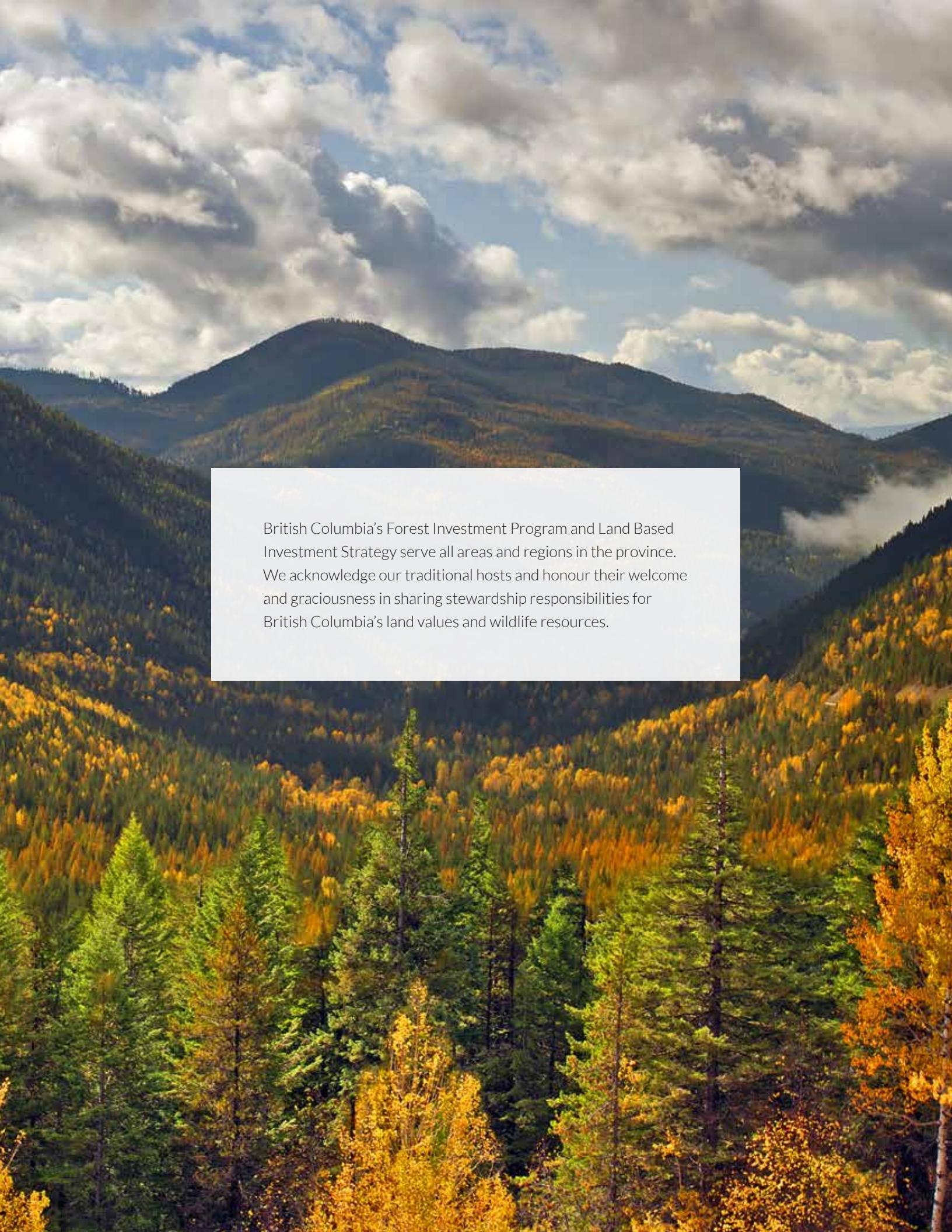




**FOREST
INVESTMENT
& REPORTING
BRANCH**

STATE OF FOREST AND LAND-BASED INVESTMENT 2021-2022 ANNUAL REPORT



British Columbia's Forest Investment Program and Land Based Investment Strategy serve all areas and regions in the province. We acknowledge our traditional hosts and honour their welcome and graciousness in sharing stewardship responsibilities for British Columbia's land values and wildlife resources.

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FOREST AND LAND-BASED INVESTMENT OVERVIEW

Purpose

The Ministry of Forests¹ forest and land-based investment provides strategic funding for land-based investments and aligns the targets and outputs for eligible activities with Government’s goals and objectives. Investments in forest economies and environmental stewardship activities are essential to the ministry’s mandate and support the sustainable management of key environmental values. Investment in a broad range of on-the-ground activities strengthens rural communities and protects the value of current and future natural resources.

Land Based Investment Strategy (LBIS) guides ongoing resource investments and short-term targeted investments in the province’s natural resources to achieve environmental sustainability and economic prosperity. The effective and efficient delivery of this investment strategy is providing economic and social benefits to British Columbians through increased timber supply, enhanced forest and range values, greater wildlife biodiversity and more recreational opportunities. In addition, these investments can increase carbon sequestration and

mitigate the impacts of climate change on our forests, water and wildlife.

The Forest Carbon Initiative (FCI) was launched in 2017 by the Climate Change and Integrated Investment Branch of the Office of the Chief Forester (OCF). FCI aims to reduce emissions, sequester carbon, and create jobs across rural BC.

Prior to April 1, 2022, the administration of LBIS was coordinated by the Ministry of Forests, Lands and Natural Resource Operations and Rural Development Resource Planning and Assessment Branch within the Resource Stewardship Division. After April 2022, Forest Investment and Reporting Branch (FIRB), the newly established branch under OCF, will continuously partner with the federal government, BC Timber Sales, First Nations, ministry staff, and other stakeholders to deliver both LBIS and FCI projects. The successful delivery will enhance ecological resilience, mitigate climate change, and support the well-being of all British Columbia.

Acknowledgments

This annual report was prepared by the Forest Investment and Reporting Branch. Support from other professionals in the Ministry of Forests, Ministry of Water, Land and Resource Stewardship, Ministry of Environment and Climate Change Strategy, and Forest Enhancement Society of BC was received to improve readability and information accuracy. Photos were provided by staff across ministries.

¹ On April 1, 2022, the Ministry of Forests, Lands and Natural Resource Operations and Rural Development was reorganized. Part of this ministry restructuring is the just-named Ministry of Forests.

Fiscal year objectives

Funding priorities are determined annually and are informed by the strategic direction provided by existing ministry commitments, including the ministry's Service Plan goals and objectives, the ministry's Mandate and Road Map, and other specific government commitments. In 2021-2022, these priorities included:

- Working with communities and industry to mitigate climate change risks, including wildfire, flooding and extreme heat, by expanding investments in reforestation and forest rehabilitation
- Working with the Ministry of Indigenous Relations and Reconciliation, First Nations and communities to modernize land use planning and facilitate reconciliation with Indigenous Peoples
- Collaborating with stakeholders and Indigenous Peoples to develop short- and long-term strategies to expand the depth and innovation of sustainable natural resources conservation to enhance the well-being of all British Columbians without compromising the well-being of future generations

Each year, LBIS re-evaluates investment criteria to ensure the program is effectively meeting the

shifting requirements of the province's land base, wildlife and communities. Funds are reallocated as needed to ensure priorities are addressed and that LBIS is responding to emerging challenges. In the 2021-2022 fiscal year, LBIS allocated \$70.8 million across 18 investment categories to deliver hundreds of on-the-ground activities. See the appendix for allocations and a summary of spending.

FCI was launched in 2017 as a key component of B.C.'s commitment to acting on climate change mitigation. To generate greenhouse gas (GHG) benefits, FCI invests in a range of forest carbon projects across the province, including reforestation, fertilization, fibre utilization, road rehabilitation, and tree improvement. These invested forest management practices can increase carbon sequestration and reduce carbon emissions in B.C.'s forests, which ensure the achievement of provincial and federal climate change mitigation targets.

FCI is supported by funding from the federal government's Low Carbon Economy Leadership Fund (LCELFF) and 2 Billion Trees (2BT). In the 2021-2022 fiscal year, FCI allocated \$38.2 million throughout the province to mitigate climate change. See the appendix for allocations.



Impacts of Forest and Land-Based Investment’s funding investments and alignment with Service Plan goals

The following pages provide a high-level summary of the interconnected impacts of LBIS’s land-based investments, broadly grouped in alignment with the ministry’s *2021-2022 to 2023-2024 Service Plan* goals of providing economic benefits for all British Columbians, supporting strong partnerships with Indigenous Peoples and ensuring sustainable resource management.

Given that managing B.C.’s diverse and dynamic natural landscape requires a holistic view of land-based investment and habitat stewardship, there is considerable overlap between the initiatives highlighted in this report and the Service Plan goals. Many initiatives, for example, involve partnerships with First Nations communities while also supporting other goals such as increasing timber supply, enhancing community resilience, and protecting wildlife habitat. Similarly, LBIS-funded initiatives to monitor and map the province’s forest inventory are used by decision-makers to make planting decisions, respond to natural disturbances, and manage impacted ecosystems.

Investments are investments in ecosystem resiliency

Some of the expected impacts of climate change include an increase in the frequency and severity of droughts, fires and floods—all of which have a major impact on ecosystems and the communities of people and wildlife that depend on them. In much of B.C., warmer surface temperatures will also significantly affect ecosystems.

For example, within forest ecosystems, warmer temperatures and more extreme weather events will make trees more susceptible to insects and disease. Outbreaks of the western spruce budworm are projected to increase, and other insects, like the white pine terminal weevil, will be able to expand their range. Tent caterpillars, in conjunction with drought, could defoliate aspen-dominated forests and turn forests to grasslands.

More frequent and severe wildfires, a longer wildfire season, greater duration of summer drought, and greater likelihood of floods must all be taken into account when managing forests and landscapes.

As described in this report, forest and land-based investments are helping increase ecosystem resiliency to the effects of climate change. For example, planting trees in areas that have been negatively impacted by fire, drought or insects can help reduce flooding risks. Reforestation also creates habitat to support species; helps sequester carbon and contributes to economic, recreational and cultural values.



ENSURING SUSTAINABLE NATURAL RESOURCE MANAGEMENT

The ministry delivers its stewardship responsibilities in the best interests of B.C.'s citizens. Objectives include protecting wildlife habitat and improving wildlife management, and revitalizing and protecting B.C.'s forests through climate change mitigation and adaptation activities.

Supporting carbon sequestration in forests

Historically, B.C.'s forests have been an important “carbon sink” and sequestered carbon dioxide. However, increasing levels of drought, heat, insect outbreaks and wildfire, have disturbed existing forest structures, leading to greater levels of carbon dioxide emissions and impairing the carbon-offsetting ability of B.C.'s forests.

Planting and fertilization is one strategy for mitigating these impacts, conserving ecosystem integrity and enhancing ecosystem functions. Planting with selected tree seeds based on the standards of Climate-Based Seed Transfer can

improve the resiliency of the planted seedlings to future growing conditions under climate change. Fertilization can enhance tree growth which then increases the amount of sequestered carbon as trees grow and thrive.

In 2021-2022, FCI continued to increase carbon sequestration and emissions reduction through a portfolio of forest carbon projects. The FCI portfolio will contribute to the cumulative GHG emission reduction of 6.3 million tonnes of carbon dioxide equivalent (MtCO₂e) by 2030, 10.6 MtCO₂e by 2050, and 31.5 MtCO₂e by 2080.

In partnership with Forest Enhancement Society of BC (FESBC), FCI-funded projects led by the ministry realized the following achievements in fiscal year 2021-2022:

- More than 35 million trees were planted across an area of approximately 20,000 hectares in the province²
- More than 17,000 hectares of nutrient deficient forests were fertilized across the province
- More than 26,000 hectares of land were surveyed to support future planning

By the end of fiscal year 2021-2022, the total area of nutrient deficient forests fertilized by ministry-led FCI projects has exceeded 63,000 hectares. Such fertilization enhances the growth of the trees fertilized and improves their ability to sequester more carbon. Cumulatively, over 73 million trees have been planted in areas impacted by natural disturbances including wildfire, insects, and other pathogens.

Maximizing fibre use

The provincial government and forestry sector are constantly seeking ways to increase the use of lower-quality fibre during primary harvesting operations, and to replant forest lands damaged by wildfire or insects with tree species with high commercial and ecological values. Various initiatives and partnerships have been implemented to support these opportunities.

BC Timber Sales' [Innovative Timber Sale Licence \(ITSL\)](#) Initiative uses low-quality stands for development and auction. However, when rehabilitation costs are included, some opportunities to use these stands are no longer economic. To sustain

the continuous use of low-quality stands, the Forest Investment and Reporting Branch has partnered with BC Timber Sales to support the ITSL projects through the Forest For Tomorrow (FFT) program.

In 2021-2022, the ITSL program supported the harvesting of low-quality stands that were damaged by wildfire and mountain pine beetle, as well as forest rehabilitation. More than 433,000 cubic metres of fibre were produced through these operations to sustain fibre supply in the market. Meanwhile, the rehabilitated forests will mitigate the provincial midterm timber supply shortage and maintain sustainable forest development.

² This report excludes 2BT planted tree cost recovered

Enhancing and protecting freshwater fish habitat and populations

Water quality

Water quality is vital for ecosystem health. In many areas of B.C., average summer precipitation is decreasing while average annual temperatures across all seasons are rising. Warmer and drier summers lead to the greater likelihood of heat domes and drought, which negatively impact water quality and the health of fish populations. In 2021-2022, LBIS funding was used to monitor several fisher-sensitive watersheds, conserve species of concern and manage sediment.

Other highlights in 2021-2022 include:

- Establishing water quality training hubs across the province
- Quantifying fry emergence stages on the Okanagan Lake foreshore in the spring 2021 to set a baseline for the temperature and spatial distribution of egg deposition
- Processing LiDAR data for Okanagan Lake at five- and 10-centimetre intervals
- Completing the Omineca Road Sedimentation Project – Comprehensive Fisheries Sensitive Watershed effectiveness monitoring

Fish passage

The LBIS-funded Fish Passage Remediation program remediates stream crossings that impede freshwater fish migration. Road stream crossings on fish streams can be barriers to the movement of juvenile and adult fish. Free movement for fish at all life stages is important, allowing them to access appropriate habitats for rearing and spawning.

Most fish passage challenges in B.C. are associated with closed-bottom structures (culverts). Remediating these structures often involves replacing barriers with properly designed embedded structures or open-bottom structures such as bridges. The four-phase delivery of the fish passage program involves fish passage assessments, habitat confirmation, design, and construction to remediate the stream crossing. Direction for the program comes from the Fish Passage Technical Working Group.

Highlights in 2021-2022 include:

- Training First Nations teams to assess stream crossings and confirm habitat
- Updating the Provincial Stream Crossing Inventory System with the latest data to support decision-making and operations to protect fish passage
- Installing a bridge on the Maka-Murray Forest Service Road in Merritt to protect fish passage

 Success Story:

Fraser Lake Fisheries Study

Climate change and recent industrial development in the Nechako Watershed have raised concerns about impacts on fisheries. LBIS funded a study on white sturgeon, burbot (lingcod) and rainbow trout in Fraser Lake to understand the impacts of environmental changes on fish populations in the watershed. The study was initiated in 2021 in partnership with Carrier Sekani Tribal Council, the Nechako White Sturgeon Recovery Initiative, the Freshwater Fisheries Society of BC, BC Parks and the University of Northern BC.

The Fraser Lake Fisheries Study, which extends to 2025, aims to understand the trajectory of water temperature and oxygen conditions under the current and predicted changes, the movement of the studied fish species, and the interactions of fish species with each other. The results will improve regional fisheries biologists' ability to conserve fish species in the Nechako Watershed in the face of environmental changes.

The study outcomes will also be shared with local First Nations and resident anglers. Nadleh Whut'en First Nation and Stelat'en First Nation, as well as recreational anglers and communities around Fraser Lake, will be continuously and proactively engaged through information sharing via multiple platforms. In 2022, a large sign was designed by the Nechako White Sturgeon Recovery Initiative and posted at a location selected by the Nadleh Whut'en First Nation to share information about the study and its impact.



Protecting wildlife habitat and species at risk

B.C.'s diverse landscapes provide critical habitats for wildlife and fish, and support the province's unparalleled biodiversity. However, climate change and anthropogenic activities have impaired many ecosystems in B.C. and reduced available habitat for wildlife and fish. LBIS funding was used to develop and implement timely management practices to protect and sustain wildlife and fish populations.

Species at risk

The effective stewardship of ecosystem habitat and species at risk in B.C. is achieved through collaborations with Environment and Climate Change Canada and the B.C. Ministry of Environment and Climate Change Strategy to create recovery strategies and deliver implementation plans. Data collection and analysis, wildlife and habitat management, and stakeholder engagement are undertaken to assist in the recovery of species designated "threatened" or "endangered."

In 2021-2022, funding was provided to monitor juvenile Nechako White Sturgeon, a critically endangered fish, in the Nechako River and in Fraser Lake.

Using government regulations to protect sensitive habitat

Some wildlife species are sensitive to human activity. The government can use the tools in the Government Actions Regulation (GAR) to legally designate habitat protection for wildlife species identified in the *Forest and Range Practices Act* and prescribe measures to ensure that wildlife habitat and population objectives are achieved.

Highlights in 2021-2022 include:

- Conducting a watershed sensitivity analysis on the Wrede and Swannell rivers to support Fisheries Sensitive Watershed designations
- Conducting redd counts in Williston watershed, supported in kind by ChuCho Environmental with the Tsay Keh Dene Nation, to support future Fisheries Sensitive Watershed designations

Conducting wildlife inventories

The Province collects, stores and provides access to data and information on all wildlife species in B.C., including mammals, birds, amphibians, reptiles, insects and plants, as well as their habitats. A central repository for wildlife species inventory data and information helps facilitate the storage and access to the information required for making informed management decisions and supports improved conservation efforts.

In 2021-2022, LBIS funding was used to support the continuous monitoring and assessment of keystone wildlife species and wildlife with special concerns, including elk, moose, black bears, grizzly bears, mule deer, bighorn sheep and mountain goats.

Highlights in 2021-2022 include:

- Conducting inventory and monitoring of Roosevelt elk in the South Coast region
- Completing a moose inventory assessment and monitoring in multiple management units
- Conducting moose calf monitoring in multiple regions
- Setting up citizen science bumble bee population monitoring in British Columbia
- Assessing harvest sustainability of black bears on Vancouver Island

Monitoring invasive plant species

Invasive species can have significant ecological and economic impacts. Once established, invasive species can disrupt essential ecological functions by reducing soil productivity and biodiversity, and by altering natural fire regimes. Invasive species, like Scotch broom (*Cytisus scoparius*) and Japanese knotweed (*Fallopia japonica*) can also impact human health and safety. LBIS funding was used to monitor and control invasive species to protect ecological integrity, ensure human health and support the growth of species with high commercial and cultural values.

Highlights in 2021-2022 include:

- Completing control measures on 914 priority and regional invasive plant sites for early detection and rapid response
- Establishing aquatic invasive plant inventories on 12 waterbodies
- Completing biocontrol agent dispersal monitoring on 344 target invasive plant sites
- Maintaining agreements with seven First Nations to share invasive species knowledge and build on capacities



Completing habitat projects

One goal of the LBIS is to spatially report on all activities supported by the program. The map below shows the habitat activities that received LBIS funds in the last fiscal year.



Protecting scenic values

The *Forest and Range Practices Act* explicitly identifies the requirement to manage and protect scenic values, and LBIS is entrusted with managing the visual impacts of forestry operations on Crown forest land. Visual quality objectives are established to guide forest management practices to ensure scenic values are maintained. LBIS funding was used to support compliance with visual management objectives and maintain integrity of visual data.

Assessing cumulative impacts

All actions conducted previously, presently and in the future can impact the ecosystem and create compounding effects on it. A landscape-level evaluation can help the government, stakeholders and First Nations identify the cumulative effects of activities and proactively manage projected risks. The province's Cumulative Effects Framework (CEF) was established to provide consistent and systematic procedures to support cumulative effect evaluation. This framework can support transparent reporting on cumulative effects assessment information, identify policy gaps in natural resources management under climate change, and facilitate reconciliation with First Nations by preventing potential infringement on Aboriginal or treaty rights.

LBIS funding was used to support implementing and applying the CEF, with highlights in 2021-2022 including:

- In collaboration with First Nations, delivering training on field monitoring procedures and improved monitoring protocols
- Publishing three CEF Grizzly Bear Current Condition Reports
- Completing draft reporting on old growth and forest biodiversity for the Quesnel, Cariboo-Chilcotin and 100 Mile House districts
- Completing summaries and revisions to Thompson-Okanagan region old growth reports
- Conducting cumulative effects assessment work with the S'ólh Téméxw Stewardship Alliance using the Collaborative Stewardship Framework

Supporting rangelands

Rangelands and ranching are an important part of B.C.'s environment, economy and future. Ranches in B.C. occupy more than five million acres of private land and 21.5 million acres of Crown ranged land. The province's beef industry is estimated to contribute approximately \$600 million annually – or 0.25% – to the provincial GDP. However, climate change and the cumulative effects of anthropogenic activities have produced numerous challenges for B.C.'s farmers, such as wildfire, drought, flooding and ecosystem degradation. LBIS funding has been used to conserve grassland ecosystems to support ranching in B.C.

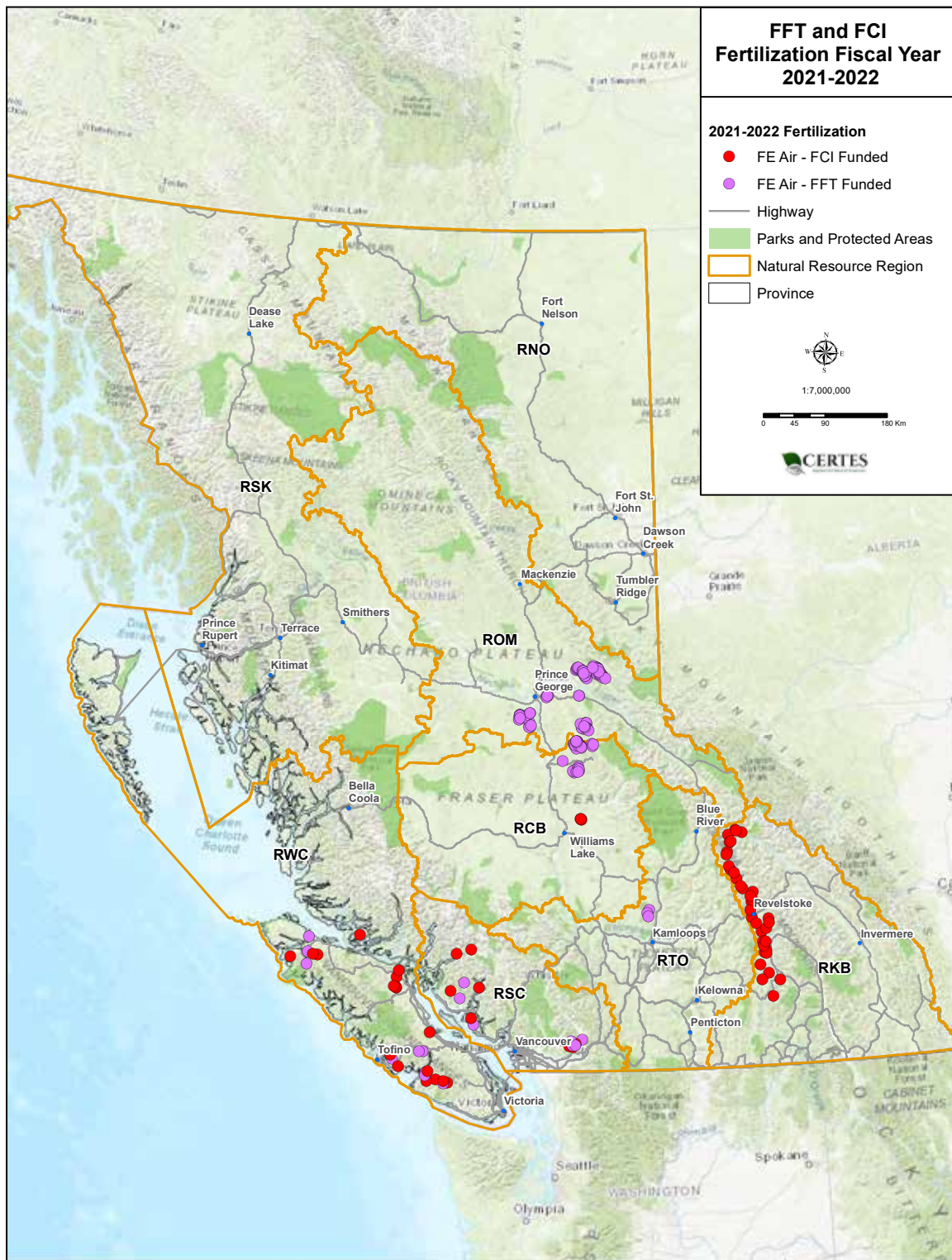
Minimizing damage from floods

Flooding is a common occurrence in B.C., resulting from heavy rain, freshet and storm surge. Climate change has dramatically increased the frequency of extreme weather events and significantly raised flooding risks. The Province aims to reduce flooding risks to protect people, communities and infrastructure through integrated flood hazard management, and reforestation is an important part of this.

Trees can directly intercept rainfall and can increase soil infiltration rates. Tree roots increase the hydraulic roughness of soil by holding back water and slowing the flow during heavy rainfall. Consequently, trees can reduce the amount of runoff and release water more slowly into water bodies. More than 23 million trees and 35 million trees were planted through FFT and FCI, respectively, from 2021 to 2022 in more than 10,000 and 20,000 hectares, respectively, across B.C.



The map below illustrates the locations of all aerial fertilization (FE) projects funded via both FFT and FCI between 2021 and 2022.



 Success Story:

Elaho Valley Post-Wildfire Reforestation

The Elaho forest fire burned approximately 12,495 hectares of forest in the summer of 2015, of which 1,541 hectares were situated in Clendinning Provincial Park (affecting just over 12 per cent of the park). Clendinning Park and the Upper Elaho Conservancy are inaccessible and there has been little to no forest regrowth in many areas.

The traditional territories of the Squamish Nation and Lil'wat Nation overlap with the burned areas of the park. In consultation with BC Parks and the two nations, FCI developed a replanting plan that aligned with the desires, management plans and policies of BC Parks and the nations. The Squamish Nation identified Wild Spirit Places in the vicinity of the proposed project, and the Lil'wat historically used the Elaho River to travel to coastal villages and the river still provides opportunities for vision questing. In the spring of 2022, archeology crews (Ecologic Consulting with representatives from the Squamish Nation and the Lil'wat Nation) completed surveys in the flats at the confluence of Elaho River and Simms Creek. The archaeological assessment ensured that the planned reforestation activities would not negatively impact any unknown values.

A total of 150 hectares were assessed within the park boundaries for plantable ground, and a reforestation plan has been drafted for 77.5 hectares to be planted with more than 150,000 trees in the 2022-2023 fiscal year.



SUPPORTING STRONG PARTNERSHIPS WITH INDIGENOUS PEOPLES

Forests are a source of cultural traditions, spiritual knowledge, traditional foods and revenue for Indigenous communities in B.C. The ministry works with Indigenous governing bodies to ensure that First Nations' interests, values and principles are factored into forestry-related policy and program development that supports First Nations in forest land use planning that is holistic and reflective of their traditional and contemporary knowledge, values and governance systems. The following LBIS-funded initiatives exemplify this commitment.

Collecting data to better manage fish populations

Collecting data on fish populations and river temperature fluctuations enables decision-makers to proactively develop strategies to protect B.C.'s fishery resources and increase the survival rates of threatened fish species.

LBIS funding has been used to monitor water temperature and collect data on diseases that threaten fish. In 2021-2022, funding was used to assess bull trout and steelhead populations, conserve species of special concern, and conduct stock monitoring and management planning.

Some highlights in 2021-2022 include:

- Working with Ktunaxa Nation Council and Freshwater Fisheries Society of BC to conserve burbot in Upper Kootenay watersheds to protect its Indigenous, recreational and ecological values
- In collaboration with Nupqu Resources Ltd., a development corporation of the Ktunaxa Nation Council, tagging more than 400 fish for cutthroat trout population monitoring in Elk Valley

- In partnership with First Nations, conducting stock monitoring and assessments of bull trout, steelhead, sturgeon and cutthroat populations, along with assessing water temperature in their habitats

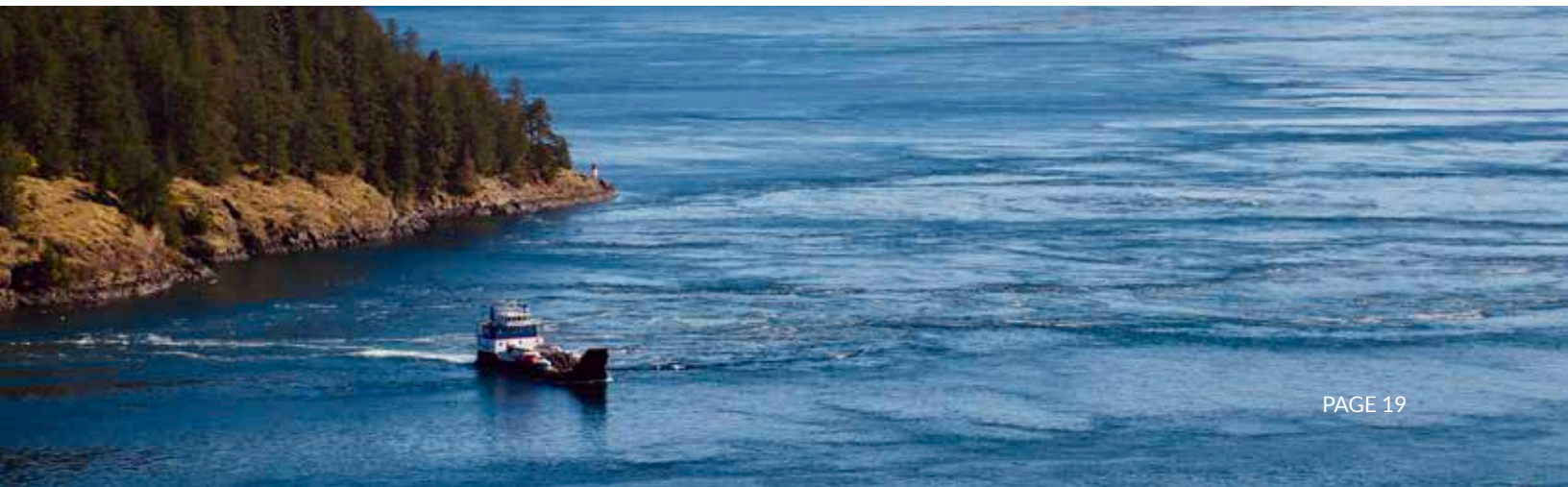
Mapping ecosystems to support conservation initiatives

Terrestrial ecosystem mapping is a way of stratifying the landscape into map units according to ecological features that include climate, physiography, surficial material, bedrock, geology, soil and vegetation. Terrestrial ecosystem mapping and related spatial databases for Biogeoclimatic Ecosystem Classification site series and their qualifiers provide a standardized, ecological framework for informed, strategic land use planning and resource allocation.

In 2021-2022, terrestrial ecosystem mapping activities in the Great Bear Rainforest and Haida Gwaii supported government-to-government commitments for implementing land use objectives for ecosystem integrity and human well-being. The refined data will support conservation initiatives, old growth strategic review and provincial timber supply analysis.

Other highlights in 2021-2022 include:

- Acquiring LiDAR data over the Surf Inlet area and Great Bear Rainforest to enhance understanding of forest structure in both managed and non-managed stands
- Producing LiDAR-derived canopy structural types with field validation across four Nanwakolas Nations' territories as a part of an ongoing research collaboration with the nations
- Conducting sampling to predict the presence of culturally important plants in the Great Bear Rainforest in response to a Land Use Order (Schedule J)
- Developing analytical processes to assign a forest structural stage on terrestrial ecosystem mapping to identify high-priority forests for conservation



Enhancing ecosystem resilience through the cultural use of fire

Partnerships with First Nations are building an understanding of the importance of the traditional and cultural uses of fire, and the benefits of reviving traditional and cultural burning on the land base as part of wildfire prevention and land management. Integration of traditional knowledge into current practices is supported by reintroducing cultural fire across all types of natural landscapes to enable First Nations to care for and protect their lands and communities, in particular from wildfire.

Some highlights from the past year include:

- Carrying out 2,410 hectares of prescribed fire burning and 612 hectares of mechanical treatments to mitigate wildfire risks and conserve critical habitats for red-listed species
- Developing a strategic planning tool in partnership with the First Nations Emergency Services Society of BC to support First Nations in their fire management activities
- Supporting three artistic painting workshops on cultural fire use with Williams Lake First Nations to share traditional ecological knowledge



Success Story:

The Nadina-South Ootsa Road Restoration Project

Road rehabilitation projects aim to restore natural drainage patterns, de-fragment habitats, and contribute to carbon sequestration. However, the cost of these projects can be prohibitive. Cost sharing among interest groups can facilitate the broad-scale implementation of road rehabilitation and enhance landscape-level conservation.

The Forest Investment and Reporting Branch has supported the Nadina-South Ootsa Road Restoration Project since 2020. This project is rehabilitating resource roads and fire guards and planting suitable seedlings, within the priority winter habitat areas, for caribou in the Cheslaslie area near Burns Lake. Many individuals and organizations are involved in this project to ensure its successful implementation, including:

- Cheslatta Carrier Nation
- Habitat Conservation Trust Foundation
- Nadina Natural Resources District staff and Silvicon Services Inc.
- Skeena regional biologists
- Society for Ecosystem Restoration in Northern BC

Through this project, approximately 19 hectares of road and fire guard were rehabilitated in 2021 and an additional 29 hectares were rehabilitated in 2022. Following the planting of 15,000 seedlings in 2022, 18,000 seedlings will be planted in 2023 and 36,000 seedlings are to be planted in 2024.

This project is also supporting the recovery of the caribou population. Approximately one-quarter of the population are calves, which bodes well for continued population growth.



PROVIDING ECONOMIC BENEFITS FOR ALL BRITISH COLUMBIANS

The ministry plays an important role in supporting a healthy and sustainable forest sector economy by improving community resilience to the impacts of natural hazards, minimizing waste and supporting economic diversification and growth. The following initiatives align and overlap with these objectives.

Planting better seeds to grow healthier and more resilient forests

With climate change, drought is predicted to be more frequent, which leads to increased stress on trees and increased susceptibility to insects and pathogens. Investments in tree improvement are one strategy to mitigate this risk.

Tree improvement research in B.C. is conducted by Ministry of Forests Research Program and focuses on producing well-adapted selectively bred seeds or cuttings that can grow into healthy trees. No

genetically modified organisms are used to improve seed and tree performance, and the goal is to maintain the genetic diversity found in natural populations. This program aims to increase forest health, productivity and value by using tree seeds for reforestation that have been bred to grow faster and be more resistant to pests, and by strategically planting seeds or cuttings in areas where they will be able to grow and thrive even under the predicted warmer temperatures that result from climate change.

In 2021-2022, 182 million seedlings (65 percent of the provincial total) were derived from improved seed in B.C. for reforestation. This improved planting stock is expected to provide 20 percent more volume on average and help mitigate the mid- and long-term timber supply shortage in the province, thereby sustaining timber supplies and increasing industry competitiveness. The tree improvement program also contributes to carbon reduction goals by increasing carbon sequestration in young stands, reducing emissions caused by pest attacks and increasing forest resilience.

Monitoring and protecting forest health

The Forest Health Program protects B.C.'s forest resources from the impacts of a wide range of potential threats, including bark beetles, defoliators, pathogens and animal damage, as well as threats from wildfire damage and drought. Risks are detected through aerial surveys and other monitoring activities and funding is provided to proactively treat and control threats.

The annual provincial aerial overview survey is the cornerstone of forest health monitoring in B.C., efficiently recording the location and severity of forest disturbances that can be seen from the air. In 2021-2022, 76 per cent of the forested land base was flown and spatial data was uploaded to the BC Geographic Warehouse by August 2022.

To protect all three regions in the South Area, 68,000 hectares of priority areas were sprayed for western spruce budworm and western hemlock looper. Twenty per cent of mountain pine beetle management funding was awarded to First Nation contractors.



Mapping and modelling forest inventory

A clear understanding of forest inventory is needed to develop forest models that accurately project future yield – the foundation of strategic forest management plans that sustain the long-term benefits of B.C.'s forests. LBIS funding supported the implementation of the 10-year Forest Inventory Strategic Plan by improving and expanding our forest inventory data and validating our forest models.

In 2021-2022:

- 2.1 million hectares of the forested land base was surveyed to update forest inventory maps in Northern Vancouver Island, Lillooet, Cranbrook, Revelstoke and Northeastern B.C.
- 3.6 million hectares of new inventory information was uploaded to the forest cover map
- Ground sampling was conducted across the province to improve the accuracy of forest cover and stand modelling

Generating employment opportunities and economic impact

Forests for Tomorrow and the Forest Carbon Initiative invest in and implement projects to reforest areas impacted by wildfires or insect outbreaks to restore healthy forests and increase carbon sequestration. In 2021-2022, these programs employed 337 workers over the course of the year. In terms of logging value, the Forests for Tomorrow investment in reforestation is predicted to contribute \$17 million to provincial GDP and the Forest Carbon

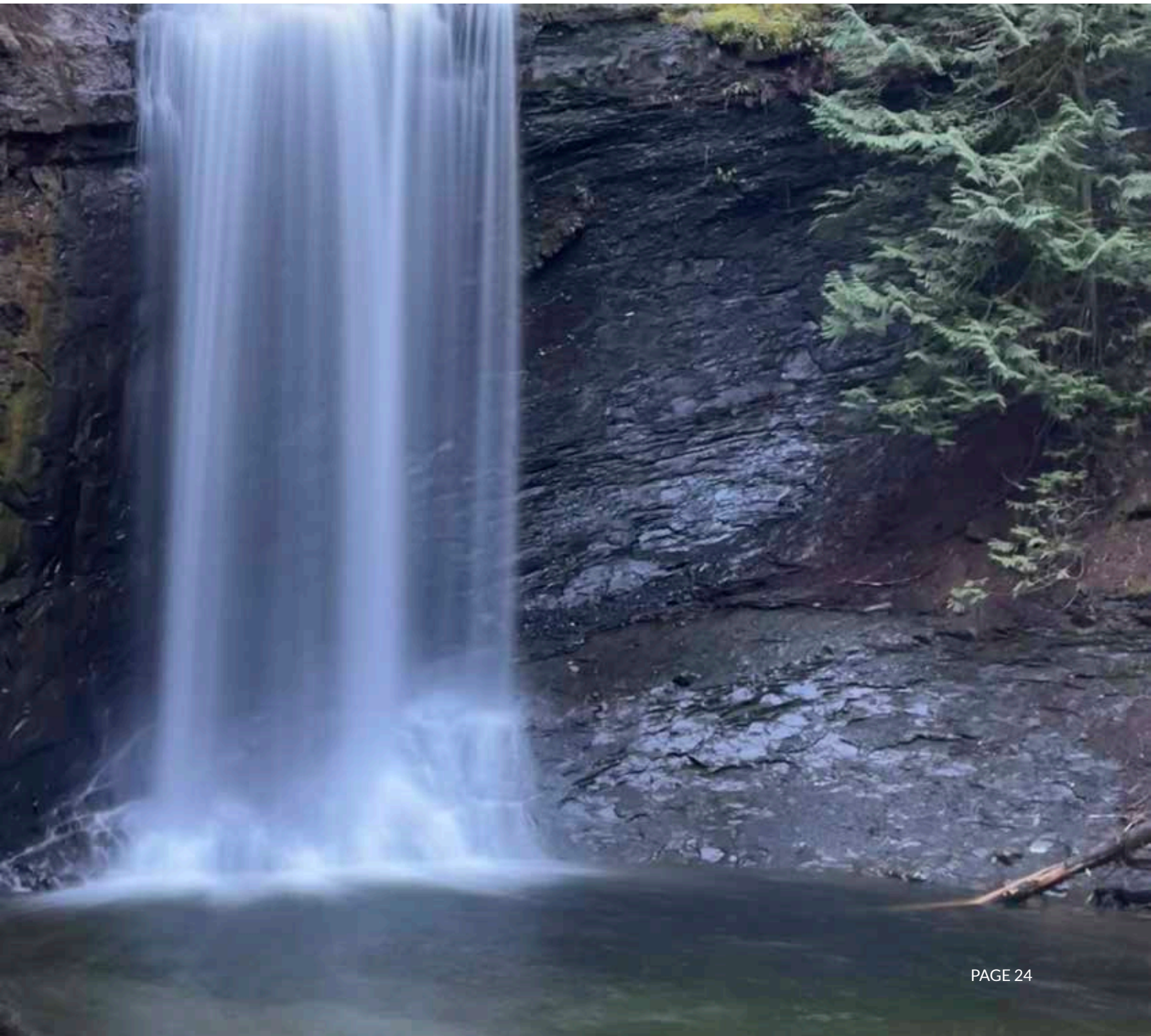
Initiative investment in reforestation is expected to contribute \$13 million.

The Forest Investment and Reporting Branch was created in the Office of the Chief Forester in late 2021 to manage government-funded reforestation programs. The Forest Investment Program combined Forests for Tomorrow, funded by LBIS, and the Forest Carbon Initiative.



LOOKING AHEAD

The impacts of climate change are creating significantly more challenges in managing our province's rich natural resources. Care must be taken to make sure that needed long-term investments are in place that will help mitigate these impacts so that ecosystems will be healthy and thrive. Partnerships with other organizations and leveraging funds will be essential to ensure that LBIS continues to support ministry mandates and service goals – strengthening communities and enhancing resilience to climate change.



APPENDIX

2021-2022 LBIS allocation summary

The 2021-2022 Land Based Investment Strategy allocated \$70.83 million for forest investment, habitat stewardship and wildlife management activities.

Total Allocation

Investment Category	2021-2022 LBIS Allocation
FFT - Current reforestation	\$37,882,000
FFT - Timber supply mitigation	\$8,653,000
Forest health	\$6,250,000
Tree improvement	\$1,923,000
Forest inventory	\$7,817,000
Ecosystem-based management	\$625,000
Visual resource management	\$48,000
Fish passage remediation	\$769,000
Fish inventory	\$481,000
Water quality	\$462,000
Range - Ecosystem restoration	\$192,000
Range - Remediation	\$385,000
Invasive species	\$769,000
Wildlife - Inventory	\$1,442,000
Species at risk	\$961,000
Government actions regulation	\$577,000
Recreation sites and trails	\$731,000
Stewardship and performance	\$864,000
Total	\$70,831,000

2021-2022 LBIS investment category spending summaries

Forests for Tomorrow

The Forests for Tomorrow Program was established in 2005 to respond to the catastrophic wildfires and mountain pine beetle epidemic. For financial reporting, the Timber Supply Mitigation (and current reforestation categories are combined).

Activity	Actual Expenditure
Access	\$98,900
COVID safety expenses	\$259,600
Fertilization	\$6,859,100
Planning (administration, audits, investment initiatives and overhead)	\$4,831,600
Planting	\$16,576,700
Reforestation surveys	\$5,607,000
Seed purchase	\$853,000
Sowing	\$6,561,500
Spacing	\$381,500
Timber Supply Mitigation surveys	\$559,400
Total	\$42,588,300

Forest Inventory

Activity	Allocation
Modern forest management practices such as collecting and maintaining current forest inventories with aerial overview surveys and LiDAR monitoring stand growth and modelling future yield	\$6,964,800

Forest Health

Activity	Actual Expenditure
BTK purchase	\$258,400
Admin and project support	\$70,000
Aerial overview survey	\$1,261,000
Defoliators	\$993,200
Douglas-fir beetle	\$1,426,500
Monitoring	\$187,900
Mountain pine beetle	\$720,200
Spruce beetle	\$864,500
Gypsy moth FI	\$249,500
Total	\$6,031,200

Ecosystem Based Management

Activity	Actual Expenditure
Inventory activities to support ecosystem-based management	\$297,600
Ecosystem-based management	\$321,700
Total	\$619,300

Range: Invasive species

Activity	Actual Expenditure
Biocontrol development	\$360,500
Range – Invasive species	\$592,300
Total	\$952,800

Range: Remediation

Activity	Actual Expenditure
Range remediation practices	\$383,100

Range: Ecosystem restoration

Activity	Actual Expenditure
Range – Ecosystem restoration	\$191,800

Fish Passage Remediation

Activity	Actual Expenditure
BCTS fish passage	\$332,300
Fish passage	\$349,100
Total	\$681,400

Water Quality

Activity	Actual Expenditure
Fisheries sensitive watersheds	\$87,200
Omineca turbidity and sediment	\$13,600
Quantifying the effect of exceeding the FWMT Kokanee threshold on Okanagan Lake	\$21,800
Vaseux Creek Drought Mitigation Feasibility Study	\$15,000
Water quality	\$247,300
Williston drainages watershed sensitivity analysis	\$40,000
Total	\$424,900

Fish Inventory

Activity	Actual Expenditure
2021 Flooding – Fish inventory	\$10,000
Bull trout assessment	\$22,100
Burbot recovery	\$21,600
Cutthroat stock assessment	\$58,500
Fish inventory	\$298,700
Horsefly River juvenile assessment	\$10,000
Kokanee genetics	\$22,100
Kokanee stock assessment	\$3,400
Moberly Lake trout recovery plan and monitoring	\$2,100
Whirling disease response	\$20,100
Total	\$468,600

LBIS Stewardship and Performance

Activity	Actual Expenditure
Project management	\$192,600
Resource stewardship monitoring	\$405,600
RMF – Cumulative effects	\$137,400
Total	\$735,600

Species at Risk

Activity	Actual Expenditure
Fisher management plan & respective implementation plan	\$85,400
Marbled murrelet	\$122,800
Northern goshawk inventory	\$240,000
Northern goshawk inventory – Skeena	\$20,000
Northern goshawk inventory – South coast	\$8,000
Northern goshawk management strategy	\$60,000
Northern leopard frog reintroduction	\$20,100
Provincial spotted owl	\$180,000
Species at risk	\$15,000
SEAR hotspots collaborative management	\$26,400
Vancouver Island marmot captive breeding	\$50,000
White sturgeon density & habitat capacity	\$30,000
Total	\$857,700

Habitat (Government Actions Regulation (GAR))

Activity	Actual Expenditure
Fisheries sensitive watersheds (FSW)	\$24,400
FSW designation & effectiveness monitoring	\$71,100
GAR delivery	\$99,900
Goat winter range effectiveness monitoring	\$81,000
IFS watershed assessment	\$20,000
Land designation gap analysis	\$25,000
Omineca bull trout critical habitat	\$25,000
Omineca mineral licks	\$4,500
Skeena GAR moose UWR designation	\$100,000
South Peace bull trout population monitoring	\$19,900
Warbler WHA effectiveness monitoring program	\$15,000
Williamson's sapsucker	\$25,000
Total	\$510,800

Wildlife Inventory

Activity	Actual Expenditure
Abundance of key furbearers - Omineca	\$23,600
Assessing harvest sustainability of black bears on VI	\$104,100
Big game - Roosevelt elk inventory & monitoring	\$110,100
Big game inventory & monitoring	\$114,900
Elk monitoring	\$8,800
Estimating cougar population size on Northern VI	\$8,000
Moose inventory (SRB) & habitat assessment MU 7-36 & MU 7-35	\$45,600
Mule deer monitoring	\$40,200
Mule deer survey	\$83,700
Mule deer use of fuel treatments	\$30,500
Skeena - Wildlife inventory	\$129,000
SRB moose survey	\$173,700
Strategic ecosystem management	\$69,600

Thompson-Okanagan bighorn sheep and mountain goat monitoring program	\$75,600
Whitetail deer movements	\$29,000
Wild sheep and goat compulsory inspection - M.Ovi surveillance	\$9,400
Wildlife - Inventory	\$181,700
Wood bison - Etthithun Lake herd habitat use & range study	\$60,900
Total	\$1,298,400

Recreation Sites and Trails

Activity by Region	Actual Expenditure
100 Mile - Chilcotin	\$32,300
Cascades	\$32,200
Chilliwack	\$41,300
Columbia - Shuswap	\$34,600
Discovery Coast	\$43,100
Haida Gwaii	\$7,200
Headwaters	\$32,500
Kamloops	\$31,200
Kootenay - Boundary	\$40,000
Nadina - Skeena	\$32,400
North Coast - Kalum - Cassiar	\$33,100
Okanagan	\$36,900
Peace - Fort Nelson	\$32,500
Prince George - Mackenzie	\$32,500
Quesnel - Central Cariboo	\$23,400
Recreation Youth Crews	\$109,600
Rocky Mountain - North	\$20,000
Rocky Mountain - South	\$20,100
Sea to Sky	\$27,700
Sunshine Coast - South Island	\$42,300
Vanderhoof - Fort St. James	\$32,500
Total	\$737,400

Visual Resource Management

Activity	Actual Expenditure
Visuals data maintenance	\$45,000

2021-2022 FCI allocation summary

FCI was conducted in partnership with FESBC. In 2021-2022, the Ministry of Forests contributed \$38.23 million to FCI projects. In addition, approximately \$4.8 million was from FESBC to support FCI-funded projects that were delivered by the Ministry. (More details regarding FESBC contribution can be accessed on their website www.fesbc.ca/reports)

Total Allocation

Forest Carbon Initiative	2021-2022 Allocation
Access management	\$333,300
Administration	\$6,804,900
Fertilization	\$1,447,600
Fertilizer purchase	\$8,833,400
Forest health	\$223,100
Habitat restoration	\$76,600
Monitoring survey	\$131,900
Planting	\$13,545,500
Road rehabilitation	\$652,200
Science & research agenda projects	\$1,169,400
Seedlings	\$4,206,600
Seeds	\$256,200
Tree improvement	\$553,300
Total	\$38,234,000



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