

125 years of forest history told by a Yukon white spruce

The following pages display a showing of a selection of important events in the history of Canada's forests and the Canadian Forest Service (CFS) over the last 125 years. Events above the bar are mostly related to Canadian laws and events, international agreements, forest products, CFS reorganizations, and world events that had an impact on CFS, its purpose and direction. Events below the bar are related to natural disturbances, forestry, as well as CFS-led silviculture initiatives, science, knowledge, research, technology, tools, inventories and other initiatives.

The dates of the timeline are superimposed on a bar cropped from an image of tree rings from an increment core collected in 2023 from a white spruce (*Picea glauca*) tree in the Dawson Creek area, Yukon. White spruce, the arboreal emblem of Manitoba, is widely distributed and found in all Canadian provinces and territories.

The timeline shows decades on the increment core. The distance between years and decades is not uniform as ring widths vary. Each year is defined by the boundary between dark-coloured late wood formed at the end of summer and light-coloured wood formed in the spring of the next year.



The study of tree rings, dendrochronology, provides a wealth of information about forest change. Tree rings not only tell us when a tree was born but also its age, and how fast it grew throughout its lifetime. Calculations of a **Ring Width Index (RWI)**, which removes the effects of tree age and size on growth, can be examined over time, allowing researchers to accurately attribute annual growth changes to annual environmental changes. By matching temporal patterns of variation in the RWI across many trees, we can learn about forest resilience to disturbances, like fire, insect outbreaks and disease epidemics, and better understand the impacts of climate change on forests. CFS developed a database of tree rings collected from Canadian tree species (called CFS-TRenD). Continued analyses of these data will provide important information to sustainably manage forest resources in a time of rapid environmental change.

Below is the entire white spruce increment core used in the timeline (the section in the red box starting in 1890) and its **derived annual RWI graph**. Solid and dotted lines show the yearly and 20-year mean RWI for our white spruce (blue) and the stand mean (black, 17 trees), as well as the average growth (horizontal black line). This graph tells us that:



BETWEEN 1750-1820

There was a slow stand growth likely caused by inter-tree competition for limited resources (e.g., light, water).

BETWEEN 1820-1845

There was a rapid stand growth possibly due to growth after an undocumented spruce beetle outbreak.

BETWEEN 1885-1900

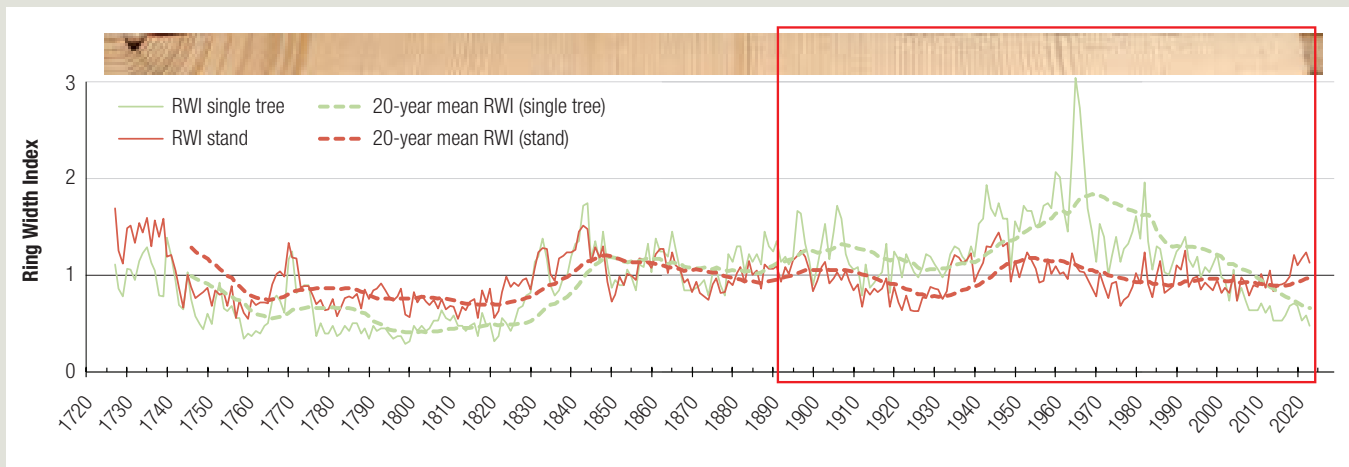
There was an above-average stand growth likely due to favourable weather.

BETWEEN 1935-1950

There was a rapid increase in stand growth of surviving trees after a spruce beetle outbreak (1930s) that killed some trees, opening up the forest.

IN 1970

Although our white spruce showed a gradual decline in growth, possibly due to competition or disease, the stand grew normally responding to small interannual weather fluctuations.



As is the case with tree cores, yearly tree rings of disks or “cookies” cut from large trees can also be labelled and associated with important local, national or international events. Such disks have long been used in displays in museums, universities, institutions and CFS forestry offices, as shown in this picture of the Tree Rings and Timelines of šuučabispauw display, at the Pacific Forestry Centre. This display shows a tree disk collected in British Columbia linking, on the right, important events with yearly tree rings and, on the left, graphs illustrating tree growth, temperature, and CO₂ concentrations for the 520 years of the tree ring record.

Timeline legend



Forest, forestry



Silviculture



Wildland fire



Insects



Diseases



Seeds



Inventories, mapping



Canadian laws and events, and international events and agreements



Forest products



CFS story



Forest, forestry, silviculture and natural disturbances



Science, knowledge, research and initiatives



Technology, tools and inventories



Beginning and end of the 125-year period (1899 to 2024)



Decades

<p>1906: <i>Dominion Forest Reserves Act</i>.</p> <p>1911: <i>Forest Reserves and Parks Act</i>. The Forestry Branch directly administers 6.5 million ha of forestland.</p>	<p>1914-18: World War I (WWI). Canada is involved in home front and overseas.</p> <p>1918-19: Global influenza pandemic.</p>	<p>1929-39: Great Depression, a period of global economic upheaval.</p> <p>1939-45: World War II (WWII). Canada is involved in home front and overseas.</p> <p>1949: <i>Canada Forestry Act</i>. Granting statutory authority forming the Forestry Branch of the Department of Resources and Development.</p>	<p>1960: <i>Department of Forestry Act</i>.</p>	<p>1982: Patriation of Canada's Constitution. Includes the recognition of Aboriginal and treaty rights. Indigenous groups are now recognized as more than stakeholders in resource management.</p> <p>1994: The Montréal Process Working Group forms and develops sustainable forest management criteria and indicators for temperate and boreal forests.</p>	<p>2015: The Truth and Reconciliation Commission Report is released, with 94 Calls to Action.</p> <p>2020-22: Global COVID-19 pandemic.</p>
<p>1913: Forest products labs open for research on pulp and paper and testing wood for aircraft.</p>		<p>1927: Creation of the Pulp and Paper Research Institute of Canada (PAPRICAN).</p>	<p>1966: Forest product labs develop glued-laminated beams and efficient methods for using small logs.</p> <p>1975: PAPRICAN's woodlands research group is disbanded and reborn as the Forest Engineering Research Institute of Canada (FERIC).</p> <p>1979: The western and eastern forest products labs privatize under the name Forintek Canada.</p>		<p>2007: FPInnovations merges FERIC, Forintek and PAPRICAN.</p>
<p>1884: The forestry commission is appointed (forest protection and reproduction on Dominion lands in the west).</p> <p>1899: Establishment of the Department of Interior, Forestry Branch.</p>	<p>1909: Following the North American Conservation Conference, the Commission of Conservation is established to further knowledge of natural resource management.</p>	<p>1923: The Forestry Branch adsorbs the Commission of Conservation and is renamed Dominion Forest Service (DFS).</p> <p>1930: DFS turns over 3.72 million ha of forest reserves to western provinces and reverts to the Forestry Branch. It shifts focus to scientific research in silviculture, experiment stations, forest products, inventories, protection, mensuration and policy development.</p> <p>1950: The Forestry Branch is reorganized into research, operations, and forest products laboratories divisions.</p>	<p>1966: Forestry is a branch of the Department of Forestry and Rural Development and merges (1968) with Fisheries to become the Department of Fisheries and Forestry.</p> <p>1969: The Forestry Branch is renamed Canadian Forestry Service (CFS).</p> <p>1972: CFS becomes part of the Department of Environment, with five forestry centres—Pacific and Yukon, Western and Northern regions, Ontario, Québec, and Atlantic region.</p>	<p>1984: CFS transfers to the Department of Agriculture, then to Environment in 1985.</p> <p>1989: Forestry Canada becomes a full department.</p> <p>1993: The Department of Natural Resources is created, including the CFS.</p>	<p>2007: The Canadian Wood Fibre Centre (CWFC) becomes the sixth CFS research centre.</p>
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<p>1899: Elihu Stewart is appointed Chief Inspector of Timber and Forestry of the new Forestry Branch, initiates a system of fire guarding, expands forest reserves, and starts regulating harvest on Dominion lands.</p> <p>1901: The Forestry Branch Prairie Shelterbelt Tree Planting program starts. The program ended in 2013 after 618 million trees were planted. The Forestry Branch manages about 1.4 million hectares (ha) of western forest (1906), to limit losses by fire and regulate harvest on Dominion lands.</p>	<p>1916: Matheson wildland fire in Ontario, with about 223 to 244 fatalities. It is the second deadliest wildland fire in recorded Canadian history, after the 1825 Miramichi (NB) fire which killed more than 300 people.</p> <p>1919: Bad fire years in Alberta and British Columbia. The Forestry Branch aerial fire patrols spot fires and drop educational leaflets.</p>	<p>1948: Forestry awareness increased, justifying federal tax revenue to fund forestry and leading to provincial Royal Commissions on sustained yield forestry.</p> <p>1950: The Chinchaga/Wisp wildland fire in British Columbia and Alberta burns about 1.5 million ha.</p>	<p>1961: First replicated thinning trials in eastern North America is set up in Green River, New Brunswick (harvested in 2008).</p> <p>1970s-80s: Extensive outbreak of eastern spruce budworm in Eastern Canada.</p>	<p>1982-85: Canadian Council of Forest Ministers forms and develops a framework for provincial-federal cooperation and a strategy to increase timber supply and renewal.</p> <p>1982-87: Forest Resource Management Agreements between provinces and CFS to improve silviculture.</p> <p>1990s: A mountain pine beetle outbreak in British Columbia. In the 2000s, the insect expands beyond its historic range to Alberta.</p>	<p>2023: Canada experiences its most extreme fire season. The total area burned is approximately 17.2 million ha. This area is more than 7 times the 20-year average and double the previous record set in 1989.</p>
<p>For millennia: Indigenous Peoples used Traditional Knowledge of fire to manage the land, until traditional burnings were banned by settler governments (starting in 1874). The reasons for using fire were many, including:</p> <ul style="list-style-type: none">• maintenance of meadows, and making and maintaining trails• burning deadwood and obtaining firewood• opening animal habitat and increasing berry production <p>1912: The first federal forestry lab (entomology) is established on University of New Brunswick campus.</p> <p>1917: Vernon forest insect lab and Petawawa forest experiment station (1918) are established.</p>		<p>1929: Canadian wildland fire research begins at the Petawawa Station.</p> <p>1930s: Silviculture research forests established in New Brunswick (Acadia 1933), Québec (Valcartier 1934), Manitoba (Duck Mountain 1933) and Alberta (Kananaskis 1934).</p> <p>1941-46: Hiatus in research activities during and after WWII.</p>	<p>1953: Joint agreements with industry and provincial forest services in Québec and New Brunswick led to aerial insecticide spray programs to combat spruce budworm infestations.</p> <p>1967: The National Tree Seed Centre is set up to store tree and shrub seeds for research and conservation.</p> <p>1980: The first operational use of <i>Bacillus thuringiensis</i> to fight spruce budworm (also used in the 1990s against the spongy moth).</p>	<p>1995: Traditional Knowledge becomes more accepted and recognized for resource management following the work of the Clayoquot Sound Scientific Panel (British Columbia).</p> <p>1996: Launch of the First Nations Forestry Program to encourage Indigenous participation in the forest economy, superceded by the Aboriginal Forest Initiative (2011) and the Indigenous Forestry Initiative (2017).</p>	<p>2011: New CFS DNA test for the white pine blister rust.</p> <p>2013: CFS develops TreeAzin® to control emerald ash borer.</p> <p>2013-15: CFS scientists author 11 reviews on current and future impacts of climate change and resource development on Canada's boreal forest.</p> <p>2024: Wildfire Resilient Futures Initiative (change in fire occurrence and how to reduce fire risk).</p>
<p>1910: First surveys of Nova Scotia's and British Columbia's (1918) forest resources are completed by the Commission of Conservation.</p> <p>1914-18: After WWI, airplanes are used by the Forestry Branch for wildland fire patrols and preparing sketch maps for forest surveys.</p>		<p>1936: Forest Insect and Disease Survey is initiated (cancelled in 1996), and national forest classification system is devised.</p> <p>1940-45: Scientists develop methods to conduct forest surveys from aerial photographs. Forest survey techniques proved of great value to allies during the war.</p>	<p>1963: The Department of Forestry creates the world's first operational Geographic Information System (Canada GIS) used to collect and analyze data.</p> <p>1968: The Canadian Forest Fire Danger Rating System is created (used nationally and later in the USA and other countries).</p>	<p>1982: The Canadian Interagency Forest Fire Centre is established.</p> <p>1990s: The Canadian Wildland Fire Information System is set up.</p> <p>1996: The Forest Fire Behaviour system is created.</p> <p>2000: Canada's National Forest Inventory and National Information System are established.</p>	<p>2006: Use of the Carbon Budget Model-Canadian Forest Sector (developed in 1992) to report annual greenhouse gas inventories.</p> <p>2011: Development of Enhanced Forest Inventories using LiDAR (led by CWFC).</p> <p>2020-22: Plant Hardiness Zones and Canada's Vegetation Zones updated with recent climate data.</p>
<p>See Sources and information for more detail and references and visit us online at cfs.nrcan.gc.ca/stateoftheforests.</p>					