



## **2021 YEAR IN REVIEW**

Forest Improvement and Research Management Branch

Ministry of Forests, Lands, Natural Resource Operations  
and Rural Development





## FROM THE DIRECTOR

In this brief, informal publication, the staff of Forest Improvement and Research Management (FIRM) branch share a few highlights from 2021. We are not aiming for a comprehensive review of branch operations, but rather a few highlights from each section that may interest our clients, colleagues, and stakeholders.

***FIRM is structured into six sections with the following key functions:***

- i. Orchards:** Produce improved seed for reforestation in BC
- ii. Research Management:** Coordinate the ministry's forest research program
- iii. Tree Seed Center:** Process, store, and distribute the tree seed used for reforestation of all Crown lands in BC
- iv. Forest Genetics:** Conduct forest genetics research and tree breeding
- v. Policy and Planning:** Manage the policy framework for BC's forest tree genetic resources
- vi. Business Operations:** Provide administrative support for FIRM branch and contract procurement services for the Office of the Chief Forester and Resource Stewardship Divisions

Throughout 2021, COVID-19 continued to impact branch operations. In addition, 2021 brought a heat dome, grasshopper outbreak at Kalamalka, and two or three atmospheric river events. However, for those working in the southern interior, extensive wildfires in the summer of 2021 caused the greatest disruption.

Wildfires prevented some field work, destroyed some test sites, and generated thick smoke that continued for weeks and made outdoor work difficult.

Crops from the ministry's pine orchards were heavy, while the yields from most other species were light. Initial estimates are 1053 hectolitres of cones harvested from ministry tree seed orchards, containing 634 kg of seed—enough for roughly 30 million seedlings. To help rectify longstanding deficits in lodgepole pine seed production, we established a new 5000 ramet, advanced generation lodgepole pine seed orchard at the Prince George Tree Improvement Station.

In 2021, staff turnover was high. Some of our colleagues left the branch (including Allie Affleck, Keith Bird, Barb Gass, Katie Lemire, Leslie McAuley, Angela Nagel, Petra Nielsen and Matt Wilson), new colleagues joined (including Hayley DeBianchi, Sebastien Jimenez, David Noshad, and Melody Sizer), and many staff took on new assignments to sustain branch operations amid all these changes.

In research management, we completed the first cycle of research scientist classification reviews. This unique process helps the ministry attract and retain scientists, and motivate and reward science accomplishment.

In 2021, we continued our work on tree improvement projects focussed on increasing carbon capture (and avoiding carbon losses) in plantations. This work was funded by the federal Low Carbon Economy Leadership Fund (LCELF) and the provincial Forest Carbon Initiative (FCI).

In 2022, FIRM will continue to strive for excellence in the delivery of our services, operate as a well-organized team, and provide a healthy work environment. FIRM staff work at nine different locations around the province.

As I visit our sites, I am struck by the pride FIRM staff take in their work and the care we take with the valuable public assets entrusted to us.

I hope you enjoy the brief, informal articles in our fifth Year in Review publication.

**Patrick Martin**  
Director, FIRM



*Progeny in the western redcedar breeding program (Lise van der Merwe)*



*Penny May and Mark French at Bailey Seed Orchard*



*Blending a large ponderosa pine seedlot at Tree Seed Center*



*Katelyn Hengel surveys her domain at Kalamalka*





## ORCHARDS

The COVID-19 pandemic continued to affect our people and our work this year. Moreover, the June heat-dome, significant labour shortages, wildfires, and a record dry summer all contributed to more complexities in running orchards in 2021.

This year produced a moderate crop. We collected all pine crops, including a record yield in ponderosa pine this year. Smoke from forest fires and high summer heat created challenging picking conditions overall. Hats off to our staff who worked through difficult conditions to get the job done! From ministry orchards, preliminary estimates are that 1053 hectolitres (HL) of cones were collected. This will yield approximately 634 kg of seed and produce about 30 million seedlings.



*Chris Halldorson stabilizes a newly planted graft at Saanich Seed Orchard*

As the June heat-dome developed, staff adjusted irrigation regimes to offset potential damage. The extreme heat scorched needles and cones. Needle loss was most pronounced on interior spruce and Douglas-fir. Impact on cones was most obvious on western white pine and lodgepole pine. Little mortality from the summer heat dome has been noted among the well-established orchard trees but some new plantings were killed.

All orchards now have soil moisture monitoring equipment and data loggers. These are being used in combination with each orchard's soil type to guide irrigation for tree growth, cone initiation, and seed production.

Mulch was added to Kalamalka and Skimikin's newest orchards, totalling about seven hectares. Mulch additions will help protect young ramets from extreme events. In the future we plan to increase the use of mulch in orchard establishment.

This year we completed many infrastructure improvements. Skimikin Seed Orchard upgraded its powerline and completed the disconnect from PRT-Skimikin. Transformer updates will continue to take place over the next few years at Skimikin and PGTIS. Irrigation automation continued at Skimikin and 3 new irrigation branches were installed. Retired orchard 301 was cleared to make way for future white pine needs.

On-site, residential security is now in place at FIRM sites through contract and accommodation agreements. Also, we now have in-house staff training capability from Tim Cardinal for Aerial Platform and Fall Arrest training.

LCELF/FCI-funded orchard development continues. The next generation lodgepole pine orchard #411 for the Nechako Bulkley Valley is 80% established at the Prince George Tree Improvement Station. Staff helped plant this orchard and also a new Whitebark pine orchard. An excellent extension video showcasing the establishment of these orchards was developed. White pine rootstock trees were planted at Cobble Hill, as well as installation of a complete irrigation system. Testing for Phytophthora was completed prior to planting, and a baseline pollen monitoring program was established.

Extensive monitoring of beneficial organisms was completed at 4 sites. The project report highlighted several orchards with low beneficial organism diversity. Assessment of Contarinia oregonensis spray trial results from coastal Douglas-fir orchards showed a 60% reduction in galls in treated blocks of orchards with high Contarinia populations.

Stethorus monitoring at interior orchard sites showed that Stethorus did not survive extreme temperatures in late June, however little spider mite presence was found. A plan for active weed management, soil improvement and supporting beneficial insects was initiated. Cedar cones for larval counts from the Cedar Cone Midge spray trial were collected prior to harvest and will be analyzed. Western redcedar and Contarinia Cone Gall Midge spray trials continued in collaboration with Saanich Seed Orchard, Western Forest Products and Mosaic Forest Management.

Despite the increased complexities in 2021, the Seed Orchard team had a productive and effective year. Cone crops were successfully harvested, numerous improvements were made, and safety standards were maintained.

**Stephen Joyce**  
Manager, Seed Production



*PGTIS - BC WildFire controlled burn, preparing site for new orchard*



*Summer staff celebrating success at the end of the pick, Skimikin Seed Orchard*



*Charlette Ward-Elliott picking redcedar at Saanich Seed Orchard*





## RESEARCH MANAGEMENT

The Research Program includes more than 75 research scientists, technicians, co-op students, graduate students, and auxiliary personnel working in branches and regions throughout the province. The program is coordinated by the Research Management Unit within FIRM branch. The Research Management Unit manages the research program budget, coordinates the business cycle, manages knowledge, and conducts outreach.

### **Significant achievements by the Research Management Unit in 2021 include:**

- i. Launching the new [Research Program Strategic Plan for 2021-2024](#)
- ii. Completing the first cycle (in 12 years) and initiating a second cycle of research scientist classification reviews under the Research Scientist Achievement Review Framework
- iii. Releasing the 2020/21 Research Program Annual Report and developing a Communication plan for the program
- iv. Completing the second triannual survey of research program user satisfaction in collaboration with BC Stats with the final report available in early 2022
- v. Improving the protection of research field installations (EPs) by creating a centralized email to receive research inquiries and updating the status and research information for each EP
- vi. Holding a virtual meeting with the University of Northern British Columbia (UNBC) to enhance research partnerships and planning for a face-to-face research symposium to be held in spring 2022
- vii. Sharing the Research Program's successes at the National level on the [Canadian Institute of Forestry's webinar platform with 4 presentations](#)
- viii. Publishing a special series in the Association of BC Forest Professionals (ABC FP) magazine, an article in the Canadian Institute of Forestry magazine, and updates on each region's research work shared in the inter-ministerial newsletter, The Understory (previously known as The DIRT)
- ix. Creating a new public [webpage with links to current publications and communication material](#) and updating the Research Program [intranet website](#)
- x. Creating a [podcast series—Forest of Ideas](#)—where research scientists share their stories



Podcast series [A Forest of Ideas](#) hosted by Jodi Axelson and Steve Baumber with research scientist interviewees Colin Mahony, Melissa Todd, Dave Wilford and Lorraine MacLauchlan

The Research Management Unit is ready for another successful year. We will keep working to leverage resources and expertise to support the research program while it continues to provide timely, relevant, and high-quality science for decision making.

**Francesco Cortini**  
Research Management Lead



## TREE SEED CENTRE

As an essential service, the Tree Seed Centre continued operations throughout the COVID-19 pandemic. Physical and operational changes implemented in 2020 allowed staff to work in a safe and effective manner, resulting in only minor delays to normal service. Tours of the Centre resumed in September with a visit from Honourable Katrine Conroy, Minister of Forests, Lands, Natural Resource Operations and Rural Development.

In 2021, the Tree Seed Center worked with representatives from BC tree seed orchards to improve on processes and reduce the challenges that arise in years with a bumper crop cone harvest.

The Tree Seed Centre saw a continuation of staff change and team building over the past year. Lab Technician Barb Gass left the public service and Melody Sizer was hired into the role.

The seed cooler/freezer replacement project is moving forward, we are currently at the design and development permit phase. Also, we are continuing with the replacement of some worn-out equipment and have acquired 2 new gravity tables and 1 new seed aspirator.

***The Tree Seed Centre operates with a steady and predictable annual business cycle. Below are some highlights from 2021:***

- i. Withdrawal, preparation and shipping of tree seed to seedling nurseries:** More than 2,500 sowing requests were processed representing about 285 million requested seedlings
- ii. Processing, testing and long-term storage of seed from BC cone collections:** More than 75 seedlots were registered on SPAR. It was a record year for Ponderosa pine seed processing with more than 1250 hectolitres being collected from various locations throughout the province
- iii. Testing:** more than 3000 seed tests completed
- iv. Conservation:** More than 271 seed collections completed for Genetic Conservation purposes

**Michael Postma**

Manager, Tree Seed Centre



*Sacks of Ponderosa pine cones conditioning, Tree Seed Centre*



*Seed stored in the freezer*





*Deputy Chief Forester Shane Berg and Minister Conroy toured the Tree Seed Center*



*Larch Seedlot 63913 is ready to be stored in the freezer. James Campbell (left) and Bash Buksh (right)*



*March 2021 – A 1000 lb seed shipment to nurseries*



*New Seed Aspirator*





## FOREST GENETICS

A year to remember, COVID-19 continued to impact our daily lives, a historic heat dome damaged trees, interior clone banks were eaten by swarming locust, fires scorched swathes of the interior, and atmospheric rivers flooded communities. Although these events tested our resolve both personally and professionally, our cohesive planning and delivery model provided a collaborative and supportive work environment for staff to overcome these challenges.

Heat, smoke and Covid-related travel restrictions stimulated innovation as coastal and interior staff swapped work to minimize regional travel and reduce risk, yet meet business objectives. When Vernon was under evacuation alert, interior and coastal sections developed an integrated plan to save valuable research. This exercise will be repeated annually as a pro-active measure to help mitigate potential risks from unforeseen events.

Staffing change remained a constant for the section. After 40+ years Petra Nielsen sheathed her grafting knife one last time and retired, leaving a legacy of thousands of carefully grafted trees in our orchards, clonebanks and progeny tests. Keith Bird, Coastal Douglas-fir technician, also retired after 40+ years and passed the torch to Andrew Coster. We said farewell to Allie Affleck, Forest Technician Kalamalka, and Katie Lemire, Nursery Manager Cowichan, as they took the next step in their careers.

We welcomed David Noshad and Sebastian Jimenez as our respective coastal and interior Pest Resistance and Management scientists.



*Cone collection for the Ponderosa Pine program*

With climate change upon us, both are playing key roles in helping our geneticists breed and select trees with improved resistance to disease and pests. Lise van der Merwe became our newest tree breeder and is responsible for the large coastal Western Redcedar breeding program as well as managing, along with Kate Nahirnick, the Cowichan Lake Research Station and nursery. In the interior, Lindsay Bellingham took on greater responsibilities, recently becoming our newest Forest Technician at Kalamalka. Lindsay will play a key role with the interior spruce, interior Douglas-fir and larch breeding programs.

Despite this year's challenging environment, our integrated approach to planning enabled us to meet our planned business objectives. Some of our accomplishments include approximately 4700 grafts of Bulkley Valley Lodgepole pine growing and doing well in our greenhouses. These grafts are destined for orchards and once planted will produce much needed seed to help the Province meet its reforestation objectives.

The new Ponderosa pine breeding program took a significant step forward with seed collections from parent trees. The range of Ponderosa pine will expand with climate change and by establishing a breeding program now, followed by orchards, we will be

positioned to provide much needed seed for establishing forests better adapted to future climates.

Cowichan Lake Research Station staff worked closely with Saanich Orchard staff to establish the infrastructure and planting of rootstock at the Cobble Hill Orchard site. This new White pine orchard will provide seed with resistance to the devastating blister rust disease and help re-establish healthier White pine on the coastal forest landscape.

We are not sure if the events of this past year can be topped, hopefully not!

**Keith Thomas**  
Manager, Forest Genetics



*Greg O'Neill preparing to stress out some seedlings*



*Petra Nielsen, who made thousands of quality grafts over her long career, retired in 2021*



*Lindsay Bellingham at work in the growth chamber at Kalamalkaka*





## POLICY AND PLANNING

2021 was another busy year punctuated by COVID-19 and the resulting changes in the workplace—both in the office and virtually. After 32 years in government, the majority of time in the various iterations of Forest Improvement and Research Management Branch, Decision Support Officer Leslie McAuley retired. Her breadth of knowledge and experience with seed policy were invaluable to the Policy and Planning section.

### Climate Based Seed Transfer

On June 18, 2021 the Chief Forester announced the next phase in the transition from Geographic-Based Seed Transfer (GBST) to CBST. The Chief Forester's Standards for Seed Use will be amended to remove GBST as an option as of August 2022 (prior to the beginning of the 2023 sowing season). The Policy and Planning section have been busy working on the amendments to the standards and planning for the transition in 2022.

### Seedling Requests

The uptake of CBST continues to be strong in the last year of the transition to CBST. As of December 2021, 78% of seedling requests were made using CBST—a significant improvement over the use of CBST last year.

Agency	Million seedlings for 2021 sowing	Percent using CBST
BCTS	44.51	93%
Various	5.90	95%
FCI	24.98	99%
FFT	20.88	96%
Licensees	144.73	59%
Various	1.09	93%
<b>Total</b>	<b>242.09</b>	<b>78%</b>

### Species Planning Tool

Work continues on the development of a Species Plan dashboard tool in conjunction with Forest Genetics Council. A prototype of the tool has been created that can display projected supply and demand of seed by tree species, orchard, and BEC unit. As part of the project, orchard ramet age profiles and mature ramet production estimates were derived for each orchard, ultimately resulting in orchard production estimates that will be incorporated in the new tool.

### SPAR Updates

***Two releases of SPAR updates were completed in 2021. These updates included:***

- Improvements in how genetic worth for secondary/tertiary traits are calculated and displayed for seedlots
- Incorporating the new fee schedule
- A warning when not selecting climatically suitable seed

A significant amount of preparation work has also been completed for the next SPAR release which is targeted at changes needed for the transition to CBST in 2022.



*Leslie McAuley (center) holds the 3-cone award at her retirement. Kevin Astridge (left) and Sabina Donnelly (right)*

## Communication, Extension, and Training

***Communication and extension activities are a continual occurrence every year and include:***

- i. Webinars and tutorials on CBST, and CBST in SPAR
- ii. One-on-one support and training for SPAR users
- iii. Providing support to companies and First Nations involved in reclamation and restoration projects
- iv. Assistance for clients preparing alternative requests
- v. Presentations to Forest Genetics Council, ITAC, and CTAC
- vi. Participation in monthly silviculture and research conference calls





## BUSINESS OPERATIONS

Well, another memorable year is behind us. With COVID-19 safety restrictions and requirements, and many staff working from home this year, it has been tough at times to maintain that team spirit. Overall, though, I think we were successful in keeping motivated as a team and making some significant accomplishments again this year.

For those that don't know this group, we are quite unique in that we provide the numerous administration duties for the seven FIRM Branch sites as well as the analysis and assistance in contracts for the Office of the Chief Forester and Resource Stewardship divisions. So, our tasks are quite diverse.

### *A few highlights from 2021 include:*

- **Payroll management:** Onboarding more than 100 auxiliaries over the year in various job roles and managing their numerous payroll issues and time sheets
- **Contract development assistance:** Assisting in the development of over 250 contracts
- **Records management and LAN drive utilization:** Using and refining a specialized ARCS/ORCS LAN drive for the seed orchard team. Also, safety documents for the orchards, genetics, and the tree seed centre are filed here. This centralized organization will keep our sections safer and information better organized, which will benefit all staff.
- **Plan development:** Assisting with and contributing to various plans, including safety plans; various orchard plans; short-, medium- and long-term budget plans; and business continuity plans.
- **Staffing:** All while dealing with constant changes to staffing at most of our sites.



*Jenny Taylor at Kalamalka*

But like everyone in government, change is the name of the game and there will surely be constant and continual change in the year ahead. However, with change brings positive elements such as anticipation, opportunities, and new ways of looking at things.

Now, as 2021 fades into the background, the business operations unit wishes everyone a restful holiday season and a great, prosperous New Year. We look forward to helping our branches and divisions in 2022.

*Jennifer Taylor, Tanisha Hett, Deanna Foster, Stephanie Gillis, Kyla Seward, Lauren Harrison, Kelly Michelsen, Bridget Brohman, Diana Thornton, and Darrell Wood.*

**Darrell Wood**  
Manager, Business Operations





*The Forest Genetics Council annual fall tour*



*The 5-Wheeler (Chris Ryan)*



*Mark (M) Griffin at Kalamalka*



*Multiple flats a long way from town*



*Grasshopper outbreak, Kalamalka*



*Stephen Joyce and his entry in the annual pumpkin growing contest*



*Val Ashley*



*Seriously into Christmas (Jon Degner)*