KNOWLEDGE SUMMIT

MARCH 11-13th, 2024
VANCOUVER, BC

Silviculture Innovation Program

Bulkley Valley
Research Centre

WHAT WE HEARD

EXECUTIVE SUMMARY

On March 11-13, 2024, the SIP hosted a Knowledge Summit to harness collective ideas and experiences and identify knowledge gaps and opportunities for advancing innovative silviculture practices in BC. The objective was to create a "roadmap" outlining knowledge gaps and contextualizing why the knowledge gaps are important and how they could be addressed through research and extension. The SIP identified three core themes to structure discussions on how applied research and extension can ensure knowledge is available to inform the use of more diverse silvicultural systems and tools: 1) Partial Harvest, 2) Fire and Silviculture and 3) Intensive Silviculture.

The Knowledge Summit was designed to represent a cross section of experts, with the specific intention of creating a space to support meaningful conversations and empower underrepresented voices. All regions in BC were represented (Coast, Central Interior, SE, SW, NE and NW) as well as provincial and national scale perspectives. Roles and positions represented at the summit included: First Nations, researchers (government and academia), industry (major licensees, community forests, woodlots), and government and First Nations decision-makers. Representation of attendee career stages spanned from early career to retirees, reflecting the collective experience of innovative silviculture.

Participants were asked to describe the greatest investment the SIP team could carry out following the Knowledge Summit. These were summarized into five broad categories:

i. **Create a Knowledge Hub:** A searchable open-access data repository is needed to store knowledge on various silvicultural activities, and could include items such as decision aids, guidebooks, case studies, grey literature, peer-reviewed papers and data, technical notes, list of experts, and an interactive map of forests and research trials in BC.

ii. **Build capacity and grow communities of practice:** Build capacity to carry out innovative silviculture by offering in-field training workshops and opportunities to advance learning for practitioners and planners. Support mentorship of early career foresters and facilitate knowledge transfer from foresters nearing retirement. Bring together communities of practice across the province and help support new ones.

iii. **Support new research:** Support the creation of new research projects that address issues using multiple knowledge systems, new technologies, and broad-scale perspectives. Make sure that research

connects the creators to the users (or the researchers to the practitioners) through collaboration on project design, research development, communication of results and extension products etc.

iv. **Synthesize existing knowledge:** Summarize and collate existing research and communicate findings to practitioners and researchers so they can use the best available knowledge to inform actions, such as improve models, design better treatment objectives, etc.

v. **Extend knowledge into practice:** Help translate knowledge into practical and useful products to support practitioners in managing multiple values, such as toolkits, guides, and workshops. Consider and include all knowledge systems, including Indigenous Knowledge and Indigenous science.

Outcomes regarding needs for research and extension were summarized across themes and within each theme. Overall, there were four trends and observations that persisted across all Knowledge Summit themes, including the needs for: 1) Addressing the practitioner–researcher gap, which limits applicability of research outcomes and uptake of innovative practices; 2) Support of new research trials and leveraging current research trials that can provide insight on emerging novel issues, such as climate impacts; 3) Evaluation of multiple values across forested landscapes to inform their management and monitoring; and 4) Increased understanding of technical models to inform forestry decisions. Needs and project ideas specific to each Knowledge Summit theme: partial harvest, fire and silviculture, and intensive silviculture are also summarized in "The Roadmap".

The roadmap will be used by the SIP to strategically identify investment priorities and areas of focus through research and extension. At this time, we are pleased to share that the SIP external research program granting process will launch this summer, with project proposal intake closing in the Fall. Successful projects will be able to begin work by the start of 2025. The structure of the project streams, project requirements and expectations, and grant intake will be informed by the outcomes of the Knowledge Summit.

PREFACE

A Message from the Silviculture Innovation Program (SIP) Team:

We would like to extend our gratitude to all the participants who attended the Knowledge Summit to advance opportunities for innovative silviculture in British Columbia. Your dedication, expertise, and thoughtful contributions were instrumental in shaping the discussions and outcomes of this report.

This "What We Heard" report captures the collective insights and perspectives from a two-day workshop establishing a roadmap for the future of innovative silviculture. Hosted with the intention of fostering dialogue and collaboration among a diverse community of practitioners, the Summit aimed to identify key opportunities for investment in research and extension. Participants shared experiences, challenges, and visions for a shared future, focused on sustainable forestry management. This report captures the diverse viewpoints expressed during the Summit. Ideas and trends identified in this report offer a transparent summary of the perspectives of the attendees. Our program team listened and then synthesized nearly 40 ideas on the future opportunities for innovative silviculture. These outcomes will guide the SIP in future decision making on investments and we hope the broader forestry community will benefit from this comprehensive summary.

We would like to express our sincere appreciation to Fuse Consulting for their invaluable support in helping organize and facilitate the Summit. Their expertise played a pivotal role in ensuring the success of the event and in creating an inclusive and dynamic space to put our heads together. We also would like to acknowledge the support of the Government of British Columbia for their continued commitment to fostering innovation and sustainability in forestry practices. Collaborative partnerships like these are essential to advance the forestry sector.

We also acknowledge that the Summit took place on the unceded traditional territories of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) First Nations. We express our respect and gratitude to the Indigenous peoples of these lands, past and present, for their stewardship of the land and their enduring connection to it.

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COVER PHOTO // Knowledge Summit participants share thoughts in a closing circle at the end of the two day event (Gillian Chow-Fraser).

KNOWLEDGE SUMMIT
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Silviculture Innovation Program
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WHAT WE HEARD

INTRODUCTION

Purpose of the Summit

On March 11-13, 2024, the SIP hosted a Knowledge Summit to harness collective ideas and experiences and identify knowledge gaps and opportunities for advancing innovative silviculture practices in BC. We gathered on xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish), and səlilwətaɬ (Tsleil-Waututh) Nations unceded traditional territory with the objective to create a "roadmap" outlining why these knowledge gaps are important and how they could be addressed through research and extension.

Following the Knowledge Summit, the knowledge gaps and opportunities outlined in the roadmap will be used by the SIP to strategically identify future investment priorities and areas of focus through research and extension.

"*It was inspiring and felt like the beginning of something important.*"

PHOTO // **Strategic Advisory Group member Dennis MacDonald provides opening remarks** (Laura Stanton).
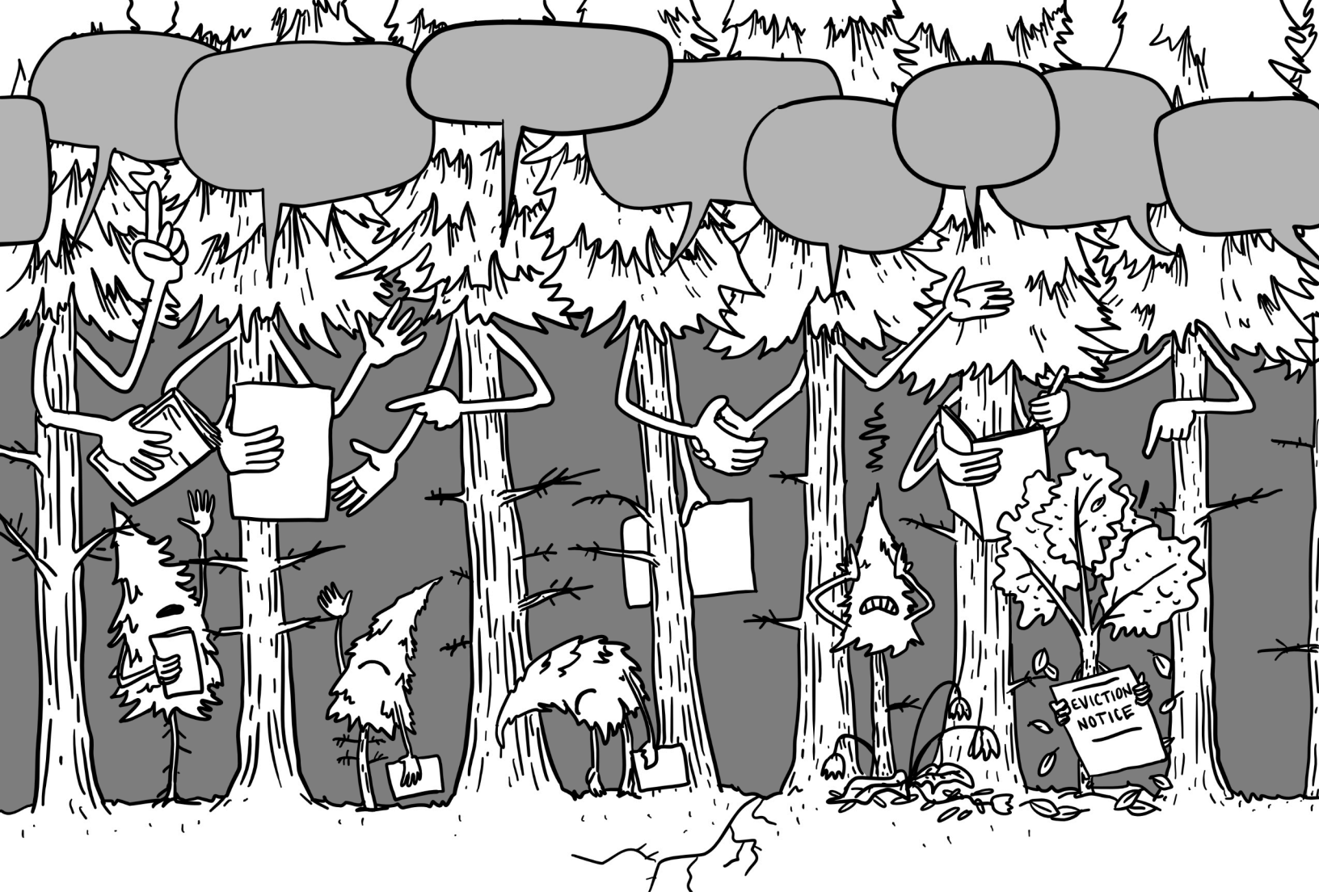
Why Innovative Silviculture?

Over the past several years, forest management and forestry practices have come under increased scrutiny within the province. Through these pressures, conversations about forestry have become increasingly focused on diversifying the range of values forests are managed for. There has also been a large focus on identifying opportunities to increase the diversity of forest practices applied and using forest management to reduce the divergence between managed and natural ecosystems (Palik and D'Amato 2017).

The term 'silviculture' has historically been defined as the 'art and science' of growing and tending forest crops (Nyland 1996). The treatment of forests as crops is rooted in a western-European worldview of silviculture that emphasizes commodity production and is likely to view other objectives (e.g., compositional and structural diversity, biodiversity, intrinsic ecosystem processes) as constraints (Puettmann et al. 2009, 2015). In forestry, the commodity production paradigm has been undergoing a critical shift in the face of social and environmental change over the past decades and there is an increasing awareness that silviculture as a discipline needs to recognize and manage forests as complex adaptive systems (Puettmann et al. 2009). To achieve this, it is essential that stewardship be placed within the context of the silvicultural system - from evaluation, planning, harvesting,

Figure 1. An illustration characterizing a uniform forest devoid of complexity, structurally or compositionally, that is unable to support diverse plant and understory communities (above left), versus a complex forest with a variety of species (including broadleaves), age classes and diverse ecological attribute (above right). The text boxes in each figure represent how dialogue in the forestry space has been historically dominated by a limited and uniform group (above, left), and the shift to dialogue that is characterized by inclusion and diversity of rich perspectives and underrepresented voices (above right). *Illustrations by Laura Stanton.*

planting and tending, to harvesting again. This cyclical system embraces spatial and temporal diversity, where patterns and processes shift across scales and through time.

Innovative silviculture (also termed adaptive silviculture) creates a framework for stewarding multiple values at the stand and landscape scale, ranging from the physical to the spiritual. Managing forests for multiple values such as water, wildfire resilience, wildlife habitat, forest health, old growth, etc. requires an interdisciplinary approach. Such an approach must

ensure that disconnected knowledge systems (e.g., western scientific approach, Indigenous knowledge and science) are bridged to structure research questions and projects, extension processes and products, and ultimately inform mainstream silviculture practice and policy.

The SIP program was forged on the principle that by contributing to applied research and extension on innovative silviculture, we can ensure knowledge is available to inform the implementation of more diverse silvicultural strategies in BC.
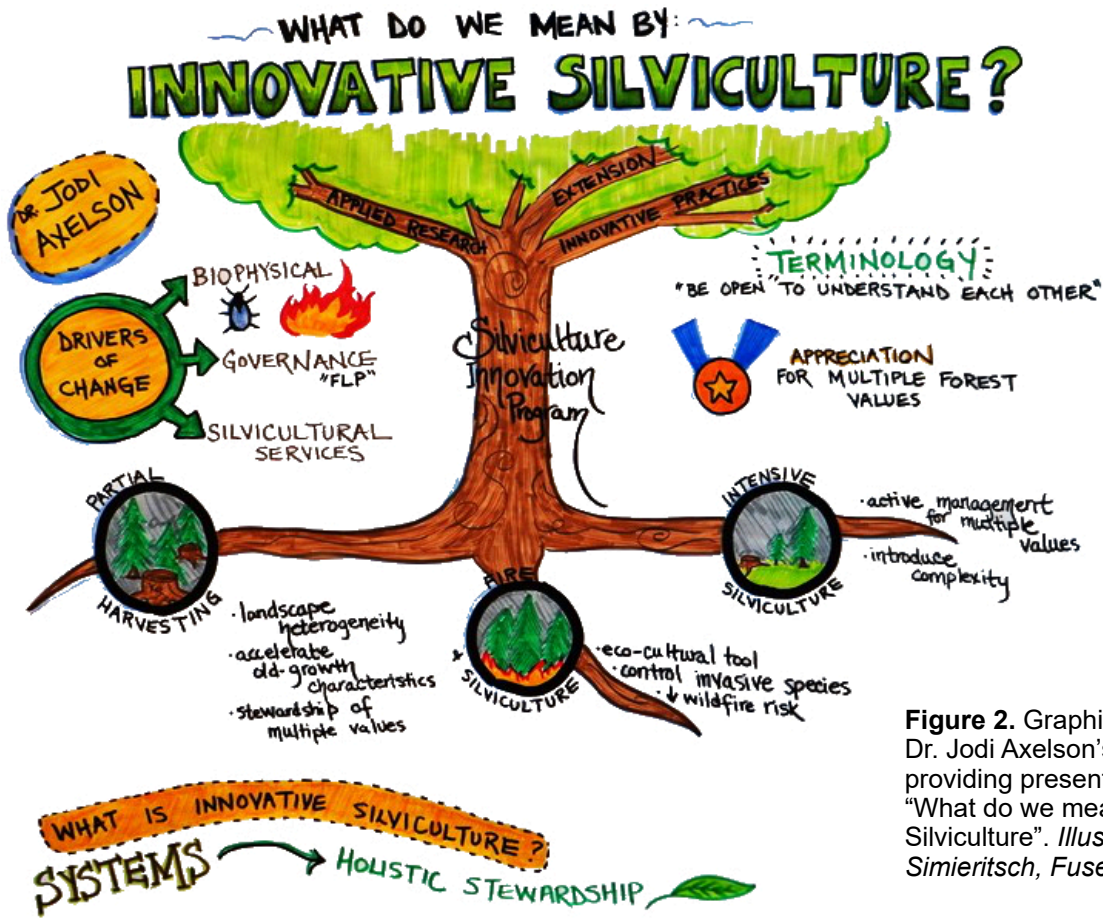
Figure 2. Graphic recording of Dr. Jodi Axelson's context providing presentation, titled "What do we mean by Innovative Silviculture". *Illustration by Terra Simieritsch, Fuse Consulting.*

CONTEXT

In BC, approximately 95% of forest management utilizes a clear-cut with reserve system. In the last decade, the shift in the social values placed on forests, and their management, spurs us to think credibly and creatively on how a more holistic conception of silviculture can be adopted.
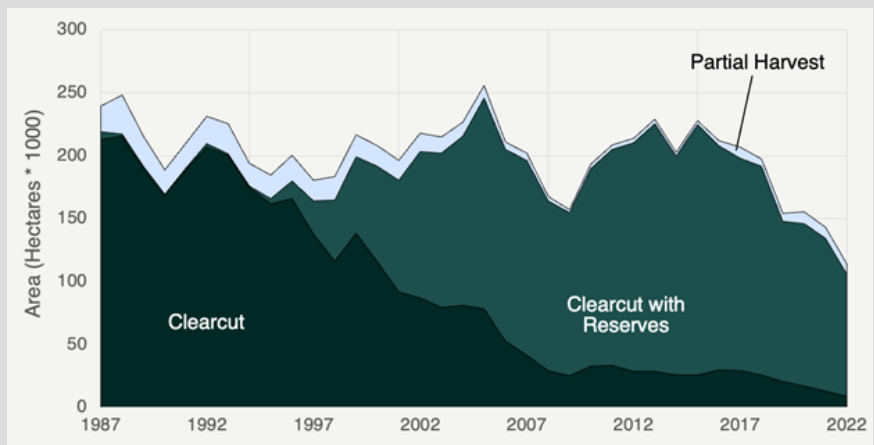

Figure 3. Area of Crown forest harvested in BC from 1987 to 2022 using clearcut, clearcut with reserves, and partial harvest silvicultural systems. Original figure accessed at: https://www.env.gov.bc.ca/soe/indicators/land/silviculture.html. Updated by forest management analyst in the Forest Science, Planning and Practices Branch, Office of the Chief Forester, B.C. Ministry of Forests.

KNOWLEDGE SUMMIT DESIGN & DELIVERY

Summit Design

Summit Participants

The Knowledge Summit goal was to bring together a diverse collective of forestry practitioners and knowledge holders to contribute their ideas regarding critical knowledge gaps and opportunities to support innovative silviculture. Our aim was to gather a medium-sized group that represented a cross section of experts to allow for effective facilitation and encourage meaningful engagement in the process, while ensuring multiple regions and areas of expertise and sectors were suitably represented. We aimed to create a space to support meaningful conversations and empower underrepresented voices to share perspectives.

As such, participation in the Knowledge Summit was by invitation or approved-request only. We recognized the potential for the influence of our unconscious biases and prioritized the importance of ensuring our subjective selection of participants was grounded in principles of justice, equity, diversity and inclusion. Our planning committee purposefully sought attendees to support:

- Gender parity;
- Black, Indigenous and People of Colour (BIPOC) representation;
- Early and mid-career stages;
- Intersectionality of underrepresented groups; and,
- Regional representation.

Individuals were also identified based on experience, perspective, and knowledge related to managing forests for multiple values in BC.With a diverse group of participants at the Knowledge Summit, we found ourselves on a strong foundation to hear new perspectives and capture a holistic understanding of gaps and priorities.

All regions in BC were represented (Coast, Central Interior, SE, SW, NE and NW) as well as provincial and national scale perspectives.
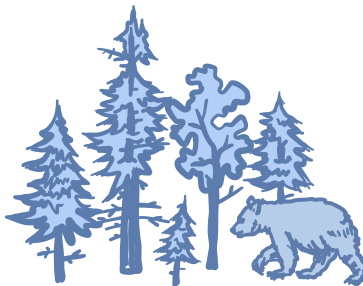
Roles and positions represented researchers (government and academia), industry (major licensees, community forests, woodlots), First Nations, and government decision-makers.

Representation of attendee career stages spanned from early career to retirees, reflecting the collective experience of innovative silviculture.

Summit Pre-interviews

We invited attendees to participate in 30-40 minute pre-interviews ahead of the Summit with the SIP Extension Specialist. Overall, 60 attendees (~80% of Summit attendees) volunteered their time to share insights on the state of innovative silviculture in BC, why innovative silviculture is important, the challenges and opportunities for innovative silviculture, and hopes for the outcomes of the Summit. These insights were fundamental to the design and planning of the Summit and our planning team was able to observe strong themes on drivers and barriers to innovative silviculture uptake in BC. We are working on completing a full analysis of the pre-interviews and look forward to sharing our findings in the near future.

Summit Themes

The SIP identified three core themes to structure discussions on how applied research and extension can ensure knowledge is available to inform the use of more diverse silvicultural systems and tools: 1) Partial Harvest, 2) Fire and Silviculture and 3) Intensive Silviculture. The themes can be thought of as actions that facilitate the creation and/or maintenance of diverse values (e.g. water quality, old forest attributes, resilience to disturbances) across spatial and temporal scales, and thus, are integrally connected to innovative silviculture objectives.

These themes helped guide breakout sessions and we encouraged participants to embrace the themes as containers within which we can have productive conversations. Herein are working descriptions that were provided to participants ahead of the Knowledge Summit.

Intensive Silviculture

Intensive silviculture is a forest management approach that involves the application of various silviculture practices, at discrete time intervals, to improve the growth and yield of trees in a forest stand. Intensive silviculture will generally maintain specific tree species or forest cover types, which may result in an increase to volume. Intensive silviculture can also be used to accelerate forest growth to achieve a broader range of forest values including hydrologic recovery and visual recovery.

There are numerous activities that can be considered under intensive silviculture, such as: strategic spacing

Figure 4. Illustration of intensive silviculture. *Illustration by Laura Stanton.*

and thinning which manipulates the arrangement and density of trees; fertilization to enhance soil fertility and provide essential nutrients to the trees, promoting faster and healthier growth; and pruning which removes lower branches to produce higher quality, knot-free wood. All of these activities are discrete actions within the entire silvicultural systems approach.

In the context of innovative silviculture, the inclusion of intensive silviculture may be counter-intuitive to some. However, intensive silviculture reflects a suite of actions within an active forest management framework that, when applied at ecologically appropriate times and intervals, can be used to actively manage forests for multiple objectives, and maintain ecological integrity and biodiversity. For example, traditionally, thinning may have been done to reduce within-stand tree competition enhancing the productivity of the remaining stand. In an innovative silviculture application, thinning can satisfy multiple objectives such as reducing wildfire risk and/or the risks of tree mortality from insects, disease and droughts, and to stimulate plant growth in the understory.

Fire and Silviculture

Fire and silviculture, or 'pyrosilviculture', refers to a land management practice that integrates prescribed or cultural burning (one component of Indigenous fire stewardship) with silviculture practices to achieve a set of objectives. This approach combines the principles of fire management (including modified

Figure 5. Illustration of fire and silviculture (alternatively, pyrosilviculture). *Illustration by Laura Stanton.*

wildfire response) and forest management to achieve specific ecological, cultural and silvicultural objectives.

Fire and silviculture considers the role of fire within the silviculture toolkit, a practice that was much more common in BC's past forest management. Through prescribed and cultural burning techniques, fire is intentionally set under specific conditions to manage for multiple values and create more open and fire resilient forests. Fire, in this context, is being used as a tool to achieve forest management objectives such as reducing fuel loads (accumulated dead vegetation), promoting the growth of fire-adapted plant species, controlling invasive species, and enhancing overall ecosystem health. This approach can be used to manage landscapes, improve forest resilience, and enhance biodiversity.

In the context of innovative silviculture, the inclusion of fire and silviculture is integral to expanding our tools, and moving ecosystems away from the fire deficits they have experienced for almost a century. Instead, fire is used to increase forest heterogeneity, select for tree species and understory species well adapted to fire, and for maintaining and/or enhancing forest resilience by proactively managing fuel levels. Ultimately, using fire through innovative silviculture can help our managed forests reach maturity and rotation.

Partial Harvesting

A partial harvest refers to a forest management practice in which only a portion of the trees within a forest stand are harvested, leaving the remaining trees standing. This approach contrasts with clear-cutting, where all, or nearly all, of the trees in an area are removed during harvest. Partial harvesting is a flexible and adaptive approach that allows foresters to meet multiple objectives, including ecological conservation, economic viability, and recreational values within a managed forest. Partial harvesting is also designed to maintain some level of forest cover, and ecosystem structure, through time.

There are different methods of partial harvesting, and they can be tailored to meet various objectives. Partial harvesting may favour uneven-aged management through single tree selection, the emulation of natural disturbances such as creation of gaps through group selection or retention of trees to emulate mixed severity fires, or

facilitate the creation of even-aged structures (that change through time) using a shelterwood system.

Figure 6. Illustration of partial harvest. *Illustration by Laura Stanton.*

In the context of innovative silviculture, the inclusion of partial harvesting is a key method to promote continuity in forest structure, function, and processes through time, and complexity - the need to create and maintain structural and compositional complexity and diversity. Both the concepts of continuity and complexity with the partial harvesting theme also compel us to think about spatial heterogeneity at multiple scales.

Interconnections Between Themes

While each theme can stand alone, the SIP recognizes their interconnected nature and the many places where they may overlap. There was broad support for these themes at the summit and participants also emphasized how these

themes intersected. We heard participants urge us to move away from siloes of activities and information, and embrace an interwoven and overlapping program. For example, recognition that certain research trials may have outcomes that support and inform both partial harvest and intensive silviculture activities. We recognize the synergies between these themes and that areas of overlap are crucial. We will consider products that can serve multiple outcomes, while thoughtfully pursuing gaps and needs that might be specific to each theme, as well.

Below, we offer a modified and refined illustration of the themes that reflects this major piece of feedback.

Figure 7. Illustration of all three themes (partial harvest - left; intensive silviculture - right; fire and silviculture - bottom), interconnected into one. *Illustration by Laura Stanton.*
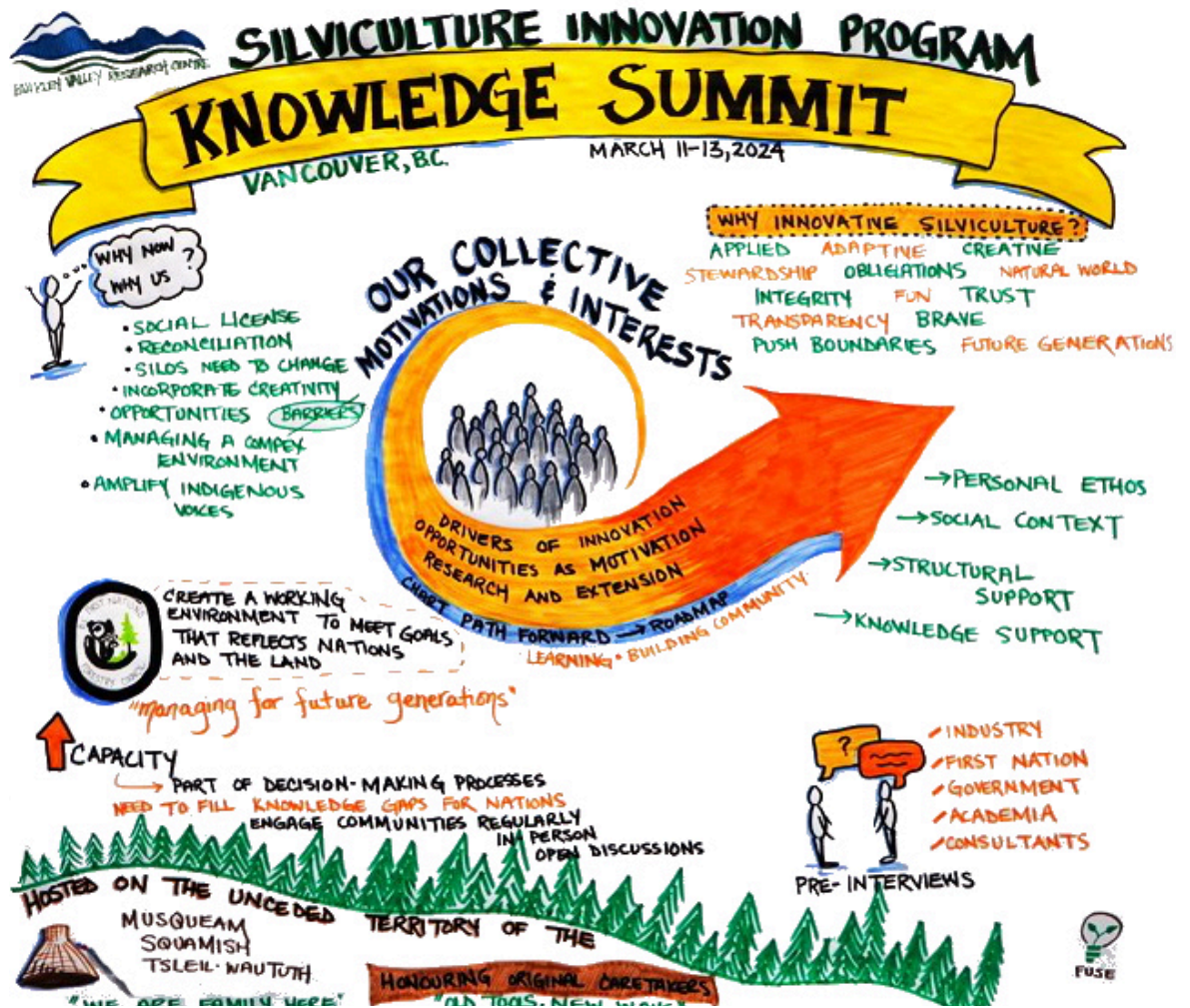
Figure 8. Graphic recording of the Summit introduction and opening remarks. *Illustration by Terra Simieritsch, Fuse Consulting.*

PHOTO // **Graphic recorder, Terra, bringing Summit conversations to life** (Gillian Chow-Fraser).

Summit Delivery

The Knowledge Summit was carried out over two days and included facilitated activities. The activities leveraged various engagement styles to provide equal opportunity for all participant voices. This included one-on-one interviews, breakout sessions of different sizes, and whole group discussions.

The process was also supported by a graphical illustrator, Terra, who captured key points and the spirit of the discussion across several large panel illustrations. Her pieces are integrated throughout the report.

On the first day, we were honoured to have Elder, Bob Baker, from the Squamish First Nation lead the land acknowledgement and opening prayer. Our morning featured presentations from several members of the SIP Operations Team and Strategic Advisory Group, including a plenary presentation by Dr. Jodi Axelson and an opening presentation and Q&A led by Dennis McDonald with the First Nations Forestry Council.

In the afternoon, we focused on small facilitated group activities to identify roughly ten knowledge gaps in each of the three themes: partial harvesting, intensive silviculture, and fire and silviculture.

On the second day, we reviewed the previous days' key knowledge gaps as a whole group. Participants were provided the opportunity to add other crucial knowledge gaps they felt were missing.

PHOTO // Dr. Jodi Axelson provides an opening plenary presentation (Kira Hoffman).

PHOTO // To begin the Summit conversations, participants engage in the "Interview Matrix" exercise (Gillian Chow-Fraser).

PHOTO // Participants synthesize the Interview Matrix outcomes into key gaps and priorities for each theme (Laura Stanton).

This process resulted in a fourth theme around multiple values with several knowledge gaps identified.

In small facilitated groups, participants were asked to develop actionable plans to address each knowledge gap. Action plans included group discussions on: why is this gap important, where are regions of focus, what are project ideas, and what are the first steps? This resulted in 35 action plans.

A final activity urged participants to reflect on the most important investment in research and/or extension that could advance innovative silviculture in BC. Ideas were written on index cards, randomly distributed, and rated by peers on a scale of 1 to 5 over five rounds. Top rated ideas were shared and reported below.

Finally, we ended the second day with a closing circle and invited group reflections and observations.

PHOTO // The facilitators and SIP team gather to review the facilitation plan on the morning of day two (Gillian Chow-Fraser).

PHOTO // Participants review and revise the "Marketplace of Ideas" wall before breaking out into a series of table conversations Gillian Chow-Fraser).

PHOTO // **Group photo near the end of day two** (Matt Dance).

PHOTO // Participants engage in a table conversation as part of the "Marketplace of Ideas" exercise (Kira Hoffman).

PHOTO // Participants trade cards in the fast-paced "25-10" prioritization exercise (Gillian Chow-Fraser).

OUR ROADMAP

Overview of Outcomes

Trends in our *greatest opportunities* for investment

Herein, we summarize key take-aways from two critical exercises that reflect the major discussion points of the Knowledge Summit. These trends reflect a synopsis of what we heard from attendees, caveated by the reality that some ideas and projects might be out of scope or not reasonably within the SIP resources to meaningfully execute. Regardless, we present this comprehensive summary to capture the important ideas we heard and honour the time participants dedicated to this work.

Overarching actions:

There were five broad trends from participants when asked to describe the greatest investment the SIP team could carry out following the Knowledge Summit. Below, we summarize five overarching ideas from this exercise:

1// **Create a Knowledge Hub:** A searchable open-access data repository is needed to store knowledge on silvicultural activities, and could include items such as decision aids, guidebooks, case studies, grey literature, peer-reviewed papers and data, technical notes, list of experts, and interactive map of research forests and research trials in BC.

2// **Build capacity and grow communities of practice:** Bring together existing communities of practice across the province and help support the creation of new ones. Build capacity to carry out innovative silviculture by offering in-field training workshops and opportunities to advance learning for practitioners and planners. Support mentorship of early career foresters and facilitate knowledge transfer from foresters nearing retirement.
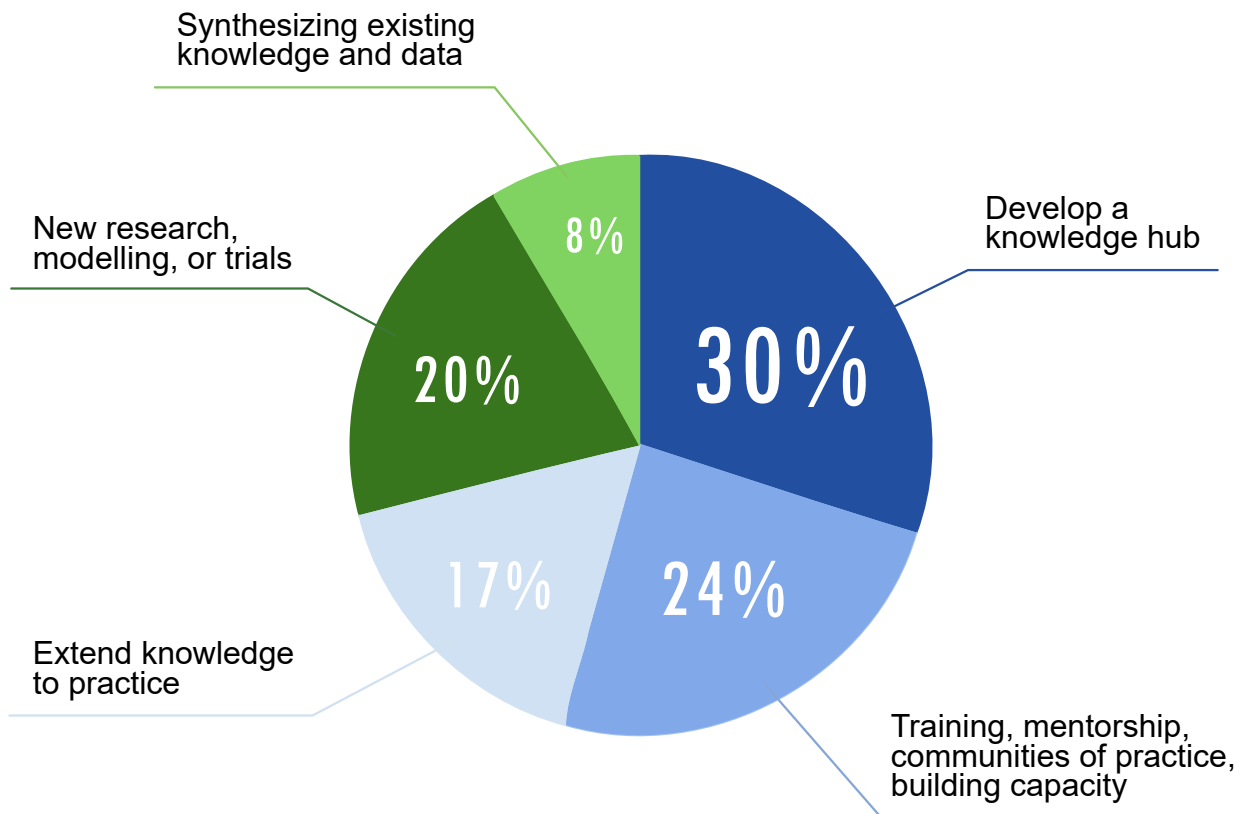
Figure 9. Results of a large group activity ("25-10") asking participants to identify the single greatest investment the SIP could make to progress innovative silviculture in BC, which were then further categorized by proportion of ideas related to five key areas. Green shades denote research focus, blue shades denote extension focus.

3// Support new research: Support new research projects that address novel issues using multiple knowledge systems, new technologies, and broad–scale holistic perspectives. Make sure that research connects the creators to the users (or the researchers to the practitioners) through collaboration on project design, research question development, communication of results and extension products etc.

4// Synthesize existing knowledge: Summarize and collate existing research and communicate findings to practitioners and researchers so they can use knowledge to inform actions, such as improve models, design better treatment objectives, etc.

5// Extend knowledge into practice: Help translate knowledge into practical and useful products to support practitioners in managing for multiple values, such as toolkits, guides, and workshops. Consider and include all knowledge systems, including Indigenous Knowledge and Indigenous science.

Deeper dive into a Knowledge Hub:

Further perspectives shared on a Knowledge and data Hub, or information repository, included the desires for:

- A needs assessment to understand where information can be accessed, how it is going to be used, and what formats the knowledge or data can be accessed.

- Engagement and integration with users throughout development.

- Categorization by key topics and use of "keywords" with input from users.

- Information on relevant experts on various topics and how to best contact each expert.

- Promotion and training resources on how to use the Knowledge hub, once developed.

- Accessibility to a diverse range of users.

- Collection of spatial data across the province.

- Infrastructure and support to maintain the repository long-term.

Deeper dive into communities of practice:

Further perspectives shared on growing a community of practice around these issues, included considerations for:

- Fostering two-way dialogue between researchers and practitioners to build reciprocal relationships and find synergies within the work.

- Using communities of practice to ensure knowledge retention and transfer, and allow for mentorship

opportunities.

- Supporting and highlighting innovative silviculture champions and changemakers.

- Facilitating the sharing of practitioner knowledge at local scales.

- Online searchable forum for crowd-sourced questions and answers problems or issues regarding innovative silviculture.

- Housing a list of all existing communities of practice to help search and locate related or local communities of practice.

- Growing a community of practice around innovative silviculture, in general, but also consider specific topics, such as:

  - Partial harvest; Fire stewardship

What is a community of practice?

A community of practice refers to a group of people who share a common interest, profession, or passion and engage in collective learning and knowledge-sharing. Members of a community of practice come together to interact, collaborate, and deepen their understanding of a particular area of interest, which might include sharing of skills, techniques, insights, and new approaches. Communities of practice can exist in various settings, including workplaces, professional associations, online forums, or informal gatherings. They play a crucial role in facilitating collaborative learning, problem solving, and the exchange of knowledge gained through experience and practice.

and burning; and,

- Indigenous-led projects or Indigenous partnerships and collaborations.

Trends in research and extension *across* themes

Overall, there were several trends and observations that persisted across all themes (i.e., partial harvest, fire and silviculture, intensive silviculture), including the needs for:

- **Addressing the practitioner-researcher gap, which limits applicability of research outcomes and uptake of innovative practices.**

  - Extension and research can support increasing collaboration, education and exposure between specialists and practitioners to reduce barriers to implementation of research products and that addresses needs

- **Support of new research trials and continue to extend current research trials that can provide insight on emerging novel issues, such as climate impacts.**

  - Research should focus on improving understanding of how different silvicultural treatments and entries benefit multiple values.

  - Ensure preservation and continued monitoring of existing long-term research trial sites.

  - Develop guidance on best practices for monitoring silvicultural treatments for a

diverse set of values.

- **Evaluation of multiple values across forested landscapes to inform their management and monitoring.**

  - Identify non-timber values within forests, such as cultural and spiritual values, carbon, social values, safety, recreation and tourism, wildfire risk, wildlife, water, visuals, local economic impacts from jobs and business within the community.

  - Seek guidance on the ability to quantify multiple values, while recognizing many values cannot, and will not, have a monetary value that can be readily compared—some values will be intangible, relationship-based and inherent, but are still high value.

  - Consider the importance of data sovereignty and rights-based frameworks for engaging on values assessments with Indigenous communities and development of monitoring programs for community values.

  - Demonstrate use of multiple values in evaluating impacts and benefits of innovative silvicultural treatments and broader time scales to rationalize longer term pay-offs to decision-makers in terms of forest values that include, and go beyond timber.

- **Increased understanding of technical models to inform forestry decisions.**

  - Mobilize knowledge on model

selection criteria and suitability for different scenarios. Provide clarity and understanding on what questions the model(s) can and cannot answer.

- Support training and education of quantitative analysts whose work is integrated into research projects and informed by the needs of practitioners.
- Improve quality and quantity of baseline data fed into models.

Trends in research and extension *within* themes

We explored more specific ideas in greater detail, using a "marketplace of ideas" approach, through which the group identified 35 knowledge gaps or priority areas across all themes. We note that gaps were initially identified for the three Knowledge Summit themes (partial harvest, intensive silviculture, fire and silviculture); however, participants noted that other important over-arching components were missing. For the exercise, a fourth category of "Other values" was added - their perspectives are captured above in the overarching trends across themes.

Below, we distill each themes' key project ideas and major take-aways, as there was considerable overlap across many priority area discussions and distinct trends in desired outcomes or desired products. A full list of the table topics is located in the Appendix.

PARTIAL HARVEST

Implementation support

- Support opportunities for practitioner and/or operator training, such as those ongoing in Mission, Vancouver Island University and Quesnel; consider standardization of training and certification programs that are accessible and inclusive of marginalized communities and rural populations.

Decision support:

- Improve models to include components such as forest health impacts, understory and overstory interactions, and climate impacts. Increase practitioner understanding of existing models, how they can be used and their limitations, and increase researchers awareness of model needs.
- Provide guidance on partial harvest treatments (what, where, when, how and why) informed by experienced practitioners. Support knowledge transfer between practitioners across career stages to understand local ecological stand development trajectories in response to partial harvest - particularly directed towards practitioners that want to try something new and don't know where to start.
- Improve understanding of economics for machinery and tools needed for partial harvests (e.g., cost, pricing, availability, suitability, etc.).

Knowledge support:

- Increase understanding of partial

harvest impacts (positive and negative) on aspects such as maintaining old growth characteristics, mitigating hydrological impacts from climate change, wildfire risk, and minimizing human access and road densities;

· Increase understanding of how partial harvest impacts forest health and how to mitigate issues such as windthrow, wounding risk, insects and disease;

· Increase understanding of how different partial harvest systems impact different wood products and their value.

INTENSIVE SILVICULTURE

Decision and knowledge support:

· Intensive silviculture discussions were tightly tied to overarching

research and extension needs regarding the evaluation of multiple values, identification of treatments that benefit those values, and guidance on where to apply those treatments.

FIRE AND SILVICULTURE

Implementation support

· Support cross training between wildfire and forestry experts so that wildfire application is informed by forestry objectives, limitations, and practices; support on-the-ground training of practitioners.

Decision support:

· Increase capacity support for the transfer and sharing of Indigenous fire stewardship knowledge into burn plans.

· Support development of provincial guidance for practitioners to know

when and where to apply cultural and prescribed fires, while being intentional about increasing the scale of fire as a tool on the landscape.

· Synthesize and collate knowledge on burn projects to assess objectives, outcomes, locations and methods; synthesize information on fire histories throughout the province, including fire severity, spread,

history, stand types, and species.

Communications support:

· Communicate and engage with the public about the role of fire and burns on the landscape to increase social license for the use of controlled burns; identify effective public messaging depending on different audiences (urban or rural, online or in-person, etc).

PHOTO // **Participants share final thoughts and observations in a closing circle** (Gillian Chow-Fraser)
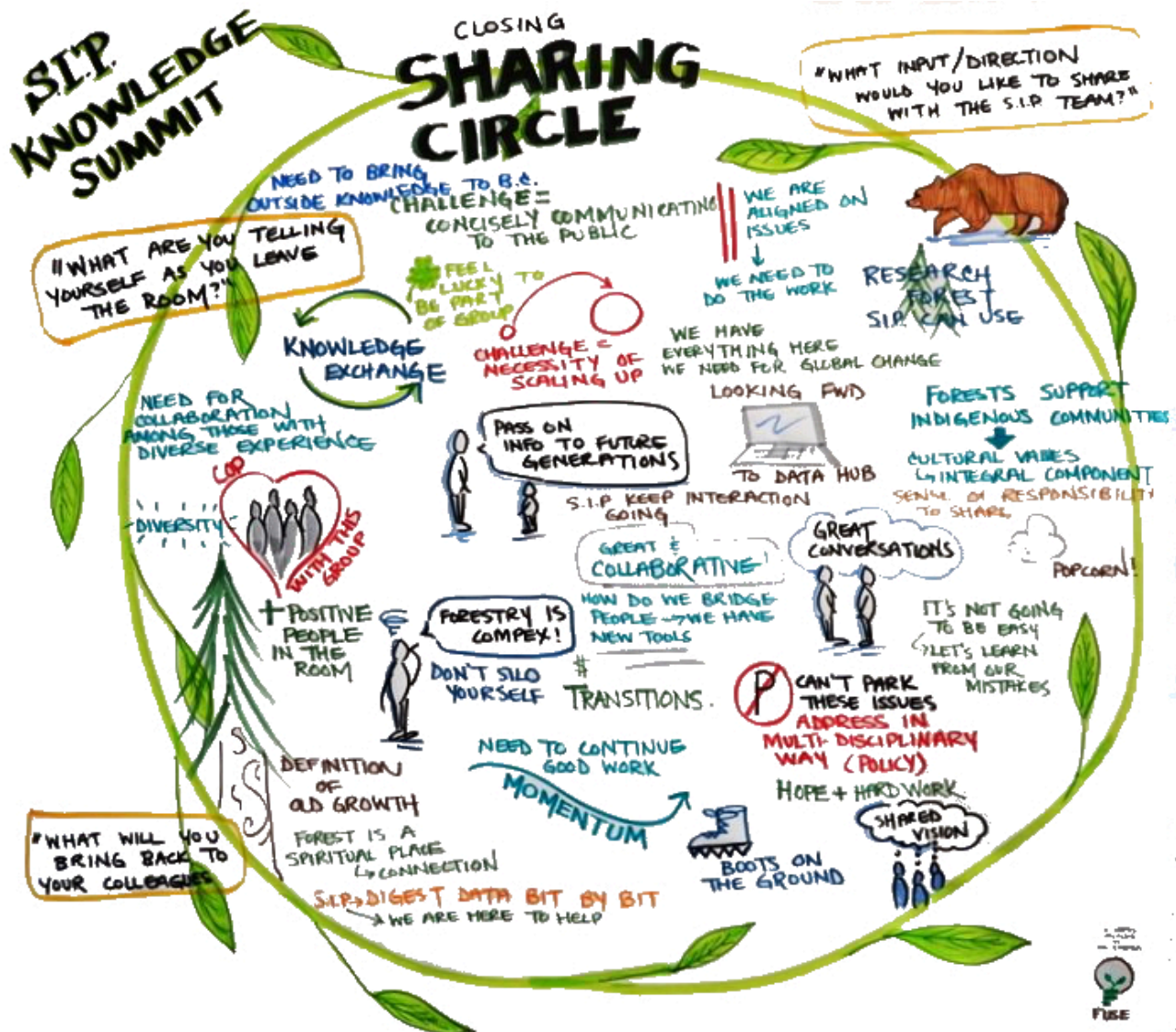
Figure 10. Graphic recording of the Knowledge Summit closing circle. *Illustration by Terra Simieritsch, Fuse Consulting.*

Reflections

We asked participants to complete a survey following the completion of the Knowledge Summit to reflect on their experience. We are extremely grateful that roughly three-quarters of all attendees participated in this post-Summit survey. We heard tremendous support for the Summit and appreciated the opportunity to broaden their networks:

- Nearly all participants rated the Knowledge Summit as "Excellent" (64.4%) or "Very Good" (33.9%)

- Nearly all participants would recommend a SIP-hosted event to a colleague (98.3% would "Likely" or "Very Likely" recommend)

Table 1. Topic ideas from Knowledge Summit participants for one new or existing community of practice they would want to be a part of.

Topic	# supporters
Partial harvest	10
Innovative silviculture	9
Fire (Pyrosilviculture)	7
Research and trials	6
Indigenous-led forest management, collaboration and partnership	5
Modelling	4
Monitoring	3
Forest practitioners	1
Extension	1
Non-timber values	1
Policy	1
Mentorship	1
Old Growth values	1

- Nearly half of participants made 10 or more new connections at the Knowledge Summit (49.1%)

We also asked participants what new communities of practice they'd like to be a part of. The three most popular new communities of practice topics include: partial harvest, innovative silviculture and fire (or pyrosilviculture).

PHOTO // Participants write keywords describing their areas of expertise to help build a Knowledge Summit contact list (Kira Hoffman)

On the Horizon

Following the Knowledge Summit, the SIP team is ensuring a deliberate and thorough review of all knowledge gaps and ideas garnered at the Summit. Ideas are being evaluated for scope, urgency, impact, resource and capacity needs. Some projects may be identified as out of scope for the SIP and some of these projects will be shared with a suitable agency, organization or partner that has the resources or knowledge to carry out the desired project, or support ongoing work in that area, recognizing the importance of these ideas to the innovative silviculture community.

Extension

The identified extension priorities will inform SIP program near-term and long-term objectives, particularly related to the development of communities of practice and a knowledge hub or data repository.

Research

The SIP will use priorities identified through the Knowledge Summit to guide a call for research proposals. At this time, we are pleased to share that the SIP external research program granting process will launch this summer, with project proposal intake closing in the Fall. Successful projects will be able to start by early 2025. The SIP team will share more information on the scope of the research call and details on the application process in the coming months.

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Subscribe for updates from the SIP, new events, and opportunities for engagement! Be the first to receive the latest news from the SIP straight to your inbox. To sign up use the QR code or visit **https://sip.bvcentre.ca**

APPENDIX A

Table 2. "Marketplace of ideas" breakout table topics and summary of discussion. *Important note: the topic list order is randomized and is **not** presented by order of importance.*

#	Topic	Summary
1	**Training for partial cutting for practitioners, foresters, and/or operators**	There is a necessity for training of operators in partial cutting, highlighting a shift from production-focused to value-based forest management, improving safety, and ensuring effective tree selection. Existing initiatives are few and mostly in their early stages, with projects underway in Quesnel, Mission, and VIU aimed at establishing common training standards and certifications, facilitating year-round employment, and minimizing operational incidents. Success involves integrating these programs into broader educational frameworks and engaging with Indigenous communities
2	**Partial harvesting systems based on BEC zones and silvics across province**	Focus on improving partial harvesting systems across different BEC zones in the province. Forest practitioners need more decision support through better knowledge transfer, including Indigenous Knowledge. Success is the creation of a central repository of BC silviculture knowledge, with comprehensive guides and online forums to facilitate knowledge sharing, especially to help new practitioners integrate ecological conditions and operational experiences into their practices.
3	**Stocking standards needs for multiple values, like deciduous trees and resilience**	There is a need for flexible stocking standards to achieve landscape-level objectives for multiple values, moving away from timber-focused standards. Success entails implementing adaptive management frameworks, with rigorous monitoring and incentives for licensees, while incorporating Indigenous perspectives and considering region-specific needs.
4	**How can partial harvest reduce or affect wildfire risk?**	Partial harvesting may reduce wildfire risk and protect diverse forest values. There is a need for clarity on prescription to achieve wildfire risk reduction and modified stocking standards, conducting collaborative projects across the province to assess effectiveness, and analyzing retrospective data from old partial cuts that have been impacted by wildfires. Initial steps include forming collaborative working groups, identifying research gaps, and designing experiments to evaluate the economic and ecological viability of partial cutting in various regions.

#	Topic	Summary
5	New models to forecast outcomes for multiple values	There is a need to advance models to forecast outcomes beyond timber values to support informed decision-making. Models should consider a broad spectrum of values including Indigenous and ecosystem values. Success entails maximizing the potential of existing tools like TASS, making them more accessible and inclusive. Initial steps involve consulting with experts, identifying existing models' capabilities, and outreach to practitioners to understand their needs and ongoing initiatives.
6	Economic Analysis for Range of new values to inform risk/reward	Economic analysis is needed to inform decision-making beyond timber values. Success entails achieving a balance of values, with a clear understanding of local objectives and the recognition of the value of all fiber, not just sawlogs, in forest management. Initial steps involve engaging with economists to quantify values, identifying opportunities in community forests and woodlots, and exploring stocking standards for different treatments.
7	Where and when to apply fire treatments? What works best where?	It is important to incorporate fire treatments into silviculture practices for eco-cultural restoration, fuels management, and risk reduction, especially considering Indigenous food sovereignty and economic opportunities. Success involves Indigenous-led burns, capacity building for prescribed burn associations, and planning for pyrosilvicultural prescriptions based on ecosystem types.
8	What tools exist or could be developed to incentivize or compel more innovative silviculture practices to be used?	Systemic changes in forest management practices need to match evolving social values, with innovative practices requiring motivation for wider adoption and systemic barriers addressed and resolved. Project ideas include documenting efforts to motivate licensees, identifying barriers, fostering partnerships with Indigenous nations, and conducting cost accounting for innovative practices.
9	Cross training of fire and forestry practitioners	There is a strong need for increasing competency in fire and forestry, standardized practices and coordinated training. Success involves a larger pool of competent practitioners with measurable standards, alongside initiatives like prescribed fire pilot programs and regional knowledge exchange hubs.

#	Topic	Summary
10	What is the best way to reach the public on prescribed/cultural burning?	Engaging the public on prescribed/cultural burning for inclusive decision-making, trust-building, and managing trade-offs is critically important. Success involves in-depth media coverage, positive public feedback, and the celebration of Indigenous rights to cultural burns, alongside tailored strategies for different audiences and regions, educational efforts for the media, and identifying community champions.
11	Spatialized Inventory & Data	The discussion emphasized the importance of spatialized inventory and data for accurate operational planning, highlighting challenges with current methods and the need for improved accuracy and precision. More understanding of spatial data would allow for more collaborative studies in existing plots where there is existing data. There is a need for spatial mapping of location of trials and different prescriptions.
12	What data and tools are needed to quantify non-timber values? What about values that can't be quantified, assigned & valved?	There are challenges with quantifying non-timber values and there is a need for holistic approaches to understand ecosystem health and interconnectedness. Emphasis must be placed on informing policy, understanding relationships between ecosystem components, and advocating for systemic change towards rights-based frameworks. Project ideas include alternative quantification methods, rights-based tools, and ecosystem mapping, with the first steps involving relationship-building, policy reviews, and identifying existing data and missing stakeholders.
13	Partial harvest stocking standards given climate constraints	The discussion highlighted the need to adapt stocking standards to partial harvest regimes amidst climate constraints, emphasizing the importance of clarity on objectives and flexibility in standards. Current efforts include regional silviculture working groups and climate-informed species selection tools, but there's a recognition of incomplete data and the need for ongoing monitoring and collaboration to fill knowledge gaps and prioritize high-risk areas for intervention.
14	How do you optimize the use of fiber from various treatments over a rotation?	The use of fiber can be optimized from various forestry treatments over a rotation to create higher value products, increase employment, and support rural economies. Currently, the industry is primarily sawlog-centric, but there's a need to shift towards utilizing the entire tree and exploring new opportunities like biochar and pellets, while also considering factors like carbon benefits and economic viability. Success entails creating higher value products from lower value logs, increasing jobs, and aligning fiber supply with economic considerations, requiring collaboration with the province and investment in future facilities.

#	Topic	Summary
15	**Stand dynamics, over story, understory interactions with modelling**	There is a need to improve understanding of stand dynamics and the interaction between overstory and understory in partial harvest treatments to achieve objectives, adapt to climate change, and ensure forest health. Success entails continuous monitoring, development of models that simulate species-level dynamics, and collaboration between researchers and practitioners to gather and analyze data effectively. Project ideas include inventorying existing trials, establishing new trials for emerging questions, and developing decision support tools accessible to practitioners.
16	**Learning from past intensive silviculture and building on it**	Currently, there's a lack of centralized information and organization, with existing extension notes being incomplete and not easily accessible. Success entails easily accessible information, such as an inventory of extension notes and trials, presented in a digestible format, along with interactive maps and workshops to facilitate networking and knowledge sharing. The first steps involve determining who will steward the data, encouraging research sharing, and evaluating existing projects to identify gaps and opportunities for future initiatives.
17	**Unintended risks of partial cutting to windthrow, growing stock (stem disease, mistletoe etc), wounding decay etc.**	There is a need to recognize and mitigate risks associated with partial harvesting, such as windthrow, stem damage, root rot expansion, and insect infestations. Currently, there is a lack of comprehensive planning tools and accessible information to identify and address these risks effectively. Success would involve the development of planning tools and guidance, increased collaboration between experts and practitioners, and a cultural shift towards more hands-on supervision during logging operations. Project ideas include compiling research on impacts, updating guidebooks with a climate change lens, and conducting research on specific issues like stem cankers and rusts. The first steps involve updating existing guidebooks, assembling accessible information, and staying informed about emerging issues like swiss needle cast.
18	**Outcomes of broadcast burning, cultural and prescribed fires**	There is a need to be researching and monitoring the outcomes of broadcast burning, cultural, and prescribed fires to inform adaptive management and evaluate project success. Practitioners should have access to previous monitoring results, an open-access database, and better integration of traditional ecological knowledge with western science. Project ideas include creating an open-access database, using community forests for fire effects monitoring, and engaging with Indigenous nations to determine culturally appropriate monitoring protocols.

#	Topic	Summary
19	**Adaptive management for long-term monitoring**	There is a need for long-term monitoring in partial harvest practices using adaptive management frameworks. Standardizing protocols, coordinating monitoring efforts, engaging Indigenous nations, and publicly reporting outcomes are a priority. Project ideas include database creation for data sharing, training for capacity building, and incorporating monitoring into forest management plans.
20	**Risk management of doing or not doing fire**	It is important to manage the risks associated with both conducting and not conducting controlled burns, aiming to minimize the potential for future severe wildfires. Success involves increased utilization of cultural burns, reduced high-intensity burns emitting smoke, and improved capacity building for fire management. Proposed projects include training programs, public education initiatives, and cooperative projects with Indigenous communities, spanning various regions and focusing on proactive measures at the wildland-urban interface and protected areas.
21	**Guidelines and economic analysis of silviculture practices to reduce fuel loads**	It is important to consider expanding appraisal for fuel reduction, mapping fire risk areas, developing landscape-level fire plans, and ensuring each district has a wildfire and fuel reduction plan. Project ideas include quantifying biomass supply, conducting economic analyses of the supply chain, identifying priority areas for fuel reduction treatments, and monitoring treatment areas. First steps involve continued funding for ongoing efforts, initiating trials of different methods, collating data on past successes and failures, and forming larger networks or working groups to address barriers and engage stakeholders.
22	**How to build communities of practice**	The focus must be sustaining and transferring generational knowledge while fostering inclusivity and collaboration across different sectors. Current initiatives include regional silviculture committees, joint working groups, academic programs, and various community-based efforts. Success involves establishing partnerships, fostering high trust among stakeholders, and developing known training pathways. Project ideas include mapping existing communities of practice, collaborating with regulators, and documenting regional challenges and gaps. The first steps include co-hosting a data hub, creating a list/forum of contacts, and forming regional committees to synthesize existing information.

#	Topic	Summary
23	Which actions benefit which values and how do we measure them over time? How do you navigate trade-offs?	Current initiatives include various research projects, cultural plant ecosystems, and forest landscape planning efforts. Success involves respecting risk thresholds for certain values, establishing monitoring plans, and developing adaptive management strategies. Project ideas include conducting a meta-analysis of existing literature, developing prescriptions based on research findings, and piloting operations of adaptive management approaches.
24	Economics of different machinery and tools	Understanding the economics of different machinery will enable innovative silviculture practices, which are currently hindered by equipment setups designed for clearcutting. There needs to be equipment available and operators for innovative practices, diversity of equipment across regions, and enough operational trials to gather cost data. The first steps involve providing guidance to contractors, standardizing data collection, and disseminating information to communities of practice. Exploring practices from other jurisdictions could provide valuable insights.
25	How can partial harvest affect the forest capacity to better the negative hydrological effects of climate change? E.g. snowpack, glacial retreat, extreme weather etc.	Understanding the impact of partial harvest on hydrology is crucial due to widespread issues of low stream flow affecting fish habitat, environmental needs, and drinking water. There needs to be support for increased understanding of the effects of partial harvest on hydrology, implementation of restoration projects, and development of best management practices for hydrologic resilience. Key steps include conducting meta-analyses, installing additional hydrological stations, and partnering with practitioners of partial harvesting.
26	The role of partial harvesting to accelerate development of old-growth characteristics	It needs to be determined if and how partial cutting can accelerate the development of old-growth characteristics to address loss of old growth in many ecosystems and understanding how to recruit them, considering factors like contiguous distribution. Success involves retaining big trees to recruit oldness, setting targets for attribute density post-harvest, and implementing trials across multiple ecosystems to monitor attribute development. The first steps include examining legacy silvicultural systems trials for attributes documentation, updating literature reviews, and defining attributes of old growth by ecosystem.

#	Topic	Summary
27	How to manage or minimize human access and road densities using partial harvest	There are negative impacts of roads on various values. Success involves having higher quality, well-designed roads with less negative impact, effective partial harvest programs without increasing existing roads, and collaborative planning for both future and existing roads. Project ideas include determining primary users of existing roads, conducting cost-benefit analyses, studying predator-prey interactions on roads, and exploring new technologies/strategies to reduce the need for roads.
28	Intensive silviculture: where on landscape and what values	Intensive silviculture is crucial for ensuring future stability in cultural, environmental, social, and economic values, aligning with the seven-generation perspective. There must be integration into policy and community buy-in. The use of intensive silviculture will depend on the objectives determined based on identified community values.
29	Stand dynamics and growth models for multi-species and/or multi-genetic worth standards and decision tools	Management tools for complex stands must improve, particularly those involving multi-species. Current efforts include the development of tree-level models like TASS and trait-based models such as LandR. Success entails providing practitioners with user-friendly tools for scenario analysis, increasing quantitative skill sets in forestry, and fostering collaboration between research and practitioners to update and refine existing models.
30	Training a new generation of fire practitioners and increasing capacity and depth of knowledge, including Indigenous Knowledge	Improved training for fire practitioners is needed to mitigate risks and liabilities, and ensure a depth of knowledge that's been lost over time. Success involves standardized training curricula, accessible training opportunities, and the integration of fire management into forest management processes, all while respecting Indigenous fire stewardship knowledge and fostering cross-community collaboration.
31	Explore partial harvesting and carbon markets to offset the increased costs and reduced revenue	Carbon markets offer a means to finance better forest management practices. Success entails continuous verification and diversifying economic opportunities beyond carbon revenue. Project ideas include gathering learnings from existing projects, aggregating activities within regions for economies of scale, and measuring carbon effectively, especially in soil.

#	Topic	Summary
32	**Determining what and whose values are you burning for and how to define success**	Fire management values must be identified, prioritized, and communicated effectively for successful implementation. Success involves region-based committees collaborating to prioritize projects, reflecting vision and values in landscape-level plans, and coordinating across administrative boundaries. Project ideas include consolidating spatial databases to reflect all values, building frameworks to assess value outcomes, and increasing community capacity through education and outreach.
33	**What are the specific prescriptions required to enhance resiliency to wildfire of different stand types in different ecosystems?**	Practitioners need to consider how to reduce fire intensity and spread, protect communities and landscape values, and promote culturally important species. Success entails flexible stocking standards, empowering Indigenous communities to burn safely, identifying and removing barriers, and coordinating with the government.
34	**Forest practitioner training in silviculture systems**	There is a lack of silviculture training for existing practitioners, leading to gaps between education and practical forestry experience. Success would involve more co-ops, workshops, and training opportunities focused on partial cutting systems, along with the development of regionally-based modules and a new silviculture systems handbook with flexible case studies.
35	**Can a bioeconomy be supplied via "waste", low value wood?**	Neglecting low-value wood or residues impacts the bottom line and silviculture treatments must consider non-merchantable wood products. Success involves having a data toolbox to inform decision-making on the value of wood products in partial harvesting systems and better understanding how partial harvest affects wood quality. Initial steps include showcasing existing projects and quantifying the impacts of partial harvesting on wood quality in long-term trials.

APPENDIX B

About the Silviculture Innovation Program (SIP)

Al Gorley and Garry Merkel released "A New Future for Old Forests" in 2020, which was the result of their independent strategic review of old growth forest management in the province. The review involved engaging and listening to British Columbians on how they value old forests, and how they should be managed. The recommendations in this strategic report were shaped by the recognition that society is undergoing a paradigm shift in its relationship with the environment, and the way society expects our old forests to be managed.

The BC government accepted the report, and committed to the implementation of all its recommendations. One such recommendation called for the creation of a program that supports broad scale collaboration to develop and implement innovative silvicultural systems that maintain or enhance old forest values. In March of 2023, $10 million in funds were provided to the Bulkley Valley Research Centre (BVRC), which established the Silviculture Innovation Program (SIP) in April 2023.

The vision for the Silviculture Innovation Program (SIP) is that innovative silvicultural systems are applied widely across British Columbia's forested ecosystems for the stewardship of multiple values. The SIP will meet this goal by expanding knowledge through applied and operational research and mobilizing knowledge through extension.

Within research and extension, we have identified four areas to focus our efforts:

1. **Gap Analysis:** Identify priority areas by assessing and building on the current state of Indigenous and western knowledge across BC, and understanding the needs of the forest management community.

2. **Co-create Knowledge:** Fill critical knowledge gaps by focusing on collaboration, leveraging different forms of knowledge, expertise and practice across diverse communities.

3. **Extend Current Information:** Share existing knowledge from Indigenous and western perspectives by centering the reciprocal nature of knowledge exchange and maintaining flexibility and adaptability.

4. **Build Long-term Commitment:** Promote the operational implementation of innovative silviculture across BC by maintaining open dialogue with practitioners, Indigenous communities and leadership, decision- and policy-makers.

The Knowledge Summit addressed the first area of focus for the SIP, carrying out a gap analysis, to understand the needs of the community and what they need to implement innovative silviculture practices.

The Bulkley Valley Research Centre is a policy neutral non-profit and it is outside the scope of the SIP to engage in policy recommendations. However, the SIP is committed to developing open dialogue with policy makers within government to mobilize knowledge into action to inform policy, thereby promoting the operational implementation of innovative silviculture across BC.

Silviculture Innovation Program

Bulkley Valley
Research Centre

Bulkley Valley **Research Centre**