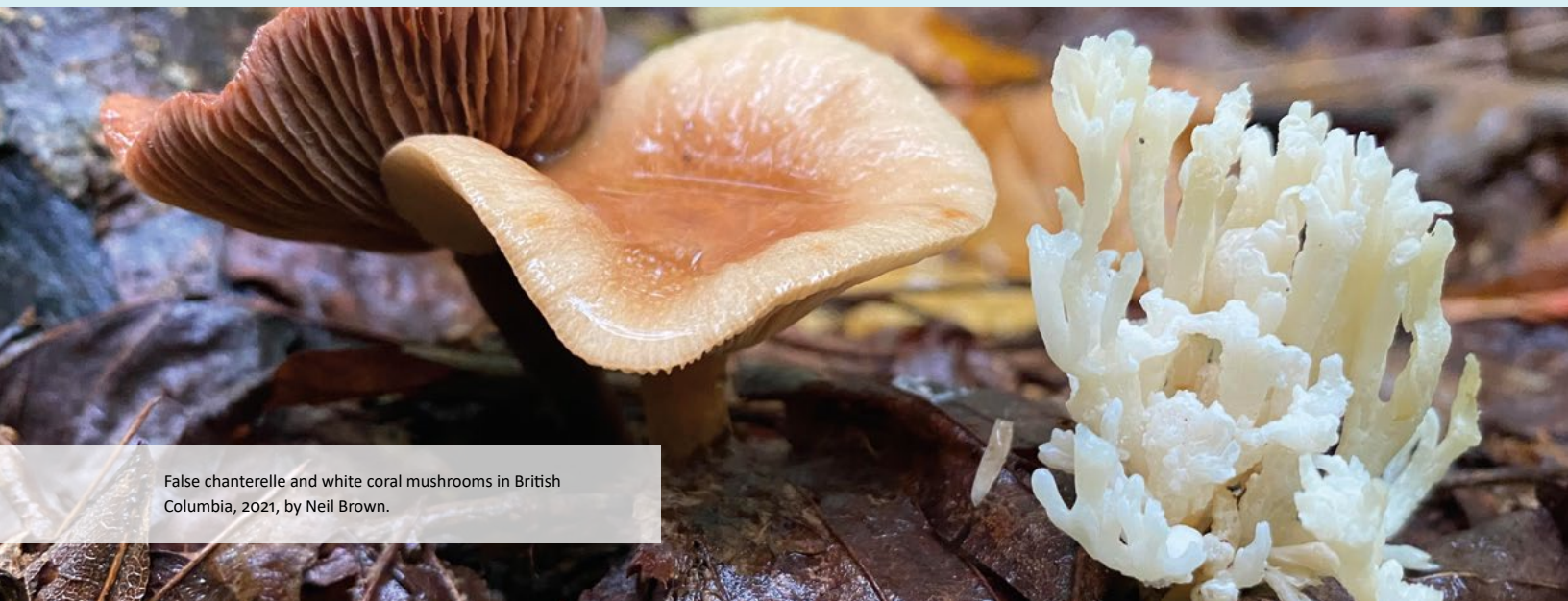
A I've had a lot of fun with soil bioengineering using pioneering species, willows primarily, to start the process of recovery. For example, where you have a problem with excess moisture on a slope, you can use a biological technique called live pole drains to actually drain the site and allow the pioneering species to start up and create conditions that recover the site.

You can often create conditions that foster wildlife use of an area and bring in the fruiting bodies of plants to promote recovery. When I did the Heber Dam site, we had woody debris that then brought in the birds that then expelled the seeds (e.g., thimbleberries); we were using wildlife to actually assist with the restoration. We created the conditions to allow this to happen.

Ecosystems are very complex and so predicting the recovery trajectory of an ecosystem is difficult at the best of times, but if you create conditions to allow for a diversity of recovery trajectories, then you can create a diversity of species that would occur in those situations.

Q Do you think project costs are a significant barrier to successfully implementing an ecological restoration project?

A No, ecological restoration projects, generally speaking, can be done fairly cheaply. If you have angle of repose waste rock dumps, you just need to reslope them, and so that costs money, but some of those big mine sites are doing quite well and can afford the costs of proper restoration practices. What is in it for them is creating a better world for future generations. CMF



False chanterelle and white coral mushrooms in British Columbia, 2021, by Neil Brown.

Adapting to Climate Change

By Adaptation Learning Network Staff

PERHAPS THE SUMMER of 2021, with its deadly heat domes, wildfires, and floods, has been a turning point in awareness of, and readiness to address, escalating climate risks. The August 2021 release of the [Sixth Assessment Report of the United Nations' Intergovernmental Panel on Climate Change](#)¹ summarizes what many already know about the criticality of the issues. Underneath the headlines are issues well-known to biologists, such as the ongoing massive losses of biodiversity. Meanwhile, professionals working with Indigenous governments and communities have shared the grief of what we have learned through the gravesites at residential schools, which has sharpened our collective responsibility to continually improve approaches for building reciprocal relationships with Indigenous communities as we address climate change impacts. The summer of 2021 heightened awareness of the fact that climate change is already upon us, and the impacts are being felt across the country. Unsurprisingly, climate change emerged as an issue in the fall election with a focus by all parties on the need for increasing the pace and scope of greenhouse gas emissions reductions. Despite these promises, however, there was little discussion by any of the parties of how they would address the climate change impacts already *baked* into the climate system and the urgent need to integrate climate adaptation, disaster risk reduction, and emergency management into our collective practices.

Summer 2021 has not been an idle day at the beach, but instead has been a perfect storm of critical issues, with an unquestionable need for professionals who have the capabilities to deal with these challenges and lead a culture of adaptation for a warming world.

Understanding and integrating into practice climate adaptation competencies is an important element of climate action. It demands a systemic approach to identifying and incorporating climate adaptation awareness and skills within professional associations, organizations, and consulting

firms and how continuing professional development and participation in interdisciplinary networks can support that work. Building the climate adaptation capacity of working professionals also requires refreshed curricula in public post-secondary institutions to prepare engineers, planners, architects, biologists, and others entering the field to integrate climate considerations into practice. It further demands that governmental organizations implement new regulations and standards that require professional upskilling.

Adaptation is not an accomplishment but a process, a part of a path of change and response (Wise et al. 2014). Adapting well to a constantly changing environment requires continuous

“Adapting well to a constantly changing environment requires continuous learning and improvement of processes through collaboration and knowledge-sharing.”

learning and improvement of processes through collaboration and knowledge-sharing. Most experts state that professionals' competencies related to decision-making in the space of uncertainty and the implementation of adaptation measures still lag far behind where society needs to be. Kristie L. Ebi, a professor of public health at the University of Washington, describes the complexity of such competencies. Ebi has been conducting research and practice on the health risks of climate variability and change for the past 25 years and she comments that when it comes to climate impacts, “you’re not just adapting to one thing at a time, you’re adapting to everything shifting at once” (2018).

The Adaptation Learning Network

In support of mainstreaming climate adaptation practices and competencies, the [Adaptation Learning Network \(ALN\)](#), an initiative led by Dr. Robin Cox at the [ResilienceByDesign Lab](#) at Royal Roads University (RRU), is very busy with capacity-building around these issues. This work is funded by the [Natural Resources Canada Building Regional Adaptation Capacity and Expertise \(BRACE\) program](#) and the [BC Ministry of Environment and Climate Change Strategy](#). The project focuses on building adaptation capacities and competencies with working professionals in British Columbia (BC) through professional development course work and the use of a new [Climate Adaptation Competency Framework \(CACF\)](#). Regulatory bodies such as the College of Applied Biology, professional associations from the natural resource sectors, municipal planning, and engineering have partnered with the ResilienceByDesign Lab to provide advice to the ALN

project helping to inform and support the initiative’s climate adaptation actions, which include:

- > Development of [11 continuing professional development courses on climate adaptation topics](#) now offered to working professionals through five BC post-secondary institutions (University of British Columbia, Simon Fraser University, University of Victoria, Vancouver Island University, and Royal Roads University);
- > Development and testing of the Climate Adaptation Competency Framework (CACF) to determine how best to identify and address organizational competency gaps vis-à-vis climate adaptation domains of knowledge;
- > Development of a national strategy for awarding recognition (credentialling) of climate adaptation skills and competencies through micro-credentials;



- > Contributions to climate adaptation information sharing and knowledge mobilization through the operations of a *knowledge network*, including the creation of a series of podcasts and webinars, all communicated through a monthly newsletter and social media channels.

The Climate Adaptation Competency Framework

The CACF was developed over a two-year period and involved consultation with worldwide climate adaptation experts. It was launched in early 2021 and provides a defined set of competencies to ensure that individuals and teams have the necessary expertise and abilities to perform climate adaptation functions that contribute to climate action. The CACF includes five categories that group relevant and related competencies. These are (1) Science & Practice Literacy; (2) Leadership; (3) Working Together; (4) Understanding the Challenge; and (5) Planning and Implementation. Each

- > What is the preferred approach/instrument to identify climate adaptation skills gaps in a particular organization? (e.g., survey? a talent management platform? other?)
- > Does the CACF effectively identify climate adaptation skills gaps for individuals? for organizations? or both?
- > What recommendations can help organizations address their climate adaptation skills gaps and improve and expand their services?
- > How can the CACF help those hiring and those applying for jobs and contracts to understand what skills, behaviours, and attitudes are needed to effectively perform climate adaptation work?
- > Does the CACF provide value to instructional designers as a framework to effectively develop learning outcomes for courses focused on climate-related issues, hazards, and solutions?

“ The complexity of climate change adaptation demands a whole gamut of knowledge, skills, and abilities (i.e., competencies)—both technical and non-technical. It involves building individual and organizational capability to address the perfect storm of climate action issues across sectors and shared community interests. ”

of these categories includes specific competencies and observable behaviors.

The ALN team is testing the efficacy of this framework with environmental consulting firms to contribute to approaches for mainstreaming climate adaptation know-how in this interdisciplinary professional field. ALN welcomes opportunities to work with organizations to identify climate adaptation competencies, skills gaps, and upskilling recommendations.

The CACF can be used as a skills-assessment instrument in organizations and as a framework for developing learning outcomes in courses. Here are sample evaluations to consider:

The complexity of climate change adaptation demands a whole gamut of knowledge, skills, and abilities (i.e., competencies)—both technical and non-technical. It involves building individual and organizational capability to address the perfect storm of climate action issues across sectors and shared community interests. ALN invites continued interest and participation from the community of the College of Applied Biology to help facilitate the recruiting, selection, assessment, workforce planning, and succession management for climate adaptation-related roles in both public sector organizations (e.g., municipal and regional governments) and private sector organizations and consulting firms. [CM](#)

Life as an Applied Biology Professional

By Cam Dexter, RBTech, Manager, Registrations and Compliance

Work I have done as an RBTech

As a Registered Biology Technologist (RBTech), I have been involved in a wide range of projects. Prior to working at the College, my work was primarily focused on environmental monitoring and habitat compensation. My environmental monitoring work was primarily focused on marine and freshwater ecosystems on and around oil and gas, forestry, and large infrastructure projects. The habitat compensation aspect of my career has focused majorly on intertidal and the upper subtidal zones of the marine environment, including planning, implementation, monitoring and reporting of sedge bench construction and planting, eelgrass planting, rock reef habitat creation, as well as intertidal channel creation.

During this work, I took pride in implementing digital data collection methods, as well as utilizing new technology to capture imagery for data analysis.

Benefits I have had of being an RBTech

One of the largest benefits I realized after gaining my RBTech designation was the ability to work on projects that required a Qualified Environmental Professional (QEP). Having this

designation opened a lot of opportunities and communicated the level of professionalism to clients and prospective clients. I feel as though holding this designation is a good way to express my education and experience in a concise manner.

Why I see the RBTech designation growing in popularity

With the implementation of reserved practice through the Professional Governance Act, I see a growing demand for registrants of the College in the RBTech category. To go hand in hand with reserved practice, the College is developing a scope of practice for RBTechs and Applied Biology Technicians (ABTs). This scope of practice will provide a clear picture of the ability and range of these registrant categories. I believe that providing this clarity will increase employers' comfort in hiring and giving more responsibility to individuals in these categories.

Finally, a big component in growing these registrant categories is individuals advocating just how competent they are at their jobs and showcasing to future registrants the abilities and prospects of the designations. 

Call for Contributions

We invite registrants to contribute to *College Matters* by pitching us an article, sending photos, artwork, or simply suggestions for content. Please contact admin@cab-bc.org.

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Because the College is committed to bringing diverse backgrounds and expertise to College activities, we invite all registrants to consider applying for open volunteer positions. Please review the positions available here: <https://www.cab-bc.org/committee-task-force-openings> along with their respective terms of reference.

Notes & Bibliography

How does the Tree and Stand Simulator (TASS) consider climate change — Page 11

Notes

1. TASS is the source of the database used for the Table Interpolation Program for Stand Yields (TIPSY). Given computing efficiencies, TIPSY is used for managed stand projections in strategic decisions including BC's Allowable Annual Cut (AAC) determination for a Timber Supply Area (TSA).
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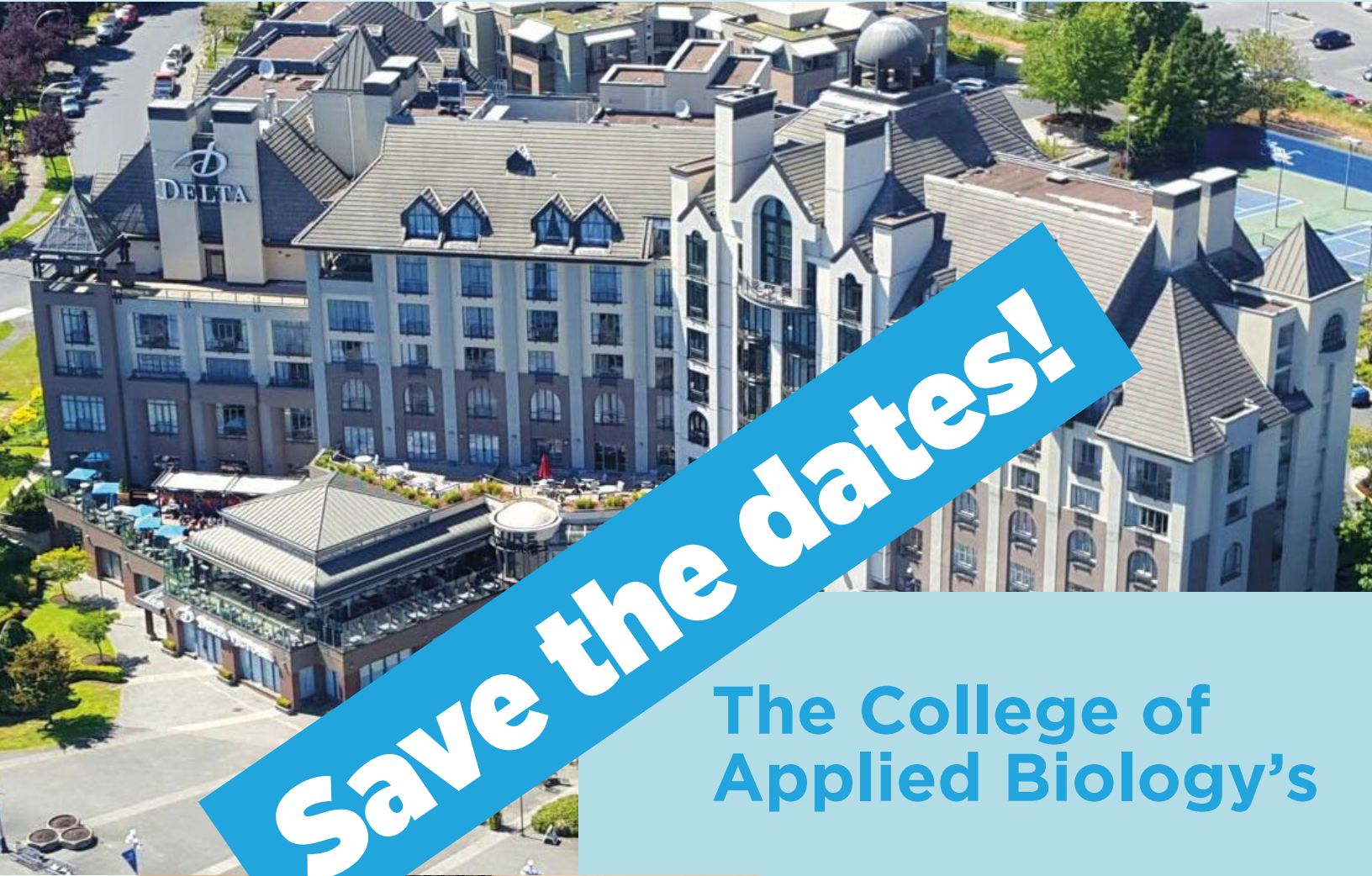
- > College of Applied Biology website: <https://www.cab-bc.org/>
- > Registrant portal / database: <https://portal.cab-bc.org/>
- > Professional Governance Act: <https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/18047>
- > Amendment to the Applied Biologists Regulation: https://www.bclaws.gov.bc.ca/civix/document/id/oic/oic_cur/0517_2021
- > Code of Ethics and Professional Conduct: https://www.cab-bc.org/sites/default/files/node_uploads/files/cab_schedule_1_-_coepc_feb5_21.pdf
- > Principles of Stewardship: <https://www.cab-bc.org/file-download/principles-stewardship>
- > Professional Practice Competencies and Competence Standard: https://www.cab-bc.org/sites/default/files/node_uploads/files/professional_practice_competencies_and_competence_standard.pdf
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- > The College's webinar on the new CPD tracking module and CPD FAQs: <https://www.cab-bc.org/news/cpd-tracking-webinar-recording-now-available>
- > Volunteer with the College: positions available and terms of reference: <https://www.cab-bc.org/committee-task-force-openings>
- > Past *College Matters* issues: <https://www.cab-bc.org/news/publications>
- > Adaptation Learning Network (ALN) website: <https://adaptationlearningnetwork.com/>
- > ResilienceByDesignLab website: <https://resiliencebydesign.com/>
- > Climate Adaptation Competency Framework (CACF): <https://adaptationlearningnetwork.com/climate-adaptation-competency-framework>
- > ALN courses: <https://adaptationlearningnetwork.com/courses>
- > The Natural Resources Canada Building Regional Adaptation Capacity and Expertise (BRACE) program: <https://www.nrcan.gc.ca/climate-change/impacts-adaptations/building-regional-adaptation-capacity-and-expertise-brace-program/21324>
- > BC Ministry of Environment and Climate Change Strategy: <https://www2.gov.bc.ca/gov/content/environment/climate-change>



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