DEHCHO CLEAN ENERGY PLAN

Part 2: Biomass resource assessment for heat & power use in Dehcho

created for

report by

author

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This report was commissioned from Boke by Turtle Island Innovations to form part of its overall report “Dehcho Clean Energy Plan”, which was created for Big River Services, with funding from Natural Resources Canada (NRCan) through its Clean Energy for Rural and Remote Communities (CERRC) program.

SUMMARY

Every Dehcho First Nation member community has more than enough local wood to meet all its energy needs. Replacing even some of the imported diesel with locally harvested wood will create sustainable, local jobs and keep money in the community.

Biomass (wood) based heating systems are mature, commercially available technologies. They can operate as standalone systems in individual buildings. or as part of a district energy system that can heat multiple buildings or even an entire community.

Governments have consistently expressed interest in helping indigenous communities transition away from diesel and have funded biomass systems in other communities.

Using pellets in these biomass systems is not recommended.

Pellets make sense if there is a nearby sawmill producing hundreds of tonnes of sawdust every year, and if that sawdust can't be used for anything else. A more practical, less expensive, and better solution for Dehcho communities is to store harvested wood as logs and then chip them as needed, typically every week or so.

If a community gets to the point where it has replaced most—or even all—the diesel it's using for heat with locally-sourced wood chips, it can move up to a technology called an Organic Rankine Cycle (ORC) Combined Heat & Power (CHP) system. An ORC converts wood into both heat and electricity.

Like biomass heating systems, ORCs are another mature and readily available technology, with over 2,000 units installed and operating worldwide.

The best local wood to use for fuel is dead standing trees left over after fires.

Forest fires are a big problem in Dehcho. But after the fires are out, the dead standing trees can be a resource, *if they're harvested sustainably*. This report gives suggestions on how sustainable harvesting of dead standing trees can work.

The report uses a new dataset—SCANFI, developed through NRCan—overlaid with fire maps—to identify the burn areas near each community most likely to provide the fuel needed. It combines these two data sources to estimate the fuel available from each burn area and the biomass available locally for each Dehcho First Nation member community.

The report includes maps of the areas around each community, pinpointing recommended locations for in-person ground-truthing of the biomass resources available.

These maps also suggest locations where unburnt wood could be harvested for other local uses in each community.

Replacing diesel with local wood for heat—and eventually for electricity—requires commitment from the community and from leadership to succeed. It is not a quick fix. But it can be a long-term solution.

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1 AREA STUDIED

To estimate the wood that can be harvested from Dehcho territory, it's necessary to define what that territory covers. This isn't as simple as it sounds.

1.1 Dehcho Administrative Region

The Government of the Northwest Territories defines the Dehcho Administrative Region as one of five regions.[1]

Figure 1: Northwest Territories Administrative Regions[2]

[1] Government of Northwest Territories. (n.d.) *Dehcho Region.* Municipality and Community Affairs. https://www.maca.gov.nt.ca/en/dehcho-region.

[2] Map source: Awmcphee. (2019). Dehcho Region. Wikipedia. https://en.wikipedia.org/wiki/Dehcho_Region. This map has been modified by adding the labels for the administrative regions.

The Municipality and Community Affairs department of the Government of the Northwest Territories lists six communities as falling within the Dehcho Administrative Region.

Table 1: Communities listed as within the Dehcho Administrative Region by the Government of the Northwest Territories[3]

community names	
Government of Northwest Territories	*Dehcho First Nations*
Fort Liard	Acho Dene Kue
Fort Simpson	Łíídlįį Kų́ę First Nation & Fort Simpson Métis
Jean Marie River	Tthets'éhk'edelį First Nation
Nahanni Butte	Nahʔą Dehé Dene Band
Sambaa K'e	Sambaa K'e First Nation
Wrigley	Pehdzeh Ki First Nation

1.2 Dehcho Territory

The Dehcho First Nations demarcate Dehcho Territory somewhat differently than does the Government of the Northwest Territories; they include a portion of the South Slave Administrative Region within their territory.

Figure 2: Dehcho Territory as demarcated by the Dehcho First Nations[4]

[3] Sources:

- Government of Northwest Territories. (n.d.) *Dehcho Region.* Municipality and Community Affairs. https://www.maca.gov.nt.ca/en/dehcho-region.
- Dehcho First Nations. (n.d.). *Community.* https://dehcho.org/community/communities/.

[4] Map source: Dehcho First Nations. (n.d.). *Community.* https://dehcho.org/community/communities/.

Statistics Canada's Census demarcations match those of the Dehcho First Nations more closely than those of the Government of the Northwest Territories.

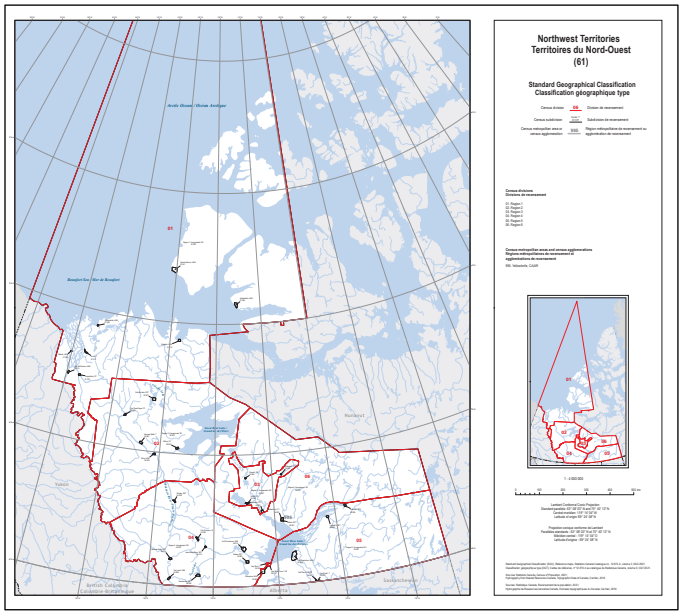

Figure 3: Statistics Canada's Standard Geographical Classification for Northwest Territories[5]

The Dehcho First Nations' demarcations also closely match those of the Northwest Territories (NWT) Surface Rights Board.

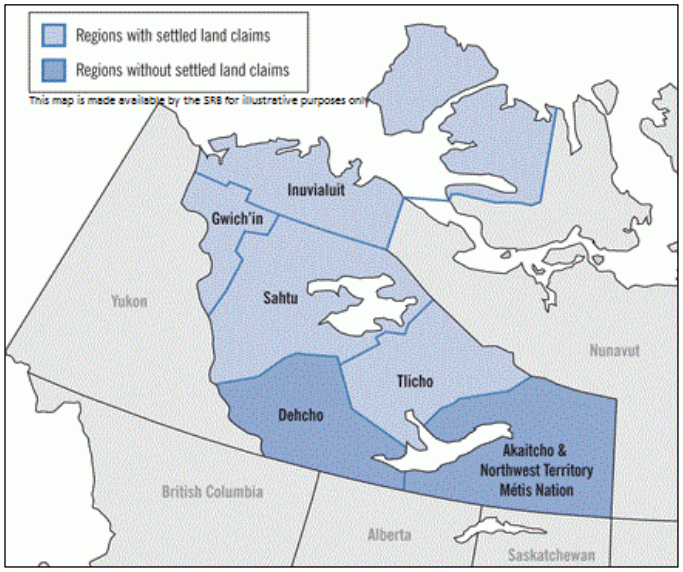

Figure 4: Map on the Northwest Territories (NWT) Surface Rights Board website[6]

[5] Statistics Canda. (2021). *Standard Geographical Classification (SGC) reference maps.* Government of Canada. https://www12.statcan.gc.ca/census-recensement/2021/geo/maps-cartes/referencemaps-cartesdereference/sgc-cgt/map-eng.cfm?SGC=02_22

[6] Northwest Territories (NWT) Surface Rights Board. (n.d.). *About us.* https://nwtsrb.ca/about-us.

Dehcho Ełehéh Ndéh zhíeh Tę k'eh Eghálagenda (the Dehcho Collaborative on Permafrost) uses a very similar demarcation to that of Dehcho First Nations, with the exception that, in the southeast corner (on the bottom right), the demarcation follows the Buffalo River from the south shore of Great Slave Lake to the north edge of Wood Buffalo National Park.

Figure 5: Dehcho territory as demarcated by Dehcho Ełehéh Ndéh zhíeh Tę k'eh Eghálagenda (the Dehcho Collaborative on Permafrost)[7]

Finally, demarcations of the Dehcho Region by the Aurora College Research Institute (Collège Aurora Institute de recherche) appear identical to those of the Dehcho Ełehéh Ndéh zhíeh Tę k'eh Eghálagenda (the Dehcho Collaborative on Permafrost).

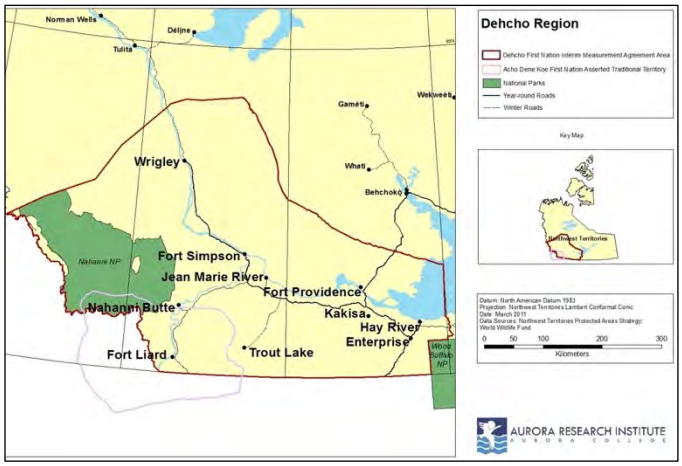

Figure 6: Dehcho Region as demarcated by the Aurora College Research Institute[8]

[7] Map source: Dehcho Ełehéh Ndéh zhíeh Tę k'eh Eghálagenda (Dehcho Collaborative on Permafrost). http://scottycreek.com/DCoP/.

[8] Map source: Aurora College Research Institute (Collège Aurora Institute de recherche). (n.d.). *Dehcho Region.* https://nwtresearch.com/licensing/scientific-research-licence/supporting-information/dehcho-re.

1.3 Implications

The difference between the Government of the Northwest Territories' Dehcho Administrative Region and the Dehcho First Nations' Dehcho Territory may, at first, not seem to be crucial.

However, several Dehcho communities are members of the Dehcho First Nations and within their Dehcho Territory, but are not included in the NWT government's Dehcho Administrative Region:

- Deh Gáh Got'ıę First Nation and the Fort Providence Métis Council, both at Fort Providence
- Ka'a'gee Tu First Nation at Kakisa Lake
- West Point First Nation (Ts'ueh Nda community) at Hay River

Census 2021 from Statistics Canada estimates the population of the Dehcho Administrative Region as 1,956. When these 3 communities are added in, its estimate rises to 2,872—an increase of nearly 50%.

There are two additional communities within the Dehcho Territory as defined by the Dehcho First Nations (but not included as members of Dehcho First Nations):

- Hay River
- Enterprise

Census 2021 estimated these two communities to have a total population of 3,244. If they are added into the population count within the Dehcho Territory (as defined by the Dehcho First Nations), the total population of the Territory is 6,116—more than triple the population of the Government of the Northwest Territories' Dehcho Administrative Region.

Table 2: Populations within Dehcho Territories

community names		***population***
Statistics Canada	*Dehcho First Nations*	
included in Gov't of NWT's Dehcho Administative District		
Fort Liard	Acho Dene Kue	468
Fort Simpson	Łíídlıį Kų́ę First Nation & Fort Simpson Métis	1,100
Jean Marie River	Tthets'éhk'edelı First Nation	63
Nahanni Butte	Nahʔą Dehé Dene Band	81
Sambaa K'e	Sambaa K'e First Nation	97
Wrigley	Pehdzeh Ki First Nation	117
Region 4, Unorganized		30
	subtotal:	*1,956*
additional communities who are members of Dehcho First Nations		
Fort Providence	Deh Gáh Got'ıę First Nation & the Fort Providence Métis Council	618
Kakisa	Ka'a'gee Tu First Nation	39
Hay River Dene 1	West Point First Nation (Ts'ueh Nda community)	259
	subtotal:	*916*
additional communities within Dehcho Territory as demarcated by Dehcho First Nations		
Hay River		3,169
Enterprise		75
	subtotal:	*3,244*
total population within Dehcho as demarcated by the Dehcho First Nations:		***6,116***

Depending on what populations are included (and which are not), Dehcho can be considered to have as little as 5% of the Northwest Territories' population, or as much as 15%.

Perhaps more important than population numbers—for this report—is the fact that the Dehcho Territory, as defined by the Dehcho First Nations, is one of the most heavily treed areas of the Northwest Territories (see the map "Treed area in Northwest Territories", below).

1.4 Report Area

This report follows the demarcations of the Aurora College Research Institute. This is essentially the same as the demarcations of Dehcho First Nations, with the added detail of following the route of the Buffalo River down from Great Slave Lake to the north edge of Wood Buffalo National Park.

Figure 7: NWT & Dehcho area evaluated in this report[9]

[9] All uncredited maps were created by Boke for this report and are attached at the end of this report as an appendix. Full-scale versions (24"x36") are available from Boke.

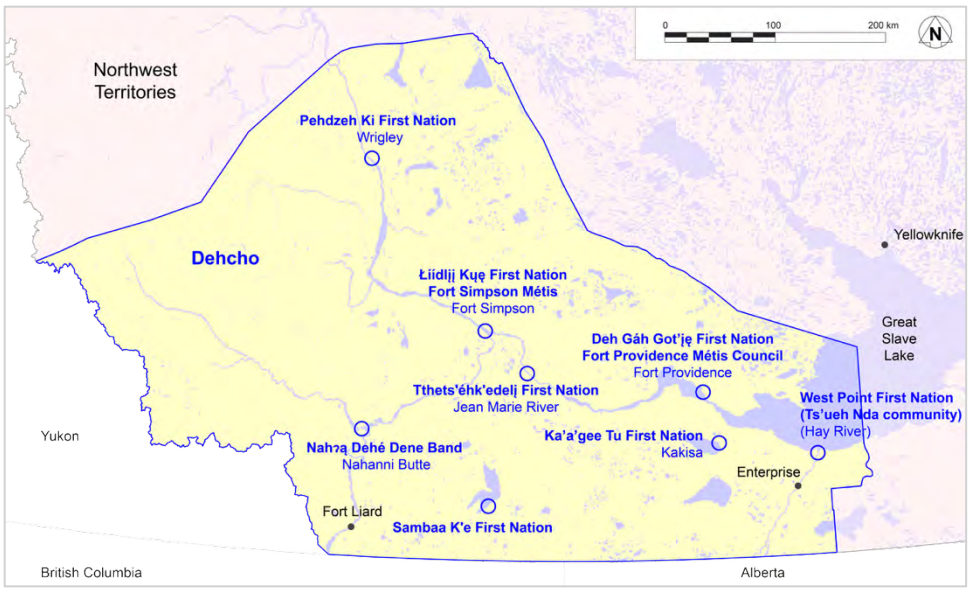

Figure 8: Dehcho area evaluated for this report

1.5 Treed Areas

This report examines the potential of trees (both burnt and unburnt) as local sources for fuel and other local uses for Dehcho First Nations member communities. As a result, it is not focused on all of Dehcho Territory, but only on its treed areas.

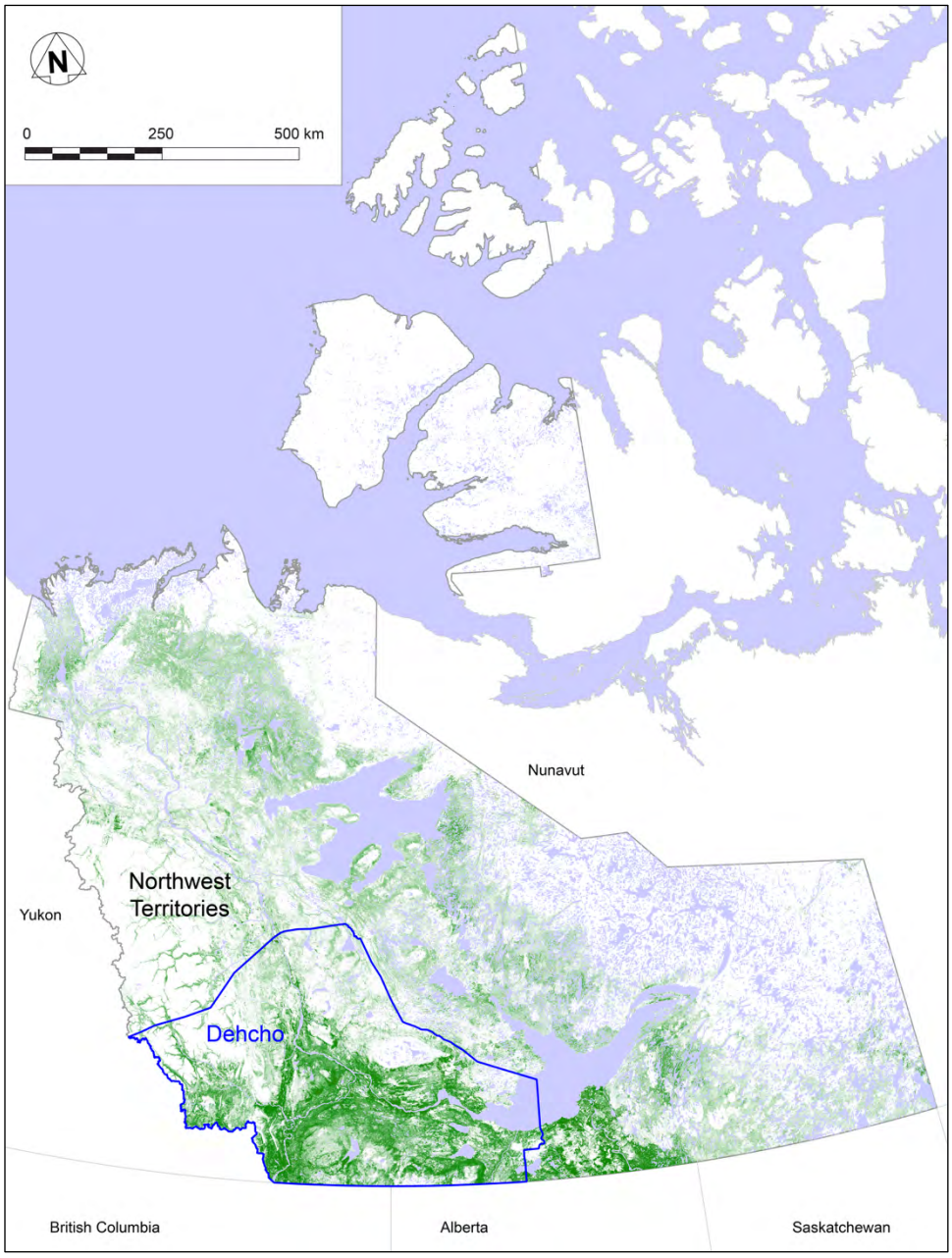

Figure 9: Treed areas in the Northwest Territories[10]

Dehcho has some of the most heavily treed areas in the Northwest Territories.

[10] This map—and numerous other maps in this report—are created, in part, with data from the SCANFI dataset. Background on this dataset can be found in Appendix A: SCANFI Dataset, at the end of this report.

Each member community of the Dehcho First Nations are surrounded by treed areas.

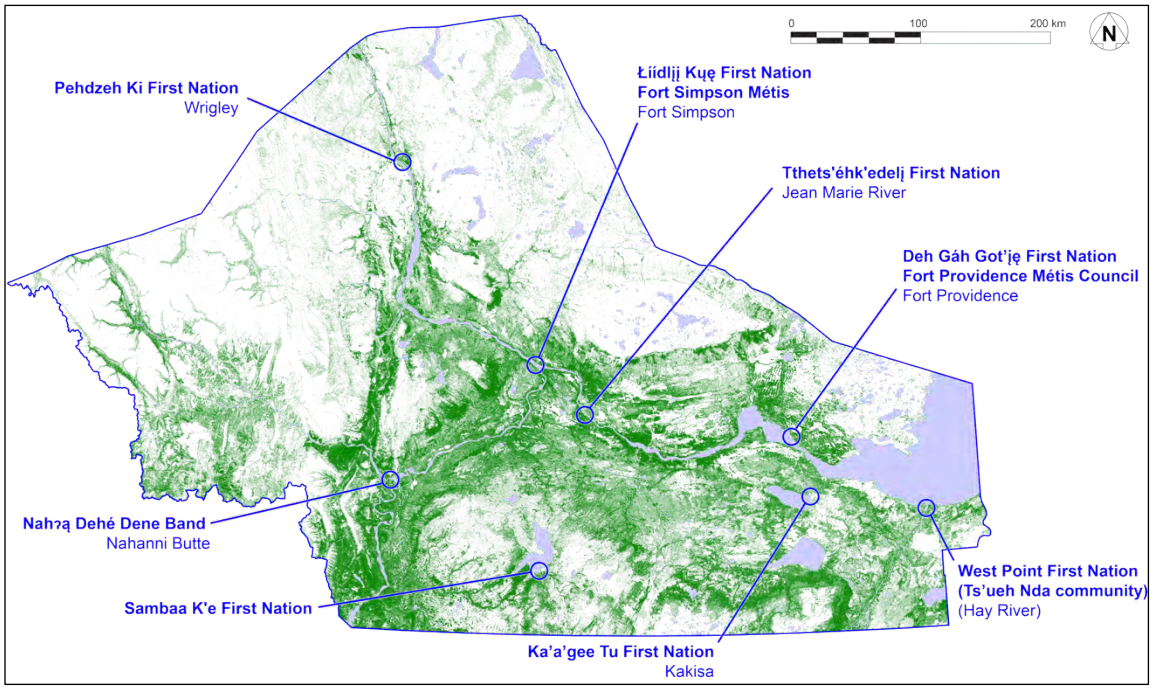

Figure 10: Dehcho First Nations member communities & treed areas

Of course, not all treed areas have the same tree density or species.

However, before we dive into the details of the trees available for local use, it will be useful to understand:

- existing forestry operations,
- the ecology of NWT overall, and
- the ecology of Dehcho in particular.

2 EXISTING FORESTRY

The Northwest Territories forest industry consists of a number of small family-run logging and sawmill businesses and larger, joint venture partnerships between local First Nation development corporations and established logging and sawmilling companies.

The total timber harvest in 1995-96 was 133,000 cubic metres. Nine sawmills produced 8 million board feet of lumber. Included in the lumber manufacture were 1.7 million board feet of aspen and 2 million board feet of salvaged fire-killed spruce. In addition, approximately 73,000 cubic metres of spruce sawlogs were produced for export and an estimated 20,000 cubic metres of wood was harvested for local fuelwood consumption. Overall, 75% of the lumber produced was exported.[11]

Table 3: NWT lumber producers, 1997[12]

company name	*operations type*	*location*
C. Plamondon Lumber	commercial sawmill	27 km west of Fort Smith
H. D. Contracting Ltd.	mobile commercial sawmill	35 km west of Fort Smith
Freund Building Supplies	commercial planer	Fort Smith
Great Slave Lake Forest Products	commercial sawmill & planer	Fort Resolution
La Merse	commercial sawmill & planer	25 km west of Fort Smith
Cliff Kimble	commercial sawmill	Enterprise
Lichtner Forest Industries Ltd.	commercial sawmill	km 11 on Mackenzie Highway
Mackenzie Wood Products	commercial sawmill	junction of Highway 1 & Highway 7
Soo Construction	sawmill	165 km southeast of Fort Simpson on Highway 7

2.1 Forest Management

The Northwest Territories Department of Resources, Wildlife and Economic Development promotes economic development in NWT forests at a level that will ensure a sustainable harvest and maintain ecological processes and natural diversity. The annual harvest of timber can be calculated using an Annual Allowable Cut (AAC) formula. The calculation is adjusted to account for biological impacts such as fire and disease, and protection of other forest uses such as wildlife habitat and recreation.[13]

Significant changes have gotten underway since Bohning *et al.* noted these forest management practices in 1997. The primary change has been the development of Forest Management Agreements (FMAs). To date, two FMAs have been signed, both in 2015:[14]

- an agreement with Timberworks (owned by Deninu Kųé First Nation and the Fort Resolution Metis Council) in Fort Resolution
- an agreement with Digaa Enterprises (owned by Deh Gáh Got'ię First Nation & the Fort Providence Métis Council in Fort Providence

[11] Bohning, *et al.* (1997). *Forests of the Northwest Territories.* https://ostrnrcan-dostrncan.canada.ca/entities/publication/f842e004-aff1-4a6e-bf9f-02d5c34de515.

[12] *Ibid.*

[13] *Ibid*.

[14] Government of Northwest Territories. (n.d.). *Forest Resources: Forest Management Agreements.* Environment and Climate Change. https://www.gov.nt.ca/ecc/en/services/forest-resources/forest-management-agreements.

The intended benefits from these agreements are:

- Development of a new, sustainable forest industry sector.
- Development of local and regional job opportunities and training.
- Promotion of biomass[15] energy substitution for fossil fuels.
- Indigenous participation in forest management planning.

These benefits align exactly with the goals of this report.

Additional work has been done by various parties, including the Government of the Northwest Territories (GNWT), announcing their intention to amend and combine the *Forest Management Act* and the *Forest Protection Act* into a new *Forest Act*. As part of the process of developing this new act, GNWT solicited public feedback in 2022[16] and published a summary of that feedback in February 2023.[17] This new *Forest Act*[18] received assent in October 2023, but has not yet come into force, because regulations are currently in development.[19]

2.2 Employment Benefits

> In 1996 the forest sector in the Northwest Territories directly and indirectly supported an estimated 300 full-time jobs. Approximately 100 direct jobs were created in logging and lumber manufacturing, the equivalent of 15 full-time jobs in site preparation and planting, 5 jobs in cone collection and approximately 10 jobs in other forest management work. Indirect employment offered 170 jobs in supply and support to the forest industry.
>
> The equivalent of 145 full-time jobs were created in the fire management program in 1996. This included 85 person years in management and summer fire fighter positions, as well as twenty 5-person contract fire crews and more than 500 emergency fire fighters.
>
> Most employment in forestry is in the smaller, outlying communities, where job opportunities are limited. Local programs consisting of on-the-job training and structured, formal courses are an important part of the forest management

[15] The term “biomass” is used in the energy industry—and in this report—to describe renewable plant material that can be used for fuel. In some southern communities, “biomass” includes waste agricultural materials. In the NWT—and in this report—it includes only trees, not any waste agricultural materials, or any material from bushes or other plants. As well, in this report, “biomass” does not refer to all of the tree, only to the central stem (sometimes called the “trunk” or “bole”). Sustainable forestry practice indicates that the branches, needles, leaves, bark and all other small materials from trees be left on the land to replenish the soil and provide needed nutrients to grow the next generation of trees.

[16] Government of Northwest Territories. (2022 Nov 22). *N.W.T. gov’t seeks public engagement on new Forest Act.* https://www.woodbusiness.ca/n-w-t-govt-seeks-public-engagement-on-new-forest-act/

[17] Government of Northwest Territories. (2023 Feb). *What We Heard: A Forest Act for the NWT.* https://www.ntlegislativeassembly.ca/tabled-documents/what-we-heard-forest-act-nwt-february-2023

[18] Legislative Assembly of the Northwest Territories. (n.d.). *Forest Act*. https://www.ntlegislativeassembly.ca/sites/default/files/legacy/bill_74_-_public_version.pdf

[19] https://www.gov.nt.ca/ecc/en/services/legislative-initiatives/forest-act

program. Over the years a core of trained fire fighters and forestry workers has been developed in most communities." [20]

2.3 Estimated Economic Value

The estimated economic value of resources from NWT forests in 1996 was about $59 million. This figure is strictly a measure of the value of resources consumed in the NWT and includes a measure of the contributed value of the harvester's efforts. The commercial forest industry contributes about $13 million annually from lumber and saw logs. Fuelwood represents another $1.7 million.

The forest also supports other commercial enterprises, particularly in small communities. Trapping is a traditional way of life and has great cultural value. It is an important source of income for the Dene and contributed about $1.7 million to the economy in 1996. The commercial fishery contributed about $2.2 million. The forests also support a subsistence economy that contributes about $38 million from the use of country foods such as meat and fish.

Many people visit the NWT to hunt or view wildlife or to hike and travel in the forests. The revenue from outfitting is about $2 million. Recreation and tourism also add significantly to the economy of the NWT.[21]

Table 4: Estimated monetary value, in millions, of resources from Northwest Territories forests, 1986[22]

	annual value (in millions)
commercial forest industry	$13.0
fuelwood	$1.7
trapping	$1.7
fishing	$2.2
outfitting	$2.0
country foods (subsistence)	$38.0
total:	*58.6*

[20] *Ibid*.

[21] *Ibid*.

[22] Government of Northwest Territories. (1986). Department of Resources, Wildlife and Economic Development. Cited in Bohning, *et al*. https://ostrnrcan-dostrncan.canada.ca/entities/publication/f842e004-aff1-4a6e-bf9f-02d5c34de515.

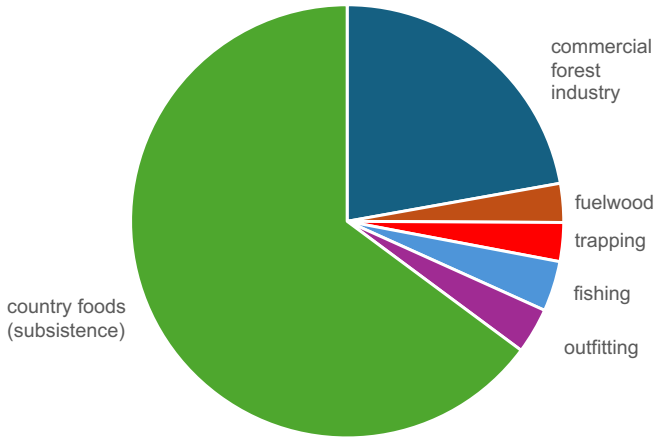

Figure 11: Value, by sector, of resources from Northwest Territories forests, 1986[23]

[23] *Ibid.*

3 ECOLOGY[24]

The Ecological Framework of Canada defines four classifications of ecosystems as a nested hierarchy of areas:

- At the top of the hierarchy, ecozones define the ecological mosaic of Canada on a sub-continental scale. They represent an area of the earth's surface representative of large and very generalized ecological units characterized by interactive and adjusting abiotic and biotic factors. Canada is divided into 15 terrestrial ecozones.
- Ecoprovinces are subdivisions of an ecozone, characterized by major assemblages of structural or surface forms, plants, animals, hydrology, soil, and macroclimate.
- Ecoregions are subdivisions of an ecoprovince, characterized by distinctive regional ecological factors, including climate, physiography, soil, water, plants, and animals.
- Ecodistricts are subdivisions of an ecoregion, characterized by distinctive assemblages of relief, landforms, geology, soil, water, plants, and animals.

For this report, the ecozone and ecoregion levels of analysis are particularly useful for understanding the species, distribution, densities, and heights of trees growing in the Dehcho region and in the areas immediately around each Dehcho First Nation member community. They aid in understanding what environmental factors Dehcho communities are likely to have in common, and where they might differ.

[24] Much of this section is extracted from:

- *The Ecological Framework of Canada.* (n.d.) Government of Canada & Canadian Council on Ecological Areas/Conseil Canadien Des Aires Écologiques (CCEA/CCAE). http://www.ecozones.ca/, and
- Ecosystem Classification Group. 2007 (rev. 2009). *Ecological Regions of the Northwest Territories – Taiga Plains.* Department of Environment and Natural Resources, Government of the Northwest Territories. https://www.gov.nt.ca/ecc/sites/ecc/files/resources/taiga_plains_ecological_land_classification_report.pdf, with a small amount of additional detail from:
- Ecosystem Classification Group. 2010. *Ecological Regions of the Northwest Territories – Cordillera*. Department of Environment and Natural Resources, Government of the Northwest Territories. https://www.gov.nt.ca/ecc/sites/ecc/files/resources/cordillera_ecological_land_classfication_report.pdf .

3.1 Ecozones

Figure 12: Ecozones in and near the Northwest Territories

Most of the eastern portion of the Northwest Territories is in the Taiga Shield ecozone, while most of the western portion is in the Taiga Plains ecozone.

Almost all of Dehcho is within the Taiga Plains ecozone, with small sections falling within the Taiga Cordillera and Boreal Cordillera ecozones.

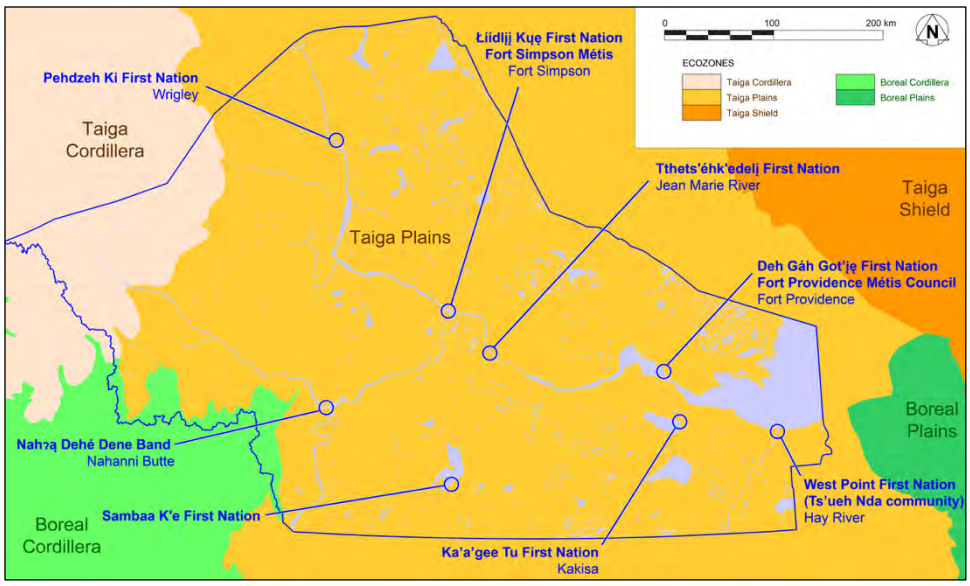

Figure 13: Ecozones in and near Dehcho

All of the member communities of the Dehcho First Nations lie within the Taiga Plains ecozone.

3.1.1 *Taiga Plains Ecozone*

3.1.1.1 LANDFORMS AND CLIMATE

A northern extension of the flat interior plains that dominate the Prairie provinces, the Taiga Plains ecozone features typically subdued relief consisting of broad lowlands and plateaus. The nearly level to gently rolling plains are occasionally interrupted by some of the larger river valleys, which can be hundreds of metres deep.

Several waves of glaciers over the region have left behind deposits of sand, gravel, and boulders. Alluvial deposits are common along major rivers and the braided networks of abandoned stream beds. Large wetlands and muskeg dominate the lowest areas. The organic soils found in the eskers of this ecozone are generally shallow, highly acidic, and nutrient-poor. The mineral soils are also poorly developed and often frozen.

The climate is characterized by short, cool summers and long, cold winters. Precipitation is low to moderate, averaging 250 to 500 mm a year across much of the ecozone. Snow and freshwater ice cover persist for six to eight months a year.

3.1.1.2 PLANTS

The tree species in the forests of the Taiga Plains relevant to this report are covered in more detail below. They include softwoods (trembling aspen, balsam poplar, and white (paper) birch, as well as hardwoods (white & black spruce, jack & lodgepole pine, and tamarack). Willow and alder shrubs also flourish here.

Low shrubs are abundant throughout this ecozone and include many species of heathers, such as labrador tea and leatherleaf, plus a wide array of berry-producing species, including cranberries, currants, and blueberries. Lichens and mosses dominate the ground cover, often forming a thick continuous carpet. Wetlands feature various sedges and mosses.

Forest fires that destroy several thousand hectares of trees are not uncommon in this ecozone. Many taiga plant species benefit from the regular cycle of fires, which can purge old, stagnant forests of insects and disease. The distinctive mosaic of forest types created by fires usually results in a boost to the overall productivity and diversity of habitats available to wildlife.

3.1.1.3 HUMAN ACTIVITIES

Water access dictated the location of most communities in the Taiga Plains. As a result, many are found in ecologically rich valleys and estuaries. Even the largest towns are immediately adjacent to vast tracts of pristine land.

Much of the local economy is based on subsistence hunting, trapping, and fishing. However, the economy does include a small number of industrial activities such as mining, petroleum extraction, and, in recent years, forestry.

3.1.1.4 TAIGA PLAINS ECOZONE CHARACTERISTICS – IMPLICATIONS FOR THIS REPORT

The characteristics of this ecozone indicate that there is significant potential for forestry development, particularly for local fuel use.

- The fact that Dehcho First Nations member communities are all located beside lakes or rivers means that nearby tree growth will be relatively abundant compared to areas further away from water.
- The tree species that grow in this ecozone can be a valuable resource for local use, if harvested sustainably. Their value will include—but will certainly not be limited to—being chipped for use as fuel in biomass systems generating both heat and power.
- The occasional instances of larger white spruce and balsam poplar sometimes found on alluvial flats bordering rivers may have some specialized uses, *but only if they are harvested sparingly and sustainably.*
- The noted development of forestry in recent years is a sign of growing potential.
- Although forest fires present a significant hazard—and are expected to increase in frequency and volume as global warming continues to alter the ecology in Dehcho—harvesting of the wood after a fire also has significant potential.

3.2 Ecoregions

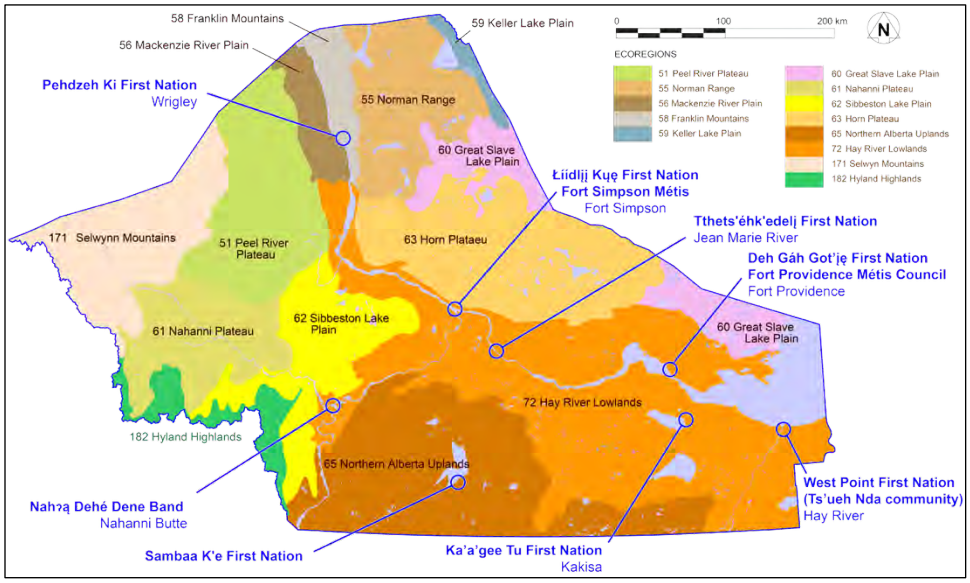

Figure 14: Ecoregions in Dehcho

Table 5: Average values of ecoregions relevant to this report

	average temperatures[25]			average precipitation		communities
	annual	*summer*	*winter*			
56 Mackenzie River Plain	-6.5°C	11.5°C	-24.5°C	350 mm		**Pehdzeh Ki First Nation** (Wrigley)
58 Franklin Mountains	-5.5°C	10.0°C	-25.0°C	250 mm		
62 Sibbeston Lake Plain[26]	-5.0°C	10.0°C		*east* 200 mm	*west* 350 mm	**Nahʔą Dehé Dene Band** (Nahanni Butte)
63 Horn Plateau	-5.5°C	12.0°C	-21.0°C	*east* 250 mm	*west* 400 mm	**Łíídlįį Kų́ę First Nation & Fort Simpson Métis** (Fort Simpson)
64 Hay River Lowlands	-2.5°C	13.0°C	-19.0°C	400 mm		**Nahʔą Dehé Dene Band** (Nahanni Butte) **Łíídlįį Kų́ę First Nation & Fort Simpson Métis** (Fort Simpson) **Tthets'éhk'edelį First Nation** (Jean Marie River) **Deh Gáh Got'ıę First Nation & the Fort Providence Métis Council** (Fort Providence) **Ka'a'gee Tu First Nation** (Kakisa) **West Point First Nation (Ts'ueh Nda community)** (Hay River Dene 1)
65 Northern Alberta Uplands	-2.25°C	13.5°C	-19.0°C	425 mm		Sambaa K'e First Nation

[25] Because of rapid climate warming in northern Canada, these temperature estimates are becoming out of date. They are useful now—and in the near future—primarily to show the relative temperature differences between these ecoregions.

[26] This box is greyed out because the source for the data in this table—the *Ecological Framework for Canada*—has a typographical error, listing the average winter temperature for Sibbeston Lake Plain as -1°C.

3.2.1.1 ECOREGION 56: MACKENZIE RIVER PLAIN

Relevant to Pehdzeh Ki First Nation (Wrigley).

A narrow northern extension of the boreal forest along the east side of the Mackenzie River, this ecoregion is a rolling, drift-covered plain. It is classified as having a subhumid high boreal ecoclimate, marked by cool summers and very cold winters.

Wetlands cover 25-50% of this ecoregion. Forests consist predominantly of medium to tall, closed stands of black spruce and jack pine, with understories of feathermoss, bog cranberry, blueberry, Labrador tea, and lichens. White spruce, balsam fir, and trembling aspen occur in the warmer, more moist sites in the southern section of the region. Drier sites have more open stands of black spruce and jack pine. Low, closed and open stands of black spruce, ericaceous shrubs, and sphagnum mosses dominate poorly drained, peat-filled depressions.

Hunting, trapping, and some forestry are the principal land use activities.

3.2.1.2 ECOREGION 58: FRANKLIN MOUNTAINS

Relevant to Pehdzeh Ki First Nation (Wrigley).

The ecoregion is classified as having a low subarctic ecoclimate.

The predominant vegetation consists of open stands of black spruce with an understory of dwarf birch, Labrador tea, lichen, and moss. Drier and warmer sites tend to have more white spruce, paper birch, and some aspen. Wet sites are usually covered with bog-fen vegetation such as dwarf black spruce, Labrador tea, ericaceous shrubs, and mosses.

Hunting, trapping, outdoor recreation, and tourism are the main land use activities.

3.2.1.3 ECOREGION 62: SIBBESTON LAKE PLAIN

Relevant to Nahʔą Dehé Dene Band (Nahanni Butte)

This ecoregion forms a series of linear, relatively low ranges and ridges. The narrow western extension of the ecoregion is composed of part of the Liard Plateau between the South Nahanni and Liard rivers. It is characterized by tree-as and alpine tundra-covered hills.

This ecoregion is classified as having a low subarctic ecoclimate.

Wetlands cover approximately 50% of this ecoregion. It is dominated by open stands of black and white spruce, paper birch, and some aspen.

Land uses include hunting, trapping, recreation, and tourism.

3.2.1.4 ECOREGION 63: HORN PLATEAU

Relevant to Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson)

This plateau rises abruptly above the flat-lying terrain of the surrounding Great Slave Lake Plain and the Hay River Lowland ecoregions.

The ecoregion is classified as having a high boreal ecoclimate.

Wetlands cover approximately 50% of the ecoregion. Native vegetation consists predominantly of low to medium, closed stands of black spruce and jack pine with an understory of feathermoss, bog cranberry, blueberry, Labrador tea, and lichens. White spruce, balsam fir, and trembling aspen occur in the warmer, moister sites in the southern section of the region. Black spruce is the climax species. Drier, colder sites have more open stands of black spruce and jack pine. Low, closed and open stands of black spruce, Labrador tea, blueberry, bog rosemary, and sphagnum mosses dominate poorly drained, peat-filled depressions.

Land use activities include forestry, hunting, and trapping.

3.2.1.5 ECOREGION 64: HAY RIVER LOWLANDS

The most relevant ecoregion for this report.

Relevant to:

- *Nahɔą Dehé Dene Band (Nahanni Butte)*
- *Łíídlíį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson)*
- *Tthets'éhk'edelį First Nation (Jean Marie River)*
- *Deh Gáh Got'ıę First Nation & the Fort Providence Métis Council (Fort Providence)*
- *Ka'a'gee Tu First Nation (Kakisa)*
- *West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)*

This ecoregion is the broad, level lowland plain drained by rivers which all ultimately flow into the Mackenzie.

Like ecoregion 56 (Mackenzie River Plain), this ecoregion is classified as having a subhumid mid-boreal ecoclimate.

This ecoregion is characterized by closed mixed stands of trembling aspen, balsam poplar, white spruce, balsam fir, and black spruce on drier sites. Poorly drained fens and bogs (about 30% of the ecoregion) are covered with tamarack and black spruce.

Hunting, trapping, recreation, and some pulpwood and local sawlog forestry are the principal land use activities.

3.2.1.6 ECOREGION 65: NORTHERN ALBERTA UPLANDS

Relevant to Sambaa K'e First Nation

Like ecoregions 56 (Mackenzie River Plain) and 64 (Hay River Lowlands), this ecoregion is classified as having a subhumid high boreal ecoclimate.

Between 50-70% of the ecoregion is covered by wetlands. Undulating to rolling morainal surfaces are covered with organic deposits supporting open stands of stunted black spruce and some birch and shrubs. Upland slopes free of organic blankets are mainly loamy glacial till supporting a white spruce, balsam fir, and aspen mixed-wood forest.

Land use is mainly limited to hunting and trapping.

4 TREE SPECIES RELEVANT TO THIS REPORT[27]

The tree species in Dehcho relevant to this report are:

- hardwoods (broadleaf)
  - trembling aspen (*Populus tremuloides*)
  - balsam poplar (*Populus balsamifera*)
  - white (paper) birch (*Betula papyrifera*)
- softwoods (coniferous)
  - white spruce (*Picea glauca*)
  - black spruce (*Picea mariana*)
  - jack pine (Pinus banksiana)
  - lodgepole pine (*Pinus contorta*)
  - tamarack (*Larix laricina*)

The distribution of each of these species varies throughout Dehcho. That distribution will affect what each community is able to harvest.

Figure 15: Trembling aspen (*Populus tremuloides*)[28]

[27] Unless otherwise noted, images and information in this section are drawn from: Bohning, R.A., Campbell, D., & Grave, J. (1997). *Forests of the Northwest Territories.* Natural Resources Canada. https://ostrnrcan-dostrncan.canada.ca/entities/publication/f842e004-aff1-4a6e-bf9f-02d5c34de515. The source of data for the maps in this section is the SCANFI dataset.

[28] Photo source: R.A. Bohning. *Ibid.*

Figure 16: Balsam poplar (*Populus balsamifera*)[29]

Figure 17: White (paper) birch (*Betula papyrifera)*[30]

[29] Photo source: Government of Canada. (2024 Nov 12). *Balsam poplar.* Natural Resources Canada. https://tidcf.nrcan.gc.ca/en/trees/factsheet/53.

[30] Photo source: Northern Wildflowers. (n.d.). https://northernwildflowers.ca/products/paper-birch.

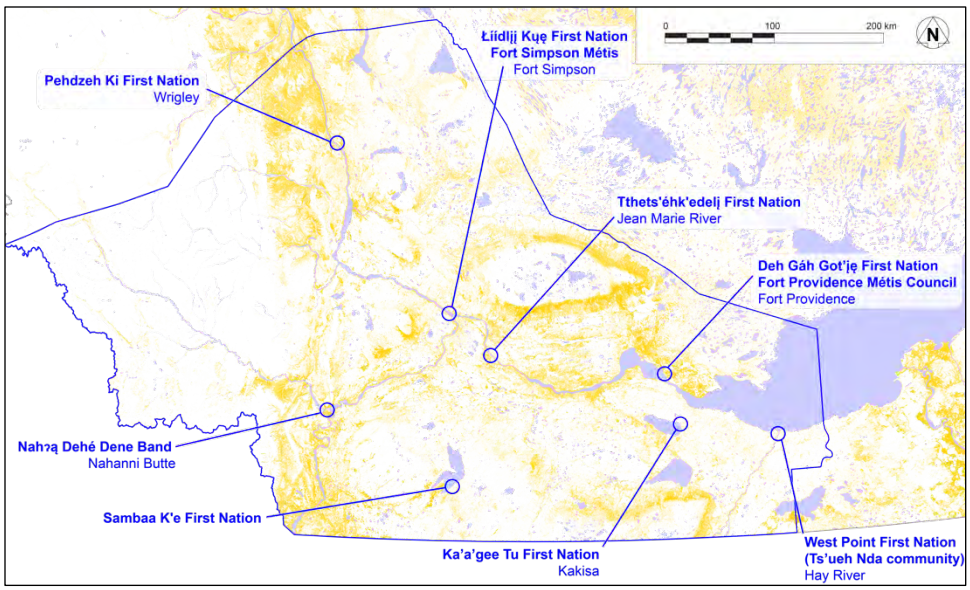

Figure 18: Distribution of hardwoods (broadleaf trees) in Dehcho

Figure 19: White spruce (*Picea glauca*)[31]

[31] Photo source: United States Department of Agriculture (USDA). *Picea glauca.* Fire Effects Information Service. https://www.fs.usda.gov/database/feis/plants/tree/picgla/all.html.

Figure 20: Black Spruce (*Picea mariana*)[32]

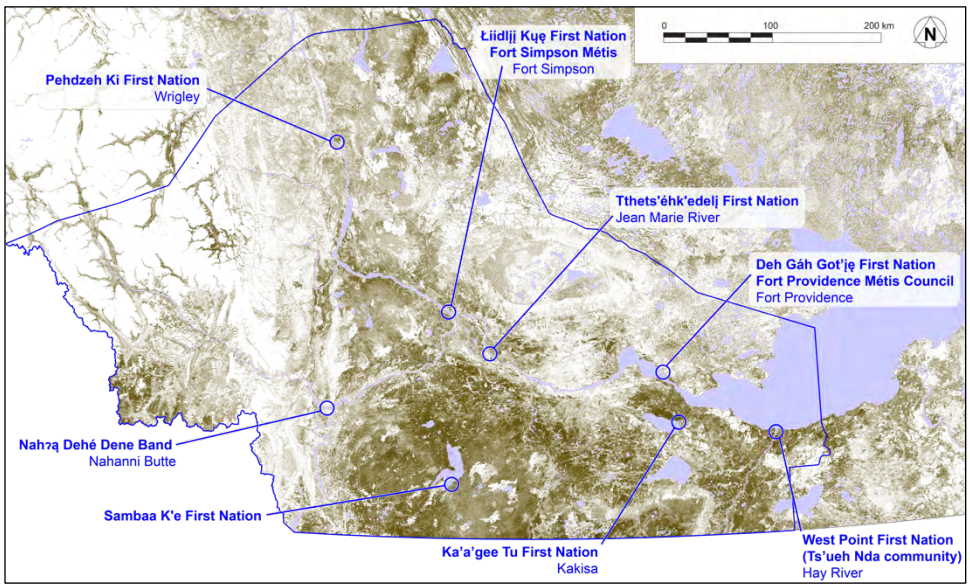

Figure 21: Distribution of black spruce in Dehcho

[32] Photo source: Gardenia. (n.d.). *Picea mariana (Black Spruce).* https://www.gardenia.net/plant/picea-mariana .

Figure 22: Jack pine (*Pinus banksiana*)[33]

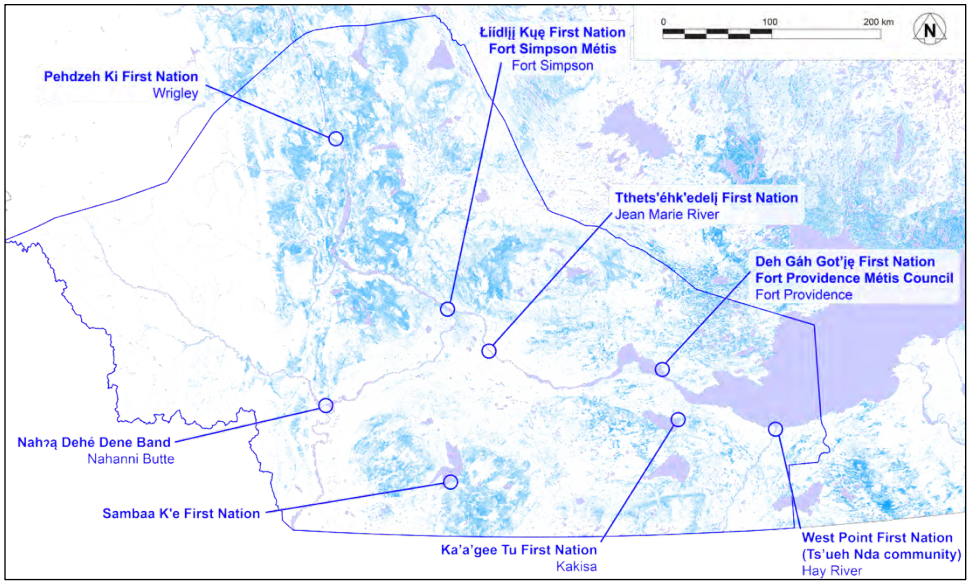

Figure 23: Distribution of jack pine in Dehcho

[33] Photo source: R.A. Bohning. *Ibid*.

Figure 24: Lodgepole pine (*Pinus contorta*)[34]

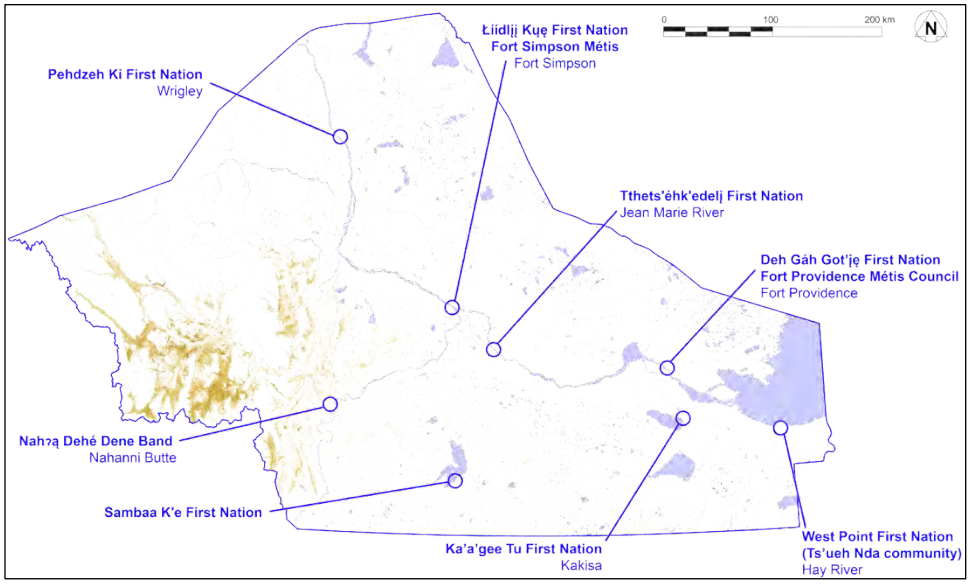

Figure 25: Distribution of lodgepole pine in Dehcho

[34] Photo source: Crawford, R.C. (2002). *No. 6. Lodgepole Pine Forest and Woodlands*. Northwest Power and Conservation Council. http://cfw.nwcouncil.org/Content/FWProgram/ReviewCycle/fy2002cp/projects/Extras/25098x/WHR_CD/DOCS/DEFS/WHDF_H06.HTM .

Figure 26: Tamarack (*Larix laricina*)[35]

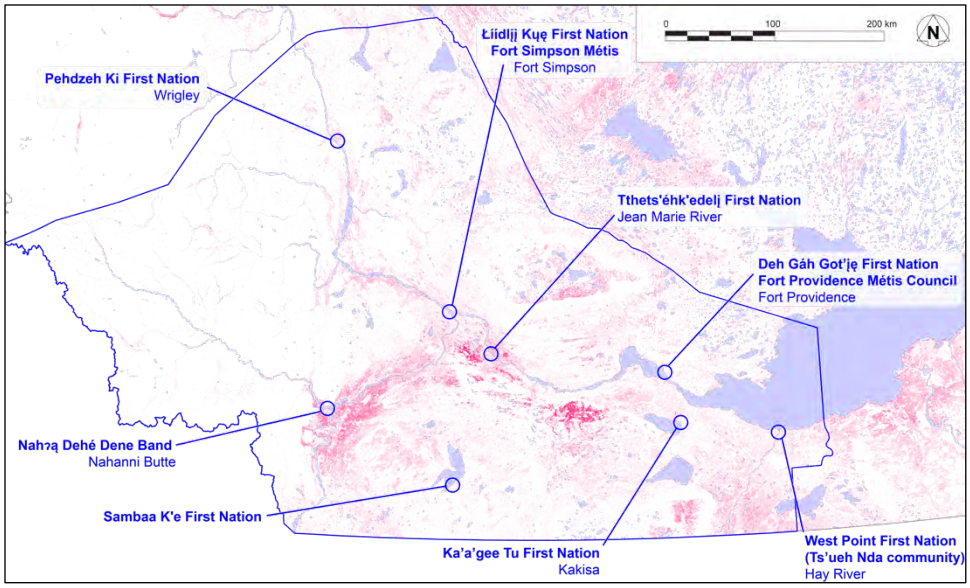

Figure 27: Distribution of tamarack in Dehcho

[35] Photo source: Tree Canada. (n.d.). *Tamarack (Larix laricina)*. https://treecanada.ca/resources/trees-of-canada/tamarack-larix-laricina/.

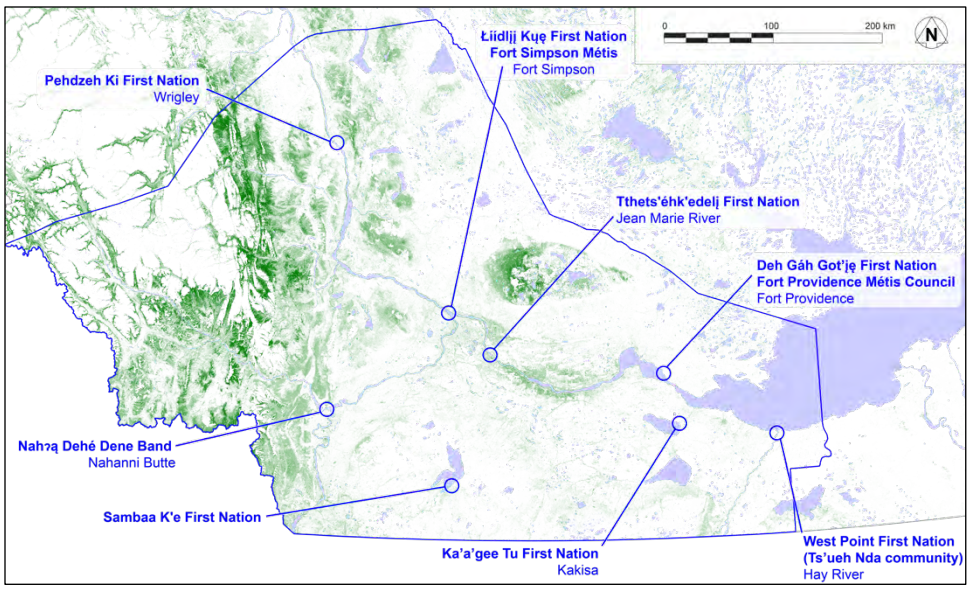

Figure 28: Distribution of other softwoods (conifers) in Dehcho

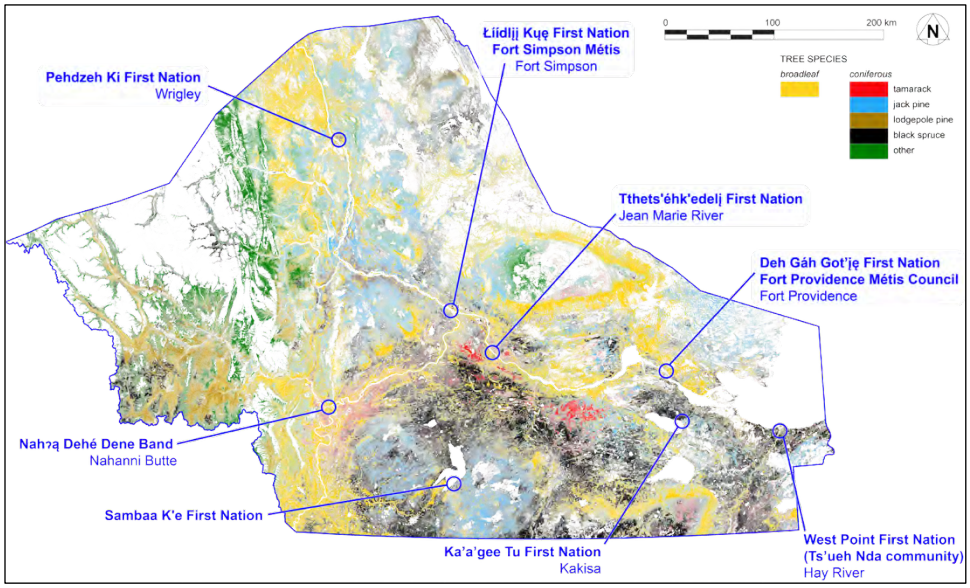

Figure 29: Overall distribution of tree species in Dehcho

5 DEHCHO FOREST CHARACTERISTICS - ESTIMATING THE WOOD AVAILABLE[36]

Table 6: Dehcho Forest Characteristics[37]

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
26	228	28	5.3	30	4.6	32%	100%	26%

biomass density *(in tons per acre)*			**height** *(in feet)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
12	102	12	17	98	15	32%	100%	26%

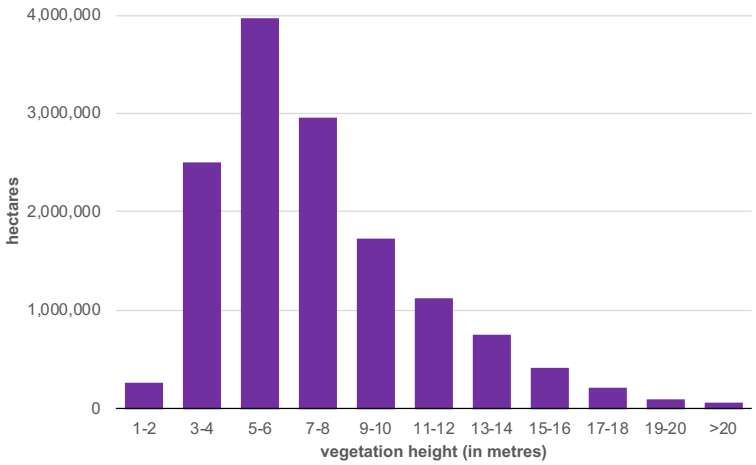

Figure 30: Height of vegetation in Dehcho region, clustered in 2-metre height increments[38]

[36] Data source: SCANFI dataset.

[37] σ: standard deviation

[38] Note that, while vegetation in the 1-2 metre column (and perhaps even some in the 3-4 metre column) may be a mixture of shrubs and saplings, in all other columns, vegetation height will be measuring trees.

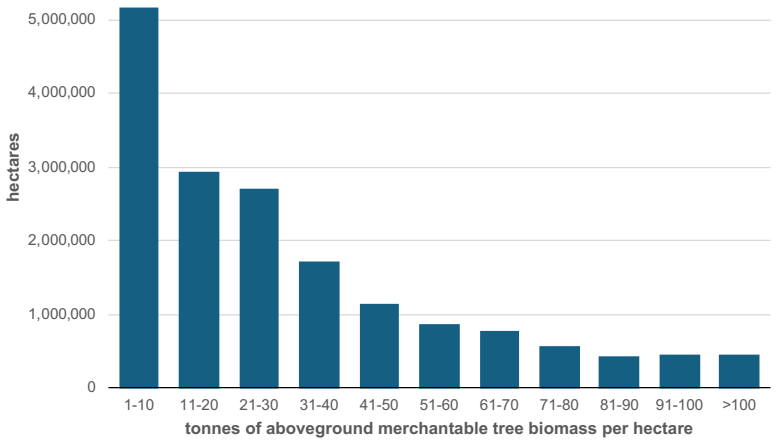

Figure 31: Tonnes of aboveground merchantable[39] biomass per hectare in Dehcho region, clustered in 10-tonne increments

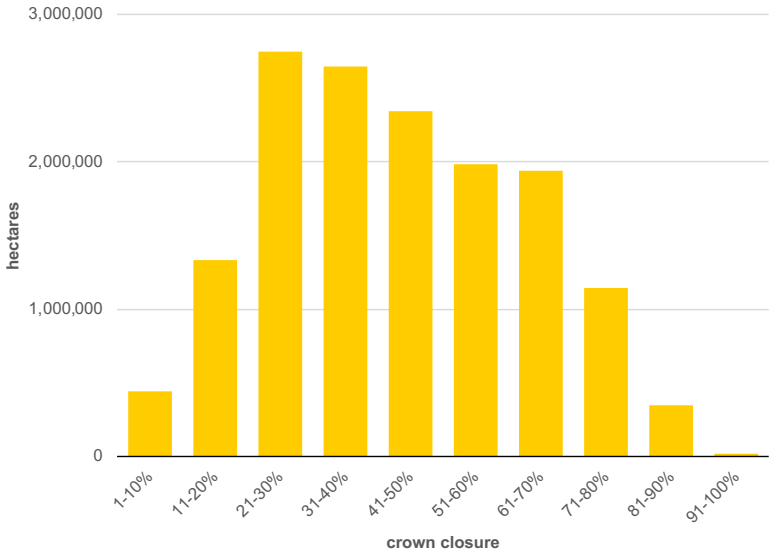

Figure 32: Summer crown closure in Dehcho, clustered in 10% increments

[39] "Merchantable" is a term used for biomass, trees, and timber; it means the biomass, trees or timber are considered viable for commercial sale. Each jurisdiction sets a definition of what is merchantable. In the Northwest Territories, "merchantable timber" means that, in a particular stand of trees, 60% of the stems ["trunks" or "boles"] have a minimum diameter outside bark (dob) of 19 cm [7.5 inches] at stump height (30 cm [12 inches]), or 18 cm [7 inch] diameter at breast height (dbh). Source: Government of Northwest Territories. (2025 Nov). *Commercial Timber Harvest Planning and Operations Standard Operating Procedures Manual.* Environment and Climate Change. https://www.gov.nt.ca/ecc/sites/ecc/files/reports/commercial_timber_procedures_manual.pdf.

Table 7: Forest characteristics within 20 km of each Dehcho First Nations member community

	biomass density *(in tonnes per hectare)*			height *(in meters)*			crown closure *(% in summer)*		
	average	maximum	σ	average	maximum	σ	average	maximum	σ
Sambaa K'e First Nation Sambaa K'e	35	217	38	6.0	27	5.2	31%	100%	26%
Nahʔą Dehé Dene Band Nahanni Butte	49	185	31	7.8	30	4.4	53%	93%	26%
Pehdzeh Ki First Nation Wrigley	22	112	22	5.6	21	4.1	39%	85%	21%
Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis Fort Simpson	47	126	29	8.9	27	5.4	43%	94%	23%
Tthets'éhk'edelį First Nation Jean Marie River	47	129	31	10.2	27	5.7	38%	94%	22%
Deh Gáh Got'įę First Nation & the Fort Providence Métis Council Fort Providence	41	128	31	6.7	22	4.6	38%	90%	26%
Ka'a'gee Tu First Nation Kakisa	27	131	25	5.4	22	4.2	28%	90%	24%
West Point First Nation (Ts'ueh Nda community) Hay River Dene 1	27	131	26	5.1	22	4.4	2904%	90%	24%

	biomass density *(in tons per acre)*			height *(in feet)*			crown closure *(% in summer)*		
	average	maximum	σ	average	maximum	σ	average	maximum	σ
Sambaa K'e First Nation Sambaa K'e	16	97	17	20	89	17	31%	100%	26%
Nahʔą Dehé Dene Band Nahanni Butte	22	83	14	25	98	15	53%	93%	26%
Pehdzeh Ki First Nation Wrigley	10	50	10	18	69	13	39%	85%	21%
Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis Fort Simpson	21	56	13	29	89	18	43%	94%	23%
Tthets'éhk'edelį First Nation Jean Marie River	21	58	14	33	89	19	38%	94%	22%
Deh Gáh Got'įę First Nation & the Fort Providence Métis Council Fort Providence	18	57	14	22	72	15	38%	90%	26%
Ka'a'gee Tu First Nation Kakisa	12	58	11	18	72	14	28%	90%	24%
West Point First Nation (Ts'ueh Nda community) Hay River Dene 1	12	58	12	17	72	14	29%	90%	24%

This data indicates that all Dehcho First Nations member communities are located where significant tree biomass is available as a harvestable resource. This should not be surprising. They are all located very near water—which is where trees grow best.

Some—such as Sambaa K'e First Nation and the Nahʔą Dehé Dene Band (Nahanni Butte) in the southwest corner—have more biomass available, while others—such as Pehdzeh Ki First Nation (Wrigley) in the north part of Dehcho—appear to have less. However, despite these variations, information from the SCANFI dataset is clear—every Dehcho First Nation member community has more than enough local wood resources to meet its fuel needs, without having to rely on importing either diesel or wood pellets.

Apparently, wood pellets are frequently imported into Dehcho for use as fuel. This may make sense if the pellets are created from leftover sawdust at a sawmill, if it cannot be used for any other purpose. However, *pellets are not best option if there isn't a sawmill producing sawdust as a byproduct; turning a tree into sawdust uses a tremendous amount of energy.* A far better option is to the leave the harvested trees in log form and then chip them when fuel is needed. Trees from northern forests—especially those harvested after fire—often have moisture content and energy density comparable to wood pellets.

Biomass boilers used to heat larger buildings or community-wide district heating systems are designed to use chips. Smaller scale stoves that can use wood chips as fuel—those designed to heat homes—are also available. Energy systems capable of generating both heat and electricity—often called CHP ("Combined Heat and Power") systems—are also designed to use chips.

See the section "Harvested Burnt Wood Should Be Stored as Logs and Then Chipped – Not Pelletized", below.

Emphasizing how much biomass is available for fuel is not to suggest that the only viable use of this local biomass is for fuel. The trees near these communities could be harvested for many local purposes in addition to fuel; a few are outlined in the section below, titled "Beyond Fuel."

This is also not to suggest that there is so much local biomass that communities don't need to ensure the volumes being harvested and the harvesting methods used are sustainable. Sustainable harvesting is essential even if the volume harvested is small. To take only one aspect of sustainability: When harvesting in a taiga forest, care needs to be taken to minimize ground cover damage, and to ensure that everything except the central stem (the "bole") remains behind, contributing nutrients to the soil, to new trees, and to vegetation in general.

5.1 Biomass Density

There are more than 3 million hectares of forest in Dehcho.

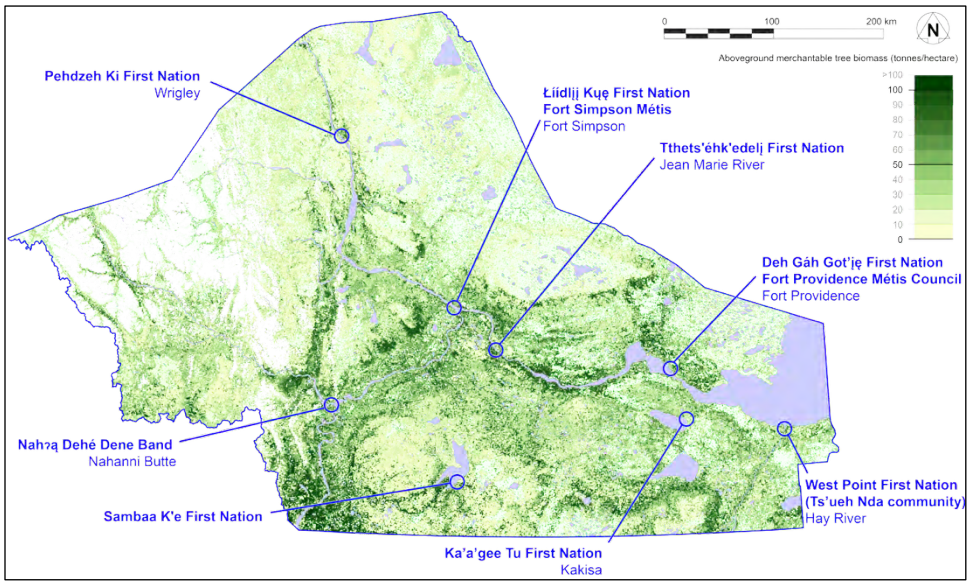

Figure 33: Estimated tree biomass available

5.1.1 *Converting Biomass Density into Other Measures*

A measure of biomass density does not always convert easily into measurements of how much fuel is available for use. There are many reasons for this:

- different entities assessing or harvesting a forest use different measures.
  - the SCANFI dataset provides estimates in tonnes per hectare
  - forestry analysis often uses cubic metres (m^3)
  - people buying and selling firewood usually use cords
  - people buying and selling wood at bulk for heat often use "oven dry tonnes" (ODT)[40]
  - heating system output is usually measured in millions of British Thermal Units (BTUs)
- wood comes in various forms:
  - stems (or "trunks" or "boles")
  - logs (usually cut to a standard length)
  - split logs
  - chips
  - pellets
- different tree species have different densities, and so have different weights per unit of volume
- the wood from slow-growing forests in the north is denser than forests of the same tree species in the south
- wet or "green" wood has more moisture in it than dried or seasoned wood
  - green wood weighs more
  - seasoned wood produces more heat (because less energy is being used to turn the water into steam)
- burnt trees remaining after a fire will have a lower moisture content—and a higher energy density—than those same trees before the fire

The most reliable way to sort out all these different measures is done as part of ground-proofing a particular area of trees:

- The people doing the ground-proofing harvest sample plots of trees. They then measure those trees to determine tonnes per hectare and mass per volume.
  - Tonnes per hectare can be determined fairly easily if the size of each sample plot is known, and the weight of the stems (trunks/boles) are measured—often using a hanging scale.
  - The mass per volume is usually measured in kilograms per cubic metre (kg/m^3). Usually, this measure is done by measuring mass (weight) of a cubic metre of logs and then of a cubic metre of chips.

[40] An "oven-dry tonne" (ODT) is a standard unit of measure in estimating biomass. An ODT is the weight (mass) of biomass, after it has been completely dried in a test oven to remove all moisture. A tonne of logs, pellets or wood chips will always contain less than 1 ODT because a portion of those logs, pellets or wood chips will be moisture. So, for example, a tonne of logs with 30% moisture (typical for green wood) will only be estimated at 0.7 ODT.

- The people doing the ground-proofing then send a sample of the trees they have harvested to a lab which can determine the moisture content and the energy density.
    - The energy density is usually measured in BTUs per kg, which can be converted into BTUs per tonne.
    - The moisture content is used to determine the ODT (oven dry tonnes) equivalent of the samples.

The more sample plots that are taken—and the more samples that are sent to the lab—the more accurate the estimates will be.

The problem for this report is that all of this can only be done as part of ground-proofing. So we are left with the challenge of estimating the amount of fuel available to a community *before* all this sampling and measuring is done.

A further complication is added when we recognize that homes and other buildings vary widely in their energy efficiency. A cabin, for example will require much more energy to heat than well-insulated home of the same size.

5.1.2 *Estimating Harvest Volume Needed*

Despite all these complications, and despite the fact that on-the-ground sampling still needs to be done, we can still make a rough estimate now of how much wood needs to be harvested to meet each community's energy needs.

5.1.3 *Wood Required for Heat*

If we can know how many homes are in each community, and about how many cords of wood a typical home in a community requires (if it was heated entirely by wood) we can estimate the volume of wood required for that community for heat. And if we can estimate the weight (mass) of a given volume of wood, we can know how many homes a given area of forest can heat.

Table 8: Homes in each community in 2021[41]

	# of private dwellings
Sambaa K'e First Nation Sambaa K'e	49
Nahʔą Dehé Dene Band Nahanni Butte	39
Pehdzeh Ki First Nation Wrigley	63
Łíídlįį Kúę́ First Nation & Fort Simpson Métis Fort Simpson	572
Tthets'éhk'edelį First Nation Jean Marie River	37
Deh Gáh Got'įę First Nation & the Fort Providence Métis Council Fort Providence	256
Ka'a'gee Tu First Nation Kakisa	19
West Point First Nation (Ts'ueh Nda community) Hay River Dene 1	116

The Statistics Canada data was collected in 2021, so is now 4 years out of date. We would need an estimate of how many homes had been built in a community in the last 4 years to get a current estimate.

Once we know the number of homes (what Statistics Canada calls "private dwellings"), we need to know how many cords of wood the average home in each community needs for heat if it was entirely reliant on wood for heat.

Local people in each community will be able to give an average estimate. Let's use Tthets'éhk'edelį First Nation (Jean Marie River) as our example. Let's say that, after a discussion with people in the community, the consensus is that a house in this community, if it relied entirely on wood instead of diesel for heat, would need an average of 10 cords of locally-harvested wood a year.[42]

If there are 37 homes in the community, we can estimate the community would need 370 cords of wood in an average year for heat.

We would also need an estimate the square footage of the average home in the community, as well as an approximate square footage of all the other buildings in the community. Let's say that after discussion with local people, we conclude that the average size of a home is about 900 square feet. (None of these numbers need to be exact.) That means those 370 cords of wood can heat about 33,000 square feet of home space for a year. (Another way of saying this is that we need one cord of wood for every 90 square feet of home space.)

And let's say, when the community adds up the square footage of all the other buildings, it comes out to about 12,000 square feet.

[41] Government of Canada. (2023 Mar 09). *2021 Census of Population geographic summary.* Statistics Canada. https://www12.statcan.gc.ca/census-recensement/2021/search-recherche/productresults-resultatsproduits-eng.cfm?Lang=E&GEOCODE=2021A00056104014.

[42] Of course, this number will vary based on many factors—how well insulated the home is, how large the home is, how cold the winter is, and what species of wood is used for heating. What we're after isn't an exact number, but an estimated average for the community.

If we estimate that the community buildings are about as energy efficient as the homes, we will need a cord of wood for every 90 square feet of community space. When we divide 12,000 square feet by 90 square feet per cord, we get an estimate of 133 cords of wood to heat the community buildings for a year (if they were all heated by wood instead of diesel).

So, in total, if every home and building in Tthets'éhk'edelı̨ First Nation (Jean Marie River) was heated by wood, we can estimate that about 503 cords of wood would need to be harvested each year for heat. If we round off this number, we'd say it's about 500 cords per year.

This process of estimating wood demand can be repeated for every Dehcho community. In each case we would need estimates of:

- the number of homes in the community
- the number of cords of locally-harvested wood the average home would need each year, if it was heated entirely by wood
- the average square footage of the homes in the community
- an estimate of the square footage of all the other buildings in the community

A smaller community would probably estimate a demand of a few hundred cords; a larger community would probably estimate a demand of a few thousand.

(Don't worry, we're not suggesting that every home and building in every community immediately convert to using biomass—wood—for all its heating requirements, that they suddenly need to harvest hundreds or even thousands of cords of wood. Converting from fossil fuels to renewable energy takes time, and works best if done in in stages.)

5.1.4 *Harvesting Requirements*

Once we have an estimate of the number of cords needed each year, we can estimate:

- how many cubic metres of wood need to be harvested,
- the number of tonnes of wood that would need to be harvested, and
- the area of forest that would need to be harvested.

A cord of wood—4 ft by 4 ft by 8 ft—is equal to approximately 3.6 m^3 (cubic metres) of harvested timber.[43] So, if Tthets'éhk'edelı̨ First Nation (Jean Marie River) estimated they needed 10 cords per home, and 500 cords for the whole community, they would need to harvest about 1,825 m^3 per year.

To calculate the tonnes of wood that would need to be harvested, we would need to know the average weight of a cord of wood. As people who buy and sell firewood know, different species of wood have different weights, and a cord of green wood weighs more than a cord of seasoned (dryer) wood.

[43] This conversion is not exact because cords of wood are usually measured is split logs, while harvested timber might be measured stacked logs or wood chips. But the conversion of 1 cord = 3.6 m^3 is close enough for estimates.

This report was not able to find data on the actual weight of different species of wood harvested in the Northwest Territories. However, it was able to find some reasonably-useful estimates:

Table 9: Estimated average weight of a cord of wood[44]

	weight (pounds)		
source:	*A*	*B*	*C*
birch	3,450	2,992	2,512
white spruce	2,550	2,240	
black spruce	2,450		
aspen	2,400	2,160	
poplar	2,100	2,080	
tamarack		3,330	
lodgepole pine		2,610	1,486
		average:	*2,489* *pounds*
			1.1 *tonnes*

Until measurements are made of actual samples sourced near each community, an estimate of 1.1 tonnes (2,500 pounds) per cord of wood can serve as a rough guide.

If we estimate that a community needs 500 cords of wood for to meet all its heating needs in a year, that means it needs 550 tonnes of wood for fuel each year.

Because we know the average biomass density (in tonnes per hectare) of the forests within a 20 km radius of each community, once we know how many tonnes of wood are needed for that community, we can calculate the area that will need to be harvested each year for each community.

Table 10: Average biomass density in a 20 km radius around each community

	average biomass density *tonnes per hectare*
Sambaa K'e First Nation Sambaa K'e	35
Nahʔą Dehé Dene Band Nahanni Butte	49
Pehdzeh Ki First Nation Wrigley	22
Łíídlįį Kúę́ First Nation & Fort Simpson Métis Fort Simpson	47
Tthets'éhk'edelį First Nation Jean Marie River	47
Deh Gáh Got'įę First Nation & the Fort Providence Métis Council Fort Providence	41
Ka'a'gee Tu First Nation Kakisa	27
West Point First Nation (Ts'ueh Nda community) Hay River Dene 1	27

[44] This report was not able to find data specific to the Northwest Territories. These were the sources used:

A: Schandelmeir, J. (2020, Nov 28). *How the various kinds of firewood stack up.* Anchorage Daily News. https://www.adn.com/outdoors-adventure/2020/11/28/how-the-various-kinds-of-firewood-stack-up.

B: Kuhns, M., & Schmidt, T. (n.d.) *Wood Heating.* Utah State University, Forestry Extension. https://extension.usu.edu/forestry/resources/forest-products/wood-heating.

C: WoodUWeigh.com (n.d.) *Cubic Metre Wood Weight Calculator.* https://www.wooduweigh.com/cubic-metre-wood-weight-calculator/.

If our estimate is that Tthets'éhk'edelı̨ First Nation (Jean Marie River) needs 550 tonnes of wood, we can estimate that they will need to harvest about 12 hectares of trees each year. If all of these trees were harvested in a single spot (which is not recommended) it would be an area of about 350 metres (375 yards) per side. Until the burn areas near the communities are surveyed, this can only be a rough estimate.

5.1.5 *Estimating Heat Produced*

It is also possible to make a rough estimate of how much heat the harvested wood produces.

Table 11: Estimated average energy produced by a cord of wood[45]

	energy produced per cord of wood		
	millions of BTUs		
source:	*A*	*D*	
birch	23.6	23.6	
white spruce	18.4	18.1	
black spruce	16.1	15.9	
aspen	16.6		
	average:	*18.9*	*millions of BTUs*
		5.5	*megawatt hours (MWh)*
		19,941	*megajoules (MJ)*

If our community consumes 500 cords of wood for heat in a year, we can estimate that it required 9,450 million BTUs (2,770 MWh or 9,970,278 MJ) of heat in that year. (Remember, this estimate will only be rough until locally harvested wood has its energy density measured in a lab.)

[45] Sources:

A: Schandelmeir, J. (2020, Nov 28). *How the various kinds of firewood stack up.* Anchorage Daily News. https://www.adn.com/outdoors-adventure/2020/11/28/how-the-various-kinds-of-firewood-stack-up.

D: Alaska Department of Environmental Conservation. (n.d.). *Know Your Wood.* Division of Air Quality. https://dec.alaska.gov/air/burnwise/know-your-wood.

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5.2 Tree Height

One of the key determinants of the best use of tree biomass is height. Even short trees can be harvested for fuel, but taller trees can be used for many other purposes, with only the small non-merchantable top part of the stem used for fuel.

The SCANFI dataset indicates that Dehcho has more than 500,000 hectares with trees 15 metres (50 feet) and taller.

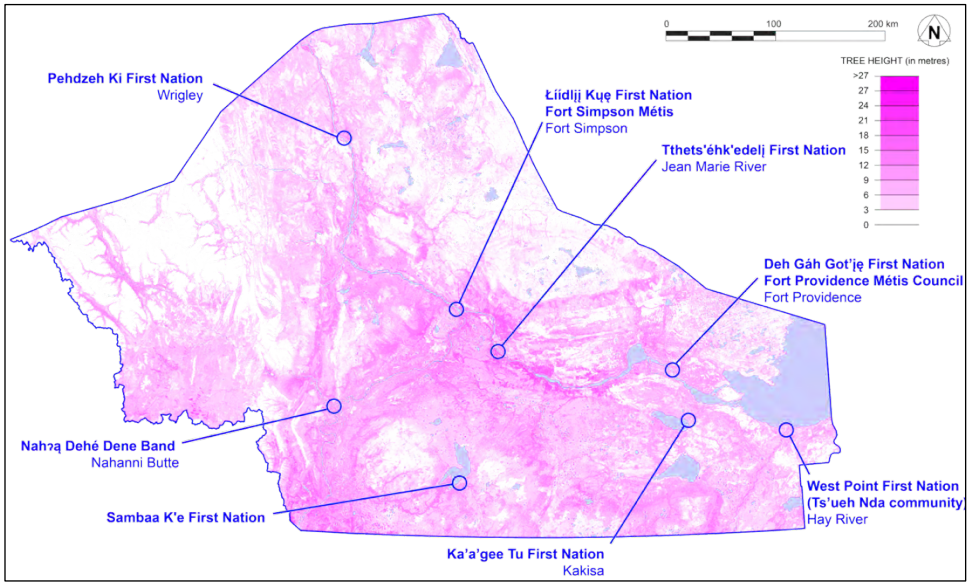


Figure 34: Distribution of trees within Dehcho by height

The taiga forest is often referred to as "the land of little sticks".[46] While trees in Canada's north are, on average, smaller than those in the south, many of the trees in Dehcho are anything but little sticks.

Table 12: Hectares of vegetation (trees) in Dehcho region, clustered in 2-metre height increments

vegetation (tree) height	*hectares*
1-2	258,335
3-4	2,507,776
5-6	3,965,932
7-8	2,964,408
9-10	1,720,706
11-12	1,119,996
13-14	743,444
15-16	416,769
17-18	208,944
19-20	98,413
>20	54,160

[46] See appendix for a note on the term "Land of Little Sticks".

A crucial benefit of the SCANFI dataset's details about tree height is the ability to pinpoint sources for tall trees, which are particularly useful for building construction. Just as it can pinpoint locations with high volumes of biomass, the SCANFI dataset can be used to pinpoint where the tallest trees are in Dehcho to an accuracy of within 30 metres (100 feet).

A later section of this report will focus on each of Dehcho First Nation communities and the estimated tree height in their immediate area.

5.3 Crown Closure

Forestry data often includes the variable “crown closure” (sometimes also called “canopy cover”). This is the percentage of a given area estimated to be covered by the tree canopy. The SCANFI dataset estimates crown closure in summer.

In winter, Dehcho’s crown closure would be lower wherever there are trees that shed leaves (aspen, poplar & birch) or needles (tamarack).

For this report, crown closure estimates may of less value than estimates of the biomass available or the tree height. However, they are still useful to know to gain a better understanding of Dehcho’s forests and the harvesting potential around each community.

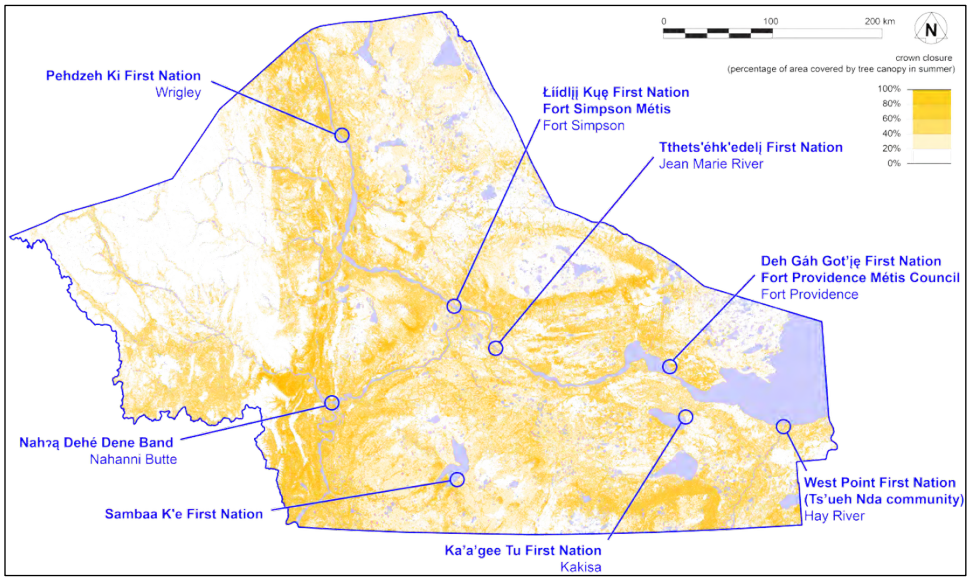


Figure 35: Summer crown closure in Dehcho

Table 13: Summer crown closure in Dehcho

crown closure	*hectares*
1-10%	441,807
11-20%	1,331,059
21-30%	2,744,752
31-40%	2,648,970
41-50%	2,343,890
51-60%	1,985,197
61-70%	1,942,673
71-80%	1,144,974
81-90%	348,026
91-100%	18,508

5.4 Burn Areas

Fires are a common occurrence in Canada's forests.

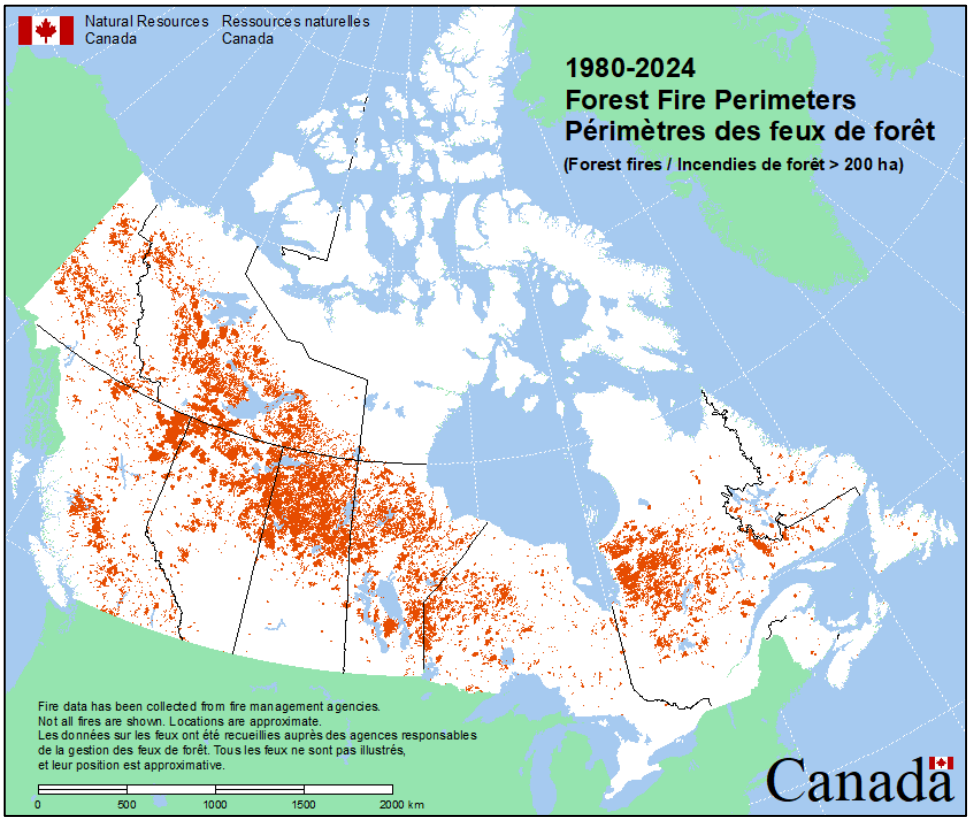


Figure 36: Canada: Forest Fire Perimeters, 1980-2024[47]

[47] Government of Canada. (2025?). *Canadian National Fire Database (CNFDB).* Natural Resources Canada. https://cwfis.cfs.nrcan.gc.ca/ha/nfdb. This map shows only fires greater than 200 hectares; data and maps including smaller fires will be presented below, when this report concentrates on NWT, and on Dehcho in particular.

5.4.1 *Burn Areas in NWT*

On average, about 1% of NWT's forested area burns each year.[48]

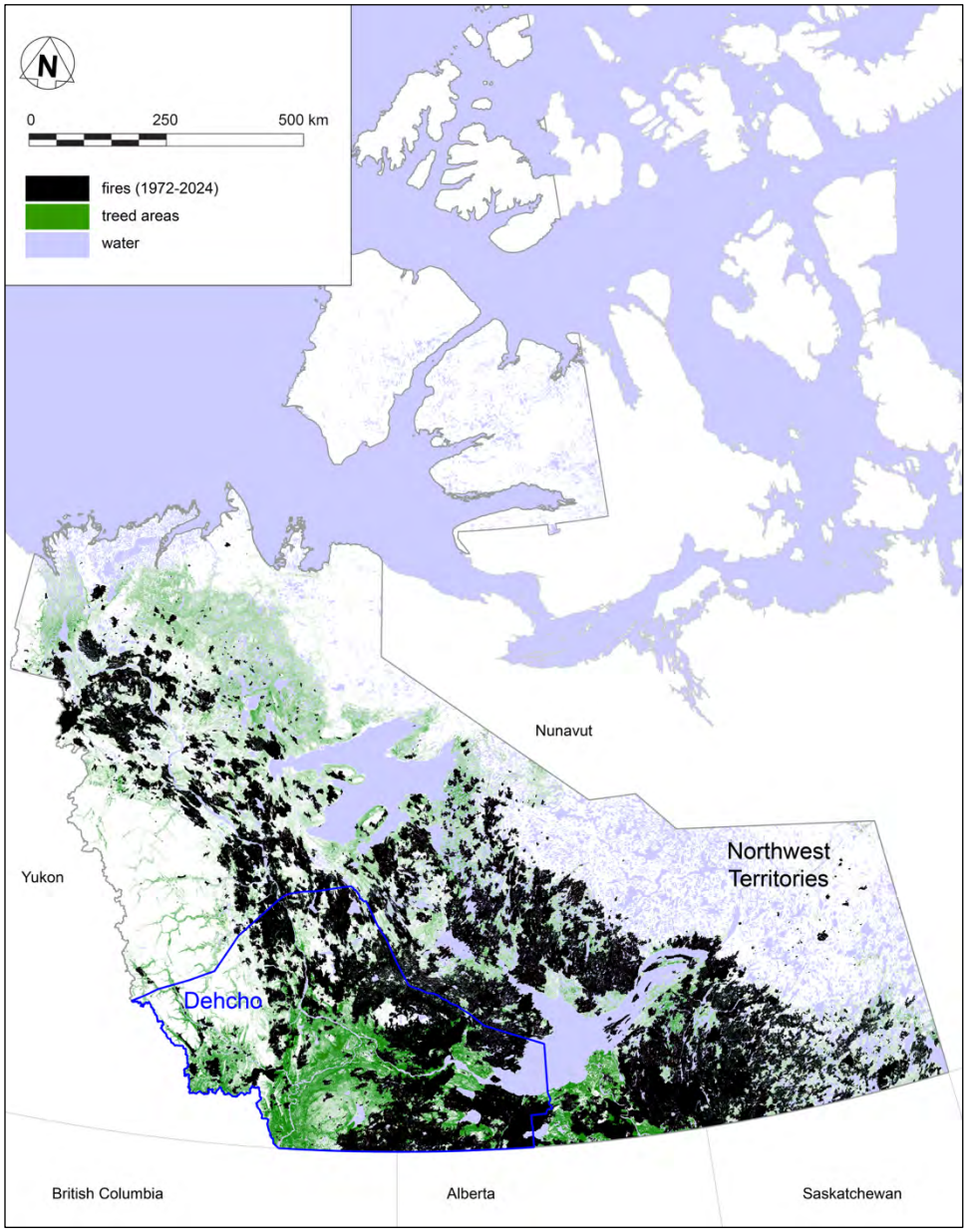


Figure 37: Fires in Northwest Territories, 1972 – 2024[49]

[48] Government of Northwest Territories. (n.d.). *Wildfire's natural role.* https://www.gov.nt.ca/ecc/sites/ecc/files/resources/haveyoursay_background_wildfire_wildfires_natural_role_1.pdf

[49] Fires from 1972 to 2020: Government of Canada. (2025 May 22). *CWFIS Datamart.* Natural Resources Canada. https://cwfis.cfs.nrcan.gc.ca/datamart. Fires from 2021 to 2024: Government of Northwest Territories. (2025). *Resources: Fire History.* NWT Centre for Geomatics. https://www.geomatics.gov.nt.ca/en/fire-history.

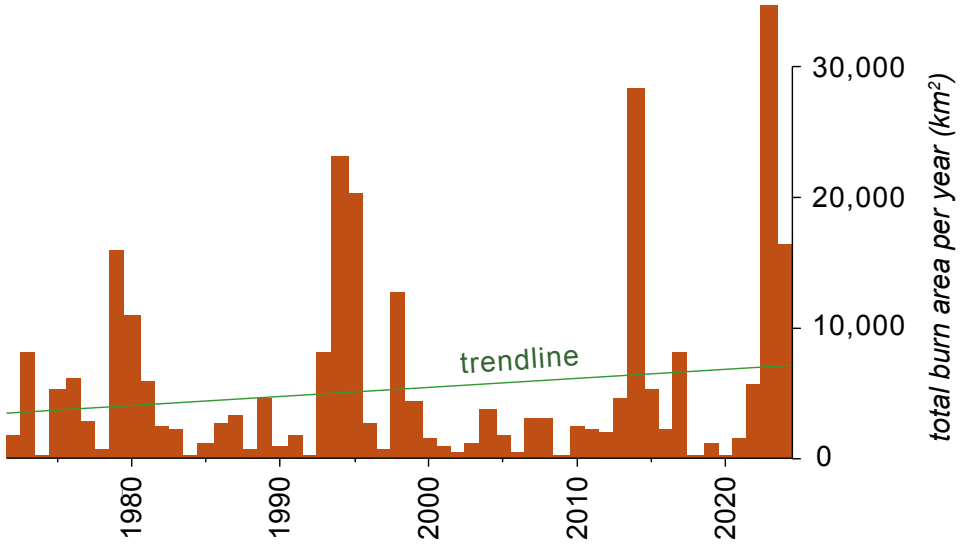


Figure 38: Total burned area in Northwest Territories, by year, 1972-2024[50]

As is obvious from this graph, the total area of forest burned varies very widely from year to year. It appears that the total area burned is increasing over the years, although the very high annual variance makes it difficult to be certain of this.

However, simply because an area of forest has experienced a fire does not mean that it has lost its potential to provide biomass, or to be a resource for harvesting. Unless an area experiences a repeat fire after just a few years, forests recover from fire.

It is difficult to estimate exactly how quickly recovery will happen. Given that the data on which these fire maps are based now stretches over 50 years, the fires from the 1970s will likely be largely recovered by now. Further research on this question is required.

[50] Government of Canada. (2025 May 22). *CWFIS Datamart.* Natural Resources Canada. https://cwfis.cfs.nrcan.gc.ca/datamart.

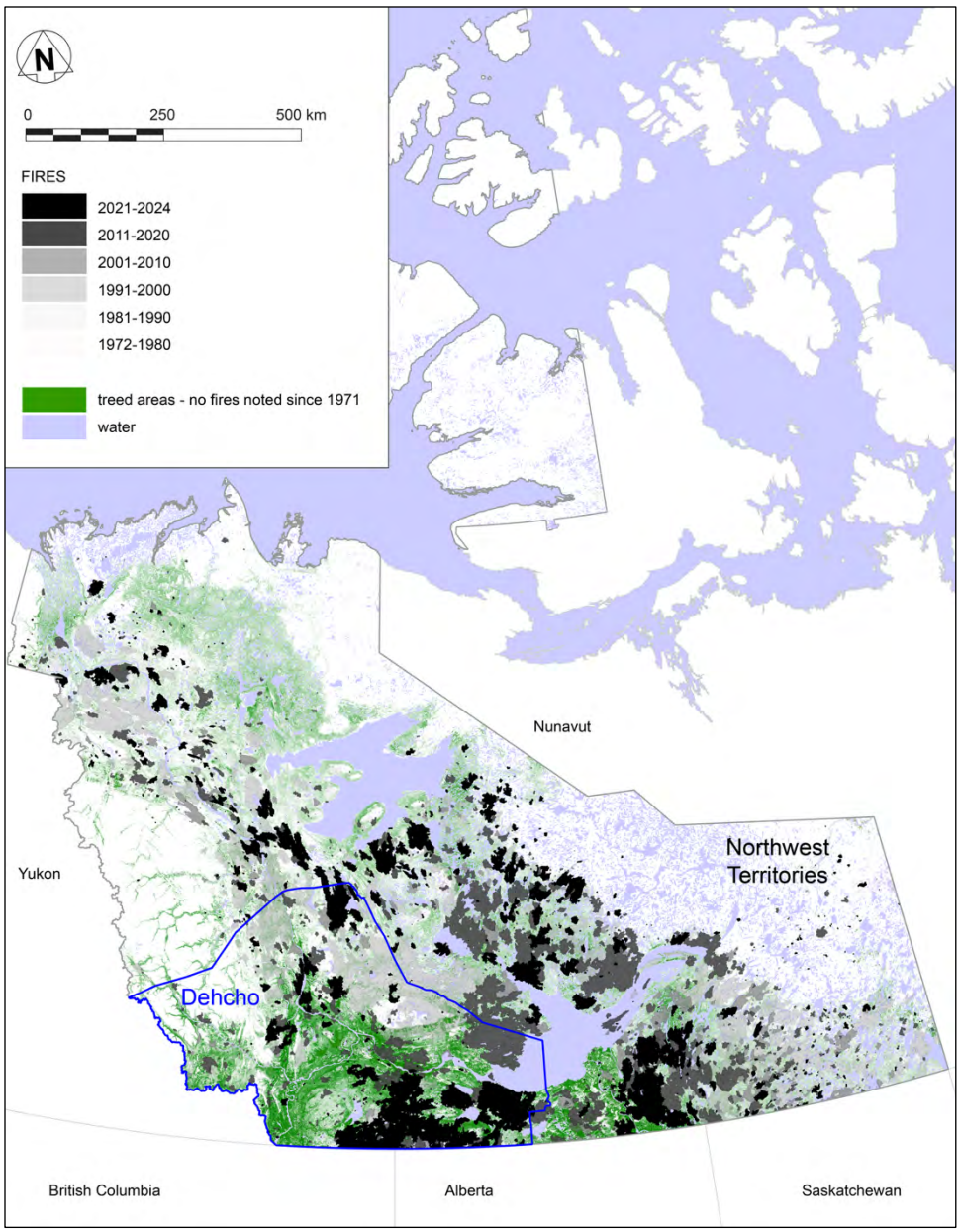


Figure 39: Fires, aged by decade (greyscale), in Northwest Territories, 1972 – 2024

5.4.2 *Burn Areas in Dehcho*

In estimating how much burnt wood might be available for harvesting in a particular area, it is necessary to understand both the characteristics of the trees in a particular area, and how long ago a fire in that area occurred.

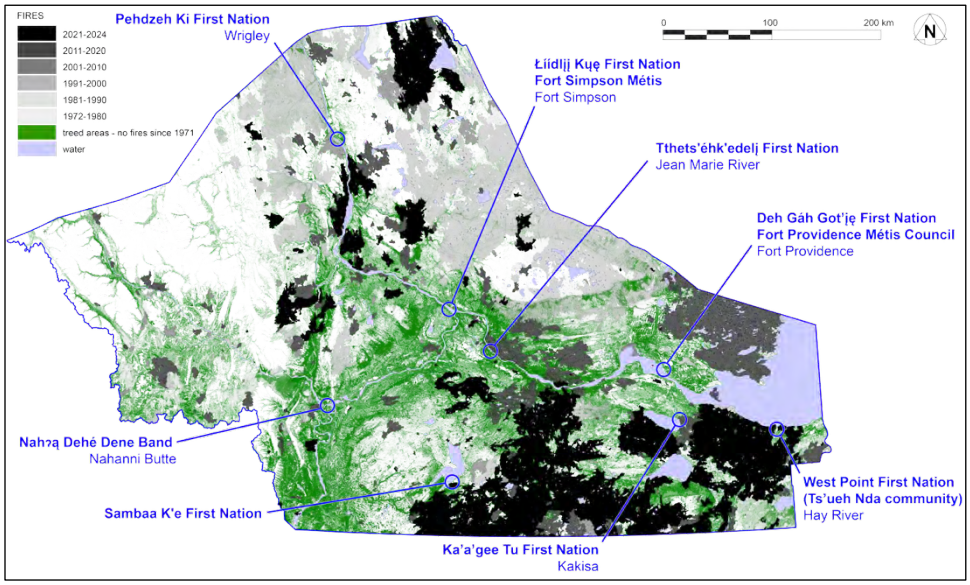


Figure 40: Fires, aged by decade (greyscale) in Dehcho, 1972 – 2024

Using a greyscale to show how long ago an area was burned is useful to give a general impression of the likely pace of recovery. However, to investigate specific fires, their resulting burn areas, and the potential harvestable biomass available in that location, coding the burned areas using colour may be more useful.

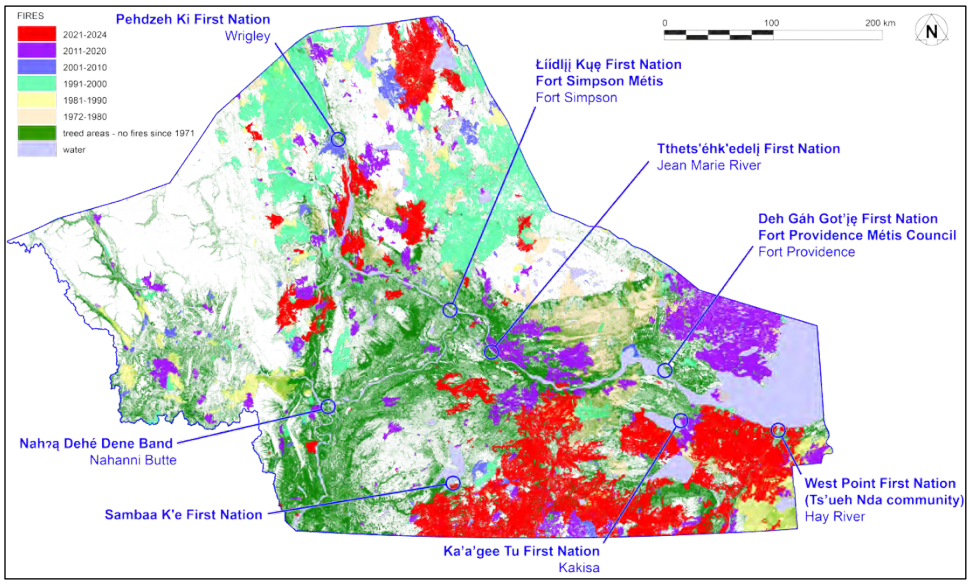


Figure 41: Fires, aged by decade (color coded) in Dehcho, 1972 – 2024

Not all of these fires will be equally relevant to this report.

5.4.2.1 NEWER FIRES

Burn areas that have harvesting potential:

- will need to be accessible to a Dehcho First Nation member community
- will probably need to have experienced a fire within the last 15 years

There are about 3 dozen fires that meet these criteria.

Table 14: Areas burned within the last 15 years, and accessible to Dehcho First Nations member communities

year	fire id	size *(in hectares)*	nearby communities
2024	FS010-24	42,766	Pehdzeh Ki First Nation (Wrigley)
	SS048-24	136,923	Ka'a'gee Tu First Nation (Kakisa)
2023	FS001-23	779,317	Sambaa K'e
	FS028-23	337	Tthets'éhk'edelį First Nation (Jean Marie River)
	SS005-23	2,962	West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)
	SS052-23	454,494	Ka'a'gee Tu First Nation (Kakisa) & West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)
2022	FS006-22	8,661	Nahʔą Dehé Dene Band (Nahanni Butte)
	FS008-22	38,104	Pehdzeh Ki First Nation (Wrigley)
	SS033-22	1,033	Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council (Fort Providence)
2021	FS016-21	1,839	Łíídlı̨į Kúę́ First Nation & Fort Simpson Métis (Fort Simpson) & Tthets'éhk'edelį First Nation (Jean Marie River)
2017	FS017-17	8,209	Nahʔą Dehé Dene Band (Nahanni Butte)
	SS066-17	245	Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council (Fort Providence)
2016	FS039-16	498	Tthets'éhk'edelį First Nation (Jean Marie River)
2015	FS048-15	6,515	Łíídlı̨į Kúę́ First Nation & Fort Simpson Métis (Fort Simpson)
	FS066-15	122	Tthets'éhk'edelį First Nation (Jean Marie River)
	SS030-15	13,409	Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council (Fort Providence)
	SS037-15	28,779	West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)
	SS048-15	1,649	Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council (Fort Providence)
	SS050-15	2,990	Ka'a'gee Tu First Nation (Kakisa)
	SS054-15	1,247	
2014	FS002-14	262	Łíídlı̨į Kúę́ First Nation & Fort Simpson Métis (Fort Simpson)
	FS026-14	40,693	Tthets'éhk'edelį First Nation (Jean Marie River)
	SS003-14	68,632	Ka'a'gee Tu First Nation (Kakisa)
	SS071-14	871	Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council (Fort Providence)
	SS099-14	35,201	West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)
	SS130-14	13,711	
	ZF020-14	596,459	Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council (Fort Providence)
2013	FS002-13	42,737	Pehdzeh Ki First Nation (Wrigley)
	FS038-13	499	Tthets'éhk'edelį First Nation (Jean Marie River)
	FS039-13	2,109	Łíídlı̨į Kúę́ First Nation & Fort Simpson Métis (Fort Simpson) & Tthets'éhk'edelį First Nation (Jean Marie River)
	FS052-13	933	Sambaa K'e
	FS070-13	11,479	Tthets'éhk'edelį First Nation (Jean Marie River)
2012	FS001-12	1,063	Łíídlı̨į Kúę́ First Nation & Fort Simpson Métis (Fort Simpson)
	SS033-12	276	Ka'a'gee Tu First Nation (Kakisa)
	SS051-12	8,462	

More than 2 million hectares of forested areas near Dehcho communities has burned in the last 15 years—and this is not even counting the fires of 2025.

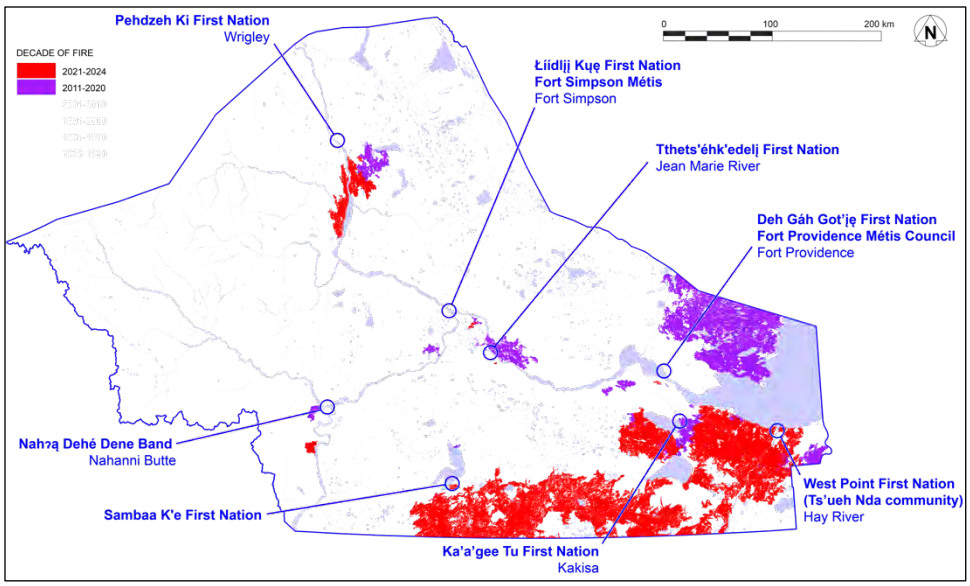


Figure 42: Areas burned within the last 15 years, and accessible to Dehcho First Nations member communities

Not all of these burned areas will be equally accessible. Fortunately, only a small portion of these burn areas—the ones most easily accessible, with the highest density of standing dead trees—will need to be ground-proofed before decisions on harvesting can be made.

Fires suggested as priorities for assessment for each community are discussed below.

5.4.2.2 OLDER FIRES

In combination with the more recent fires listed above, burn areas from older fires will help us understand how quickly (or slowly) a forest recovers in Dehcho. This will provide crucial information on when harvestable new growth is likely to become available.

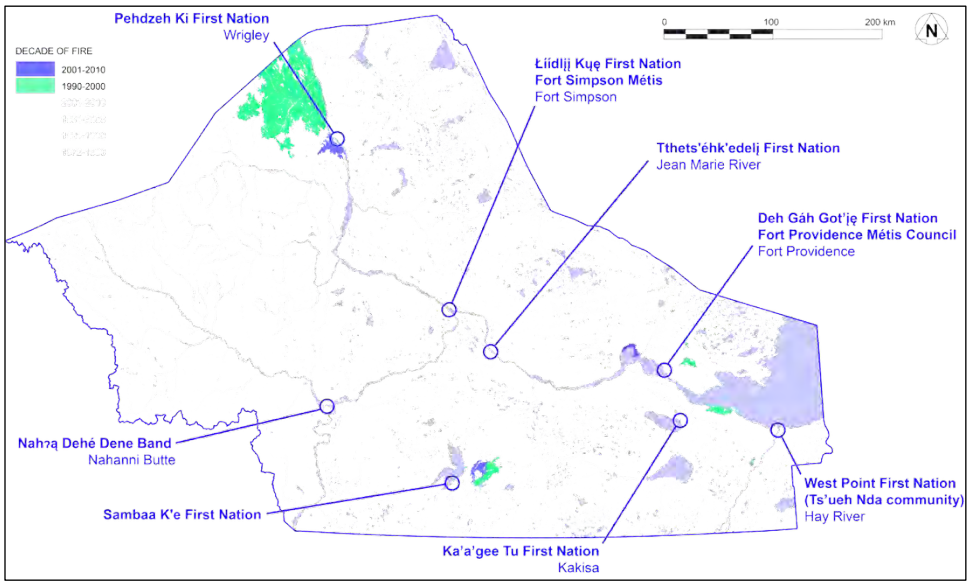


Figure 43: Areas burned 20 to 40 years ago, and accessible to Dehcho First Nations member communities

Table 15: Areas burned 20 to 40 years ago, and accessible to Dehcho First Nations member communities

year	fire id	size *(in hectares)*		nearby communities
2005	FS036-05	21,900	54,116	Pehdzeh Ki First Nation (Wrigley)
2004	FS014-04	12,516	30,929	Sambaa K'e
	HY028-04	6,842	16,908	Deh Gáh Got'ie First Nation & the Fort Providence Métis Council (Fort Providence)
1996	FS029-96	20,999	51,889	Sambaa K'e
	HY029-96	11,632	28,743	West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)
	HY038-96	1,984	4,902	
1995	FS018-95	395,400	977,052	Pehdzeh Ki First Nation (Wrigley)
1994	FS002-94	81	200	Sambaa K'e
	FS089-94	352	871	
	HY001-94	7,060	17,445	Deh Gáh Got'ie First Nation & the Fort Providence Métis Council (Fort Providence)
	HY901-94	1,026	2,536	

5.4.2.3 REPEAT FIRES

Some newer fires have overlapped with older ones, before the forest has fully recovered. The increasing frequency of fires means that these types of overlaps will occur more frequently in the future.

If a repeat fire happens too quickly after the first one, the forest will not have time to recover, establish new trees, and be able to seed again after the new fire. If that occurs, without artificial reseeding, that area of forest will probably not recover for many decades.

We need a better understanding, specific to Dehcho, of how long a gap is needed between fires for the forest to be able to recover on its own, or when artificial reseeding is needed. Studying these reburned areas can provide that guidance.

5.4.3 *Harvestable Biomass After Fires in Dehcho*

The Dehcho Territory is estimated to have about 20 oven-dry tonnes (ODT) of biomass available for harvest in burn areas, per hectare.

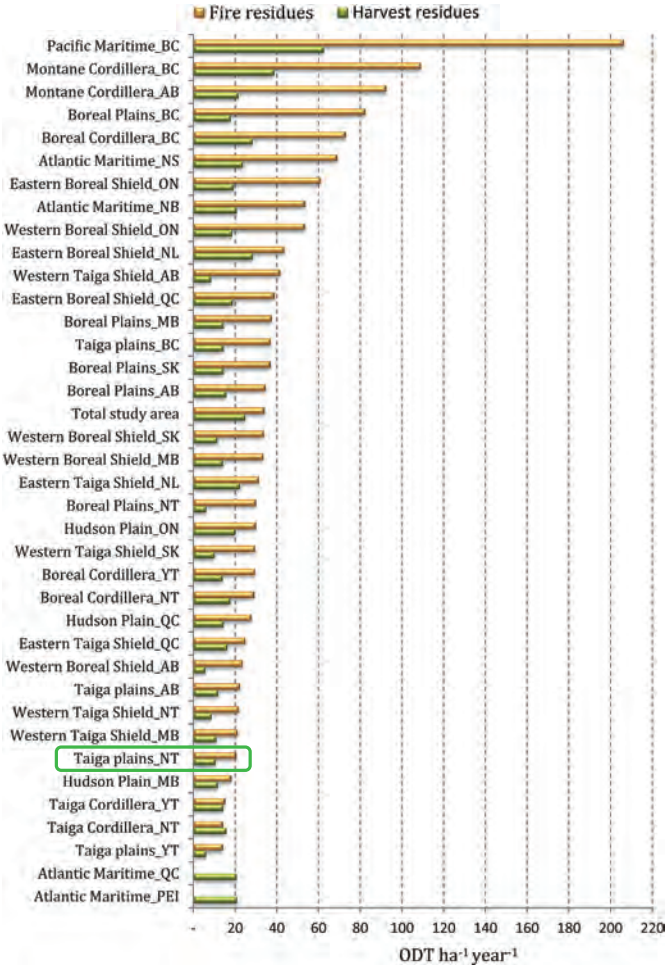


Figure 44: Mean biomass density (ODT/ha/year) produced by fire and harvest residues among selected ecozones, 2002-11[51]

[51] Figure 3 from: Mansuy, N., Paré, D., Thiffault, E., Bernier, P.Y., Cyr, G., Manka, F., Lafleur, B., & Guindon, L. (2017). *Estimating the spatial distribution and locating hotspots of forest biomass from harvest residues and fire-damaged stands in Canada's managed forests.* Biomass and Bioenergy, vol. 97, pp. 90-99, ISSN 0961-9534. https://doi.org/10.1016/j.biombioe.2016.12.014 (https://www.sciencedirect.com/science/article/pii/S0961953416303877). (Northwest Territories Taiga Plains ecozone highlighted.)

The amount available in any particular burn area will vary from this 20 tonnes/hectare (t/ha) average. For example, areas along river and stream beds or near the shore of a lake, where trees are typically denser and taller than average, will have more biomass available, while the tops of hills will typically have less.

Figure 45: Landscape just east of Pehdzeh Ki First Nation (Wrigley)[52]

The 20 t/ha average is roughly twice as much biomass as would be available as harvest residue from a standard forestry operation of the same area if a fire had not occurred. This is an abundance of fire residue compared to harvesting residue common to all ecozones in Canada.

5.4.3.1 HARVESTABLE BIOMASS IN BURN AREAS NEAR DEHCHO FIRST NATIONS MEMBER COMMUNITIES

As an example, based on the 20 t/ha average, the 38,000-hectare fire (approximately 35 kilometres south of Pehdzeh Ki First Nation—Wrigley—on Highway 1) might have roughly 750,000 tonnes of biomass available for harvest.[53] This is *far* more biomass than this community will need for fuel.[54]

Even if the community harvests only 1% of the estimated biomass available for fuel from this fire—7,500 tonnes—this is still far more than would be needed for fuel. And this is only one burn area near Pehdzeh Ki First Nation that could have harvestable biomass.

This fire—and other fires relevant to each community—will be discussed below.

[52] Image source: Google Earth Pro. (2024 May 04).

[53] This can only be a rough estimate. The SCANFI dataset is based on 2020 data, so it does not include biomass residue estimates for newer burn areas. Ground-proofing recent burn areas close to Dehcho First Nations member communities is essential if the burnt tree stems (boles) are to be considered as potential fuel.

[54] See the section Estimating Harvest Volume Needed to estimate much biomass would be needed each year to meet a community's fuel needs.

5.5 Use of Wood from Burn Areas

Wood can be harvested from burn areas—and has been used for fuel by the Dené for thousands of years.[55] Other people are coming to realize that wood from burned areas can be a viable fuel. It actually has several advantages over wood cut from live trees:

- There will be fewer branches, leaves, needles and bark.
- There will be less moisture in the wood.
    - In some circumstances, the moisture content may be as low as the moisture content of pellets.
- There is no need to wait for the wood to season.
    - Dead standing trees left after a fire will be dry enough to use immediately after harvest—as logs or as chips.

However, there is no question that, if a burn area is treated like an unburned forest area when harvesting, significant long-term damage will be done. In a taiga forest, it may take many decades for a forest to recover from poor harvesting practices after a fire. However, sustainable harvesting in burn areas is possible.

[55] A Dené person in Manitoba indicated to me that it was traditional to use burned trees ("standing dead wood") for fuel, and live trees for construction; I have not been able to find documentation on this in Manitoba Dené communities. There is some indication from a study done of the Sambaa K'e Candidate Protected Area that is the practise there as well. Source:

- Golder Associates. (2010 Feb). *Renewable Resource Assessment of the Sambaa K'e Candidate Protected Area.* NWT Discovery Portal. https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/Sambaa_Ke_Final_Report_feb2010.pdf.

Further investigation on the possible Dené tradition or preference for using standing dead wood for fuel is worth further investigation.

Figure 46: Post-fire boreal forest, sustainable harvesting site, Lac Brochet[56]

A few basic rules of thumb for sustainable harvesting in northern burn areas include:

- Wait at least a year—or preferably two—after a fire:
  - The forest floor is usually more fragile after a fire. Waiting enables it to begin to recover.
  - The trees can disperse their seeds.
  - Bark, small branches, and needles or leaves will fall off, returning nutrients to the soil.
  - This time should be used to thoroughly assess the burned area, develop a viable harvesting plan, and determine the actions needed to ensure post-harvesting forest recovery.
- Clearcutting is almost never a good idea in a burn area.
  - The disturbances clearcutting entails are very likely to disrupt seed dispersal and forest regeneration.
- Only the central tree stem (the trunk or "bole") should be removed.
  - Everything else should remain in place to provide soil nutrients and facilitate regeneration.
- Residue after harvesting ("slash") should remain dispersed on the landscape (not stacked) and under no circumstances should it be burned.
- Smaller harvesting and hauling equipment is needed to minimize harm to the forest floor.
- Hauling in winter will further minimize harm, because the forest floor will be frozen and protected under snow.

[56] Harvesting has been completed in the foreground; tree stems (boles) are stacked in the background, waiting for hauling. Note that the forest floor (in this case, mainly moss and small shrubs) remain intact, and the new trees growing from seeds dispersed by the lodgepole pine continue to grow undisturbed. Photo credit: Bruce Duggan, Boke.

- To keep the scale of harvesting small, harvesting from burn areas should only be done to supply fuel for local use.

Some initial sources for research on sustainable after-fire harvesting include:

- Saint-Germain, M., & Green, D.F. (2009 Jan). *Salvage logging in the boreal and cordilleran forests of Canada: Integrating industrial and ecological concerns in management plans.* The Forestry Chronicle (85,1). Canadian Institute of Forestry. https://doi.org/10.5558/tfc85120-1.
- Berg, S. (2018 Jan 18, updated 2023). *Post-Natural Disturbance: Forest Restoration Guidance Landscape Level Wildfire Recovery.* Government of British Columbia, Ministry of Forests. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/post_natural_disturbance_wildfire_guide.pdf.
- Pons, P. *et al.* (2020 Aug 25). *Towards better practices of salvage logging for reducing the ecosystem impacts in Mediterranean burned forests.* iForest - Biogeosciences and Forestry (13, 5). https://doi.org/10.3832/ifor3380-013.
- Mansuy, N. *et al.* (2018 Jun 01). *Salvage harvesting for bioenergy in Canada: From sustainable and integrated supply chain to climate change mitigation.* WIREs Energy and Environment. https://doi.org/10.1002/wene.298.

5.5.1 *Harvested Burnt Wood Should Be Stored as Logs and Then Chipped – Not Pelletized*

After the dead standing trees are harvested and hauled into the community for fuel, they should be stored as logs or boles (uncut logs).

Dead standing trees should not be pelletized.

Pelletizing wood for fuel only makes sense if a sawmill has a large volume of sawdust that cannot be used for any other purpose. Reducing trees (whether burnt or unburnt) to sawdust is very energy intensive. Turning sawdust into pellets requires additional energy, and then the pellets must be protected from snow and rain. All this processing means that, in order to be profitable, the price of wood pellets must be 2 to 3 times that wood chips.

In northern environments like Dehcho, dead trees, after they are harvested, can be stored outside "as is" and then only chipped when they are needed for fuel. In northern environments, intact logs will not significantly absorb any rain or snow that might fall on them.

Figure 47: Logs stored in community log yard, Lac Brochet

Snow will be easily fall off the logs as they are handled in preparation for chipping.

Figure 48: Unloading logs, Lac Brochet

Most community-scale biomass energy systems are designed to run on wood chips.

5.5.2 *Using Wood Chips for Heat*

Figure 49: Biomass boilers using wood chips for fuel and heating a water/glycol mix distributed through a district energy system, Lac Brochet

There are also heating systems for single buildings designed to use chips. One is currently in operation in the Bannockland Inn in Fort Simpson, NWT.

Figure 50: Wood chip heater in Bannockland Inn, Fort Providence. Photo: Derek Neufeld[57]

[57] Units suitable for smaller homes include the Hargassner Eco-HK50-60 kw unit. See https://www.hargassner.com/ca-en/wood-chip-boilers/.

5.5.3 *Using Wood Chips for Electricity*

Wood chips harvested from dead standing trees can also be used to make electricity in Combined Heat & Power (CHP) systems.[58]

The most suitable Combined Heat & Power technology for converting wood chips into electricity is an Organic Rankine Cycle (ORC) system. An ORC can use harvested trees and tree waste in virtually any form to produce both heat and electricity.

Figure 51: Page 1 of an ORC flyer put out by Natural Resources Canada[59]

[58] The word "Combined" in "Combined Heat & Power" means the system makes both heat and electricity.

[59] Government of Canada. (ca. 2017). *Organic rankine cycle: a technology worth replicating.* Natural Resources Canada. https://publications.gc.ca/site/eng/9.828508/publication.html. This flyer includes a capital cost estimate of "$2 to 8 million". The cost of an actual installation will vary from this—it could be lower or higher—depending on the electricity output required.

Typically, the heat is distributed to buildings in the community through a district energy system. The electricity is used to power nearby buildings. Any excess electricity can be used to offset diesel-generated electricity.

ORC systems are quite common in the forestry industry. One of the most interesting examples of an ORC system is the one installed by the Meadow Lake Tribal Council in its BioEnergy Centre in north-central Saskatchewan.

Figure 52: Image from Bioenergy Centre's web page[60]

This facility is larger than what would be needed in most Dehcho First Nations member communities. It produces enough electricity to power 5,000 homes.

A number of companies around the world manufacture and install ORCs.[61] There are more than 2,500 ORC units currently in operation throughout the world.[62] They range in size from larger ones like Meadow Lake Tribal Council's, down to small ones suitable for providing heat and electricity to a single building.

[60] MLTC BioEnergy Centre (2024). *Active Operations.* Meadow Lake Tribal Council. https://mltcbioenergy.ca

[61] Manufacturers include:

- ElectraTherm (n.d.). *Power Module75.* https://electratherm.com/en/power-module-75/.
- Enogia (n.d.). *Innovation at the heart of sustainable energy.* https://enogia.com/en/en-orc/.
- Exergy (n.d.). *Biomass Power Plant.* https://www.exergy-orc.com/application/biomass/.
- Turboden (n.d.). *ORC system.* https://www.turboden.com/products/2463/orc-system.

[62] For more on ORCs and their use in a variety of industries, see:

- Wieland, C., Schifflechner, C., Dawo, F. & Astolfi, M. (2023 Apr). *The organic Rankine cycle power systems market: Recent developments and future perspectives.* Applied Thermal Engineering, vol 224. https://doi.org/10.1016/j.applthermaleng.2023.119980.
- Wikipedia. (page last edited: 2025 Sep 28). *Organic Rankine cycle.* https://en.wikipedia.org/wiki/Organic_Rankine_cycle.
- Tartière, T. & Astolfi, M. (2025 Sep). *ORC World Map.* https://orc-world-map.org

5.6 Using of Wood from Fuel Breaks

Perhaps the simplest and best way to begin harvesting for fuel is to use the trees cut down in fuel breaks[63] being constructed around Dehcho communities.

Dehcho communities recognize the value of fuel breaks—created before a fire threatens a community—as a way of protecting their homes and community buildings. There has been funding announced for this purpose and communities appear eager to undertake this work.[64]

Creating those fuel breaks should be integrated with the ground-proofing of the forests as proposed as a follow-up to this report. This will have important benefits:

- Rather than being piled in the forest or burned in place, felled trees can be brought into the community and be made available for community and individual use.
- The community will be better protected against future fires.
- Local employment will be created.
- Local people will enhance their sustainable harvesting skills.
- The accuracy of the SCANFI dataset can be assessed.
- Estimates of the volume wood available in non-cleared areas will be more accurate.

[63] Fuel breaks are sometimes called "fire breaks". More specifically, the term "fire break" is used for a gap in the forest created in an emergency situation as a fire threatens a community and are often created very close to the community. The term "fuel break" is used in this report to refer to the process of clearing a wider strip of forest systematically around a community before a fire threatens. This is a preventative process that typically clears forest further away from the community, often in a circle or arc around the community. The further away from the community it can be, the less it will disturb community life. The wider it can be, the more protection it will provide.

[64] See:

- Carroll, L. (2023 Nov 28). *N.W.T. communities eager to tap into federal fund for firebreaks — sooner rather than later.* CBC News. https://www.cbc.ca/news/canada/north/nwt-communities-federal-fund-firebreaks-1.7041765.
- Government of Canada. (2025 May 08). *Emergency Management FireSmart program.* Indigenous Services Canada. https://www.sac-isc.gc.ca/eng/1643385529147/1643385549632.
- Government of Canada. (2025 Jul 03). *Structural Mitigation.* Wildfire preparation measures, Wildfires in First Nations communities, Indigenous Services Canada. https://www.sac-isc.gc.ca/eng/1751047267556/1751548325212#sec4-1.

6 DECISIONS NEEDED PRIOR TO GROUND SURVEYS

This report looks at the forest resources that *could* be available for local community use:

- Burn areas may have dead trees left after a fire that may be suitable for use as fuel for heat and/or electricity generation.
- Some unburnt forested areas will have taller trees suitable for use in building construction and for many other purposes.

Under no circumstances should any harvesting of wood—either remaining after fires or in unburnt areas—go ahead unless and until there is a consensus within the local community that they want to consider using these resources for the purposes discussed in this report.

6.1 Getting Off Diesel

A decision to reduce—and perhaps eliminate—the use of diesel by switching to locally available biomass needs a community consensus to succeed.

This shift creates local, sustainable, permanent jobs and keeps money in the community that is currently being spent on imported diesel. However, it also presents challenges. Questions that need to be answered before proceeding include:

- Are there local people interested in the jobs of harvesting, hauling, and chipping the dead standing trees?
- Are local people interested in being trained in and operating biomass energy systems?
- Securing the funds and then building a biomass-based energy system is not a quick or simple project. Is community leadership interested in adding this project to all the other challenges they face?

The fundamental question is:

- *Are we, as a community, content with diesel as our main energy source, or do we want to make a change?*

Fortunately, the change doesn't have to happen in a single effort. Replacing diesel with biomass can happen in stages.

6.2 Burn Areas

Every Dehcho First Nation member community has burn areas nearby which may be suitable for harvesting for fuel, if the community decides to do so. Individual burn areas, highlighted below for each community, will require in-person surveys, which should be complemented by a recorded flyover with a drone.

Burn areas with the most dead standing trees left after a fire could be harvested and the wood measured for its weight and energy density. This will enable us to understand questions specific to Dehcho:

- How many years after a fire is the best time to harvest the central stems (boles) for fuel?
- What can we expect the energy production from these harvests to be?

- Do burn areas near communities need to be reseeded, or will the natural process of forest recovery be sufficient?

6.3 Unburnt Areas with Taller Trees & Denser Growth

Each Dehcho First Nation member community has unburnt stands of taller trees and denser growth within a few kilometres of their community that could be used for building construction and for many other purposes. The people in each community will be the most knowledgeable about where these prime harvesting sites are, and which are most accessible.

Each map in the section below uses the SCANFI dataset to highlight potential sites for further examination, which may be useful as a complement to local knowledge.

Confirming prime harvesting locations will require in-person surveys, and should be complemented by a recorded flyover with a drone. Specific questions that need answering are:

- Are the trees in these areas suitable for building and other potential non-fuel uses?
- What are the challenges in bringing the logs from these sites to the community?
- Should one site be preferred over the others?

However, the fundamental question that needs to be answered before this occurs is:

- *Do we want to harvest local trees for local building use?*

Currently, as with most communities in NWT, most buildings in Dehcho are constructed from materials brought in from the south. If that is the community's preference, then there is no benefit to surveying local forests for harvesting for uses beyond fuel. If, on the other hand, the community wishes to explore construction using local wood, these locations will be good places to assess.

7 RESOLUTION OF ISSUES PRIOR TO HARVESTING

If a community decides they want to harvest forest resources, and if the ground-proofing surveys determine there is sufficient biomass to make harvesting worthwhile, at least three issues will need to be addressed prior to harvesting:

1. resolution of use questions
2. resolution of jurisdictional questions
3. securing of permits

7.1.1 *Resolution of Use Questions*

Each community has used the forests around their communities for many purposes since time immemorial. Those activities include (but of course are not limited to) food, medicine, crafts, buildings, and firewood. Many (but not all) of those activities are codified in agreements with governments; individuals and communities having rights of use of the forests. *Nothing in this report should be interpreted as proposing to restrict any of those rights.*

The crucial question which needs to be resolved before the surveys and assessments proposed in this report are undertaken is:

- *Does this particular community want to harvest trees in their area for uses beyond individuals harvesting trees for their own use?*

The primary use of local forests discussed in this report is the use of trees for fuel, beyond the trees individuals harvest for heat for their own homes. In most cases, this report proposes using trees left over after fires as fuel that could replace diesel, initially for heat and, if they choose, for electricity as well.

It is not necessary to only use burnt trees for this purpose, only that they *may* be a viable fuel source. This report also provides preliminary assessments of unburnt forested areas near communities that could be used for other local purposes.

This report does not say that communities *should* expand forest harvesting beyond their current activities, only that they *can, if they choose.*

In addition to harvesting decisions each community would need to make on their own, some communities will need to make decisions jointly with other entities.

Many of the forested areas around the Dehcho First Nation member communities have constraints on what activities can occur in those forests. Each community—and other relevant decision-making entities—would need to agree that they want to consider harvesting trees for fuel use.

What follows are two examples of discussions that should occur before on-the-ground surveying and assessment take place. Very likely, each community will know similar discussions that are needed.

7.1.1.1 EXAMPLE 1: SAMBAA K'E

All of the area shown in the Sambaa K'e map created for this report is part of the Sambaa K'e Conservation Candidate Area.

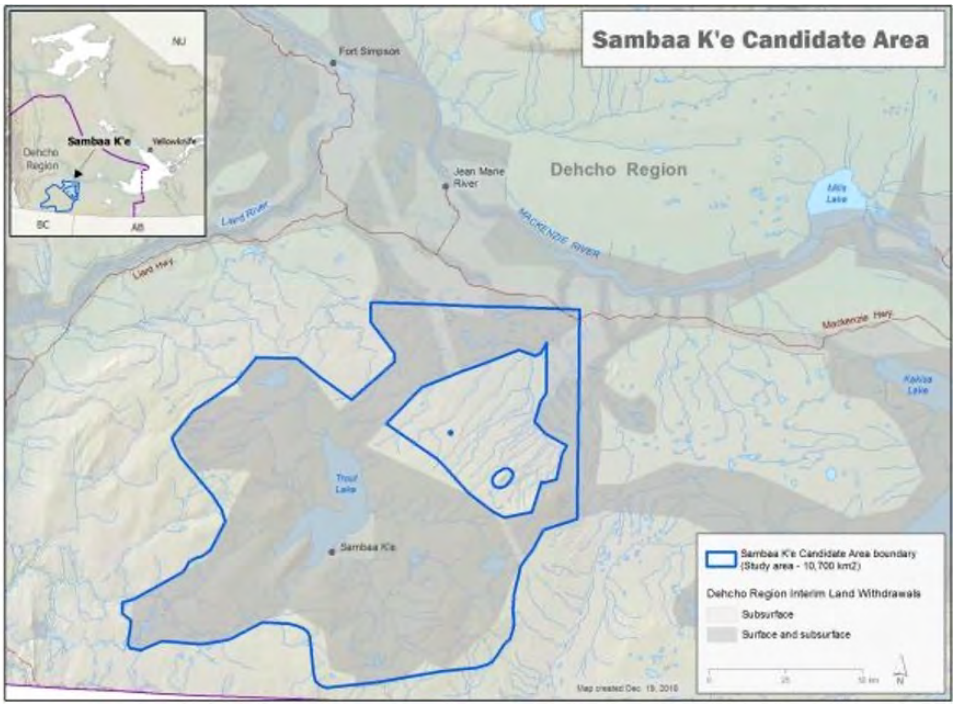


Figure 53: Consultation boundary of the Sambaa K'e Candidate Protected Area[65]

This area is protected through the Dehcho region interim land withdrawal and is part of ongoing land, resources and self-government agreement negotiations. Harvesting for fuel should only be considered if it is compatible with those negotiations.

7.1.1.2 EXAMPLE 2: NAHʔĄ DEHÉ – NÁÁTS'ĮHCH'OH (NAHANNI) NATIONAL PARK RESERVE

One of the three potential harvest sites near Nahʔą Dehé Dene Band (Nahanni Butte) shown in the map for this report is within the Nááts'įhch'oh (Nahanni) National Park Reserve. Dehcho First Nations and Parks Canada work together on park management issues through the Nahʔą Dehé Consensus Team.[66]

*No on-the-ground surveying or assessment of that potential harvest site can or should occur unless the Consensus Team decides that there **could** be some harvesting of trees for local use within the Park Reserve.*

[65]Government of Northwest Territories. (n.d.). *Learn about the NWT's Conservation Network – Sambaa K'e.* Environment and Climate Change. https://www.gov.nt.ca/ecc/en/services/conservation-network-planning/sambaa-ke

[66] Government of Canada. (2024 May 03). *2010 Nahanni National Park Reserve of Canada Management Plan.* Parks Canada. https://parks.canada.ca/pn-np/nt/nahanni/info/plan/plan4#.

Deciding not to consider harvesting for local use within the Park Reserve would not impair acting on this report. Two other potential harvests sites of unburnt trees outside the Park Reserve are suggested on the map. As well, the two burn areas suggested for investigation as potential fuel sources are both outside the Park Reserve.

7.1.2 *Resolution of Jurisdictional Questions*

In addition to resolving use questions, some of the Dehcho First Nations member communities need to resolve jurisdictional questions before on-the-ground surveying occurs. What follows is an example of only one.

7.1.2.1 EXAMPLE 3: FIRES FS006-22 & FS017-17 NEAR NAHʔĄ DEHÉ DENE BAND (NAHANNI BUTTE)

In addition to the Nahʔą Dehé Dene Band, a number of other entities—including the Acho Dene Koe First Nation and the Kaska Dena (which include Liard First Nation, Ross River Dena Council, Kwadacha Nation, and Dease River First Nation) have asserted rights over the burn areas identified as potential fuel harvesting sites.

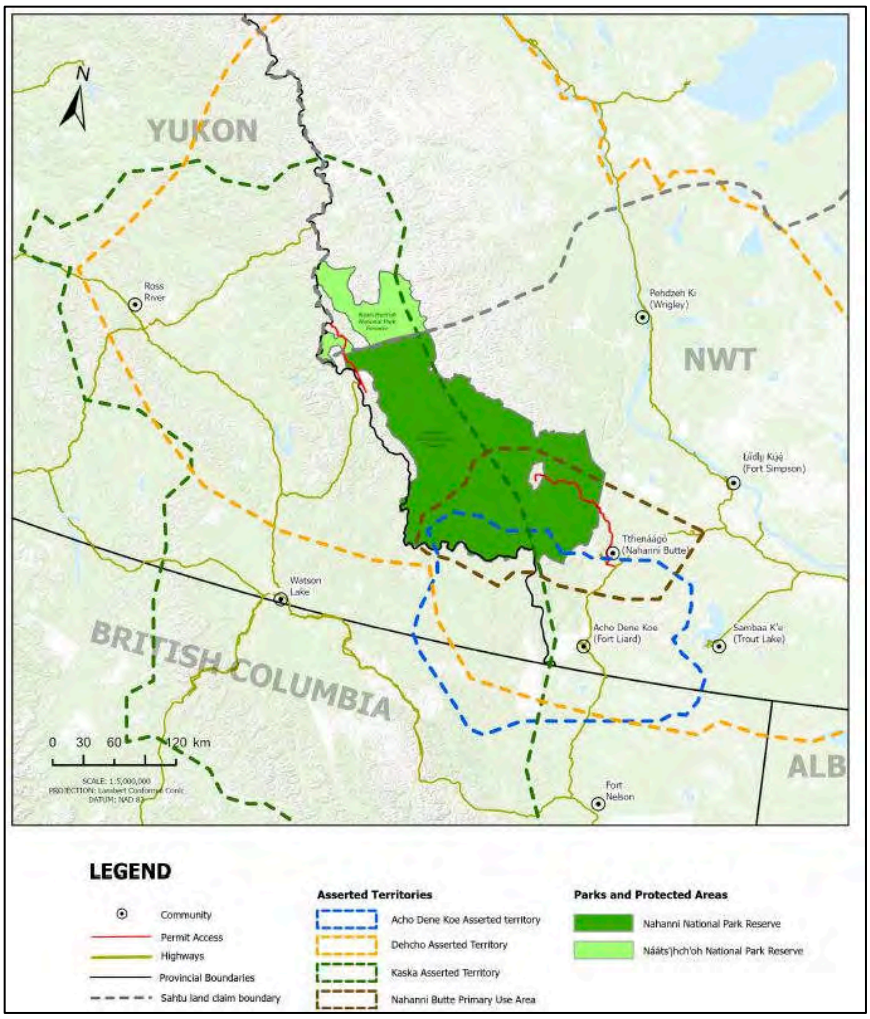


Figure 54: Indigenous territories in and around the Nahanni National Park Reserve[67]

These rights should be addressed before on-the-ground surveying occurs. This discussion may or may not be difficult, as there could well be more than enough fuel left in these burn areas to meet multiple community's needs. The other communities will also have burn areas closer to their community that will have usable fuel. Difficult or not, the discussion needs to occur first.

7.1.3 *Securing Permits*

It is likely that harvesting of trees from both unburnt and burn areas will require the development of Forest Management Agreements (FMAs), Timber Cutting Licenses (TCLs), or Timber Cutting Permits (TCPs).

Deh Gáh Got'ı̨ę First Nation & the Fort Providence Métis Council have already secured an FMA for their area, through Diagaa Enterprises. Any harvesting of wood for the uses considered in this report would occur within the terms of that agreement.

[67] Map 1 of: Parks Canada. (2021). *Nahanni National Park Reserve of Canada: Management Plan.* Nahʔą. Dehé Consensus Team. Government of Canada. http://parkscanadahistory.com/publications/nahanni/mgt-plan-e-2021.pdf.

For other communities, because the amount of wood harvested for fuel use as considered in this report will be much less than that allowed under the Diagaa Enterprises agreements, the terms of an FMA for the other communities *may* be simpler, or a TCL or TCP could be agreed.

Depending on the scale of harvesting planned for each community, a Wildlife Management and Monitoring Plan (WMMP) may also be required.

Table 16: Summary of high-level criteria used to assist in determining if a WMMP is required for timber harvesting[68]

Type of Development	WMMP Required?			
	'Always'	'Likely'	'Might'	'Likely Not'
Timber harvesting	Forest Management Agreement (>50,000 m^3/yr and >5 yrs)	Timber Cutting Licence (>5,000 m^3/yr and > 1 yr)	Timber Cutting Permit (<5,000 m^3/yr and <1 yr)	Free Timber Cutting Permit (<60 m^3 or ≤20 trees)

It may be that on-the-ground surveying will need to occur before either an FMA, TCL, or TCP is finalized. However, initial discussions with the Government of the Northwest Territories' Department of Environment and Climate Change will almost certainly be needed first.

[68] Excerpt from Table 1 of: Government of Northwest Territories. (2019 Jun, updated 2021 Jun 03). *Wildlife Management and Monitoring Plan (WMMP) Process and Content Guidelines.* https://www.gov.nt.ca/ecc/sites/ecc/files/resources/wmmp_process_and_content_guidelines_jun_2021_complete_002.pdf.

8 FOREST CHARACTERISTICS AND RELEVANT FIRES NEAR EACH DEHCHO FIRST NATION MEMBER COMMUNITY

There are striking differences in the forest characteristics and fire histories in the areas immediately around each of the Dehcho First Nation member communities.

Although they all share the same ecozone, the distinctive landscape around each community means that, if a community decides they want to consider harvesting for fuel and other purposes, each community will need their own harvesting plan.

8.1 Sambaa K'e First Nation

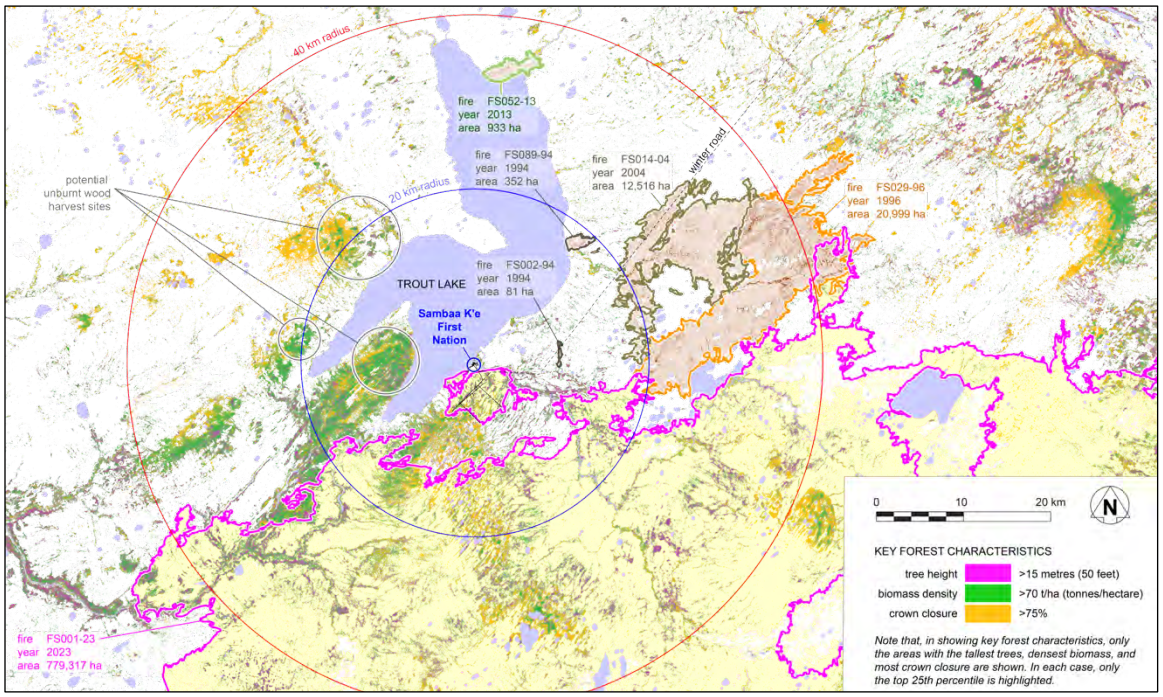


Figure 55: Sambaa K'e First Nation – key forest characteristics, relevant fires, and potential unburnt wood harvest sites[69]

[69] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in these maps. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

Sambaa K'e First Nation has more than enough local wood resources to meet its fuel needs, without having to rely on importing either diesel or wood pellets.

Table 17: Forest characteristics within 20 km (12 miles) of Sambaa K'e First Nation

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
35	217	38	6.0	27	5.2	31%	100%	26%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
16	97	17	20	89	17	31%	100%	26%

As noted, this dataset was collected remotely and will need to be ground-proofed—assessed in person.

8.1.1 *Relevant Fires*

Table 18: Relevant fires near Sambaa K'e First Nation

year	fire id	**size** *(in hectares)*	*(in acres)*	**average aboveground merchantable biomass** *(tonnes per hectare)*	*(tons per acre)*
2023	FS001-23	779,317	1,925,728	39*	17*
2013	FS052-13	933	2,306	4.4	2.0
2004	FS014-04	12,516	30,929	4.9	2.2
1996	FS029-96	20,999	51,889	8.5	3.8
1994	FS002-94	81	200	18.3	8.2
	FS089-94	352	871	9.5	4.2

* The 2023 fire occurred later than when the SCANFI data was collected (2020).
Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

8.1.1.1 FIRE FS001-23

Every Dehcho First Nations member community has, at some time in living memory, been threatened by fire. Sambaa K'e is no exception. In 2023, a massive fire swept towards the community and threatened to engulf it.

Recent satellite photography also clearly shows the scars from that fire.

Figure 56: Sambaa K'e First Nation– satellite view[70]

[70] © Google Earth. (2025). Photo mosaic, contrast enhanced.

This area is shown in pale yellow on the map above, with a pink line around it showing the fire's maximum extent.

Accessible areas of this fire could be prime sites for fuel harvesting.

The SCANFI dataset indicates that other burn areas near the community could be assessed as potential fuel harvest sites.

8.1.1.2 FIRE FS052-13

This fire occurred in 2013, at the north end of Trout Lake, where the lake flows into Trout River, on its way to the Mackenzie. This burn area is about 35 kilometres from the community. This is an area of just over 900 hectares (3.6 square miles). The SCANFI dataset indicates that this burn area had an average of 4.4 tonnes per hectare of usable biomass in 2020, for a total of roughly 4,000 tonnes.

8.1.1.3 FIRE FS014-04

This fire occurred in 2004, about 30 kilometres north of the community, along the winter road. This was a fairly large fire—12,516 hectares (about 50 square miles). The SCANFI dataset indicates that, in 2020, this burn area had an average of 4.9 tonnes per hectare of usable biomass, for a total of roughly 60,000 tonnes. If, when surveyed, even if only 20% of this turns out to be accessible and harvestable, this will still provide enough fuel for the community's needs for many years.

8.1.1.4 FIRE FS029-96

This fire occurred in 1996, just to the east of fire FS014-04. This fire was fairly large—12,516 hectares (about 50 square miles). The SCANFI dataset indicates that, in 2020, this burn area had an average of 8.5 tonnes per hectare of usable biomass, for a total of roughly 175,000 tonnes.

Careful investigation will be needed to determine how much fire kill is still harvestable. It may be that a significant portion of that 8.5 t/ha is new growth, and so would not be a prime source for fuel. On the other hand, it may be that there are still a considerable number of dead standing trees.

8.1.1.5 FIRE FS002-94

This fire occurred 30 years ago, about 5 km northeast of the community, crossing the community's access road. Although very small, this site may be well worth investigating, particularly as a training site for sustainable fuel harvesting. On the other hand, it may be that the trees have grown back and are no longer suitable for fuel.

Only an in-person assessment can determine its viability as a harvesting site.

8.1.1.6 FIRE FS089-94

This fire also occurred 30 years ago. It is about 18 km north of the community, about halfway up the east shore of Trout Lake. The SCANFI dataset indicated that, as of 2020, there was a significant amount of harvestable wood on this site—a little over 4,000 tonnes (352 hectares @ 9.5 tonnes/hectare). If this is accurate, while this single site might not meet the community's long-term needs, it could be a good second training site.

This site will need to be investigated, with the intent of answering the same questions as for fire FS002-94, immediately above.

8.1.2 *Burn Areas to Prioritize for Investigation*

Four burn areas should be prioritized for investigation:

- FS001-23
- FS002-94
- FS089-94
- FS052-13

8.1.3 *Potential Harvest Sites for Building Construction & Other Uses*

The map above highlights three potential sites that show potential as harvest sites for unburnt trees:

- two locations on the southeast side of Trout Lake, 20 km from the community
- the spit of land jutting up from the south into Trout Lake, 10 km from the community

8.2 Nahʔą Dehé Dene Band (Nahanni Butte)

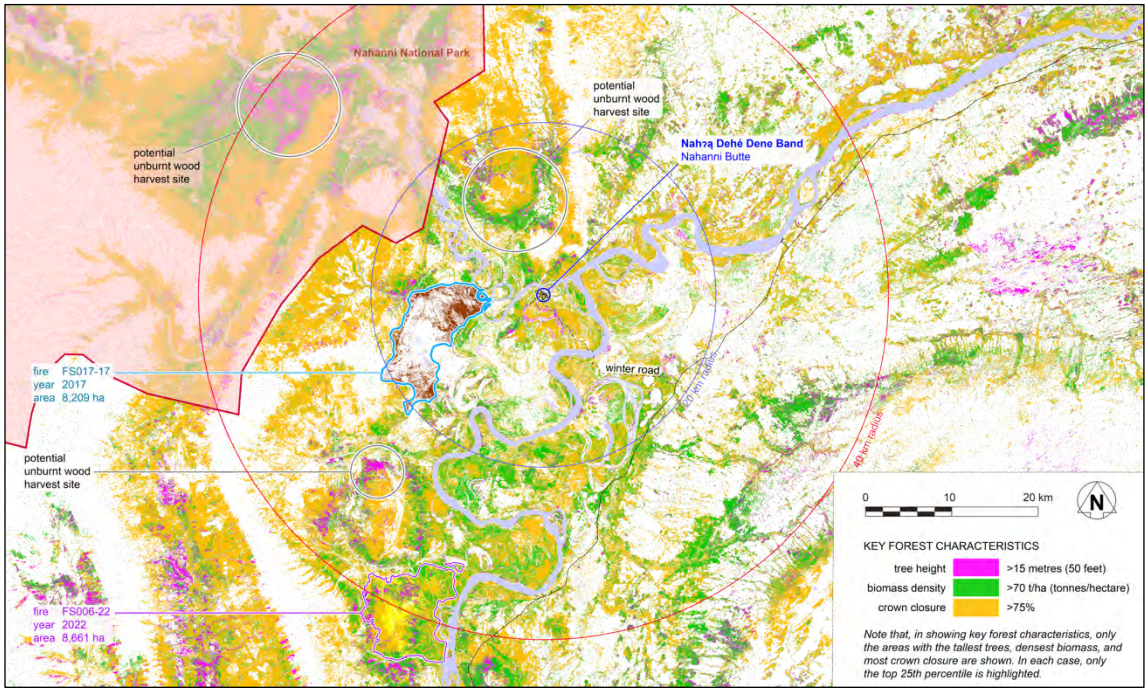


Figure 57: Nahʔą Dehé Dene Band (Nahanni Butte) – key forest characteristics, relevant fires, and potential unburnt wood harvest sites[71]

The Nahʔą Dehé Dene Band in Nahanni Butte has a wealth of forestry resources in its immediate area.

Table 19: Forest characteristics within 20 km (12 miles) of Nahʔą Dehé Dene Band (Nahanni Butte)

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
49	185	31	7.8	30	4.4	53%	93%	26%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
22	83	14	25	98	15	53%	93%	26%

[71] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

8.2.1 *Relevant Fires*

Table 20: Relevant fires near Nahʔą Dehé Dené Band (Nahanni Butte)

year	fire id	size		average aboveground merchantable biomass	
		(in hectares)	*(in acres)*	*(tonnes per hectare)*	*(tons per acre)*
2022	FS006-22	8,661	21,401	64*	29*
2017	FS017-17	8,209	20,286	26	12

* The 2022 fire occurred later than when the SCANFI data was collected (2020).
Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

8.2.1.1 FIRE FS006-22

This area had a high density of biomass before the fire. Ground-proofing will determine how prevalent dead standing trees are in this burn area and how accessible they might be for harvesting.

8.2.1.2 FIRE FS017-17

This burn area, only 5 km (3 miles) from the community, *may* be an excellent source for fuel. The SCANFI dataset indicates that, in 2020, this site may have had more than 200,000 tonnes of accessible biomass. Ground-proofing will determine the prevalence of dead standing trees and their suitability for harvesting as fuel.

8.2.2 *Burn Areas to Prioritize for Investigation*

Both burn areas should be investigated. In order of priority, they are:

- FS017-17
- FS006-22

The dataset indicates that some parts of these burn areas will have more harvestable wood than others. The northeast corner of fire FS017-17 appears particularly dense in available biomass and should be the target of an initial assessment.

8.2.3 *Potential Harvest Sites for Building Construction & Other Uses*

Three nearby areas appear to have stands of tall trees that could be used for building construction and for many other purposes. The map above highlights three potential sites for further examination:

- upstream on the South Nahanni River, about 40 km northwest of the community

  As noted earlier, this location is within Nahanni National Park. If the Nahʔą Dehé Dene Band wanted to consider harvesting here, this would obviously need to be negotiated between the Nahʔą Dehé Dene Band, Parks Canada, and other stakeholders, perhaps through the Consensus Team.
- about 5 km north of the community, outside park boundaries
- about 5 km south of the 2017 fire (FS017-17) and 5 km west of the Liard River—about 30 km southwest of the community

8.3 Pehdzeh Ki First Nation (Wrigley)

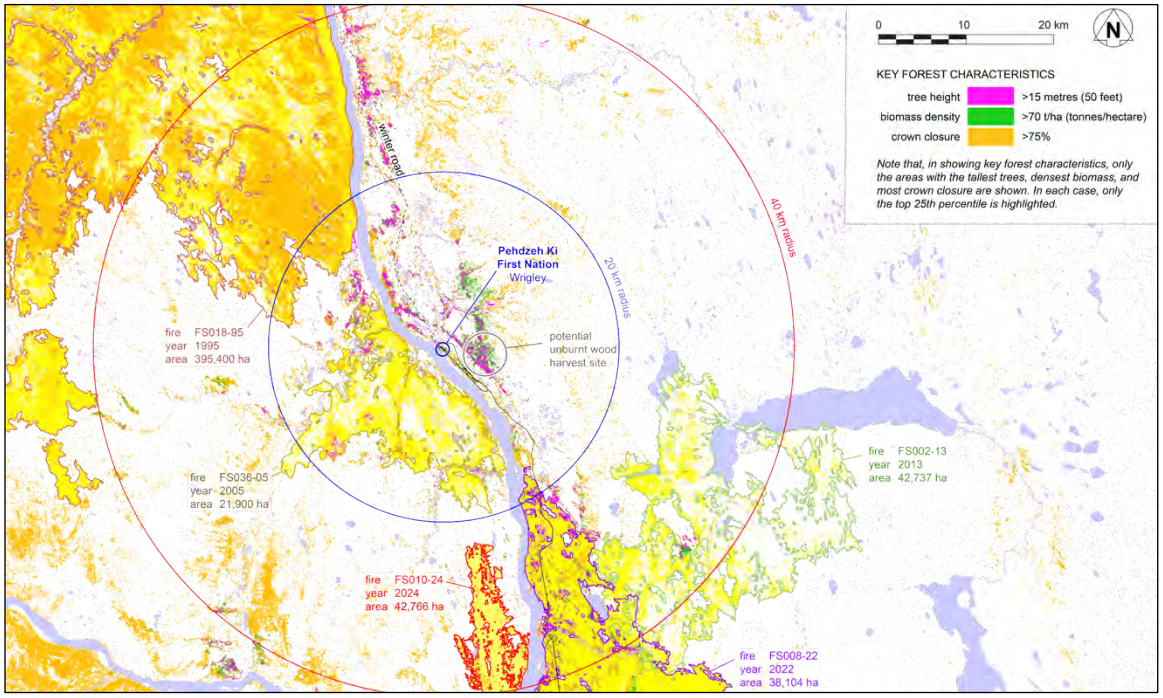


Figure 58: Pehdzeh Ki First Nation (Wrigley) – key forest characteristics, relevant fires, and potential unburnt wood harvest site[72]

Table 21: Forest characteristics within 20 km (12 miles) of Pehdzeh Ki First Nation (Wrigley)

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
22	112	22	5.6	21	4.1	39%	85%	21%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
10	50	10	18	69	13	39%	85%	21%

[72] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

8.3.1 *Relevant Fires*

Table 22: Relevant fires near Pehdzeh Ki First Nation (Wrigley)

year	fire id	size		average aboveground merchantable biomass	
		(in hectares)	*(in acres)*	*(tonnes per hectare)*	*(tons per acre)*
2024	FS010-24	42,766	105,677	64*	29*
2022	FS008-22	38,104	94,157	29*	13*
2013	FS002-13	42,737	105,605	5	2
2005	FS036-05	21,900	54,116	9	4
1995	FS018-95	395,400	977,052	18	8

* The 2022 and 2024 fires occurred later than when the SCANFI data was collected (2020). Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

The fires near Pehdzeh Ki First Nation (Wrigley) provide an excellent opportunity to examine how forests recover in Dehcho over time. The area has four substantial fires, each occurring roughly a decade apart. Comparing forest recovery between them—especially in areas with similar water and soil characteristics—will enable a better understanding of the recovery process specific to Dehcho. Among other benefits, this will enable predictions on which burn areas are likely to recover on their own and which will need seeding.

8.3.1.1 FIRES FS010-24 & FS008-22

Both these fires occurred after the SCANFI dataset was collected, so the tonnes per hectare (64 t/ha and 29 t/ha, respectively) are estimates of the biomass available *before* the fires. A ground-proofed assessment of the biomass available now would provide a useful indicator of before-and-after ratios for future fires in Dehcho.

8.3.1.2 FIRE FS002-13

This burn area will be particularly useful as a comparison with FS008-22 because it is adjacent to it (and so some parts of this burn area will have comparable soil and water characteristics) and is a decade older. It will be a useful predictor of what the newer burn areas (FS010-24 & FS008-22) will look like a decade from now, and their potential for fuel harvesting.

8.3.1.3 FIRE FS036-05

It would appear from the SCANFI dataset that this burn area is beginning to recover in the 20 years since the fire, with an estimate of 9 tonnes of biomass per hectare.

8.3.1.4 FIRE FS018-95

This fire occurred 30 years ago, and the SCANFI dataset shows this area as having substantial new growth (18 tonnes/hectare) and crown closure in excess of 75% in summer.

Ground-proofing of this apparent recovery will be important in understanding longer-term forest recovery in this area.

8.3.2 *Burn Areas to Prioritize for Investigation*

The primary burn area that should be investigated for fuel harvesting is:

- FS008-22

This burn area will likely have the best fuel harvesting sites for two reasons:

- The area is accessible by road.
- It is now 3 years since the fire. During that time, the trees would probably have time to shed seeds, and return the nutrients in needles, branches, and bark to the forest floor.

It would appear from the SCANFI dataset that the burn area stretching from 20 to 40 km south of the community on the Mackenzie Highway may have sufficient standing dead trees to more than meet the heating needs of Pehdzeh Ki First Nation (Wrigley) for the foreseeable future.

We only have a pre-fire estimate of available biomass at 29 tonnes/hectare (13 tons/acre) for this area. Ground-proofing will be needed to determine how much of this remains available as dead standing trees after the fire.

However, even if we take a very conservative estimate of 5 tonnes/hectare (2 tons/acre), given that the fire covered 38,104 hectares (nearly 100,000 acres), there could be nearly 200,000 tonnes of burnt wood available to harvest. Of course, there will be no need to harvest all of this burn area. Focusing on the densest areas, nearest to the road, will be more than sufficient.

If, after a ground-proofing assessment, this area is assessed as not suitable for fuel harvesting, the other burn areas should be investigated.

8.3.3 *Potential Harvest Site for Building Construction & Other Uses*

There appears to be an area about 5 km (3 miles) east of the community with taller trees and denser growth that could be used for building construction and for many other purposes. The map above highlights this location as a potential site for further examination. However, it is important to emphasize that local community members will have a better sense of where the best harvest sites will be than can be extracted from the SCANFI dataset.

8.4 Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson)

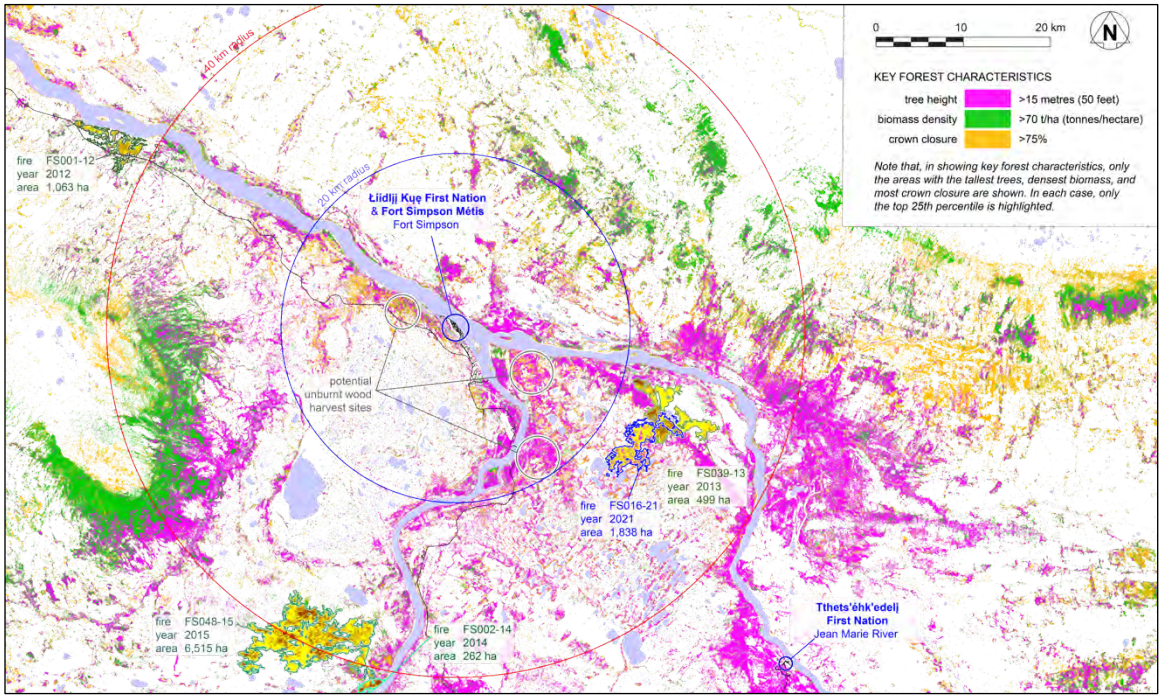


Figure 59: Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson) – key forest characteristics, relevant fires, and potential unburnt wood harvest sites[73]

Table 23: Forest characteristics within 20 km (12 miles) of Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson)

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
47	126	29	8.9	27	5.4	43%	94%	23%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
21	56	13	29	89	18	43%	94%	23%

[73] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

8.4.1 *Relevant Fires*

Table 24: Relevant fires near Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson)

year	fire id	size (in hectares)	size (in acres)	average aboveground merchantable biomass (tonnes per hectare)	average aboveground merchantable biomass (tons per acre)
2025	FS014-25	20,362	50,316		
2021	FS016-21	1,839	4,545	51*	23*
2015	FS048-15	6,515	16,098	20	9
2014	FS002-14	262	649	40	18
2013	FS039-13	2,109	5,210	22	10
2012	FS001-12	1,063	2,628	24	11

* This fire occurred in 2021, which is later than when the SCANFI data was collected (2020). Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

8.4.1.1 FIRE FS014-25

Fort Simpson is unusual amongst the Dehcho First Nation member communities in that, until this year, there have been relatively few fires very close to the community.

This changed with fire FS014-25, which is currently burning roughly halfway between Fort Simpson and Jean Marie River.[74] As of September 20, 2025, it was just over 20,000 hectares in size. Once this fire is out, this burn area should assessed, as it may become a suitable fuel harvesting site over the next few years. This assessment can occur any time over the next 2 to 3 years, as any dead standing trees will need to drop their seeds, branches, and other materials before they can be harvested.

8.4.1.2 FIRE FS016-21

The SCANFI dataset indicated that, in 2020, this area had just over 50 tonnes per hectare of usable wood. An in-person survey is needed to determine what remains of that wood after the 2021 fire, and where the best sites for harvesting might be.

Because this fire (like fire FS039-13, below) lies roughly half-way between Fort Simpson and Jean Marie River, the two communities may want to survey this fire—and its potential for fuel—together.

8.4.1.3 FIRE FS048-15 & FS002-14

These two fires—both about 40 km (25 miles) south of the community on the Liard River. The SCANFI dataset indicates that both have considerable harvestable biomass. The smaller of the two—FS002-14—appears to have roughly 40 tonnes per hectare available.

[74] Government of Northwest Territories. (2025 Sep 20). *NWT wildfire update: FS014-25.* Environment and Climate Change. https://www.gov.nt.ca/ecc/services/wildfire-update/en/fire/fs014-25.

8.4.1.4 FIRE FS039-13

This fire, which partially overlaps the 2021 fire FS016-21, would be worth investigating primarily to assess the effect of a second fire occurring on the same area barely a decade after the first. It may well be that the forest has not had sufficient time to recover on its own and may need to be prioritized for seeding.

Because this fire (like fire FS016-21, above) lies roughly half-way between Fort Simpson and Jean Marie River, the two communities may want to investigate this fire—and its potential for fuel—together.

8.4.1.5 FIRE FS001-12

This burn area is the one most accessible to the community, just over 40 km to the northwest, along the Mackenzie Highway.

It may well be that this forest has recovered to the point that harvesting burnt trees is not practical; a ground-proofing survey will be able to rule this area either in or out for fuel harvesting.

8.4.2 *Burn Areas to Prioritize for Investigation*

Three burn areas should be prioritized for investigation:

- FS014-25
- FS048-15
- FS002-14

In addition to the burn area of FS014-25, the two other plausible locations for harvesting are the two fires, FS048-15 and FS002-14, upstream on the Liard River. These two fires, if ground-proofing bears out the SCANFI data, could have more than 100,000 tonnes of harvestable biomass. Even harvesting a small percentage of this wood—perhaps 10 tonnes/hectare—could supply the community's fuel needs for more than a decade.

8.4.3 *Potential Harvest Sites for Building Construction & Other Uses*

Fort Simpson has a wealth of taller trees near the community that could be used for building construction and for many other purposes. The map highlights three potential sites for harvesting.

Perhaps the most accessible location—with what appears to be the greatest concentration of taller trees—is the area along the east bank of the Liard River, where the Mackenzie Highway crosses the river, roughly 15 km (10 miles) southeast of the community.

8.5 Tthets'éhk'edelį First Nation (Jean Marie River)

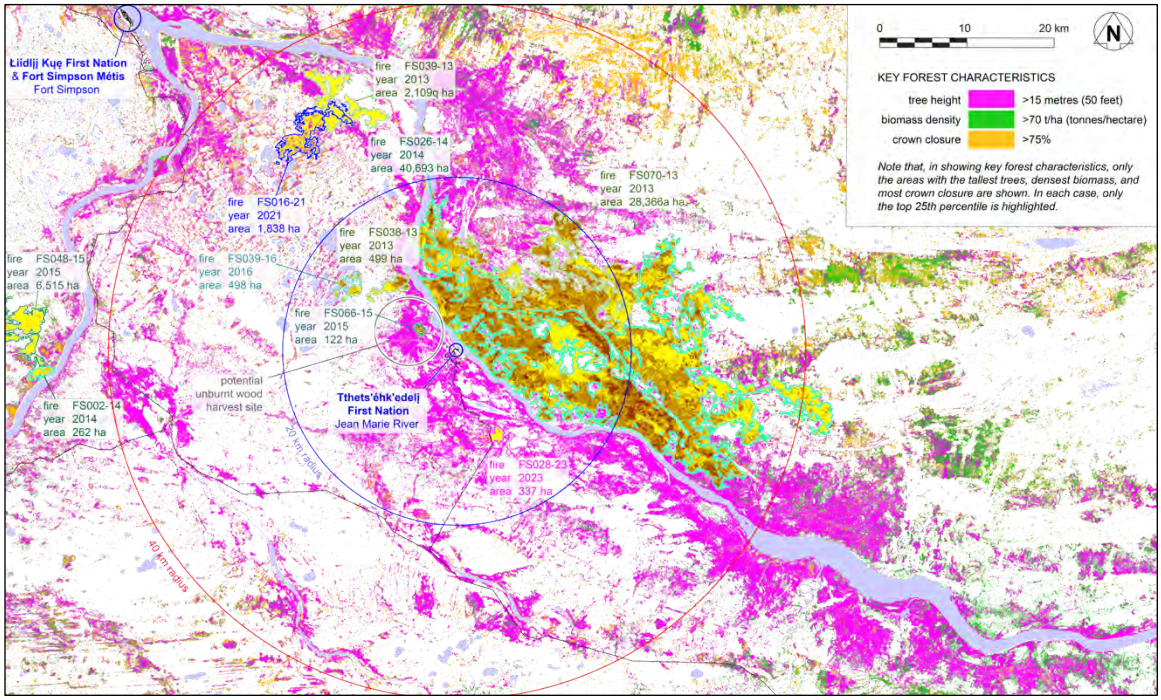


Figure 60: Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson) – key forest characteristics, relevant fires, and potential unburnt wood harvest site[75]

Table 25: Forest characteristics within 20 km (12 miles) of Tthets'éhk'edelį First Nation (Jean Marie River)

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
47	129	31	10.2	27	5.7	38%	94%	22%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
21	58	14	33	89	19	38%	94%	22%

[75] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

8.5.1 *Relevant Fires*

Table 26: Relevant fires near Tthets'éhk'edelį First Nation (Jean Marie River)

year	fire id	size (in hectares)	size (in acres)	average aboveground merchantable biomass (tonnes per hectare)	average aboveground merchantable biomass (tons per acre)
2025	FS014-25	20,362	50,316		
2023	FS028-23	337	832	49*	22*
2016	FS039-16	498	1,231	25	11
2015	FS066-15	122	302	50	22
2014	FS026-14	40,693	100,554	29	13
2013	FS038-13	499	1,233	28	12
	FS070-13	11,479	28,366	29	13

* This fire occurred in 2023, which is later than when the SCANFI data was collected (2020). Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

8.5.1.1 FIRE FS014-25

See above.

8.5.1.2 FIRE FS028-23

Located approximately 12 km (8 miles) up the road from the community.

The SCANFI dataset for this fire site indicates that, in 2020, the area burned on the west side of the road had abundant forest growth, while the area on the east side of the road had virtually none. This is unusual and merits in-person investigation.

Because it is close to the community and accessible by road, this small burn area (336 hectares, 832 acres) may be an ideal training location for minimal-impact harvesting.

It will also be useful to compare the biomass that the SCANFI dataset estimated was available before the fire, to the actual biomass available now.

8.5.1.3 FIRE FS039-16

Located about 13 km (9 miles) northwest of the community, this burn area may be more difficult to access than some of the other burn areas noted here. It should probably not be a priority for investigation.

8.5.1.4 FIRE FS066-15

Located approximately 5 km (3 miles) northwest of the community, in the centre of an area of taller trees. Investigating this small burn area (122 hectares, 302 acres) and comparing it to the forest growth immediately surrounding it will be helpful in better understanding how fires affect denser forest areas, and the state of regrowth a decade after a fire.

The SCANFI dataset also suggests that this burn area may have an unusually large amount of biomass available. This needs to be verified with an in-person assessment.

8.5.1.5 FIRE FS026-14

This large fire (40,693 hectares, 100,554 acres) may be the best site for fuel harvesting for the next few years. The SCANFI dataset indicates that there may be as much as 1 million tonnes of harvestable biomass. This is much, much more than the community will ever need for fuel. It will require in-person ground-proofing, complemented by a recorded flyover with a drone to determine how accurate the SCANFI dataset is. This assessment will needed to determine:

- How suitable is the currently-available burnt wood for use as fuel?
- What are best small areas within this large burn area for harvesting?

8.5.1.6 FIRE FS038-13

A small burn area (499 hectares, 1,233 acres) located approximately 10 km (6 miles) downstream on the southwest shore of the Mackenzie River.

The SCANFI dataset indicates that there is still considerable tree growth at this small burn area—perhaps as much as 14,000 tonnes of harvestable material. Ground-proofing this for accuracy is required to determine if harvesting here is worthwhile.

8.5.1.7 FIRE FS070-13

This burn area is north of the large 2014 fire (FS026-14). Given the apparent abundance of potential fuel much closer to the community, this burn area probably does not merit further investigation.

8.5.2 *Burn Areas to Prioritize for Investigation*

Unlike Fort Simpson, Tthets'éhk'edelı̨ First Nation at Jean Marie River has experienced many fires—both large and small—around its community. There should not be any need to investigate them all. Five burn areas (in order of priority) could be investigated:

- FS014-25
- FS028-23
- FS066-15
- FS025-14
- FS038-13

8.5.3 *Potential Harvest Site for Building Construction & Other Uses*

The SCANFI dataset suggests there are quite a few taller trees near the community that could be used for building construction and for many other purposes.

Only one potential area is highlighted on the map above, about 5 km (3 miles) northwest from the community. Local people will have a much more detailed understanding of the best nearby areas for harvesting for use beyond fuel; this one is suggested as a starting point.

8.6 Deh Gáh Got'ję First Nation & the Fort Providence Métis Council (Fort Providence)

While this document was being written, this community was under an evacuation alert because of fire.[76] The assessments made here will need to be re-evaluated once nearby fires are out.

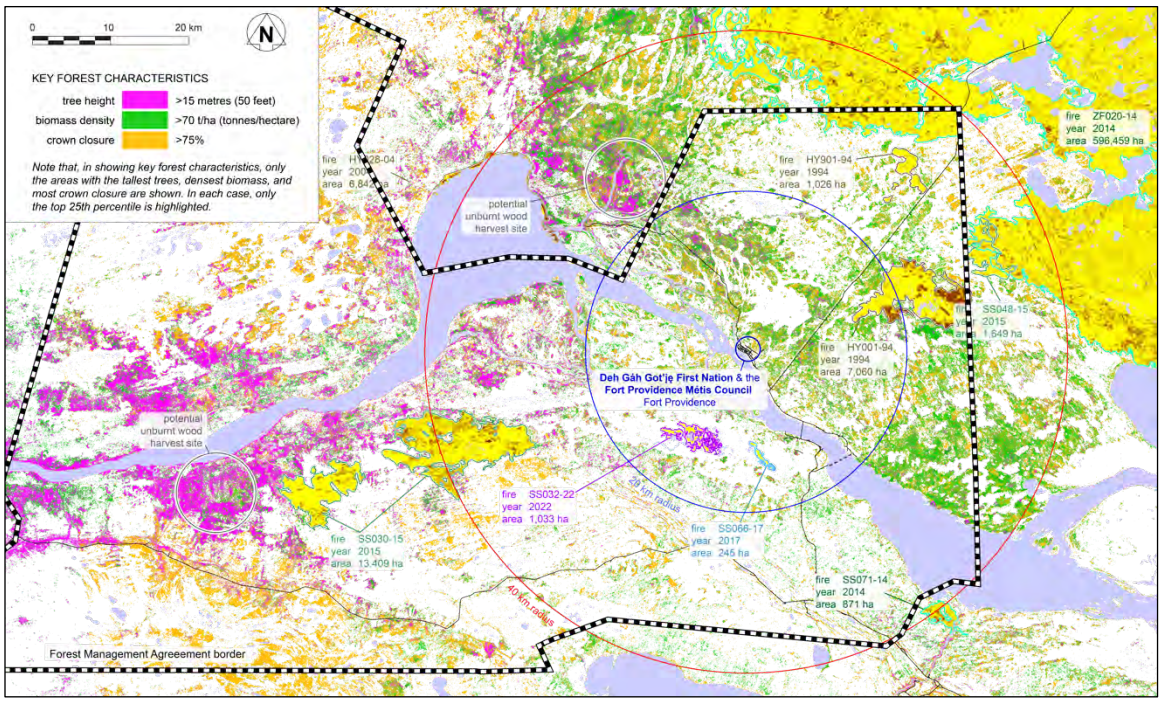


Figure 61: Deh Gáh Got'ję First Nation & the Fort Providence Métis Council (Fort Providence) – key forest characteristics, relevant fires, and potential unburnt wood harvest site[77]

[76] Details:

- Blake. E. (2025 Aug 30). *Fort Providence issues evacuation alert.* Cabin Radio. https://cabinradio.ca/255964/news/environment/wildfires/fort-providence-issues-evacuation-alert/
- Hudson, A. (2025 Sep 01). *Wildfire crews hope to 'make a real dent' in fire threatening Fort Providence, N.W.T.* CBC News. https://www.cbc.ca/news/canada/north/fort-providence-evacuation-emergency-personnel-1.7622432.
- As of September 20, 2025, this fire (FS024-25) covered 74,875 hectares. Source: Northwest Territories (2025 Sep 20). *Dehcho Fire Update.* Environment and Climate Change. https://www.gov.nt.ca/ecc/services/wildfire-update/en/firedata/regional-stats/related/4.

[77] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

Table 27: Forest characteristics within 20 km (12 miles) of Deh Gáh Got'ıę First Nation & the Fort Providence Métis Council (Fort Providence)

biomass density			**height**			**crown closure**		
(in tonnes per hectare)			*(in meters)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
41	128	31	6.7	22	4.6	38%	90%	26%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
18	57	14	22	72	15	38%	90%	26%

8.6.1 *Relevant Fires*

Table 28: Relevant fires near Deh Gáh Got'ıę First Nation & the Fort Providence Métis Council (Fort Providence)

		size		**average aboveground merchantable biomass**	
year	**fire id**	*(in hectares)*	*(in acres)*	*(tonnes per hectare)*	*(tons per acre)*
2025	FS014-25	74,875	185,020		
2022	SS033-22	1,033	2,553	24*	10*
2017	SS066-17	245	604	6	3
2015	SS030-15	13,409	33,135	12	6
	SS048-15	1,649	4,075	11	5
2014	SS071-14	871	2,152	22	10
	ZF020-14	596,459	1,473,877	10	4
2004	HY028-04	6,842	16,908	8	4
1994	HY001-94	7,060	17,445	21	9
	HY901-94	1,026	2,536	7	3

* This fire occurred in 2022, which is later than when the SCANFI data was collected (2020). Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

8.6.1.1 FIRE ZF024-25

As with fire FS014-25, currently burning between Fort Simpson and Jean Marie River, once fire ZF024-25 is out, this burn area should assessed, as it may become a suitable fuel harvesting site over the next few years. As with that other fire, this assessment can occur any time over the next 2 to 3 years, as any dead standing trees will need to drop their seeds, branches, and other materials before they can be harvested.

8.6.1.2 FIRE SS033-22

Located approximately 12 km (8 miles) south across the river from the community.

If this area is accessible—at least by snowmobiles in winter and off-road vehicles in summer, this burn area may be useful as a training location for minimal-impact harvesting.

The SCANFI dataset for this fire site indicates that, in 2020, this area has 24 tonnes per hectare (10 tons per acre) of merchantable biomass. It will be useful to compare the biomass that the SCANFI dataset estimated was available before the fire to the actual biomass available now.

8.6.1.3 FIRE SS066-17

This small burn area is also approximately 12 km (8 miles) south across the river from the community. Because of its small size, it is likely that this area will not be of much value for fuel harvesting. A quick in-person survey of the area will be able to determine if this assessment is accurate.

8.6.1.4 FIRE SS030-15

These two large burn areas, across the river and roughly 35 km (22 miles) west of the community, may be the best available location for fuel harvesting, at least for the next few years.

Although there are no roads near it, the areas closest to the river could, perhaps, be harvested and the logs transported across the river in winter. An in-person assessment will be needed to determine if this is feasible.

The SCANFI dataset estimates that there is a significant amount of harvestable biomass in this burn area, particularly the closer to the river. An in-person survey— complemented by a recorded flyover with a drone—will be needed to determine how accurate the SCANFI dataset.

8.6.1.5 FIRE SS048-15

This small burn area, 30 km (20 miles) east of the community is not likely to be a useful location for fuel harvesting. The area appears to have been burned in 2014 and then again in 2015.

It would, however, be useful to investigate this burn area to determine if the repeat fire has meant the forest cannot recover on its own and seeding may be required.

8.6.1.6 FIRE SS071-14

This is small burn area, on the south shore of the Mackenzie river, 40 km (25 miles) southeast of the community.

Because of the small size, lack of road access, and distance from the community, harvesting here is not recommended. Other burn areas, closer to the community, appear more promising.

It is also worth noting that this burn area is closer to Ka'a'gee Tu First Nation (Kakisa) than Fort Providence and may be of interest to that community as a potential harvest site.

8.6.1.7 FIRE ZF020-14

This extremely large burn area (nearly 600,000 ha, 1.5 million acres) is only now recovering from the fire that occurred a decade ago. A few areas—particularly west of Highway 3 near Caen Lake and along the north shore of Great Slave Lake—show some signs of recovery.

The area west of Caen Lake may be worth investigating as a potential fuel harvest site. However, other burn areas, closer to the community, appear more promising.

8.6.1.8 FIRE HY028-04

This fire occurred along the north shore of Mills Lake 20 years ago. The SCANFI dataset indicates that it has been slow to recover after the fire.

Even if burnt wood is available in this area, because it is right along the shoreline, harvesting is not recommended.

8.6.1.9 FIRES HY001-94 & HY901-94

These two fires are worth investigating to check on the accuracy of the SCANFI dataset. Both occurred in the same year—1994—and are only 10 km apart. Yet, one shows good regrowth and the other shows very little. Determining if this difference exists on the ground, and its possible causes, would be helpful to determine if the area is not regrowing on its own, and if seeding is needed.

8.6.2 *Burn Areas to Prioritize for Investigation*

Three burn areas should be prioritized for investigation as potential harvest sites for fuel:

- ZF024-25
- SS033-22
- SS030-15

If, after investigation, these sites are turn out not to be suitable for fuel harvesting, burn areas from fire ZF020-14 west of Caen Lake, could be investigated.

Two other burn areas—HY001-94 and HY901-94—merit investigation to determine if the forest is recovering on its own, or if seeding is required.

8.6.3 *Potential Harvest Site for Building Construction & Other Uses*

The SCANFI dataset suggests there is an unburnt forest area 25 km (15 miles) northwest of the community that should be investigated for harvesting building construction material. This site is highlighted on the map above.

This area should be accessible from the Horn River. Canvec mapping data[78] also suggests the area may be accessible by what Canvec classifies as a “Recreation Cart Track” from Fort Providence.

However, local people will have a much more detailed understanding of the best sites for harvesting for use beyond fuel; this site is only suggested as a starting point.

[78] Government of Canada. (2019 Mar 01). *Topographic Data of Canada - CanVec Series.* Natural Resources Canada. https://maps.canada.ca/czs/index-en.html

8.6.4 *Relationship to the Digaa Enterprises' Forest Management Agreement*

As mentioned above, Digaa Enterprises of Fort Providence has a Forest Management Agreement which allows them to harvest up to 87,200 m^3/year (cubic meters per year) of wood—their Annual Timber Allocation (ATA).[79]

The ATA converts to approximately 24,000 cords of wood per year. Using the calculations in the section above, "Estimating Harvest Volume Needed", we can calculate how much of this would be needed to meet the fuel needs of the homes and other buildings in Fort Providence. It will certainly be only a small portion of this Annual Timber Allocation—roughly 5-10% of the ATA. The "Estimating Harvest Volume Needed" provides a method for calculating that percentage more exactly and should be done as part of the follow-up to this report.

[79] See:

- Government of Northwest Territories. (2015 Sep 30). *Digaa Enterprises Limited Forest Management Agreement, Timber Harvest Planning Area, Twenty Five Year Strategic Plan, 2015-2040*. Environment and Natural Resources. https://registry.mvlwb.ca/Documents/MV2015W0018/MV2015W0018%20-%20Digaa%20Enterprises%20-%20Ft%20Providence%20FMA%2025%20Year%20Mngmt%20Plan%20-%20Sept30-15.pdf#:~:text=Digaa%20Enterprises%20Ltd.%20signed%20a%20Forest%20Management,(FMA)%20with%20GNWT%20on%20October%2024%2C%202014.
- *Northwest Territories Forest Management Agreement Between the Government of the Northwest Territories and Digaa Enterprises Ltd.* (2014 Oct 24). https://registry.mvlwb.ca/Documents/MV2015W0018/MV2015W0018%20-%20Digaa%20Enterprises%20-%20Ft%20Providence%20FMA%2025%20Year%20Mngmt%20Plan%20-%20Sept30-15.pdf#:~:text=Digaa%20Enterprises%20Ltd.%20signed%20a%20Forest%20Management,(FMA)%20with%20GNWT%20on%20October%2024%2C%202014.
- Bryant, P. (2023 May 26). *Wildlife Management and Monitoring Plan, LAND USE PERMIT MV2022W0006, Digaa Enterprises Ltd. (Digaa) Version 2.0.* Forsite Consultants. https://registry.mvlwb.ca/Documents/MV2022W0006/Digaa%20Enterprises%20-%20Wildlife%20Management%20and%20Monitoring%20Plan%20V2%20-%20Jun6_23.pdf.

8.7 Ka'a'gee Tu First Nation (Kakisa)

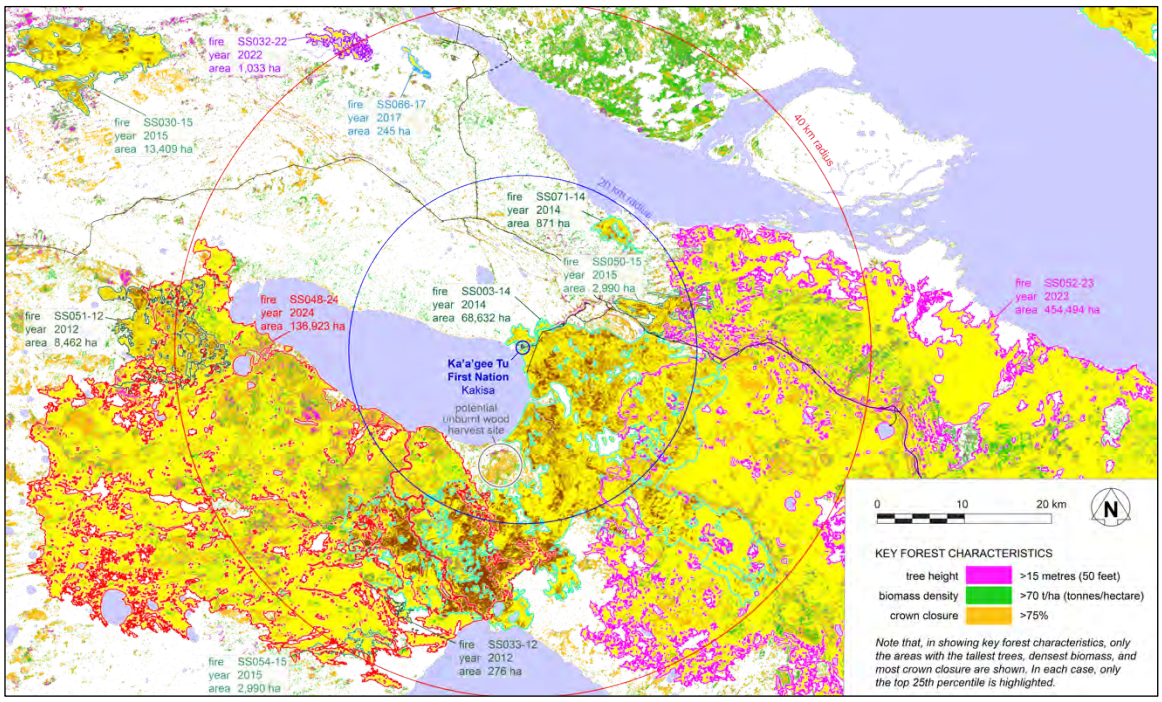


Figure 62: Ka'a'gee Tu First Nation (Kakisa) – key forest characteristics, relevant fires, and potential unburnt wood harvest site[80]

Table 29: Forest characteristics within 20 km (12 miles) of Ka'a'gee Tu First Nation (Kakisa), as estimated by the SCANFI dataset in 2020

biomass density *(in tonnes per hectare)*			**height** *(in meters)*			**crown closure** *(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
27	131	25	5.4	22	4.2	28%	90%	24%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
12	58	11	18	72	14	28%	90%	24%

This community has had numerous, large fires very near it in recent years. As a result, some of the forest characteristics as estimated by the SCANFI dataset will now be out of date.

[80] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

8.7.1 *Relevant Fires*

Table 30: Relevant fires near Ka'a'gee Tu First Nation (Kakisa)

year	fire id	size		average aboveground merchantable biomass	
		(in hectares)	*(in acres)*	*(tonnes per hectare)*	*(tons per acre)*
2024	SS048-24	136,923	338,342	39*	17*
2023	SS052-23	454,494	1,123,074	33*	15*
2015	SS050-15	2,990	7,389	25	11
	SS054-15	1,247	3,081	11	5
2014	SS003-14	68,632	169,592	20	9
2012	SS033-12	276	681	5	2
	SS051-12	8,462	20,911	18	8

* These fires occurred in 2023 & 2024, which is later than when the SCANFI data was collected (2020). Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

An up-to-date survey of burn areas within 20 km (12 miles) of the community is urgently needed. This survey will provide an accurate estimate of the volume of burnt wood that could be harvested for fuel. It will also provide a very useful before-and-after comparison with the SCANFI dataset, enabling a better understanding the effects of fire on the volume of harvestable biomass available in this area.

8.7.1.1 FIRE SS048-24

This fire forced evacuation of the community, coming within 15 km (10 miles) of the community and spreading along the entire south shore of Kakisa Lake. Before the fire, this area had good forest growth. Depending on the results of the proposed 20 km survey, this could be a prime area for harvesting burnt trees for fuel over the next few years.

8.7.1.2 FIRE SS052-23

This massive fire also forced evacuation of the community and threatened both Ka'a'gee Tu First Nation and the Ts'ueh Nda community, 100 km (60 miles) to the east.

This burn area may have a considerable volume of burnt trees that could be used for fuel. However, the burnt trees from the 2024 fire (SS048-24) will probably be easier to access.

8.7.1.3 FIRE SS050-15

This relatively small fire (2,990 hectares, 7,389 acres) occurred 10 years ago just north of the Mackenzie Highway, about 16 km (10 miles) northeast of the community.

The SCANFI dataset indicates that this area has had good regrowth after the 2015 fire. Because it is accessible by road, this area should be surveyed to determine if it provides a better alternative for fuel harvesting that the 2024 fire (SS048-24) on the south shore of Kakisa Lake.

8.7.1.4 FIRES SS054-15 & SS033-12

These two (relatively) smaller fires both occurred about 35 km southwest of the community, near Tathlina Lake. They are unlikely to provide useful trees for fuel because the area was burnt again in the 2024 fire.

However, these burn areas a worth investigating to better understand the effects of repeat fires a decade apart on the ability of the forest to recover.

8.7.1.5 FIRE SS003-14

This large fire threatened the community in 2014. The SCANFI dataset suggests that this burn area has had good regrowth since the fire. It is unclear from the data how much fire kill is available here for fuel harvesting.

This burn area should be part of the proposed 20 km survey of all burn areas around the community. This survey will provide a comprehensive assessment of burnt trees available for fuel, as well as increase the understanding of how the forests in the area recover after repeat fires.

8.7.1.6 FIRE SS051-12

This fire occurred near the west shore of Kakisa Lake, about 40 km (25 miles) west from the community. It is unlikely that this area will provide better harvesting opportunities than other, more recent fires, closer to the community

8.7.2 *Burn Areas to Prioritize for Investigation*

Two burn areas could be prioritized for investigation as potential harvest sites for fuel:

- SS048-24
- SS050-15

If, after investigation, these sites are turn out not to be suitable for fuel harvesting, burn areas from fire SS052-23 could be investigated.

Two other burn areas—SS054-15 and SS033-12—merit investigation to determine if the forest is recovering on its own, or if seeding is required.

8.7.3 *Potential Harvest Site for Building Construction & Other Uses*

Because of the numerous fires that have occurred in the last 20 years around the community, the SCANFI dataset suggests there are fewer potential harvest sites for taller trees suitable for building construction in the immediate area. One area highlighted on the map above—about 13 km (8 miles) south along the shore of Kakisa Lake—has not experienced fire in recent years and may be a good site for harvesting trees for building construction.

However, given the effects of fires in the area on the larger ecosystem—and especially on the lake—the wisest course of action may be to not harvest wood from this area. This decision will need to be made by local community members, perhaps with input from forest ecology experts.

8.8 West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)

The Ts'ueh Nda community continues to be greatly affected by fire.

Two fires in 2023—one immediately east of the community (SS005-23) and another very large one surrounding it on the south, east, and west (SS052-23)—are only the latest fires in the immediate area. Fires in 2014 and 2015 all burned within 40 km (25 miles) of the community. Long-time residents may remember the fires of 1981 and 1971 being disruptive as well.

Just as with the Ka'a'gee Tu First Nation in Kakisa, an up-to-date survey of burn areas within 20 km (12 miles) of the Ts'ueh Nda community is urgently needed. This survey will provide an accurate estimate of the volume of dead standing trees that could be harvested for fuel.

Perhaps even more important, this survey will contribute to a better understanding of the overall ecological effects of repeat fires in this area.

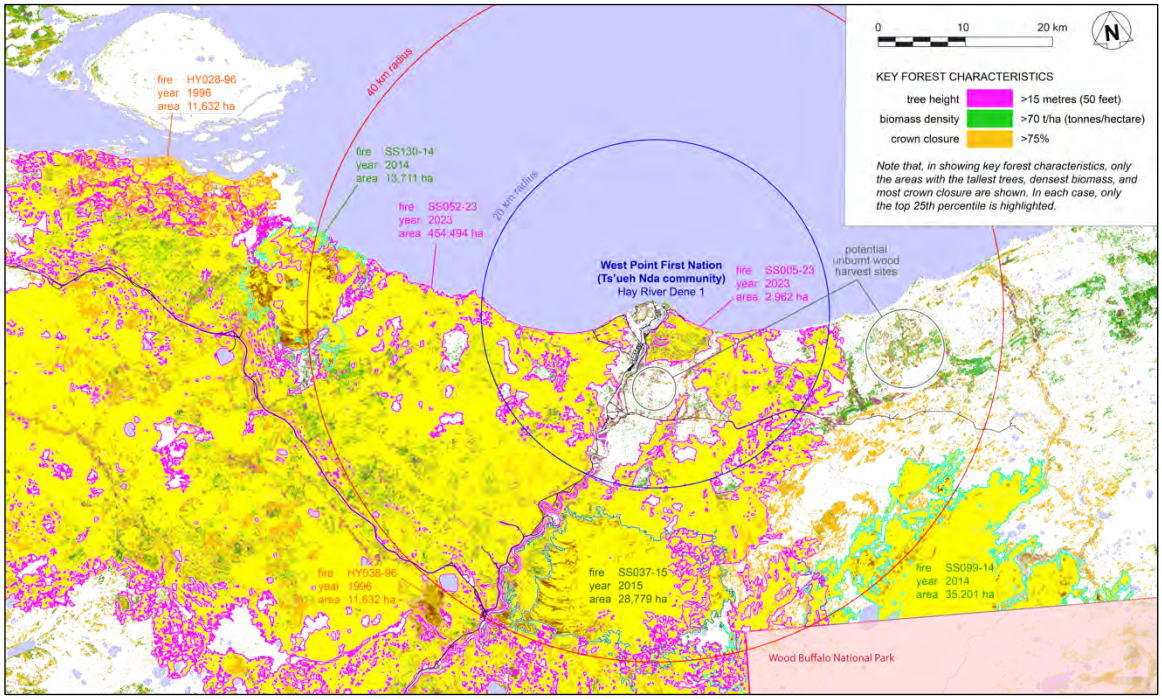


Figure 63: West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1) – key forest characteristics, relevant fires, and potential unburnt wood harvest sites[81]

[81] Note:

- Only the area with the highest biomass density, the tallest trees, and the most crown closure are shown in this map. In each case, only the top 25% (top quartile) is displayed.
- The tree height layer (purple) is shown on top of the biomass density layer (green) which is, in turn, shown on top of the crown closure layer (orange). As a result:
  - purple areas can be expected to have tall trees and high biomass density and high crown closure
  - green areas can be expected to have high biomass density and high crown closure

Table 31: Forest characteristics within 20 km (12 miles) of West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1), as estimated by the SCANFI dataset in 2020

biomass density			**height**			**crown closure**		
(in tonnes per hectare)			*(in meters)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
27	131	26	5.1	22	4.4	2904%	90%	24%
(in tons per acre)			*(in feet)*			*(% in summer)*		
average	maximum	σ	average	maximum	σ	average	maximum	σ
12	58	12	17	72	14	2904%	90%	24%

8.8.1 *Relevant Fires*

Table 32: Relevant fires near West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1)

year	fire id	**size**		**average aboveground merchantable biomass**	
		(in hectares)	*(in acres)*	*(tonnes per hectare)*	*(tons per acre)*
2023	SS005-23	2,962	7,319	52*	23*
	SS052-23	454,494	1,123,074	33*	15*
2015	SS037-15	28,779	71,114	9	4
2014	SS099-14	35,201	86,982	7	3
	SS130-14	13,711	33,880	14	6
1996	HY029-96	11,632	28,743	9	4
	HY038-96	1,984	4,902	31	14

* These fires occurred in 2023, which is later than when the SCANFI data was collected (2020). Therefore, the numbers with asterisks are estimates of the biomass available *before* the fire.

8.8.1.1 FIRE SS005-23

This fire burned to the very edge of the community.

This burn area will be included in the 20 km survey proposed above. Depending on the results of the survey, this may be a very good area for burnt-fuel harvesting.

8.8.1.2 FIRE SS052-23

This massive fire, discussed above, very nearly engulfed the Ts'ueh Nda community, along with the rest of Hay River.

The area near the community—particularly 10 to 20 km (6 to 12 miles) to the east—appeared to have reasonably good forest growth before the fire. The 20 km survey proposed above will determine if this area is suitable for fuel harvesting of dead standing trees.

8.8.1.3 FIRE SS037-15

According to the SCANFI dataset, this burn area, 20 to 40 km (12 to 25 miles) south of the community was not showing good forest regrowth after the 2015 fire. The 2023 fire (SS052-23) burned this area again. If that information is accurate, it is likely that this forest area will not recover on its own and may be a prime candidate for seeding.

8.8.1.4 FIRE SS099-14

The SCANFI dataset suggests that this burn area—40 km (25 miles) to the southeast of the community—is showing some recovery over the past decade. An in-person survey, complemented by a drone flyover would be useful in determining if this is the case.

Because this fire also occurred within Wood Buffalo National Park, it may be that Parks Canada will be assessing the longer-term effects of this fire, now that a decade has passed. It would be useful if that survey included the area north of the park.

8.8.1.5 FIRES SS130-14, HY029-96, & HY038-96

The SCANFI dataset suggests all three of these areas were showing reasonable forest regrowth by 2020. However, all three areas were burned again in the 2023 fire (SS052-23). If possible, in-person surveys, complemented by recorded drone flyovers, would be useful to determine if the recovery is continuing or (as seems more likely) reseeding may be required for the areas to recover.

8.8.2 *Burn Areas to Prioritize for Investigation*

If the 20 km survey proposed above determines that the burned trees could be suitable for fuel *and* if the community determines that they wish to harvest them for fuel, two burn areas could be prioritized for investigation as potential harvest sites:

- SS005-23
- SS052-23

If, after investigation, these sites turn out not to be suitable for fuel harvesting, burn areas from fire SS052-23 could be investigated.

Two other burn areas—SS054-15 and SS033-12—merit investigation to determine if the forest is recovering on its own, or if seeding is required.

8.8.3 *Potential Harvest Sites for Building Construction & Other Uses*

In large part because of the repeated large fires in the Hay River region over the decades, the SCANFI dataset suggests there are few larger trees in the areas surrounding the community that could be used for building construction.

Two potential harvest sites are suggested on the map. If the community determines they want to harvest unburnt trees for building construction and other uses, these two areas are suggested as locations that will need to be ground-proofed. Local people will have the best sense of the forest stands not affected by fire in the last decade or two which could best be used for this purpose.

9 BEYOND FUEL

While fuel—either in the form of logs or wood chips—is a viable use of the trees in Dehcho, there are other important uses that usually have more value than fuel. These can include:

- buildings
- furniture
- arts and crafts
- parks and nature reserves

9.1 Materials for Cabins, Homes, and Community Buildings

A wide variety of buildings could be made from Dehcho trees.

Cabins and homes are obviously two building types that could be made from local materials. Cabins, of course, are mainly sourced from local trees. Homes are a different story. It appears that a high percentage of the lumber, OSB (Oriented Strand Board), and MDF (Medium Density Fibreboard) in Dehcho homes are made from wood harvested in the south. This is unnecessary. It also means that Dehcho people are missing out on potential jobs.

In addition to cabins and homes, virtually every building needed in Dehcho could be made from wood harvested in Dehcho. Meeting centres, schools, office buildings, and commercial spaces could all be made largely from local wood, if thoughtful architectural design and a determination to build local guided decision making.

Because few of these buildings have, to date, been built using primarily local materials, it is difficult to know how their cost would compare to buildings using primarily brought-in materials. Almost certainly, the first few buildings would be more expensive, because the harvesting, processing, and manufacturing infrastructure would need to be developed. Equally certain:

- as local capacity develops, the cost of locally-built structures would come closer to ones using brought-in materials
- the Dehcho economy would diversify
- local jobs would be created
- community pride would be enhanced
- wood chips and sawdust for local energy use would be more available
- greenhouse gas emissions would be decreased, because material transport distances would be much, much less

The simplest use of trees for buildings is, of course, log building construction. Some of the trees in Dehcho are large enough to be used for the more common horizontal-log building method. Many more would be viable using the vertical-log building method.

Figure 64: Example of vertical-log cabin construction[82]

Logs as small as 4 inches (10 cm) in diameter and as short as 8 ft (2.5 metres) are viable for vertical-log building methods. Given the size of the trees in Dehcho, using logs 6 to 8 inches (15 to 20 cm) would probably be the best size for vertical-log building methods.

Local trees could also be made into both rough-hewn and finished dimensional lumber. Rough-hewn logs are ideal for timber-frame construction, while dimensional lumber would be useful for conventional building methods, as well as for renovations and additions to existing homes.

In addition to the main building structure, smaller building elements—like flooring, shutters, baseboards, door trim, window frames, and even doors—could all be made from local wood in facilities not much more elaborate than a typical high school woodworking shop.

[82] Log & Timber Works. (n.d.). *Canadiana Vertical Log Cabins.* https://logandtimberworks.com/services/canadiana-vertical-log-cabins/. This company notes that their "Canadiana Vertical Log Cabins offer unique advantages, over horizontal log structures….The most salient advantage is cost. Construction costs of a handcrafted vertical structure are roughly one half of a comparable handcrafted horizontal log building….[because they use] smaller diameter logs, along with decreased labour and heavy equipment requirements..."

9.2 Furniture

Trees in Dehcho grow more slowly than trees of the same species in the south. This has an important—though rarely recognized—benefit: Increased wood density.

Pine, for example, harvested from a forest in Dehcho is a stronger and more durable wood than pine harvested from managed forests in the south. Furniture made from Dehcho wood can be significantly harder-wearing than furniture made from the same species of wood from the south.

The denser grain pattern also adds to the wood's beauty.

This furniture could be built primarily for use in Dehcho. However, with good design and skilled marketing, a southern export market for premium-priced wood furniture from Dehcho could be developed. A good place to start might be outdoor furniture made from tamarack.

Figure 65: Tamarack Folding Wooden Outdoor Chair, retailing on Amazon for $500[83]

[83] CleverMade. (n.d.). Amazon.ca. https://www.amazon.ca/CleverMade-Tamarack-Folding-Wooden-Outdoor/dp/B0971MTBHQ. Ironically, although this is called a "tamarack chair" by the manufacturer, it is actually made of acacia wood. They are using the term "tamarack" to refer to a style of chair, not the wood itself.

9.3 Artwork & Fine Crafts

Artwork and fine craft created from wood can be valuable.

The obvious tradition to build on, already present in Dehcho, is birch-bark baskets. Acho Dene Native Crafts have pioneered this market.

Figure 66: Acho Dene Native Crafts birchbark basket and bowl[84]

There would be no need for other communities to compete with Acho Dene by focusing on birchbark as their craft medium. Other arts and fine craft made from wood that could find a ready market include items as diverse as serving bowls and animal sculptures.

Figure 67: Handmade olive wood bowl, retailing on Etsy for $296[85]

[84] Acho Dené Native Crafts. (n.d.). *Birchbark.* https://www.adnc.ca/products/birchbark/.

[85] Josef Artistic Woodturning. (2025). Etsy, https://www.etsy.com/ca/listing/1429214487/handmade-olive-wood-bowl-wooden-bowl.

Figure 68: Geometric wolf sculpture, retailing on Etsy for $751[86]

[86] Dreamhome Wood Art. (2025). Etsy, https://www.etsy.com/ca/listing/4328475432/abstract-geometric-wolf-wood-sculpture.

9.4 Parks & Wilderness Reserves

Perhaps the most important “use” for trees in Dehcho is as part of a living forest.

Overlaying the SCANFI dataset with forest fire maps from the last 50 years can pinpoint areas with the oldest trees—and usually the densest growth.

Once this data is integrated with historical harvesting records, we will be able to identify Dehcho old growth forests and quantify their characteristics.

The Haida on the Xaayda Gwaay.yaay (*Haida Gwaii*) archipelago off the coast of British Columbia have grounded their community pride and cultural renaissance (and their tourism industry) on their preservation of old growth forest on their islands. Dehcho could do the same, perhaps with similar benefits.

10 APPENDICES

Appx. A *SCANFI Dataset*

A significant portion of the data used in this report, summarized in tables and embodied in many of its maps is derived from a new, comprehensive dataset of Canada's forests, "The Spatialized CAnadian National Forest Inventory data product" ("SCANFI" for short). It is described as:

> This data publication contains a set of 30m resolution raster files representing 2020 Canadian wall-to-wall maps of broad land cover type, forest canopy height, degree of crown closure and aboveground tree biomass, along with species composition of several major tree species….SCANFI was developed using the newly updated National Forest Inventory photo-plot dataset, which consists of a regular sample grid of photo-interpreted high-resolution imagery covering all of Canada's non-arctic landmass. SCANFI was produced using temporally harmonized summer and winter Landsat spectral imagery along with hundreds of tile-level regional models based on a novel k-nearest neighbours and random forest imputation method.[87]

This dataset is a crucial new resource to enable Dehcho First Nation member communities to harvest from their forests in a sustainable, targeted way.

The SCANFI dataset is a bit like a fish finder. People familiar with the lakes and rivers of Dehcho know where the fish are; a fish finder is a supplemental tool. Similarly, people familiar with the forests in Dehcho know where the dense and abundant trees are; SCANFI is a supplemental tool, not a replacement for local knowledge.

This dataset estimates:

- biomass density
  - tonnes of merchantable biomass—trees—per hectare
- forest height
  - average vegetation height of squares 30 metres (100 feet) on each side
- crown closure
  - percentage of the ground obscured by vegetation—including tree branches, needles & leaves—in summer

The value of the SCANFI dataset goes beyond simply demonstrating that there is more than enough biomass to meet local fuel needs for Dehcho First Nations member communities. Because it estimates the available biomass at 30 metre resolution, the SCANFI dataset can pinpoint where to look for abundant biomass—and even abundant locations of a particular tree species—with an accuracy of about 100 feet. In an area as vast as Dehcho, this can be useful.

[87] Government of Canada. (2025 Mar 08). *SCANFI: the Spatialized CAnadian National Forest Inventory data product.* Natural Resources Canada, Canadian Forest Service. https://open.canada.ca/data/en/dataset/18e6a919-53fd-41ce-b4e2-44a9707c52dc.

This dataset also enables the mapping of tree species throughout Dehcho. The categories of tree species the SCANFI dataset maps relevant to this report are:

- hardwoods (broadleaf)
  - not differentiated by species
- softwoods (coniferous)
  - black spruce (*Picea mariana*)
  - jack pine (*Pinus banksiana*)
  - lodgepole pine (*Pinus contorta*)
  - tamarack tree (*Larix laricina*)
  - other coniferous (not differentiated by species)

The dataset also maps the following tree species not found in Dehcho, and so not included in this report's maps:

- douglas fir (*Pseudotsuga menziesii*)
- balsam fir (*Abies balsamea*)
- ponderosa pine (*Pinus ponderosa*)
- white & red pine (*Pinus strobus* & *resinosa*)

A.1 *Dataset Limitations*

The producers of the dataset are careful to note its limitations:

- The spectral disturbances of some areas disturbed by pests are not comprehensively represented in the training set, thus making it impossible to predict all defoliation cases….
- Attributes of open stand classes, namely shrub, herbs, rock and bryoid, are more difficult to estimate through the photointerpretation of aerial images. Therefore, these estimates could be less reliable than the forest attribute estimates.
- [T]he uncertainty of tree species cover predictions is relatively high. This is particularly true for less abundant tree species, such as…tamarack. The tree species layers are therefore suitable for regional and coarser scale studies.
- [T]he broadleaf proportion [is] slightly underestimated in this product version.[88]

A.2 *SCANFI Dataset Requires Ground-Proofing Before Harvesting Plans Can Be Finalized*

The SCANFI dataset is based on images and data from remote sensing. The estimates it provides must be checked for accuracy—ground-proofed—by forestry experts and people from the Dehcho First Nation member communities, harvesting sample plots and measuring the tonnes per hectare actually available.

[88] *Ibid.*

The processes for ground-proofing when making assessment of forestry resources are well established. Sources for developing guidelines for ground-proofing as follow-ups to this report include:

- Government of Northwest Territories. (2025 Nov). *Commercial Timber Harvest Planning and Operations Standard Operating Procedures Manual.* Environment and Climate Change. https://www.gov.nt.ca/ecc/sites/ecc/files/reports/commercial_timber_procedures_manual.pdf.
- Government of Northwest Territories. (n.d.). *Forest resources: Inventory and analysis. Environment and Climate Change.* https://www.gov.nt.ca/ecc/en/services/forest-resources/inventory-and-analysis.
- Canadian Forest Inventory Committee. (2008 Oct). Canada's National Forest Inventory Ground Sampling Guidelines. National Forestry Institute. https://nfi.nfis.org/resources/groundplot/Gp_guidelines_v5.0.pdf.
- GIS Geography. (n.d.). Ground Truthing: Verify Remotely Collected Data. https://gisgeography.com/ground-truthing.

In addition to using these guidelines for assessing unburnt areas, these guidelines should be followed when assessing burn areas, with a few additional elements:

- The use of drone photography, taken while doing the ground proofing, will provide important insights into the variation of the density of the dead standing trees.
- Particular care needs to be taken to assess the condition of the forest floor after a fire. Depending on the degree of damage from the fire, it may be appropriate to only harvest during winter, when the ground is frozen and insulated from damage by snow cover.
- A representative sample of standing trees will need to be harvested and known volumes will need to be weighed, both in log and chip form.
    - Logs could be weighed either by cubic metre or cord
    - Wood chips will need to be weighed by cubic metre
- Representative samples of dead standing trees will need to be tested in a laboratory for energy density and moisture content.

Because harvesting will require permitting, the development of plans for ground-proofing (and the actual ground-proofing itself) should be done in coordination with the relevant permitting entities. If an area is ground-proofed without this coordination, ground-proofing will likely need to be conducted again before harvesting is permitted.

Ideally, ground-proofing should occur as part of the process of creating fuel breaks around each community.

A.3 *Dataset Source*

Guindon L., Villemaire P., Correia D.L.P., Manka F., Lacarte S., & Smiley B. (2023). *SCANFI: Spatialized CAnadian National Forest Inventory data product.* Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, Quebec, Canada. https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc.

A.4 *Dataset Formal Citation*

Guindon, L., et al. Villemaire P., Correia D.L.P., Manka F., Lacarte S., Smiley B. (2023). SCANFI: *Spatialized CAnadian National Forest Inventory data product.* Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, Quebec, Canada. https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc.

Appx. B *Data Details*

In some instances where summary data from the SCANFI dataset is provided in the main body of this report, having access to the non-summarized data may be useful for follow-up studies. Non-summarized detail is included in this appendix.

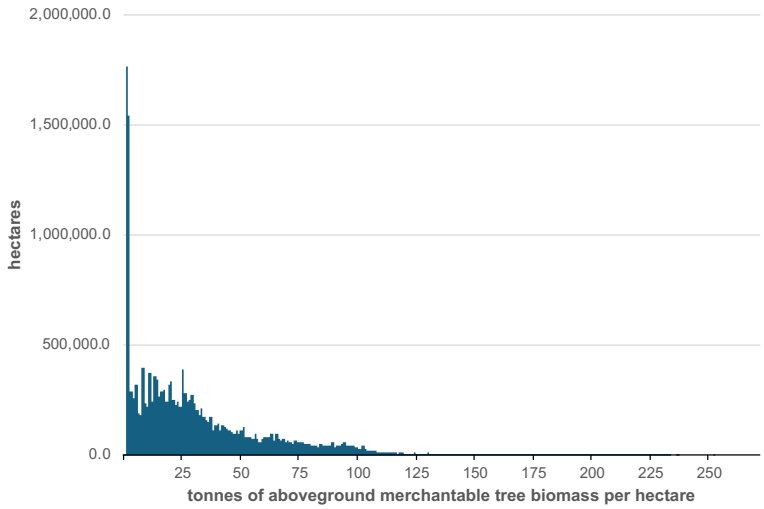


Figure 69: Tonnes of available biomass per hectare in Dehcho region

Table 33: Tonnes of available biomass per hectare in Dehcho region

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*	*tonnes of aboveground merchantable tree biomass per hectare*	*total hectares in Dehcho region*	*tonnes of aboveground merchantable tree biomass per hectare*	*total hectares in Dehcho region*
1	126.9	26	385,673.1	51	110,562.5
2	1,764,564.7	27	279,335.5	52	123,421.2
3	1,539,885.9	28	244,387.2	53	78,408.8
4	285,211.2	29	246,746.8	54	84,574.5
5	257,503.5	30	272,102.0	55	81,084.2
6	320,993.2	31	233,142.5	56	73,838.3
7	191,898.5	32	205,896.3	57	97,849.2
8	177,781.1	33	177,453.0	58	70,281.1
9	396,183.6	34	212,570.2	59	60,890.2
10	235,863.0	35	173,728.9	60	75,879.5
11	219,652.7	36	156,057.9	61	82,600.0
12	372,671.6	37	148,313.2	62	79,782.5
13	238,753.2	38	169,064.6	63	81,596.9
14	355,389.9	39	107,649.6	64	93,501.9
15	338,242.1	40	130,685.0	65	69,099.5
16	268,014.6	41	141,783.9	66	96,780.3
17	289,741.5	42	109,436.4	67	71,145.5
18	293,652.5	43	134,001.8	68	62,332.1
19	244,469.6	44	125,479.7	69	73,182.5
20	317,289.9	45	122,521.1	70	57,873.6
21	334,395.8	46	107,667.3	71	66,016.7
22	251,767.1	47	102,828.0	72	57,150.2
23	223,459.1	48	94,506.7	73	53,743.8
24	244,366.5	49	111,034.9	74	62,287.3
25	216,284.0	50	96,296.1	75	58,882.7

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*
76	54,598.2
77	54,584.1
78	51,785.6
79	50,057.4
80	51,795.5
81	40,259.3
82	40,725.3
83	44,839.8
84	36,524.1
85	47,183.6
86	38,794.6
87	42,814.0
88	45,821.8
89	41,122.4
90	54,308.8
91	37,873.4
92	43,602.6
93	44,540.4
94	52,620.5
95	58,336.3
96	44,937.0
97	45,102.0
98	39,608.0
99	43,198.6
100	33,848.1
101	28,842.7
102	27,793.9
103	39,332.6
104	24,303.4
105	15,686.7
106	19,318.3
107	18,475.2
108	16,441.4
109	12,981.9
110	12,180.2
111	9,002.7
112	14,238.8
113	8,749.5
114	8,517.8
115	8,128.4
116	8,281.9
117	9,907.7
118	7,485.5
119	8,818.7
120	8,770.2
121	6,064.9
122	6,743.1
123	5,752.9
124	5,680.3
125	7,933.2
126	5,670.5
127	5,231.9
128	2,607.8
129	6,233.0

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*
130	3,748.0
131	10,551.5
132	2,725.9
133	3,224.9
134	2,841.9
135	3,952.0
136	3,174.7
137	3,312.9
138	1,857.6
139	1,917.5
140	5,403.1
141	2,074.4
142	2,849.0
143	1,938.3
144	3,175.4
145	3,266.4
146	1,382.0
147	2,011.0
148	2,781.0
149	1,440.8
150	1,215.1
151	1,509.7
152	2,005.5
153	1,312.1
154	1,103.9
155	1,378.3
156	1,054.3
157	1,411.3
158	640.2
159	1,563.3
160	2,000.0
161	1,054.2
162	1,770.8
163	974.5
164	1,218.2
165	1,187.7
166	593.7
167	598.7
168	554.9
169	1,236.4
170	709.9
171	455.5
172	310.5
173	555.8
174	722.1
175	564.8
176	460.7
177	761.0
178	321.3
179	180.6
180	554.6
181	593.0
182	263.5
183	1,228.5

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*
184	256.2
185	1,252.1
186	190.6
187	201.4
188	397.0
189	489.7
190	146.3
191	669.8
192	147.8
193	87.0
194	272.8
195	108.5
196	267.6
197	141.9
198	24.9
199	173.2
200	79.8
201	57.1
202	58.5
203	73.4
204	28.4
205	141.6
206	60.0
207	35.3
208	110.7
209	34.0
210	41.5
211	71.6
212	17.3
213	55.1
214	38.8
215	26.5
216	32.0
217	81.9
218	15.9
219	12.3
220	4.8
221	2.1
222	45.1
223	7.0
224	4.9
225	1.8
226	4.4
227	35.6
228	95.0
229	4.3
230	42.0
231	5.0
232	3.7
233	0.5
234	2.0
235	0.2
236	0.2
237	2.9

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*
238	2.5
239	0.1
240	0.0
241	0.1
242	0.0
243	0.3
244	0.0
245	0.2
246	0.1
247	0.1
248	0.0
249	0.0

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*
250	0.3
251	0.0
252	0.3
253	2.6
254	0.1
255	0.1
256	0.0
257	0.0
258	0.0
259	0.0
260	0.0
261	0.0

tonnes of aboveground merchantable tree biomass per hectare	*total hectares in Dehcho region*
262	0.0
263	0.0
264	0.0
265	0.0
266	0.0
267	0.0
268	0.0
269	0.0
270	0.0
271	0.0
272	0.1

Appx. C *"Land of Little Sticks"*

The term "land of little sticks" is used quite often to characterize the taiga region of Canada. (The "sticks" in this term are understood to be the trees.) Canada's taiga region includes the Taiga Plains ecozone, in which almost all of Dehcho is situated. It would be natural, then, to conclude the trees in Dehcho are only little sticks.

As this report hopefully makes clear, "land of little sticks" is a misleading way of characterizing Dehcho. Some parts of it—particularly on the top of hills—may have only a few small trees. Other parts—especially in valleys along lakes and rivers—have plenty of trees that are anything but little.

It may be helpful to understand where the term "land of little sticks" came from, how it has been used, and how this misunderstanding arose. The misunderstanding is directly relevant to this report because a land where the "sticks" truly were little could not use its trees as a sustainable source of fuel.

The Oxford English Dictionary (OED) indicates that the first time this phrase appears in writing is in 1896, in the writing of C. Whitney.[89] The writing being referred to in the OED entry is almost certainly *The Musk Ox* by Caspar Whitney. The key passage relevant to this report is:

> We had passed through the "Land of Little Sticks," as the Indians so appropriately call that desolate waste which connects the edge of timber land with the Barren Grounds, and had been for several days making our way north on the lookout for any living thing that would provide us with a mouthful of food….
>
> It is well known, I suppose, that the Barren Grounds are devoid absolutely not only of trees but even of brush, except for some scattered, stunted bushes that in summer are to be found in occasional spots at the water's edge but may not be depended upon for fuel. From Great Slave Lake north to the timber's edge is about three hundred miles; beyond that is a stretch of country perhaps of another hundred miles, suggestively called the Land of Little Sticks by the Indians, over which are scattered and widely separated little patches of small pine, sometimes of an acre in extent, sometimes a little less and sometimes a little more. They seem to be a chain of wooded islands in this desert that connect the main timber line (which, by the way, does not end abruptly, but straggles out for many miles, growing thinner and thinner until it ends, and the Land of Little Sticks begins) with the last free growth; and I never found them nearer together than a good day's journey.
>
> About three- or four-days' travel takes you through this Land of Little Sticks and brings you to the last wood. The last wood that I found was a patch of about four or five acres with trees two or three inches in diameter at their largest, although one or two isolated ones were perhaps as large as five or six inches. Here you take the fire-wood for your trip into the Barrens.[90]

Whitney's phrase caught on.

[89] Oxford English Dictionary. (n.d.). *Land of Little Sticks.* https://www.oed.com/dictionary/land-of-little-sticks_n?tl=true..

[90] Whitney, C. *The Musk Ox*, found online in Whitney, C., Grinnell, G.B., & Wiste, O. (1904). *Musk-Ox, Bison, Sheep and Goat.* The MacMillan Company. Pg. 17. https://www.gutenberg.org/cache/epub/48694/pg48694-images.html#THE_MUSK-OX_AND_ITS_HUNTING.

As early as 1912, Robert Service used it in a poem as a metaphor for desolation and despair:

> What are you doing here, Tom Thorne, on the white top-knot o' the world….
> Where the wind has the cut of a naked knife and the stars are rapier keen?
>
> ….Go home, go home to your clubs, Tom Thorne! home to your evening dress!
> Home to your place of power and pride, and the feast that waits for you!
> Why do you linger all alone in the splendid emptiness,
> Scouring the Land of the Little Sticks on the trail of the caribou?
>
> Why did you fall off the Earth, Tom Thorne, out of our social ken?
> What did your deep damnation prove? What was your dark despair?[91]

Since then, the term "land of little sticks" has been used in many contexts. At least one source implies the term is a translation from Russian:

> **taiga**, biome (major life zone) of vegetation composed primarily of cone-bearing needle-leaved or scale-leaved evergreen trees, found in northern circumpolar forested regions characterized by long winters and moderate to high annual precipitation. The taiga, "land of the little sticks" in Russian, takes its name from the collective term for the northern forests of Russia, especially Siberia.[92]

Other sources it from Inuktitut:

> Eskimos call it "the Land of the Little Sticks" because Arctic winds and bitter cold keep its stunted pines from growing beyond the thickness of a finger.[93]

And another from Cree:

> Over the next few weeks, the 280,000-strong Beverly Qamamirjuaq caribou herd will migrate through this lake-speckled region, which is known as "the land of little sticks" to the Cree.[94]

Especially in recent years, most credit Dene as the source:

> Canada's Barrenlands are bounded by the Mackenzie Valley, Arctic Ocean, Hudson Bay, and northerly regions of Manitoba and Saskatchewan. The Dene named it dechinule ("land of little sticks"), as their ancestors traversed both forest-fringe and tundra in seasonal search for migrating caribou.[95]

---

[91] Service, R.W. (1912). *The Atavist.* Rhymes of a Rolling Stone. William Briggs, Toronto. https://www.gutenberg.org/files/309/309-h/309-h.htm#link2H_4_0016

[92] Juday, G.P. (last update: 2025 Jul 6). *taiga.* Encyclopaedia Britannica. https://www.britannica.com/science/taiga.

[93] Time Magazine. (1978 Feb 13). *Nation: Hot Spots in the Land of Sticks.* https://time.com/archive/6849654/nation-hot-spots-in-the-land-of-sticks/

[94] Forster, G. (2018 Sep 07). *North by Northwest.* Wknd Magazine. https://ganglersadventures.com/wp-content/uploads/2019/08/manitoba_stewart-forester.pdf

[95] Gordon, B.C. (n.d.). *Barrenlands Prehistory.* Rangifer Central, University of Carleton. https://carleton.ca/rangifercentral/?p=387.

> The traditional land of the Sayisi Dene is called *dechinule*, or "land of little sticks".[96]

> The Dene lands are known as the dechinule or the "land of little sticks", that place north where many of us have never been, a land of harsh climate, clean air, with sparkling snows and a tree line that makes its way between the taiga and the tundra while searching for the truth.[97]

No matter the attributed source, most writers cite very small trees as the landscape's defining characteristic:

> Land of the Little Sticks: [T]he part of the north of Canada that lies south of the tree line but contains only stunted evergreens or dwarf deciduous trees.[98]

And at least a few (perhaps unconsciously) echoes R. W. Service's vision of emptiness:

> The Land of Little Sticks is a vast place of extreme solitude where there isn't much mercy for anyone; wanderers are on their own, all alone by themselves.[99]

It seems clear that the landscape being described by "land of little sticks" is not Dehcho. As Whitney's writing makes clear, he uses the term to refer to the very northern fringe of the Taiga Shield ecozone and the southern reaches of the Southern Arctic ecozone, hundreds of kilometers to the north.

In assessing the potential for biomass as a fuel in Dehcho, we need to be careful not to confuse this well-worn term with the reality on the ground in Dehcho.

---

[96] Ellis. S. (1992). Personal communication. Cited in Petch. V.P. (1998 Jun). *Relocation and Loss of Homeland: The Story of the Sayis'i Dene of Northern Manitoba.* [Doctoral dissertation, University of Manitoba]. National Library of Canada. https://www.collectionscanada.gc.ca/obj/s4/f2/dsk2/ftp02/NQ32015.pdf.

[97] Kress, M.M. (2014). *Sisters of Sāsīpihkēyihtamowin – Wise Women of the Cree, Denesuline, Inuit and Métis: Understandings of Storywork, Traditional Knowledges and Eco-justice among Indigenous Women Leaders.* [Doctoral dissertation, University of Manitoba]. University of Manitoba Library. https://mspace.lib.umanitoba.ca/server/api/core/bitstreams/fa0d9734-c246-449d-893f-d4b69f05def1/content

[98] Dictionary.com. (n.d.). *Land of the Little Sticks.* https://www.dictionary.com/browse/land-of-the-little-sticks.

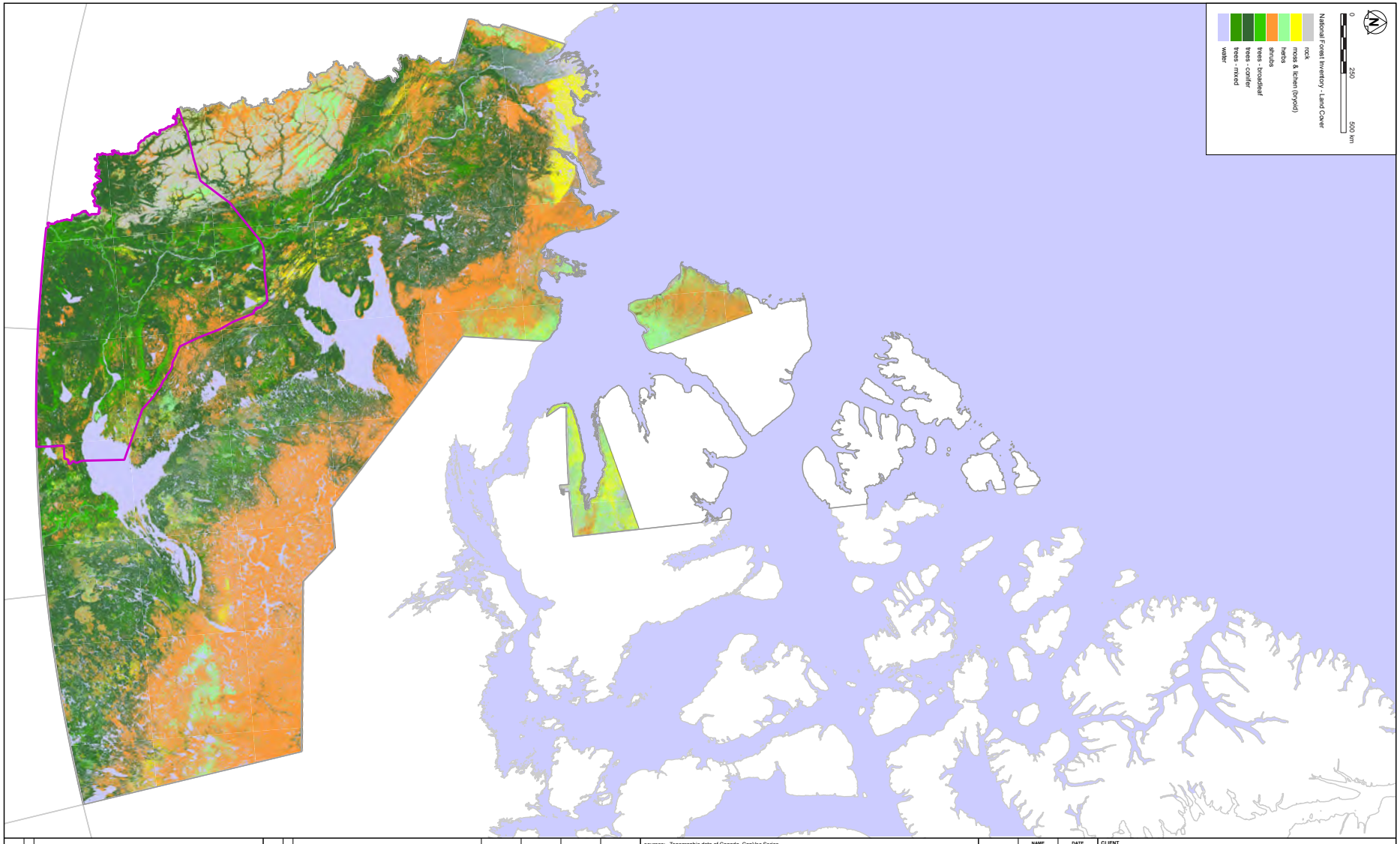
[99] Bérard's, R. (1978). *Land of Little Sticks Routes.* Government of Manitoba, Department of Natural Resources, Parks Branch. https://repromap.com/product/land-of-little-sticks-canoe-route/.

Appx. D *Maps*

Table 34: Maps

#	*name*
D 001	Northwest Territories - Land Cover
D 010	Northwest Territories - Ecozones
D 020	Northwest Territories - Treed Areas
D 060	Northwest Territories & Surrounding Regions - Vegetation (Tree) Height
D 080	Northwest Territories - Fires - 1972 to 2024
D 081	Northwest Territories - Fires - Aged by Greyscale - 1972 to 2024
D 100	Dehcho in Northwest Territories
D 101	Dehcho
D 110	Dehcho - Ecozones
D 111	Dehcho - Ecoprovinces
D 112	Dehcho - Ecoregions
D 113	Dehcho - Ecodistricts
D 120	Dehcho - Treed Areas
D 130	Dehcho - Tree Species
D 131	Dehcho - Tree Species - Broadleaf (Hardwood)
D 132	Dehcho - Tree Species - Coniferous (Softwood) - Tamarack
D 133	Dehcho - Tree Species - Coniferous (Softwood) - Lodgepole
D 134	Dehcho - Tree Species - Coniferous (Softwood) - Jack Pine
D 135	Dehcho - Tree Species - Coniferous (Softwood) - Black Spruce
D 136	Dehcho - Tree Species - Coniferous (Softwood) - Other
D 150	Dehcho - Biomass Density
D 160	Dehcho - Tree Height
D 170	Dehcho - Crown Closure
D 180	Dehcho - Fires
D 181	Dehcho - Fires - Aged by Greyscale
D 182	Dehcho - Fires - Aged by Colour
D 183	Dehcho - Relevant Recent Fires
D 184	Dehcho - Relevant Older Fires
D 190	Dehcho - Key Forest Characteristics
D 210	Sambaa K'e First Nation (Sambaa K'e) - Key Forest Characteristics
D 220	Nahɔą Dehé Dene Band (Nahanni Butte) - Key Forest Characteristics
D 230	Pehdzeh Ki First Nation (Wrigley) - Key Forest Characteristics
D 240	Łíídlįį Kų́ę́ First Nation & Fort Simpson Métis (Fort Simpson) - Key Forest Characteristics
D 250	Tthets'éhk'edelı First Nation (Jean Marie River) - Key Forest Characteristics
D 260	Deh Gáh Got'ıę First Nation & the Fort Providence Métis Council (Fort Providence) - Key Forest Characteristics
D 270	Ka'a'gee Tu First Nation (Kakisa) - Key Forest Characteristics
D 280	West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1) - Key Forest Characteristics

The following images are reduced from their original size (24"x36"). Full-sized maps are available from Boke.



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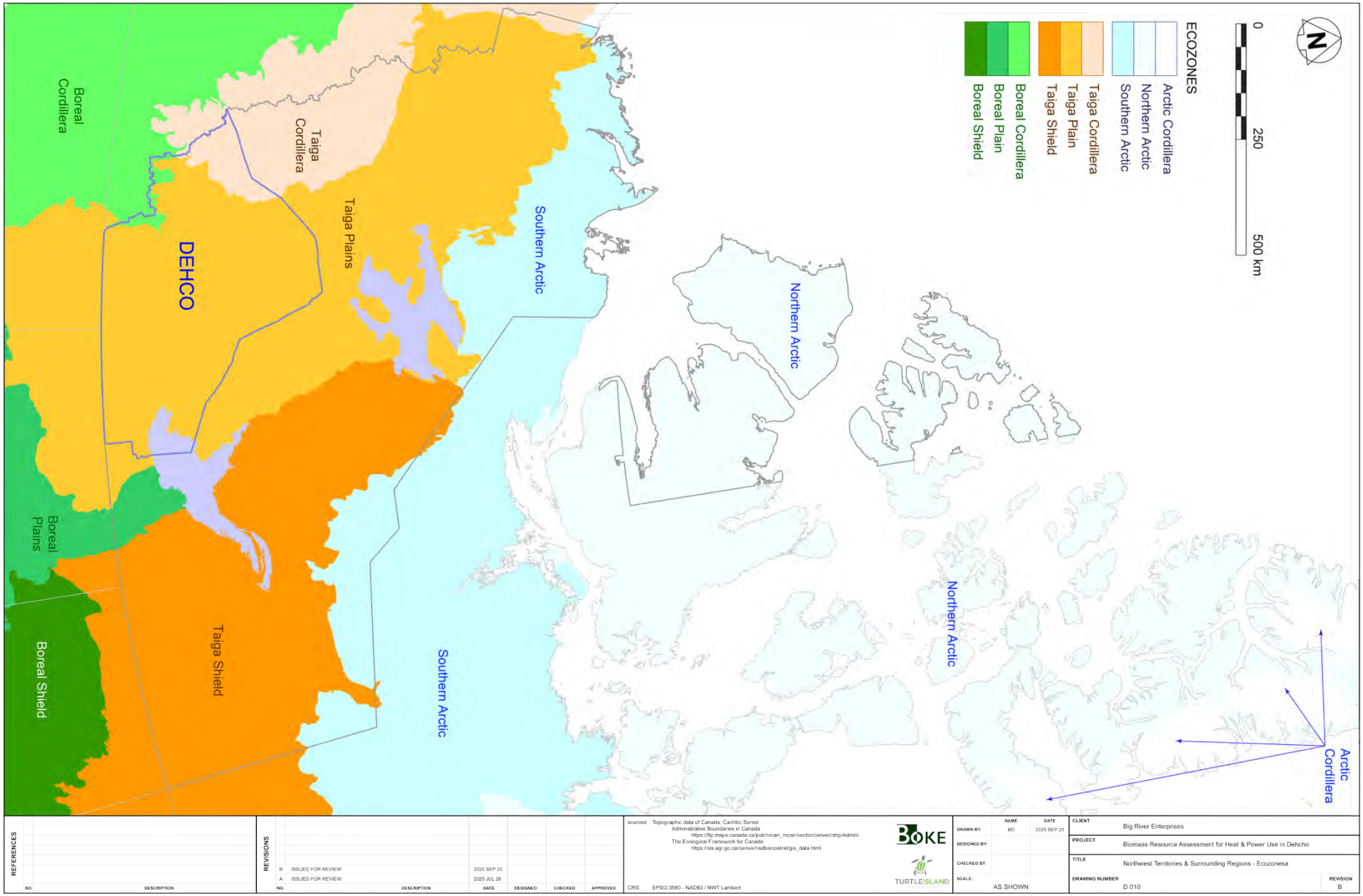
SCANFI - Land Cover
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc

CRS: EPSG:3580 - NAD83 / NWT Lambert

	NAME	DATE
DRAWN BY:	BD	2025 JUL 28
DESIGNED BY:		
CHECKED BY:		
SCALE:	AS SHOWN	

CLIENT: Big River Enterprises
PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE: Northwest Territories - Land Cover
DRAWING NUMBER: D 001
REVISION: B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Northern Arctic
Southern Arctic
Taiga Cordillera
Taiga Plain
Taiga Shield
Boreal Cordillera
Boreal Plain
Boreal Shield
0
250
500 km
N
Boreal Cordillera
Taiga Cordillera
Taiga Plains
DEHCO
Southern Arctic
Northern Arctic
Boreal Plains
Taiga Shield
Boreal Shield
Southern Arctic
Northern Arctic
Arctic Cordillera
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DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 JUL 28
sources: Topographic data of Canada, CanVec Series
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https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
The Ecological Framework for Canada
https://sis.agr.gc.ca/cansis/nsdb/ecostrat/gis_data.html
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DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
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PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
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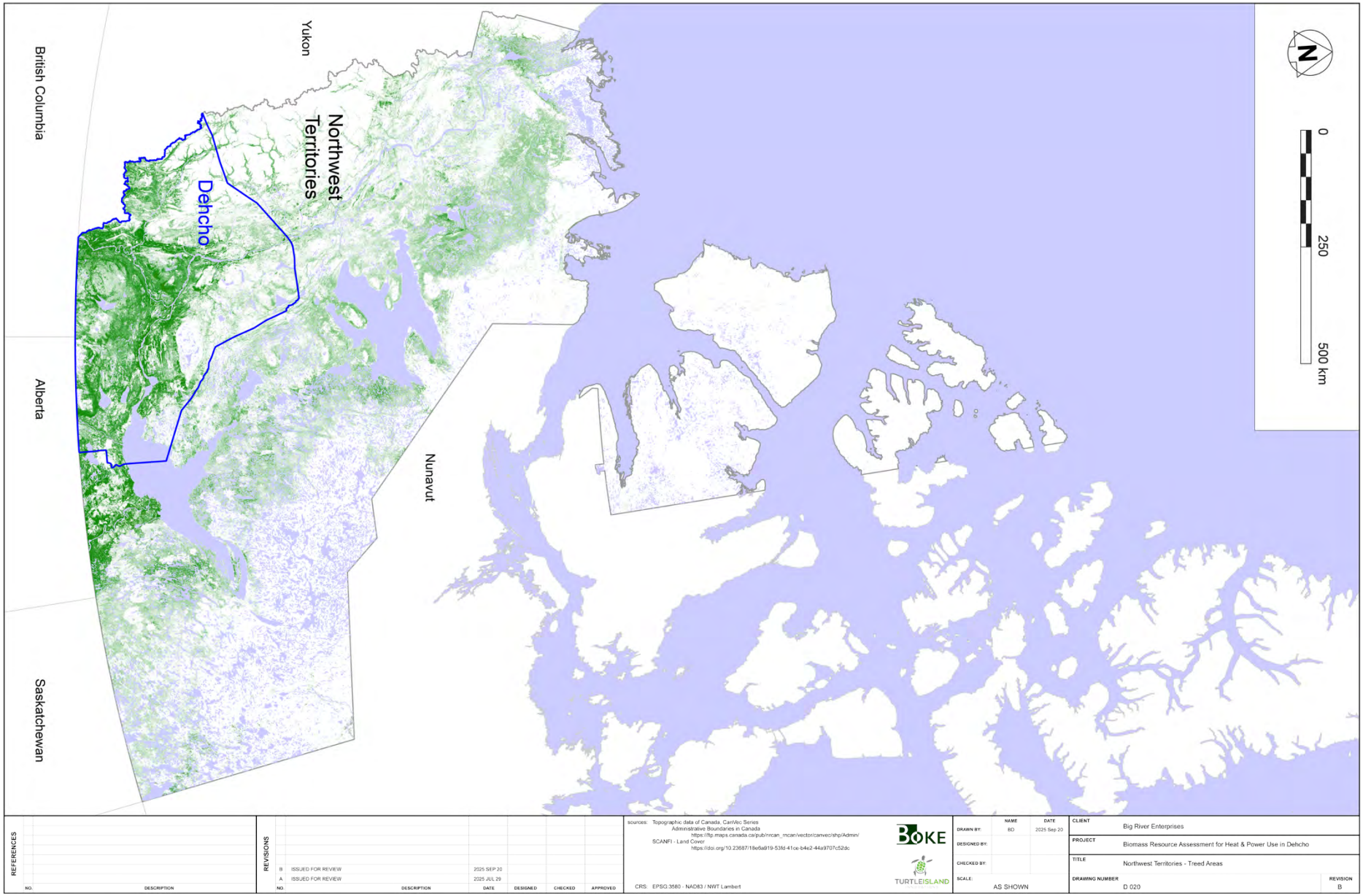
REVISION B



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CHECKED BY:		
SCALE:	AS SHOWN	

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PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE: Northwest Territories - Treed Areas
DRAWING NUMBER: D 020
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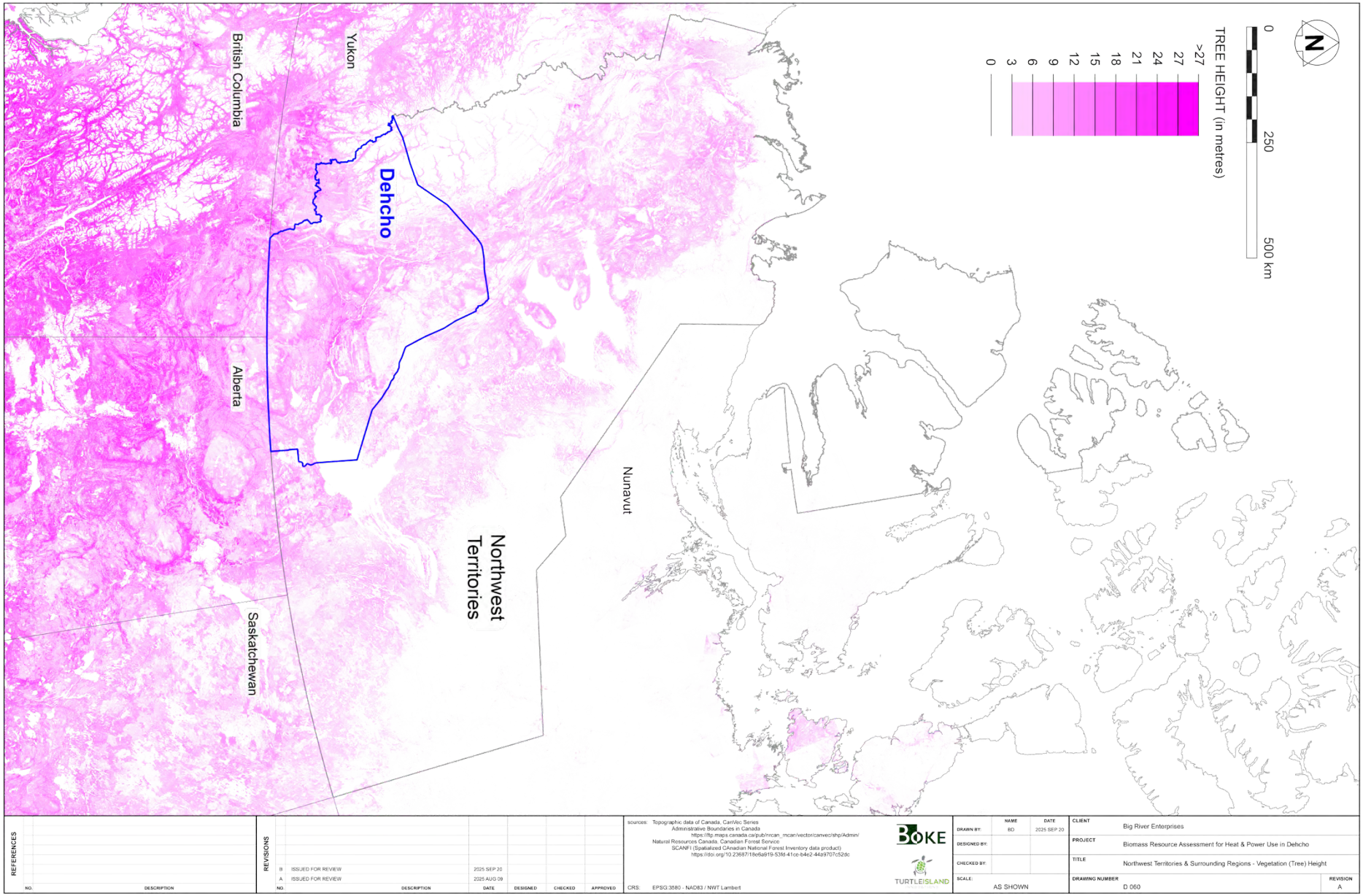

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sources: Topographic data of Canada, CanVec Series
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Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc

CRS: EPSG:3580 - NAD83 / NWT Lambert

BOKE
TURTLEISLAND

	NAME	DATE
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DESIGNED BY:		
CHECKED BY:		
SCALE:	AS SHOWN	

CLIENT: Big River Enterprises
PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
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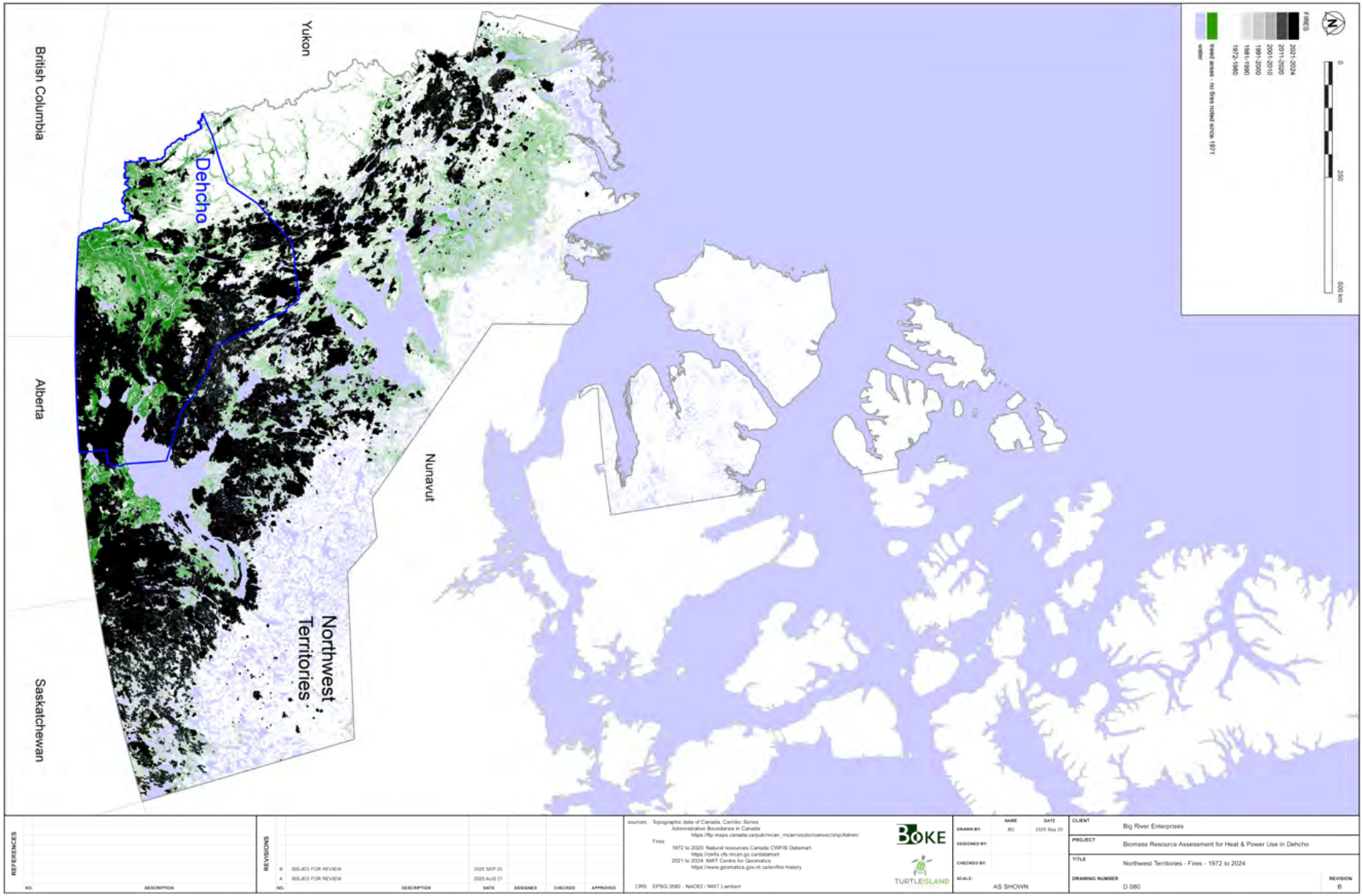
REVISION: A


British Columbia
Yukon
Alberta
Saskatchewan
Nunavut
Northwest Territories
Dehcho
FIRES
2021-2024
2011-2020
2001-2010
1991-2000
1981-1990
1972-1980
treed areas - no fires noted since 1971
water
N
0
250
500 km
REFERENCES
NO.
DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 01
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
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Fires:
1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
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TURTLEISLAND
NAME DATE
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SCALE: AS SHOWN
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PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
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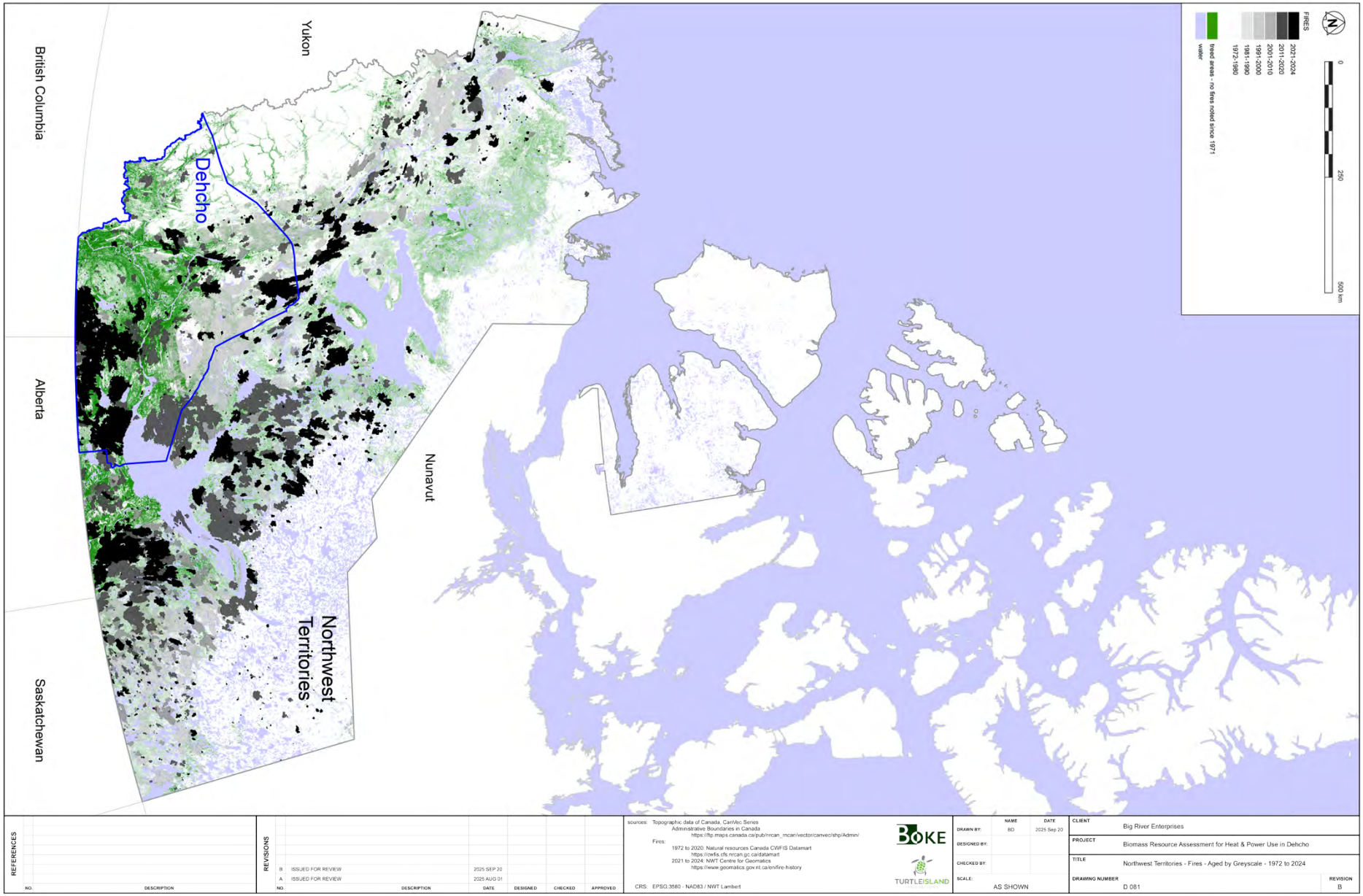
British Columbia
Alberta
Saskatchewan
Yukon
Nunavut
Northwest Territories
Dehcho
FIRES
2021-2024
2011-2020
2001-2010
1991-2000
1981-1990
1972-1980
treed areas - no fires noted since 1971
water
N
0
250
500 km
REFERENCES
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1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
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TURTLEISLAND
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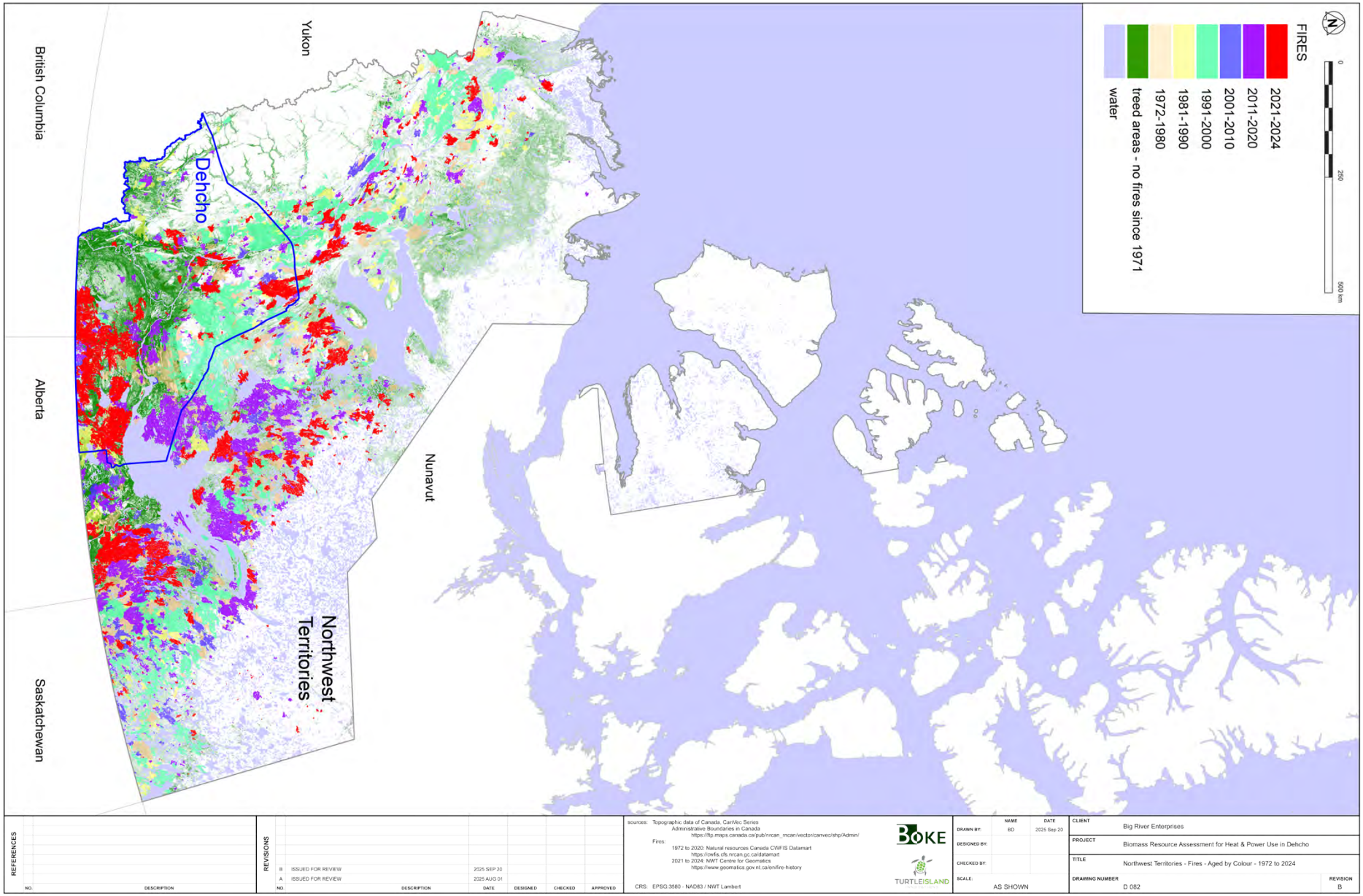
British Columbia
Alberta
Saskatchewan
Yukon
Nunavut
Northwest Territories
Dehcho
FIRES
2021-2024
2011-2020
2001-2010
1991-2000
1981-1990
1972-1980
treed areas - no fires since 1971
water
N
0
250
500 km
REFERENCES
NO.
DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 01
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
sources: Topographic data of Canada, CanVec Series
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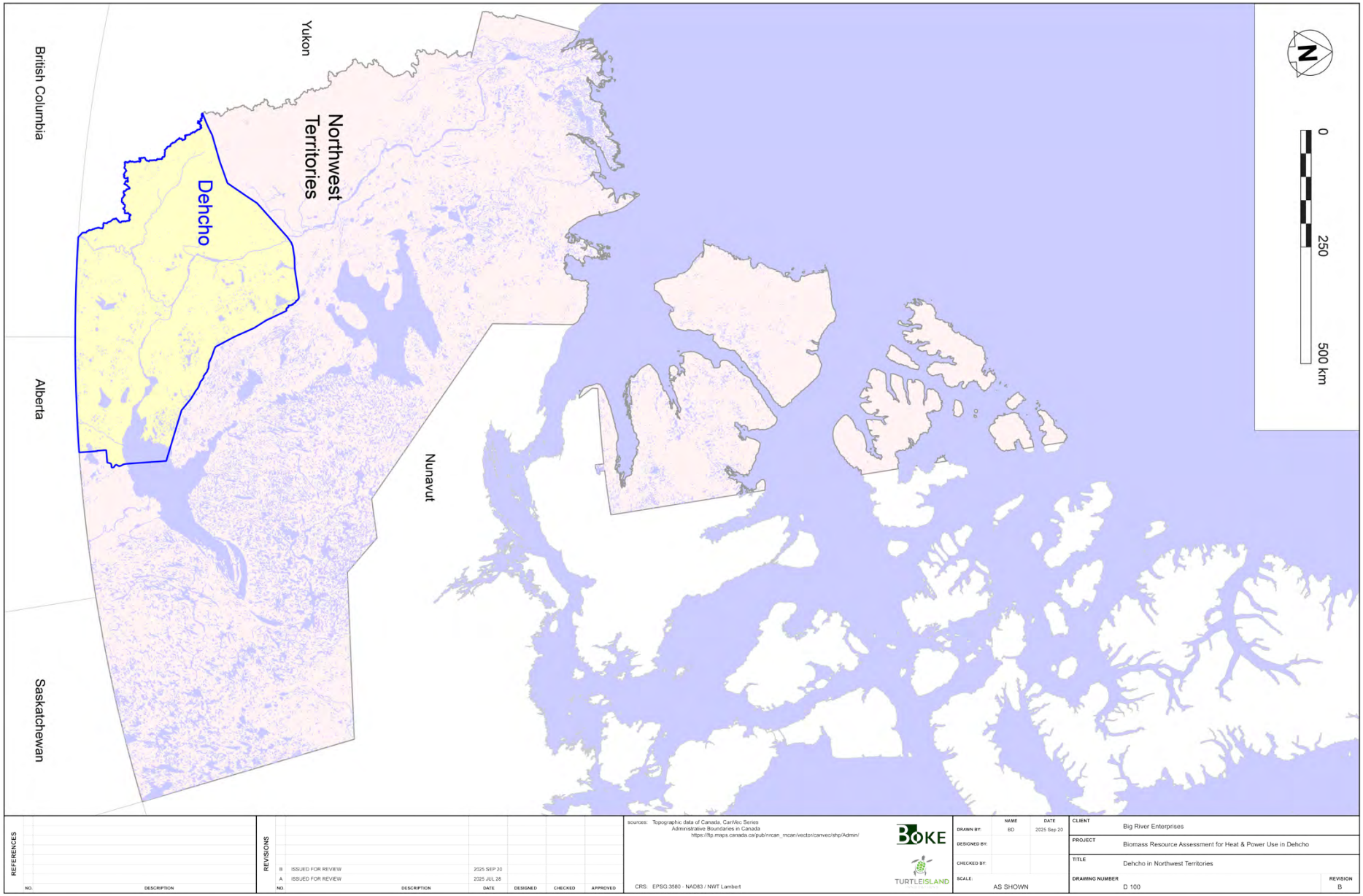
1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 Sep 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Northwest Territories - Fires - Aged by Colour - 1972 to 2024
DRAWING NUMBER D 082
REVISION B


British Columbia
Alberta
Saskatchewan
Yukon
Northwest Territories
Nunavut
Dehcho
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REFERENCES
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DESCRIPTION
REVISIONS
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DESCRIPTION
DATE
DESIGNED
CHECKED
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B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 JUL 28
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
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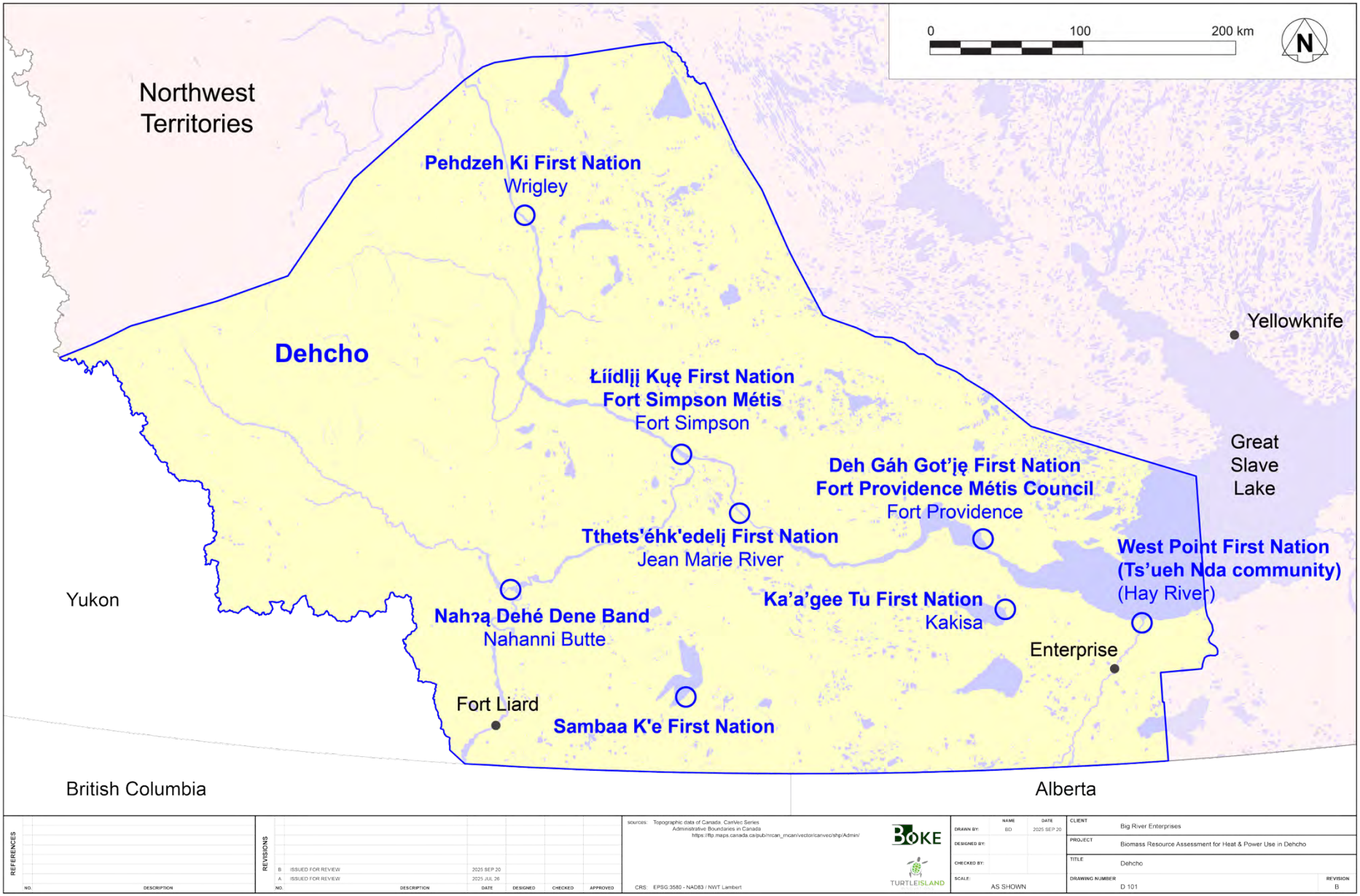
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME
DATE
DRAWN BY: BD 2025 Sep 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho in Northwest Territories
DRAWING NUMBER D 100
REVISION B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100
200 km
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Northwest Territories
Pehdzeh Ki First Nation
Wrigley
Dehcho
Łíídlįį Kųę First Nation
Fort Simpson Métis
Fort Simpson
Yellowknife
Great Slave Lake
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Tthets'éhk'edelį First Nation
Jean Marie River
West Point First Nation
(Ts'ueh Nda community)
(Hay River)
Yukon
Nahɔą Dehé Dene Band
Nahanni Butte
Ka'a'gee Tu First Nation
Kakisa
Enterprise
Fort Liard
Sambaa K'e First Nation
British Columbia
Alberta
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A ISSUED FOR REVIEW 2025 JUL 26
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sources: Topographic data of Canada, CanVec Series
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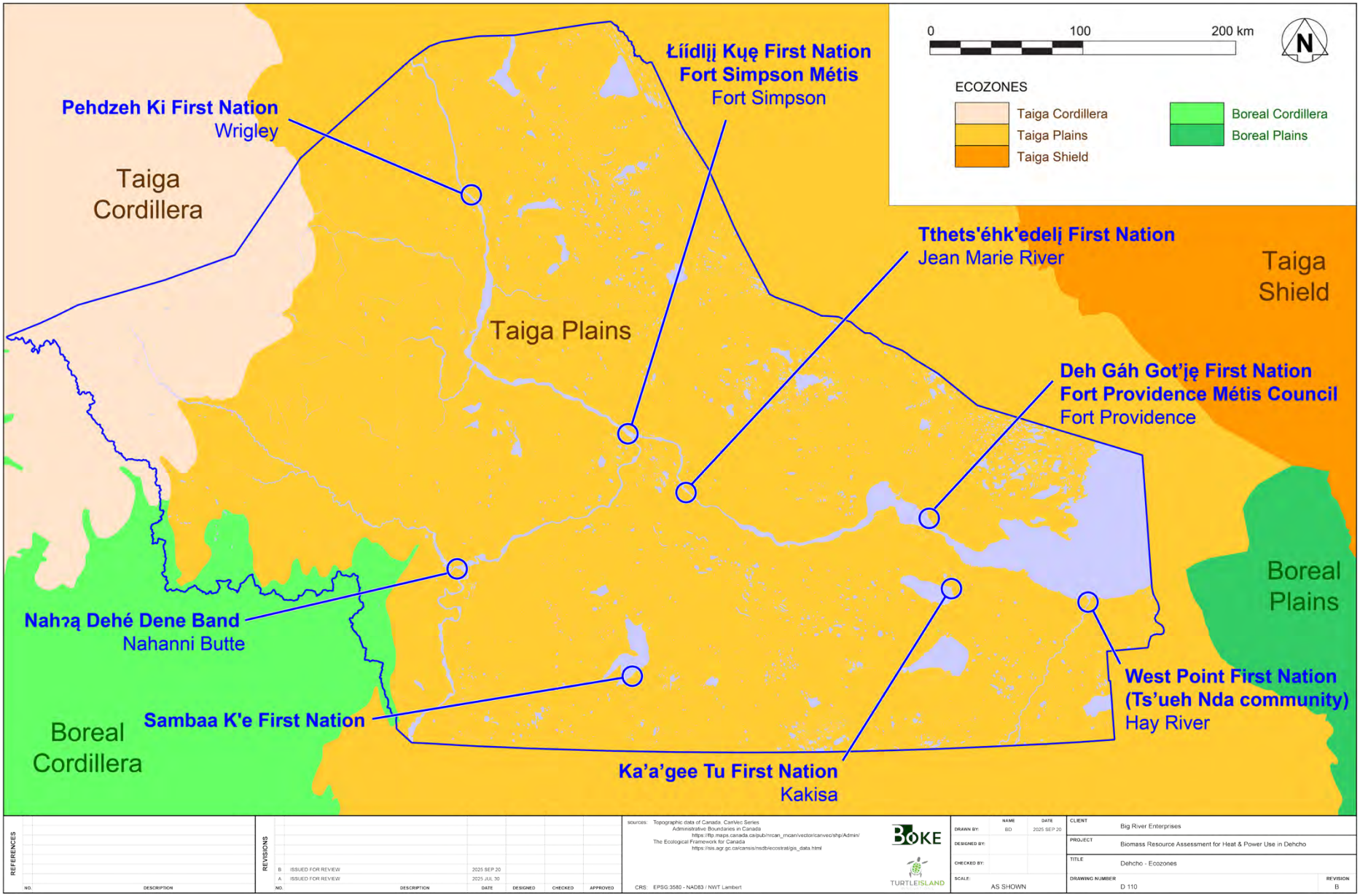
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho
DRAWING NUMBER D 101
REVISION B


0
100
200 km
N
ECOZONES
Taiga Cordillera
Taiga Plains
Taiga Shield
Boreal Cordillera
Boreal Plains
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Pehdzeh Ki First Nation
Wrigley
Taiga Cordillera
Tthets'éhk'edelį First Nation
Jean Marie River
Taiga Shield
Taiga Plains
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Boreal Plains
Nahʔą Dehé Dene Band
Nahanni Butte
West Point First Nation
(Ts'ueh Nda community)
Hay River
Sambaa K'e First Nation
Boreal Cordillera
Ka'a'gee Tu First Nation
Kakisa
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The Ecological Framework for Canada
https://sis.agr.gc.ca/cansis/nsdb/ecostrat/gis_data.html
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
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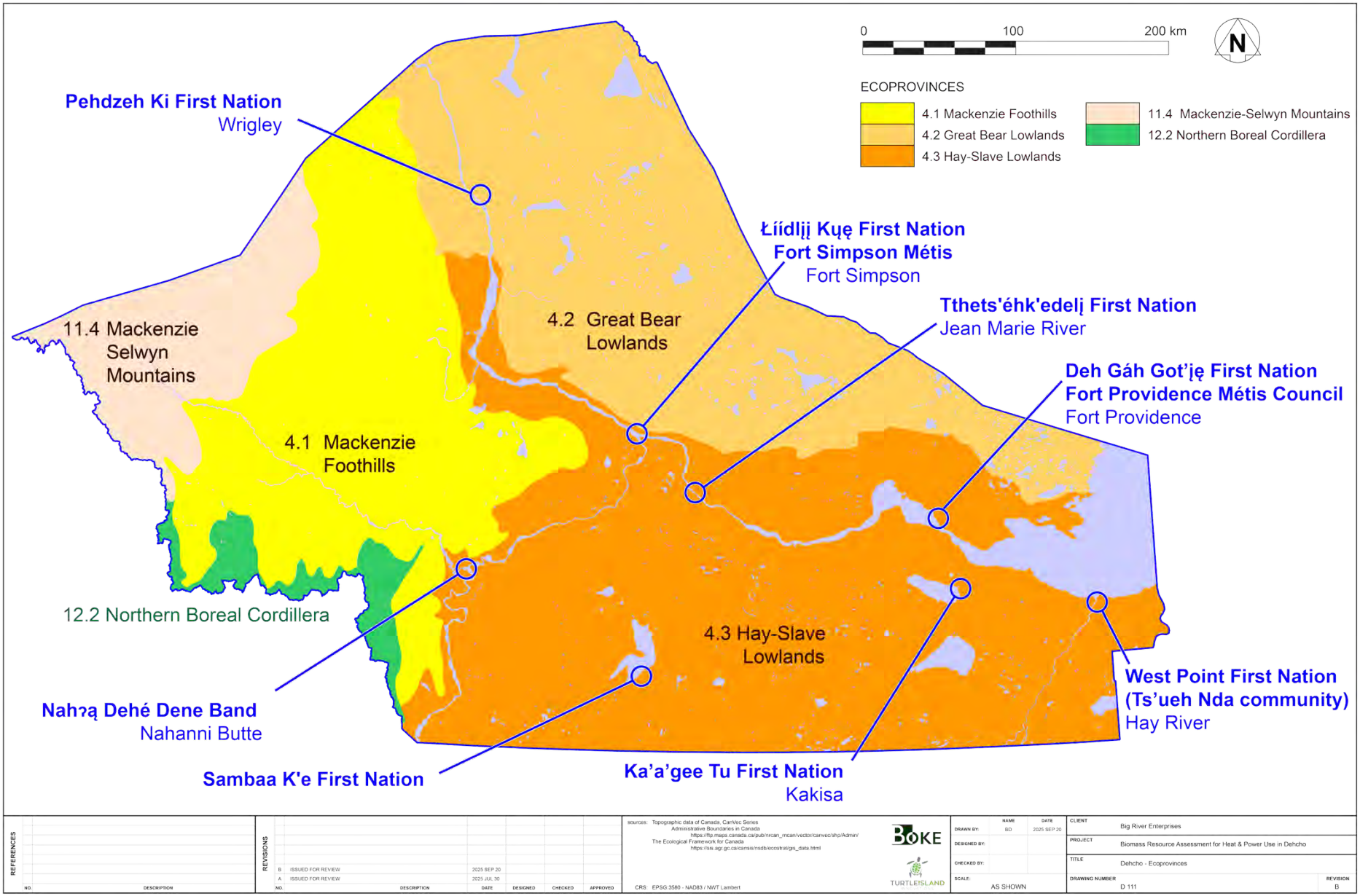
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - Ecozones
DRAWING NUMBER D 110
REVISION B


0
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N
ECOPROVINCES
4.1 Mackenzie Foothills
4.2 Great Bear Lowlands
4.3 Hay-Slave Lowlands
11.4 Mackenzie-Selwyn Mountains
12.2 Northern Boreal Cordillera
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų̨ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'ı̨ę First Nation
Fort Providence Métis Council
Fort Providence
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
Sambaa K'e First Nation
Nahɔą Dehé Dene Band
Nahanni Butte
11.4 Mackenzie Selwyn Mountains
4.2 Great Bear Lowlands
4.1 Mackenzie Foothills
12.2 Northern Boreal Cordillera
4.3 Hay-Slave Lowlands
REFERENCES
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sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
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https://sis.agr.gc.ca/cansis/nsdb/ecostrat/gis_data.html
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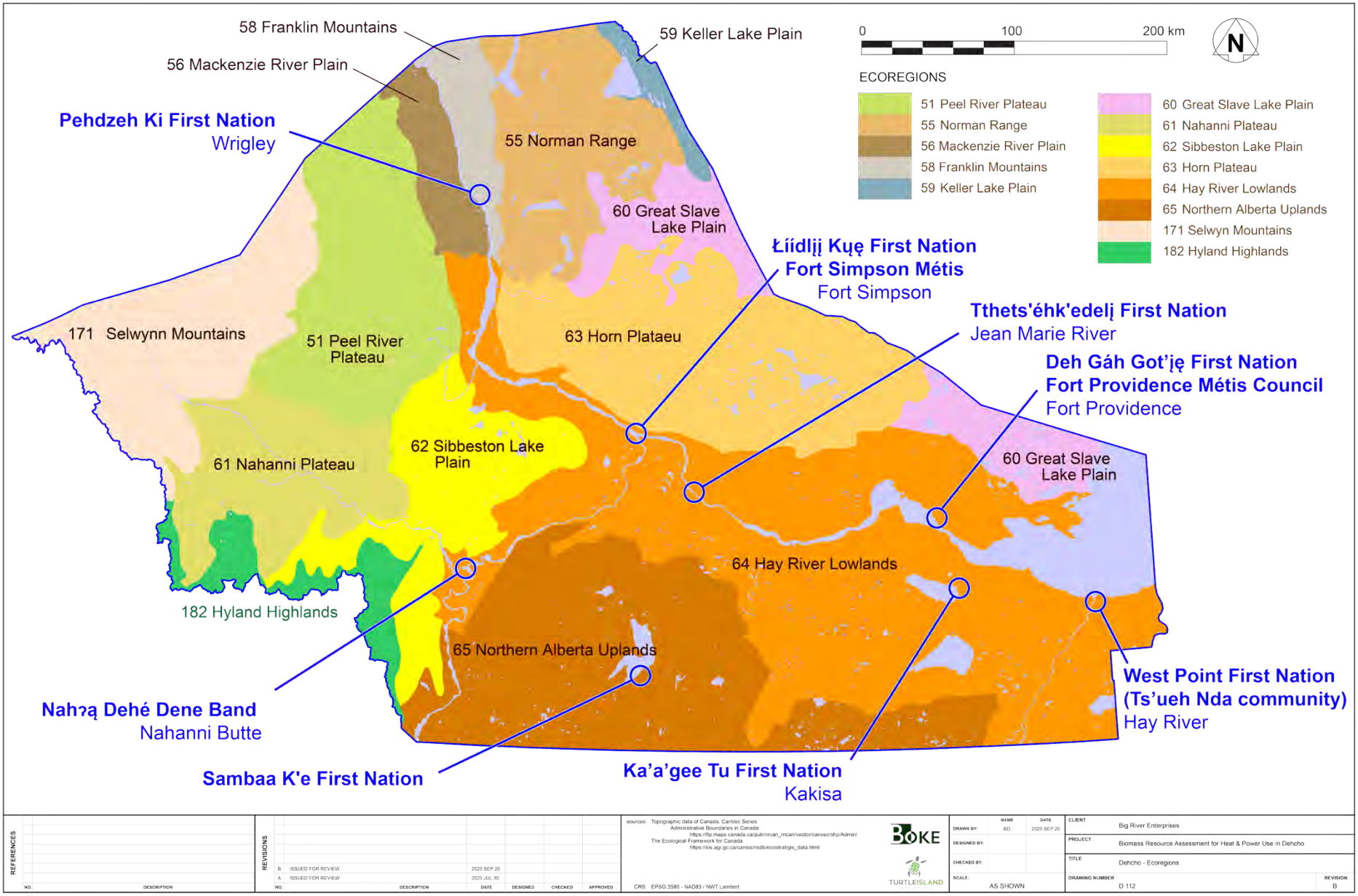
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT: Big River Enterprises
PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE: Dehcho - Ecoprovinces
DRAWING NUMBER: D 111
REVISION: B


58 Franklin Mountains
59 Keller Lake Plain
56 Mackenzie River Plain
Pehdzeh Ki First Nation
Wrigley
55 Norman Range
60 Great Slave Lake Plain
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
171 Selwynn Mountains
51 Peel River Plateau
63 Horn Plataeu
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
62 Sibbeston Lake Plain
61 Nahanni Plateau
60 Great Slave Lake Plain
64 Hay River Lowlands
182 Hyland Highlands
65 Northern Alberta Uplands
West Point First Nation
(Ts'ueh Nda community)
Hay River
Nahɔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
0
100
200 km
N
ECOREGIONS
51 Peel River Plateau
55 Norman Range
56 Mackenzie River Plain
58 Franklin Mountains
59 Keller Lake Plain
60 Great Slave Lake Plain
61 Nahanni Plateau
62 Sibbeston Lake Plain
63 Horn Plateau
64 Hay River Lowlands
65 Northern Alberta Uplands
171 Selwyn Mountains
182 Hyland Highlands
REFERENCES
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https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
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https://sis.agr.gc.ca/cansis/nsdb/ecostrat/gis_data.html
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SCALE: AS SHOWN
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PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE: Dehcho - Ecoregions
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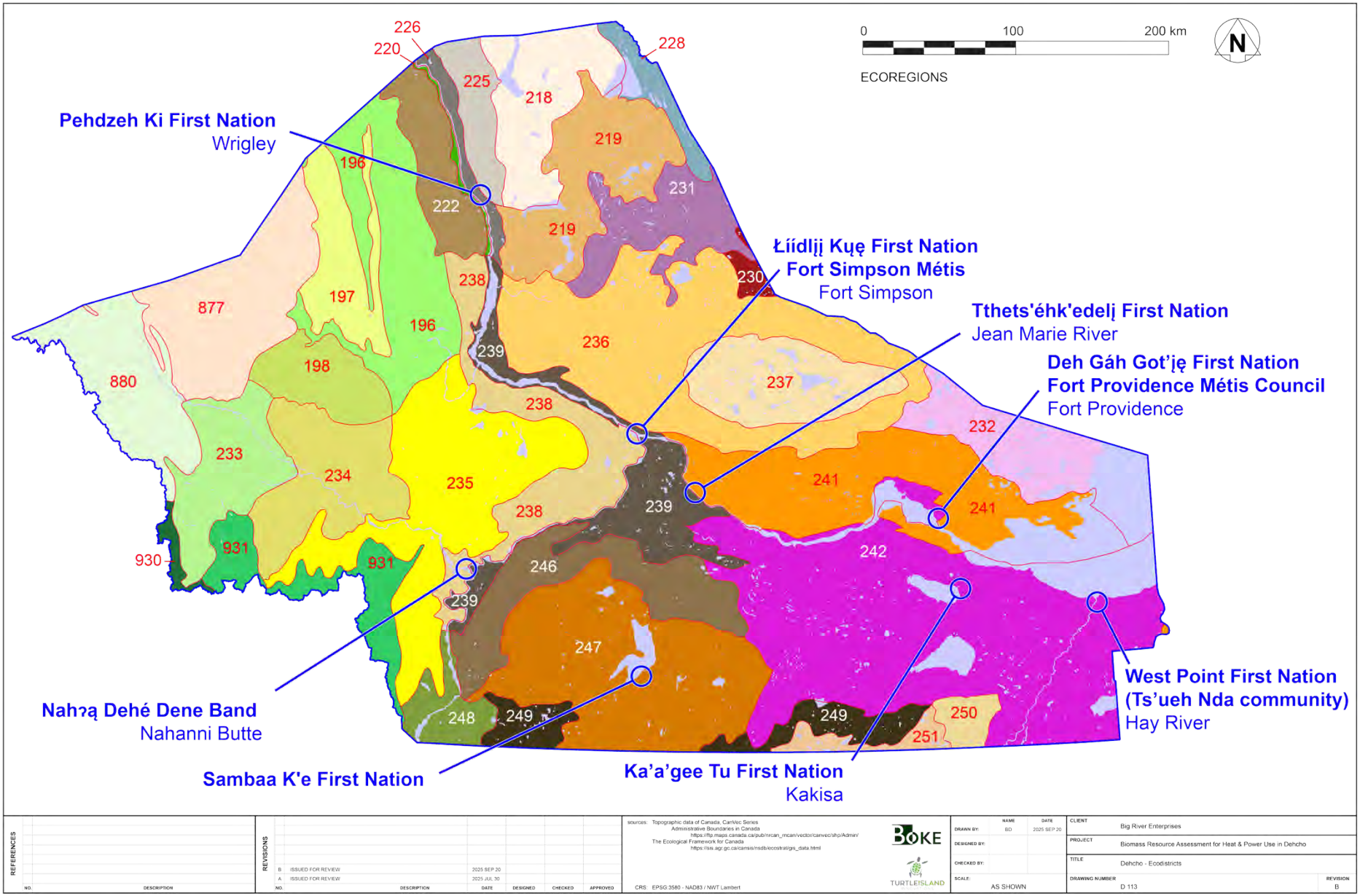
REVISION: B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100
200 km
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ECOREGIONS
Pehdzeh Ki First Nation
Wrigley
Łíídlíį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'ję First Nation
Fort Providence Métis Council
Fort Providence
Nahɔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
226
220
228
225
218
219
196
231
222
219
230
238
877
197
196
239
236
198
880
238
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931
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https://sis.agr.gc.ca/cansis/nsdb/ecostrat/gis_data.html
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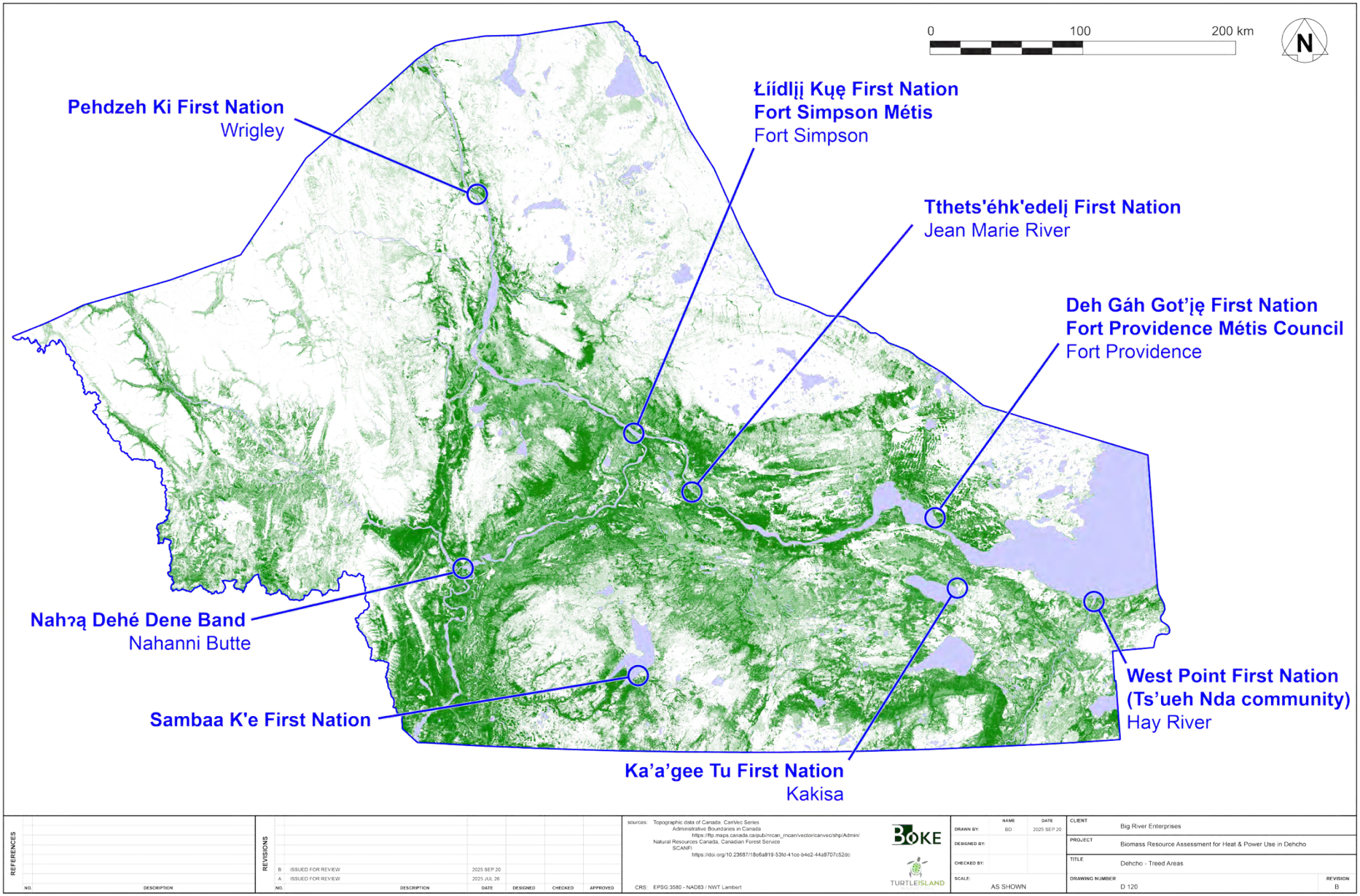
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - Ecodistricts
DRAWING NUMBER D 113
REVISION B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N
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
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DESCRIPTION
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A ISSUED FOR REVIEW 2025 JUL 26
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sources: Topographic data of Canada: CanVec Series
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Natural Resources Canada, Canadian Forest Service
SCANFI
https://doi.org/10.23687/18c6a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
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NAME DATE
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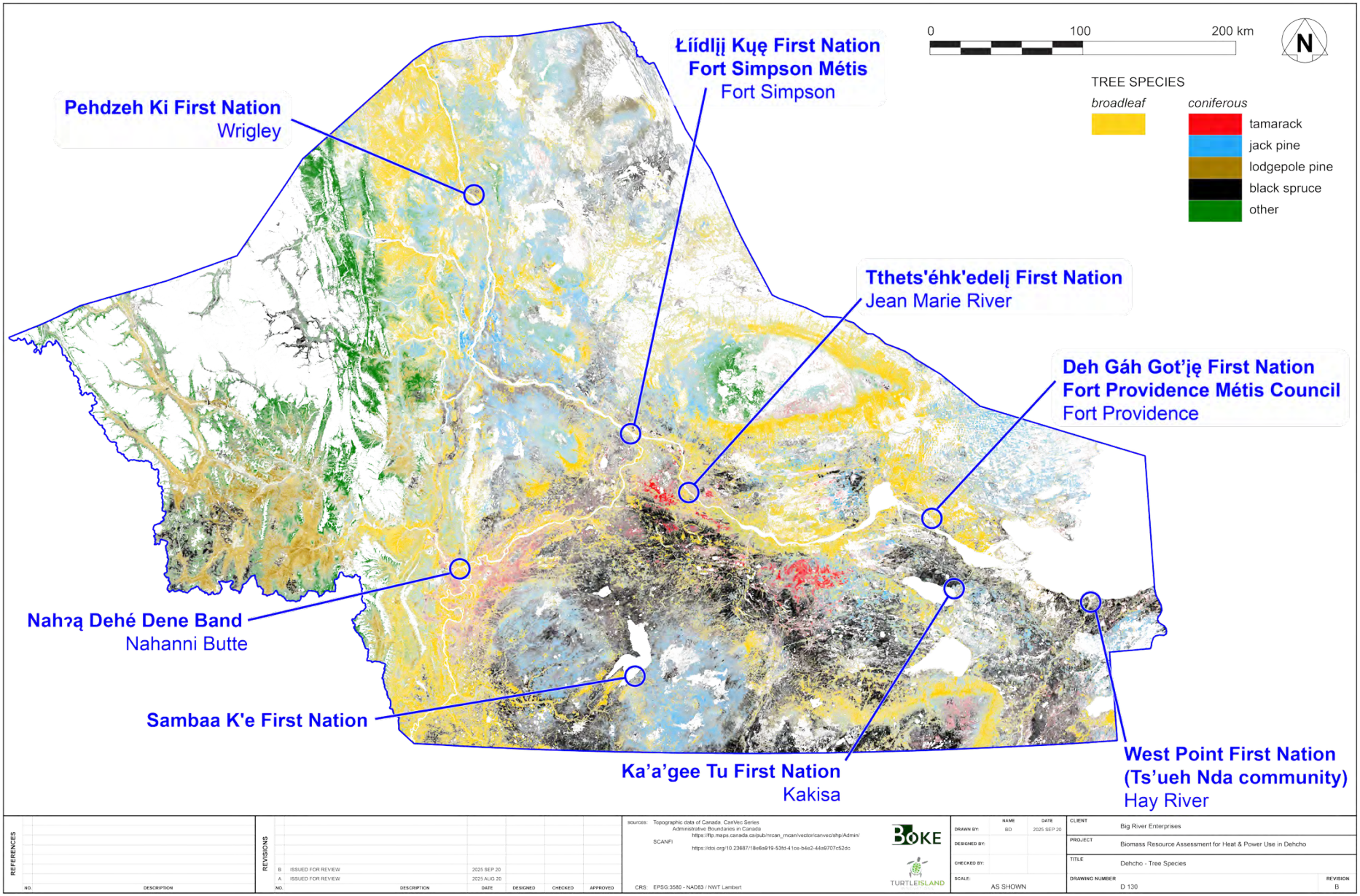
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - Treed Areas
DRAWING NUMBER D 120
REVISION B


0
100
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N
TREE SPECIES
broadleaf
coniferous
tamarack
jack pine
lodgepole pine
black spruce
other
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'ję First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
REFERENCES
NO. DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 20
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
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NAME DATE
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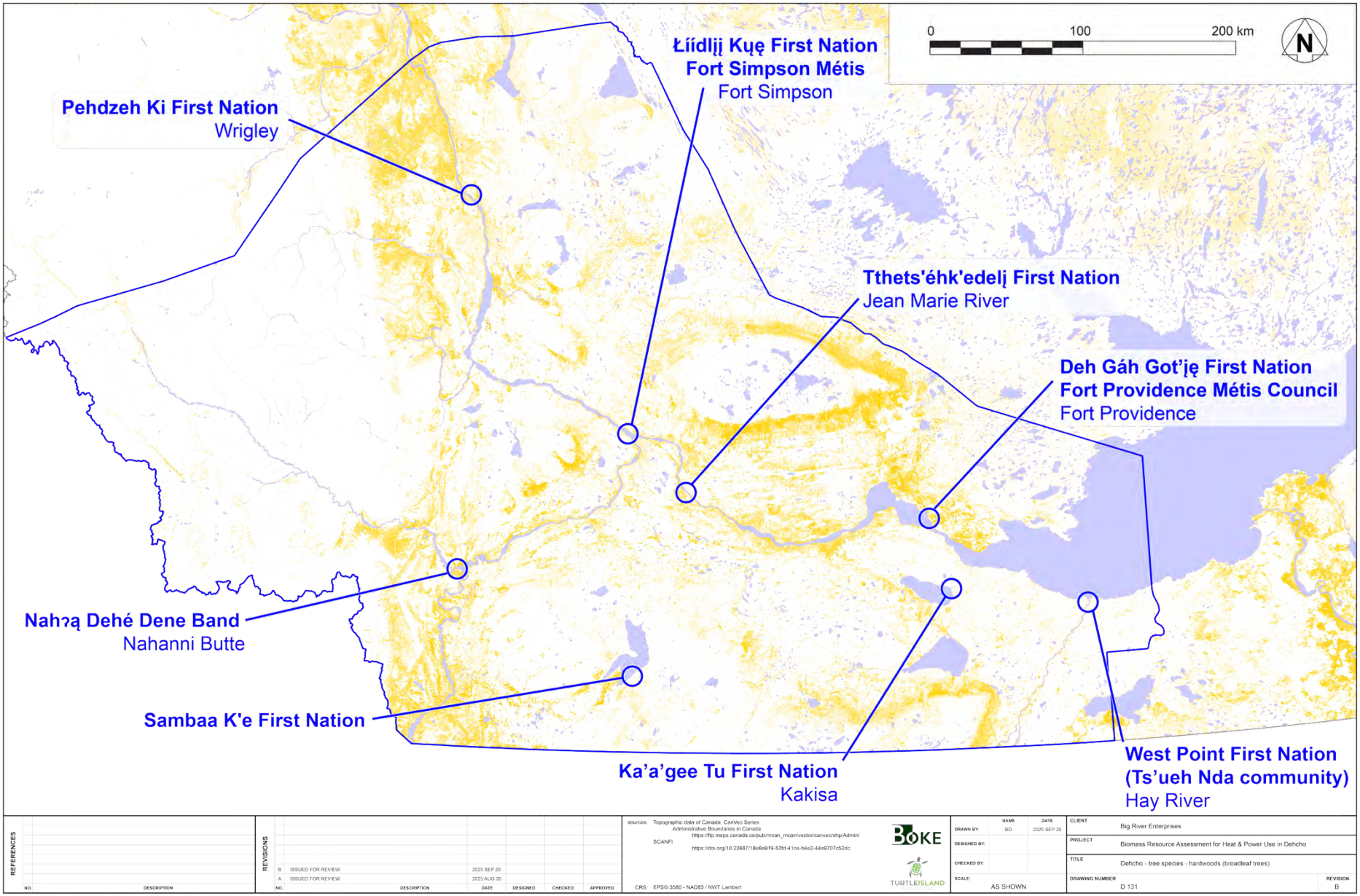
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - Tree Species
DRAWING NUMBER D 130
REVISION B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200 km
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Fort Simpson Métis
Fort Simpson
Pehdzeh Ki First Nation
Wrigley
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'ję First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
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SCALE: AS SHOWN
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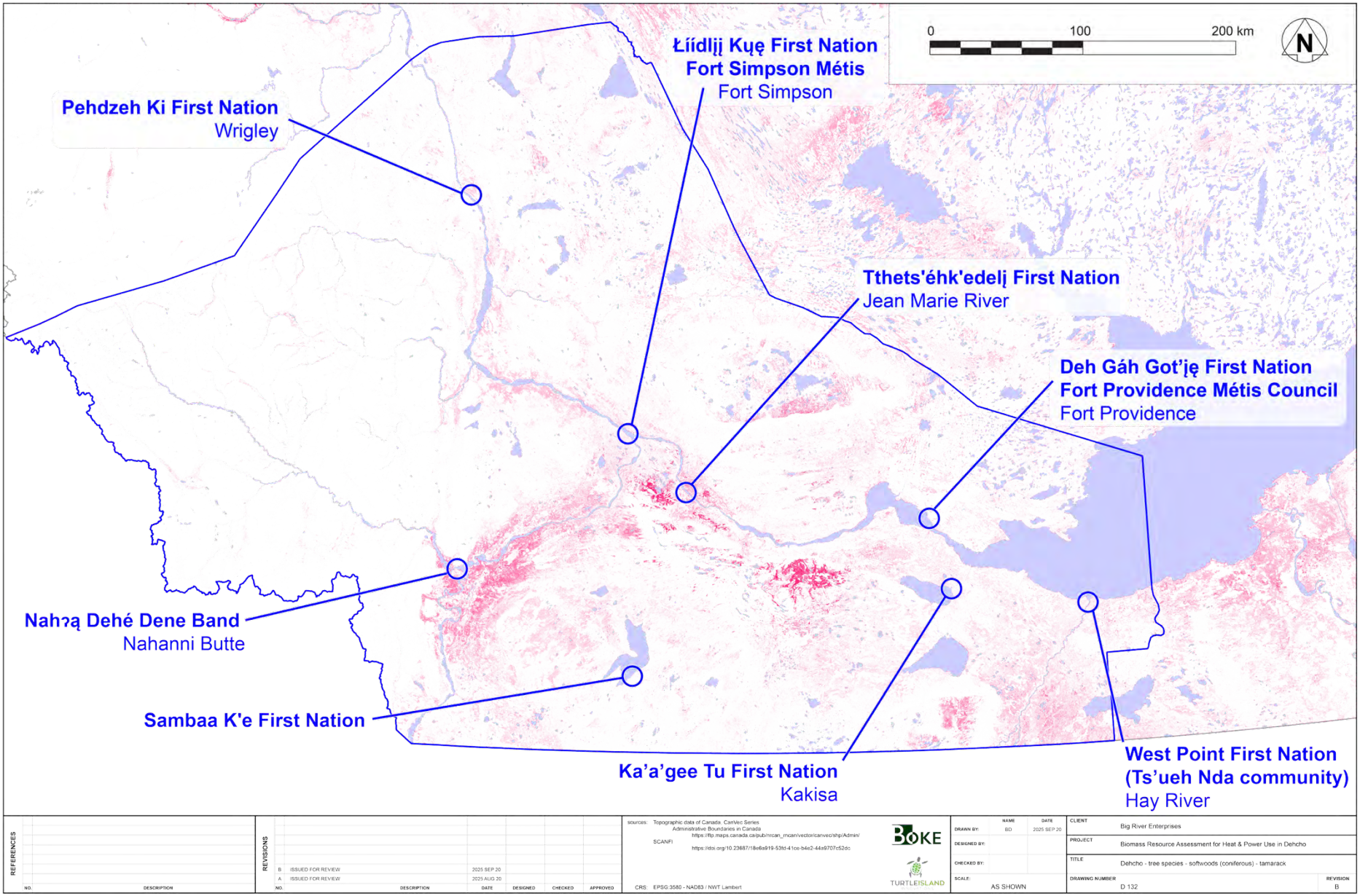
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - tree species - hardwoods (broadleaf trees)
DRAWING NUMBER D 131
REVISION B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Fort Simpson Métis
Fort Simpson
Pehdzeh Ki First Nation
Wrigley
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Jean Marie River
Deh Gáh Got'ję̨ First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
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NAME DATE
DRAWN BY: BD 2025 SEP 20
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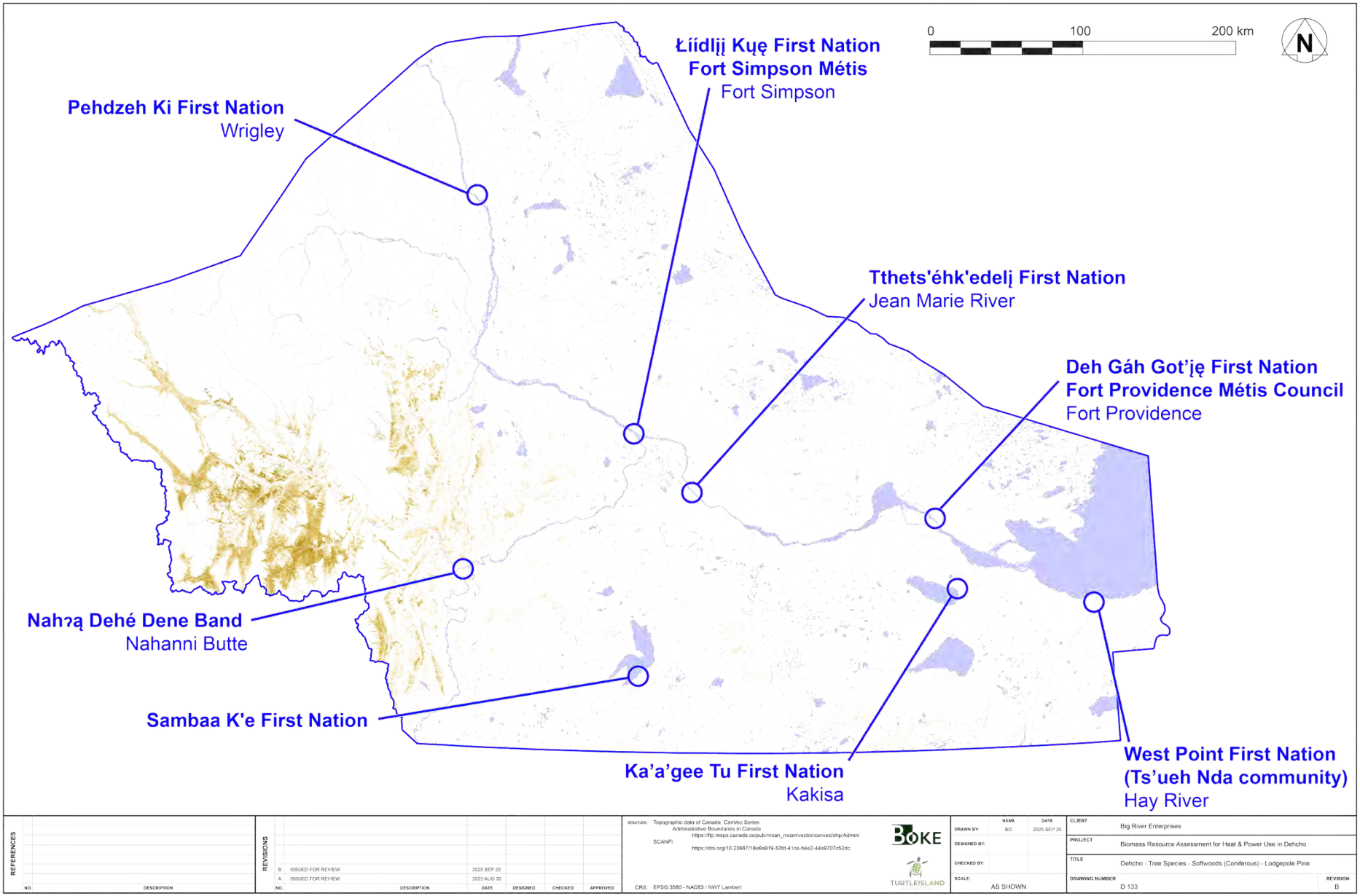
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - tree species - softwoods (coniferous) - tamarack
DRAWING NUMBER D 132
REVISION B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Fort Simpson Métis
Fort Simpson
Pehdzeh Ki First Nation
Wrigley
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
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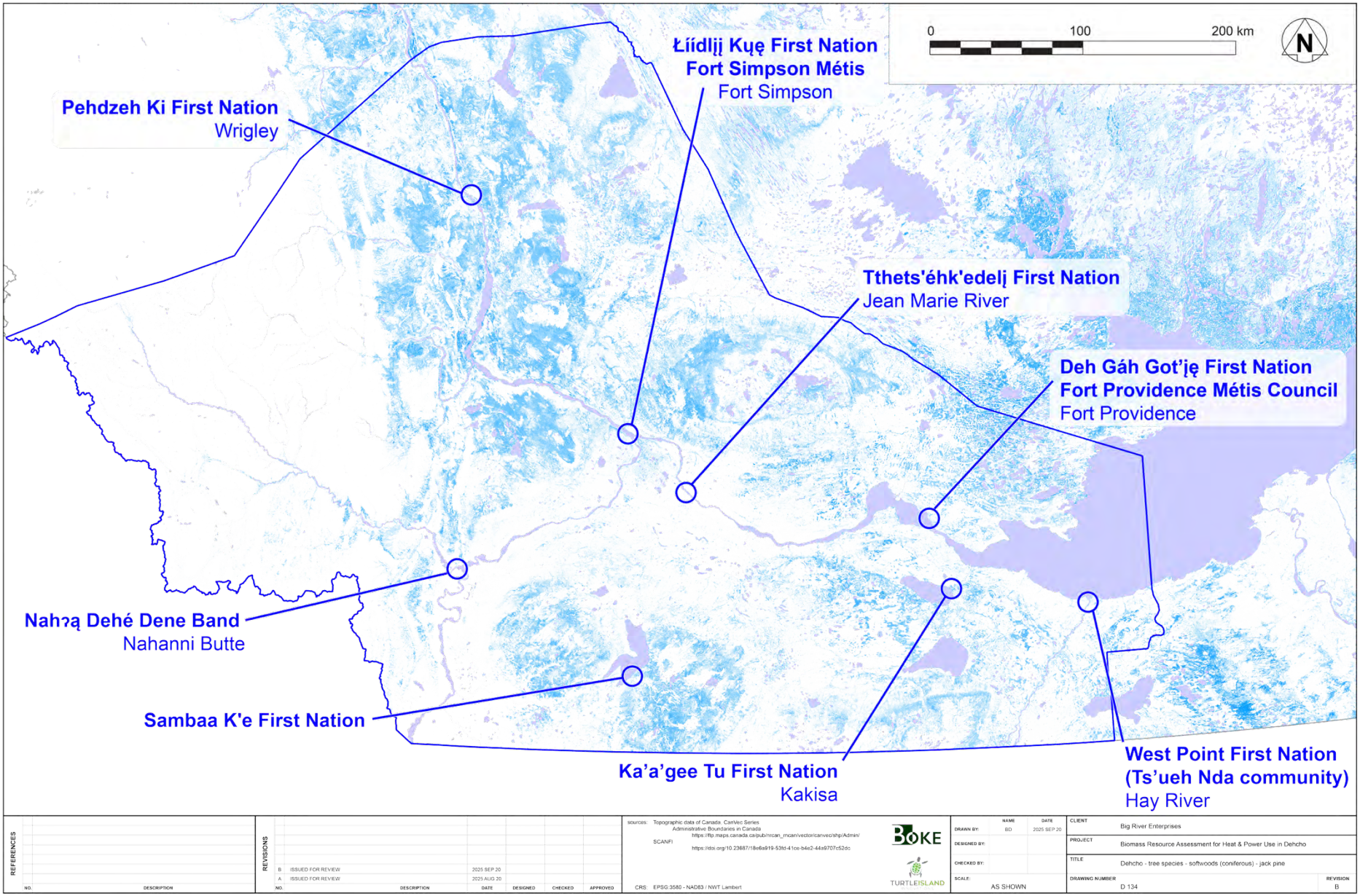
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - Tree Species - Softwoods (Coniferous) - Lodgepole Pine
DRAWING NUMBER D 133
REVISION B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Fort Simpson Métis
Fort Simpson
Pehdzeh Ki First Nation
Wrigley
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Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
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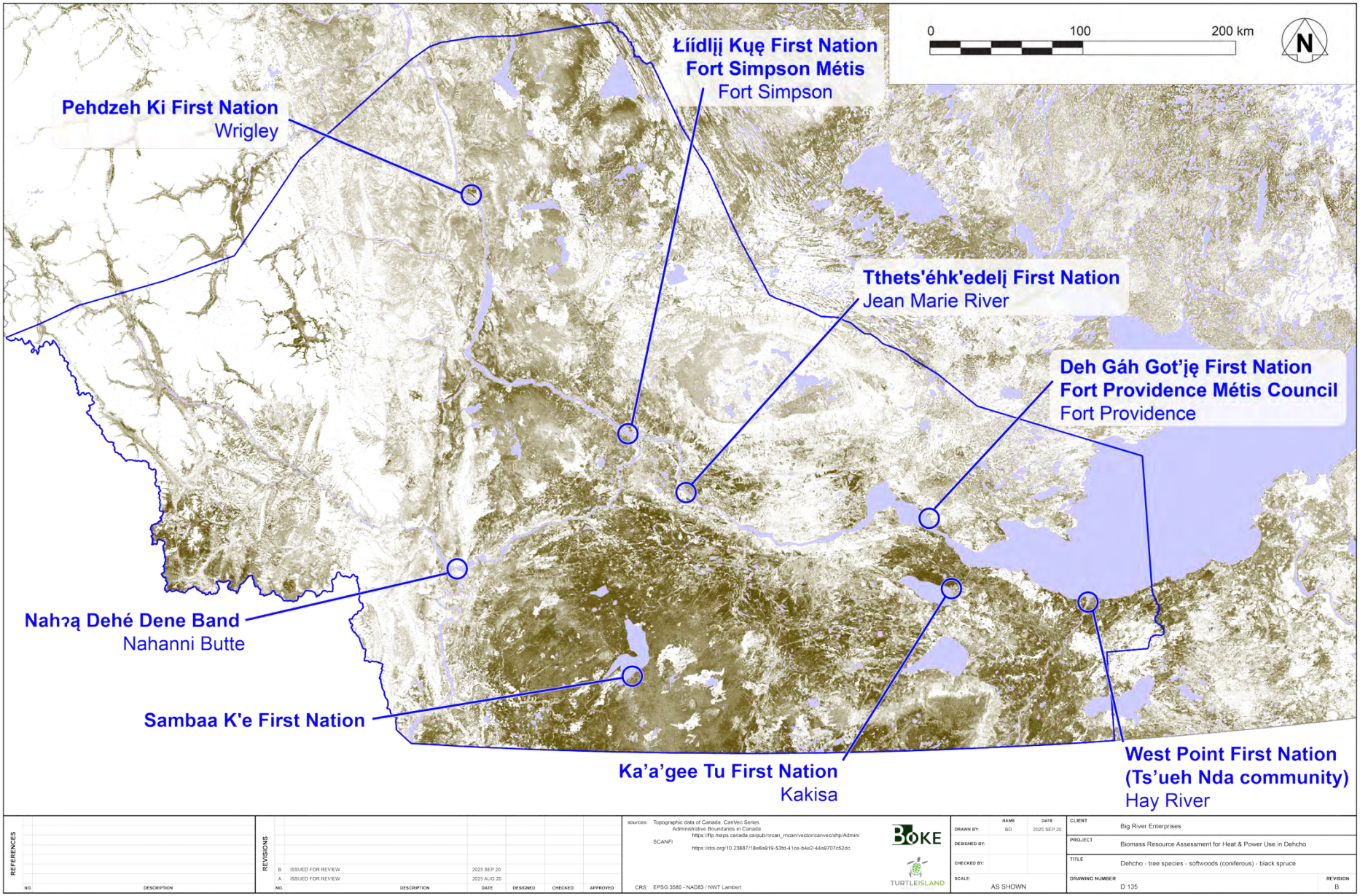
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - tree species - softwoods (coniferous) - jack pine
DRAWING NUMBER D 134
REVISION B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Fort Simpson
Pehdzeh Ki First Nation
Wrigley
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
Ka'a'gee Tu First Nation
Kakisa
West Point First Nation
(Ts'ueh Nda community)
Hay River
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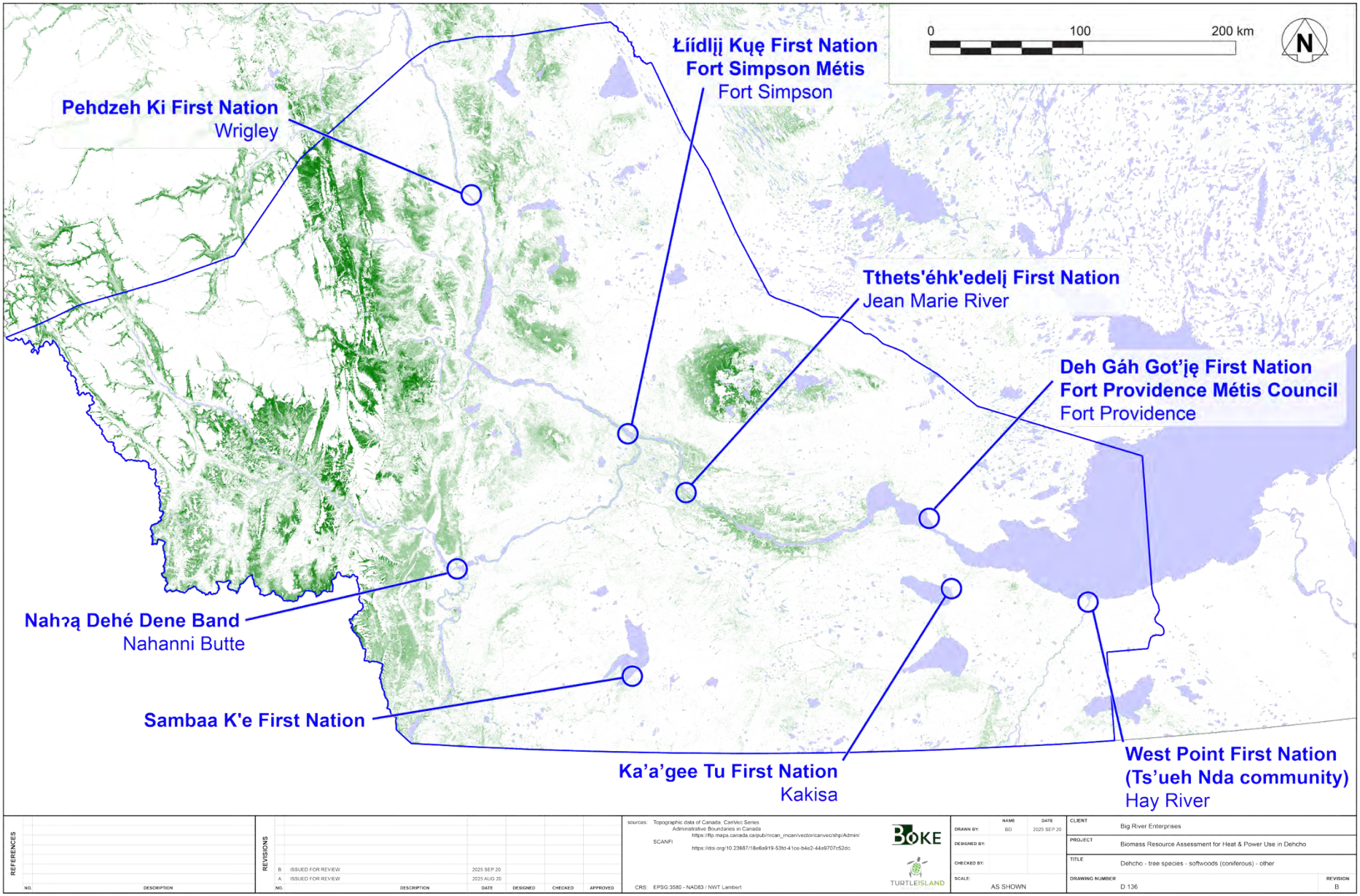
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - tree species - softwoods (coniferous) - black spruce
DRAWING NUMBER D 135
REVISION B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Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
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Nahanni Butte
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Kakisa
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A ISSUED FOR REVIEW 2025 AUG 20
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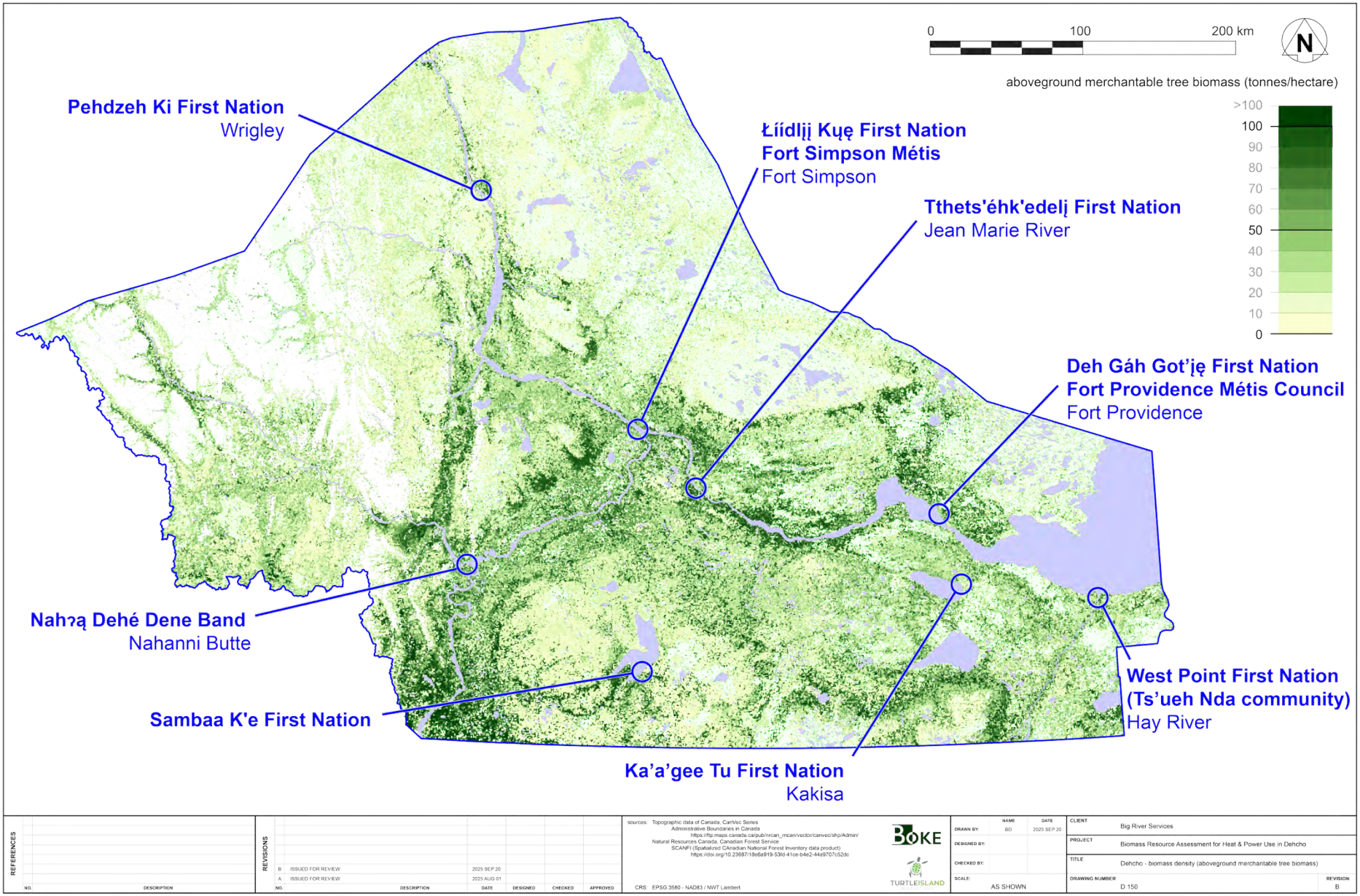
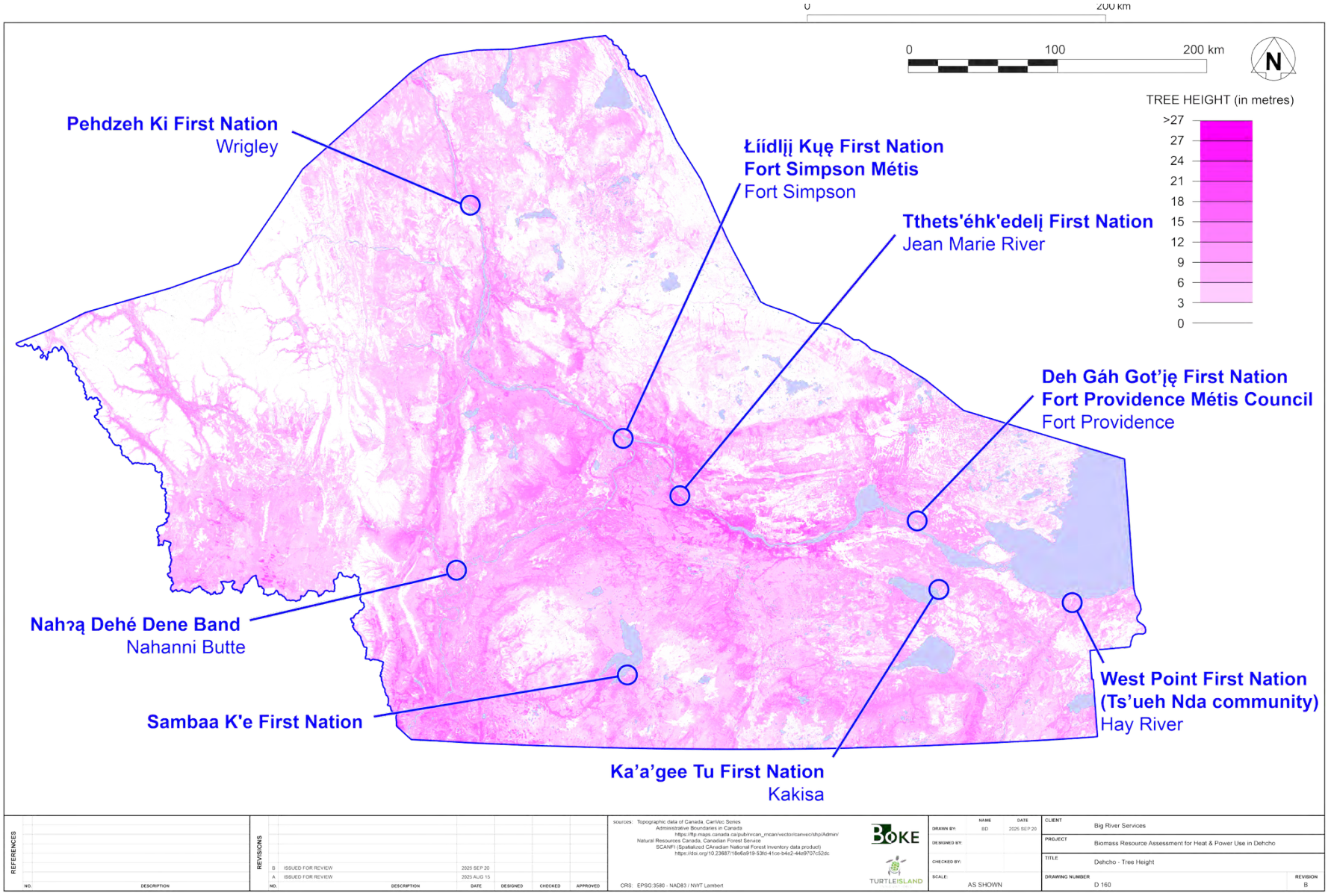
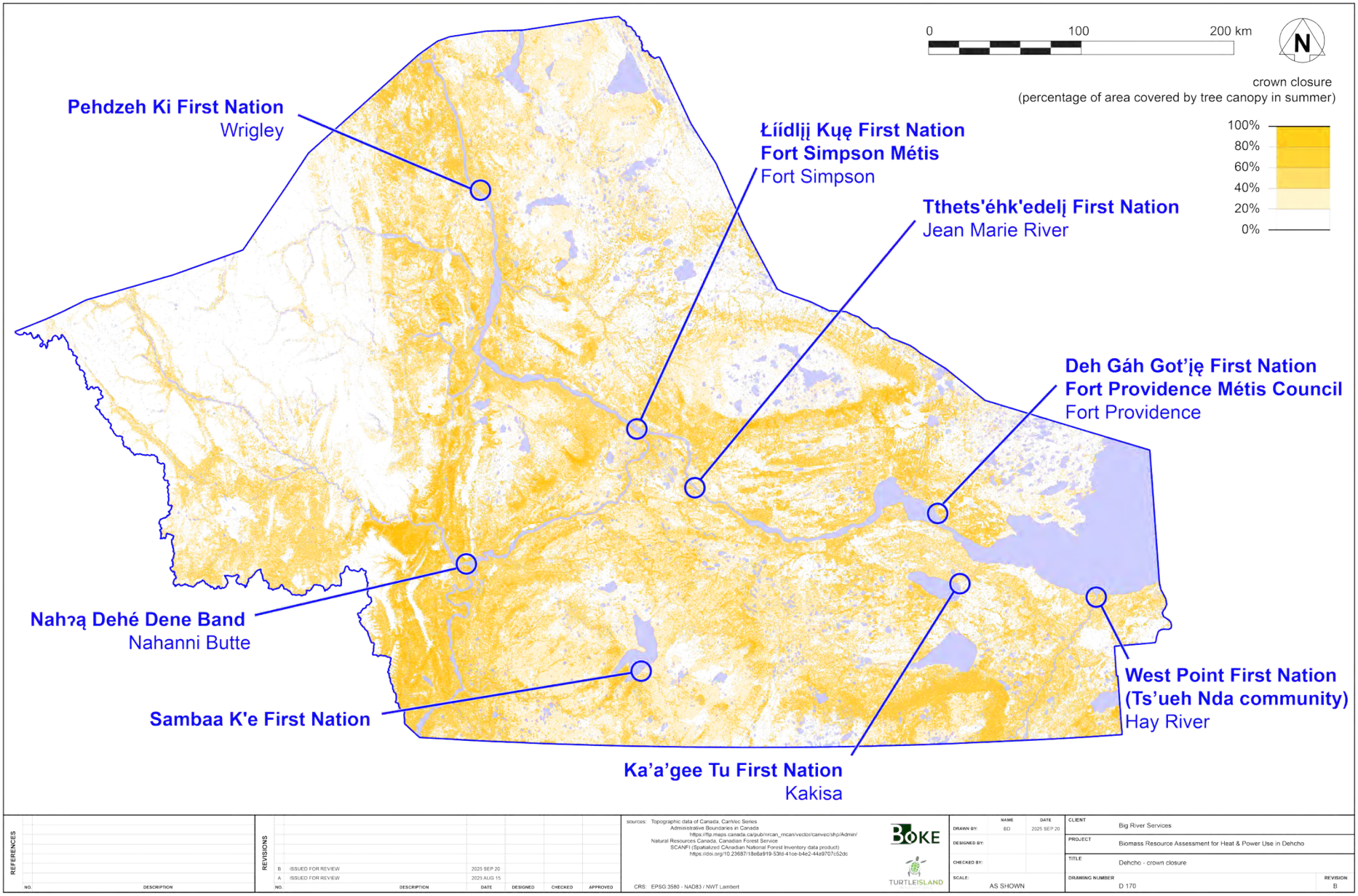
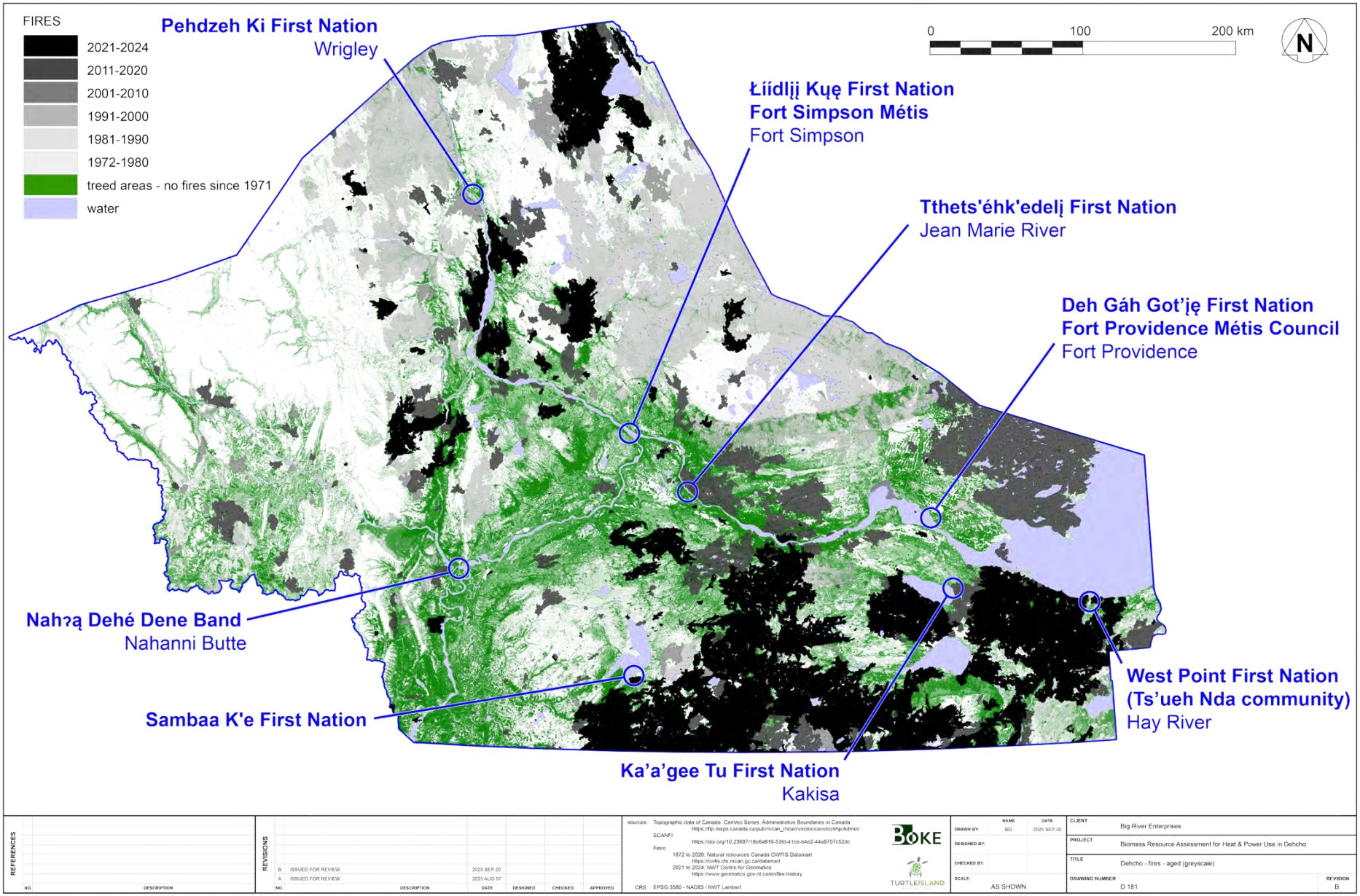
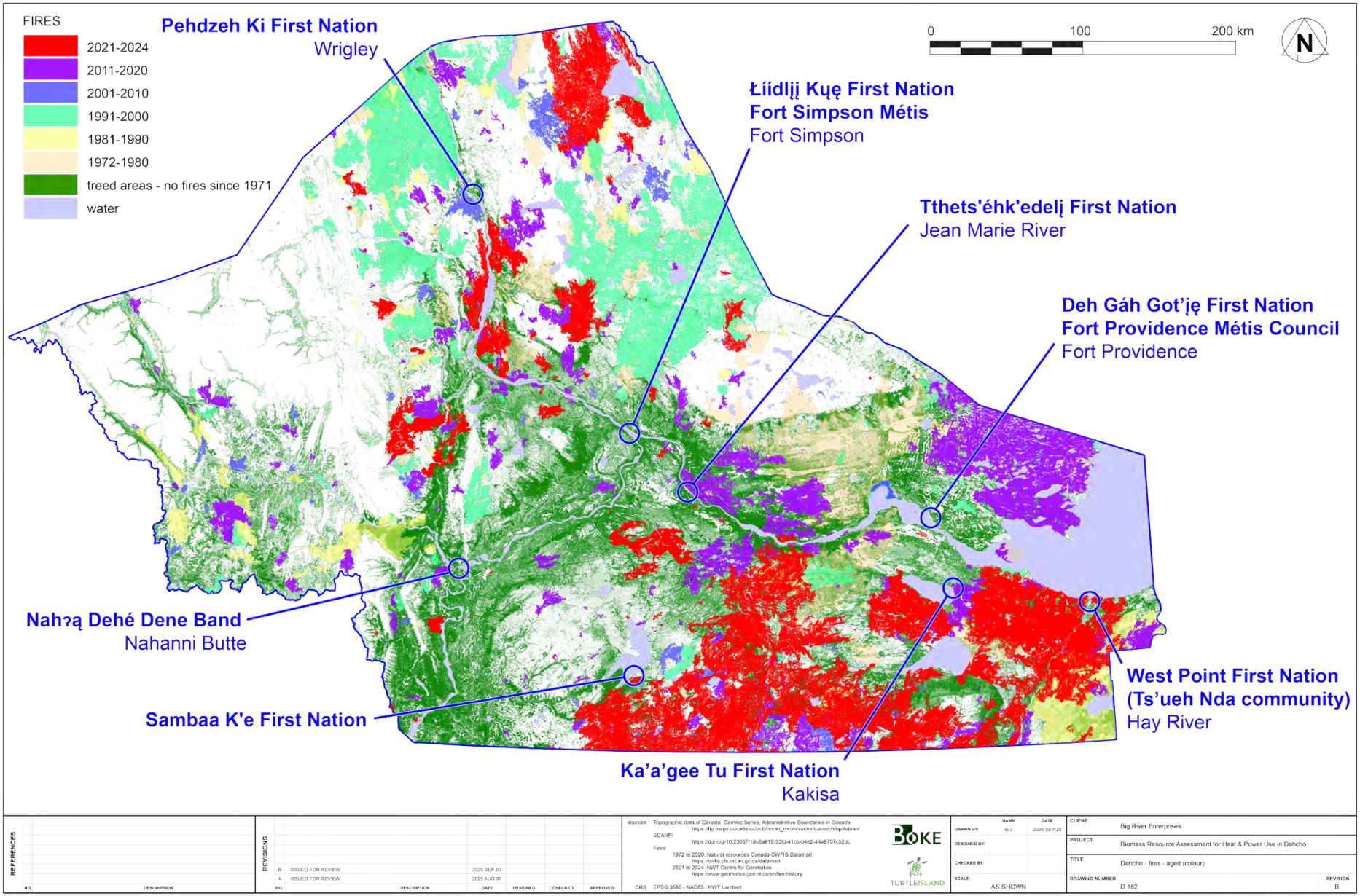
sources: Topographic data of Canada: CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
SCANFI
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - tree species - softwoods (coniferous) - other
DRAWING NUMBER D 136
REVISION B

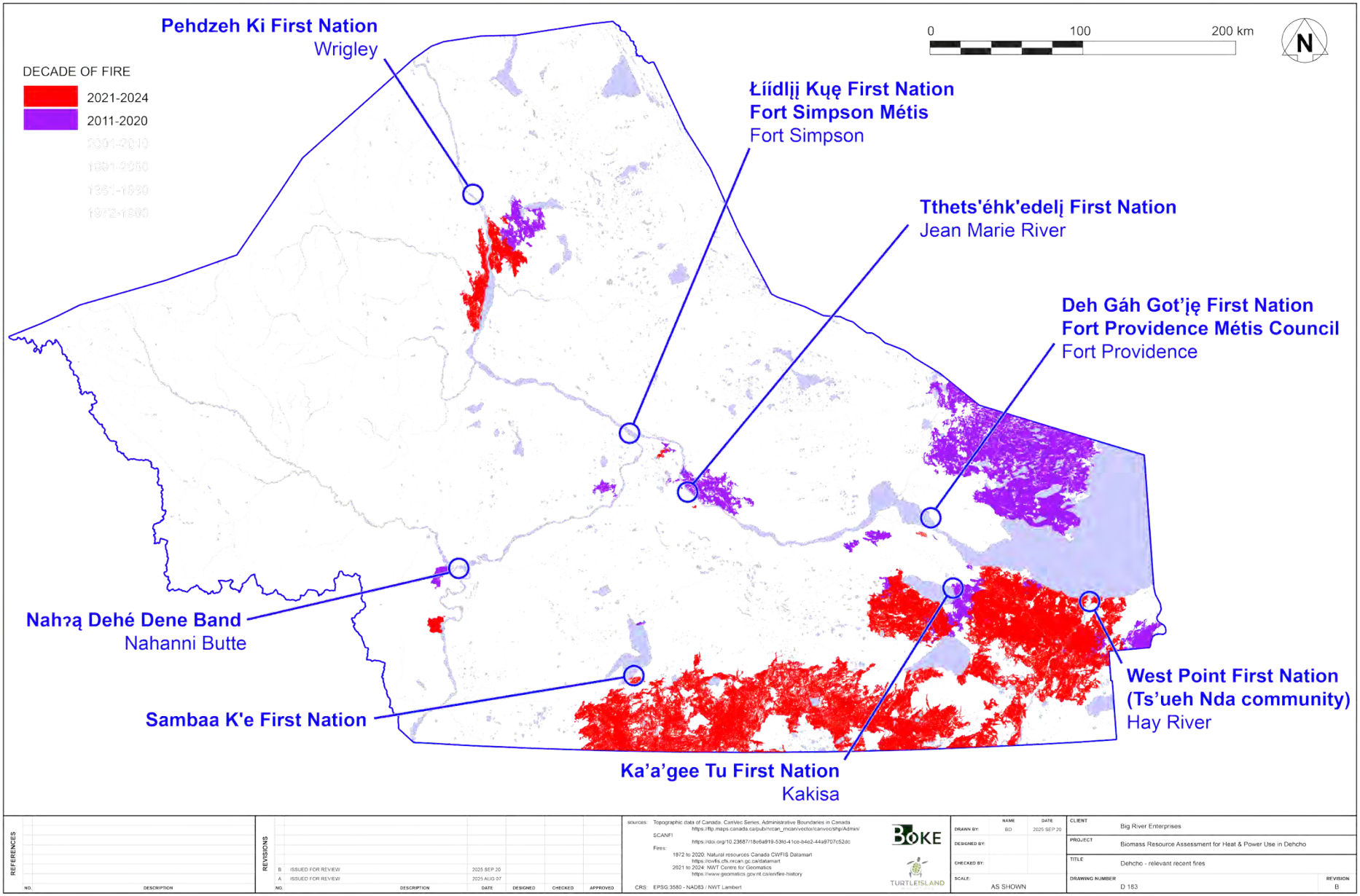

0
100
200 km
N
aboveground merchantable tree biomass (tonnes/hectare)
>100
100
90
80
70
60
50
40
30
20
10
0
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'ıę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
REFERENCES
NO. DESCRIPTION
REVISIONS
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 01
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NADB3 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Services
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - biomass density (aboveground merchantable tree biomass)
DRAWING NUMBER D 150
REVISION B

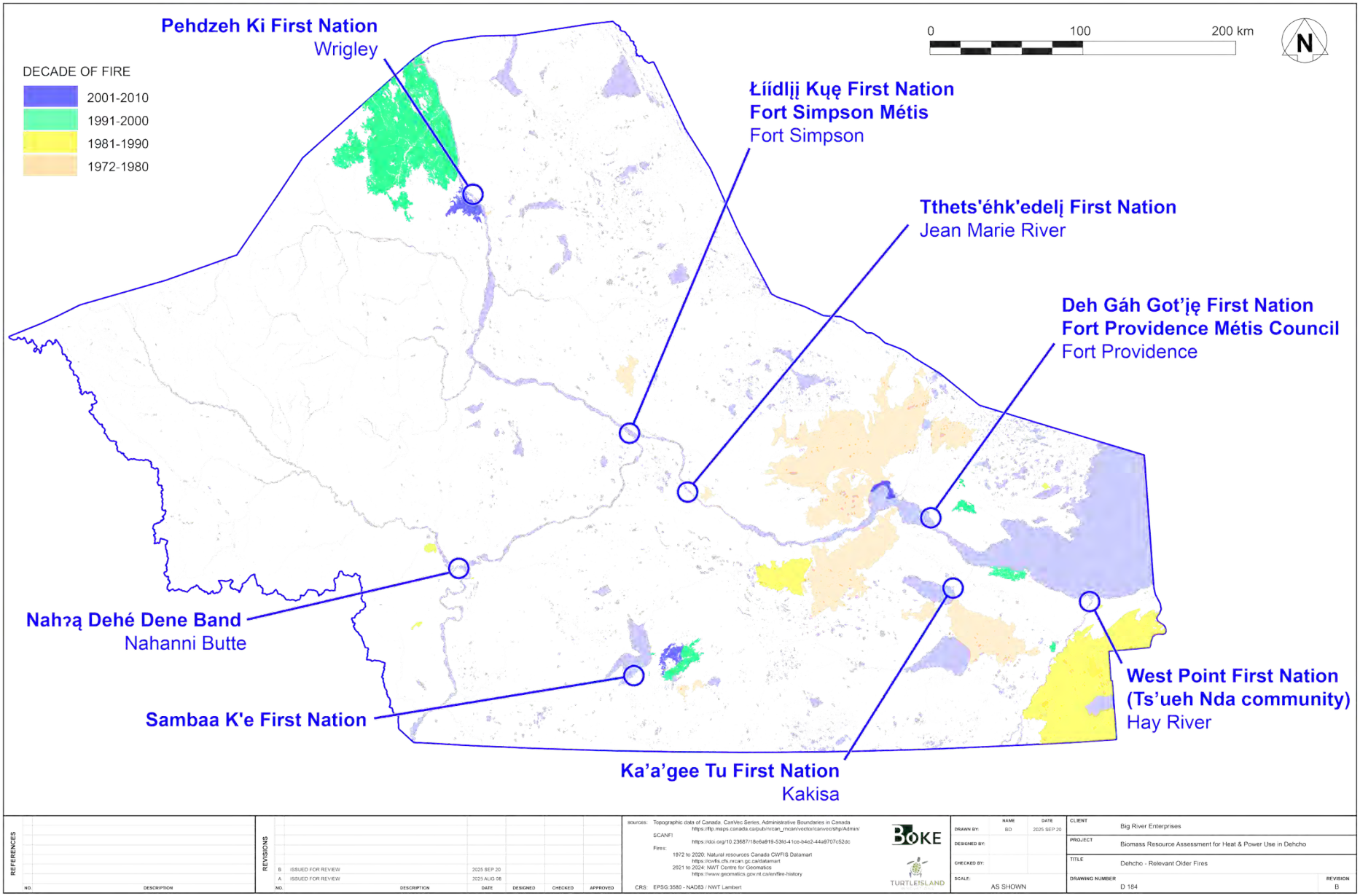

0
200 km
0
100
200 km
N
TREE HEIGHT (in metres)
>27
27
24
21
18
15
12
9
6
3
0
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
REFERENCES
NO.
DESCRIPTION
REVISIONS
NO.
DESCRIPTION
DATE
DESIGNED
CHECKED
APPROVED
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 15
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/16e6a919-53fd-41ce-b4d2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME
DATE
DRAWN BY:
BD
2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE:
AS SHOWN
CLIENT
Big River Services
PROJECT
Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE
Dehcho - Tree Height
DRAWING NUMBER
D 160
REVISION
B

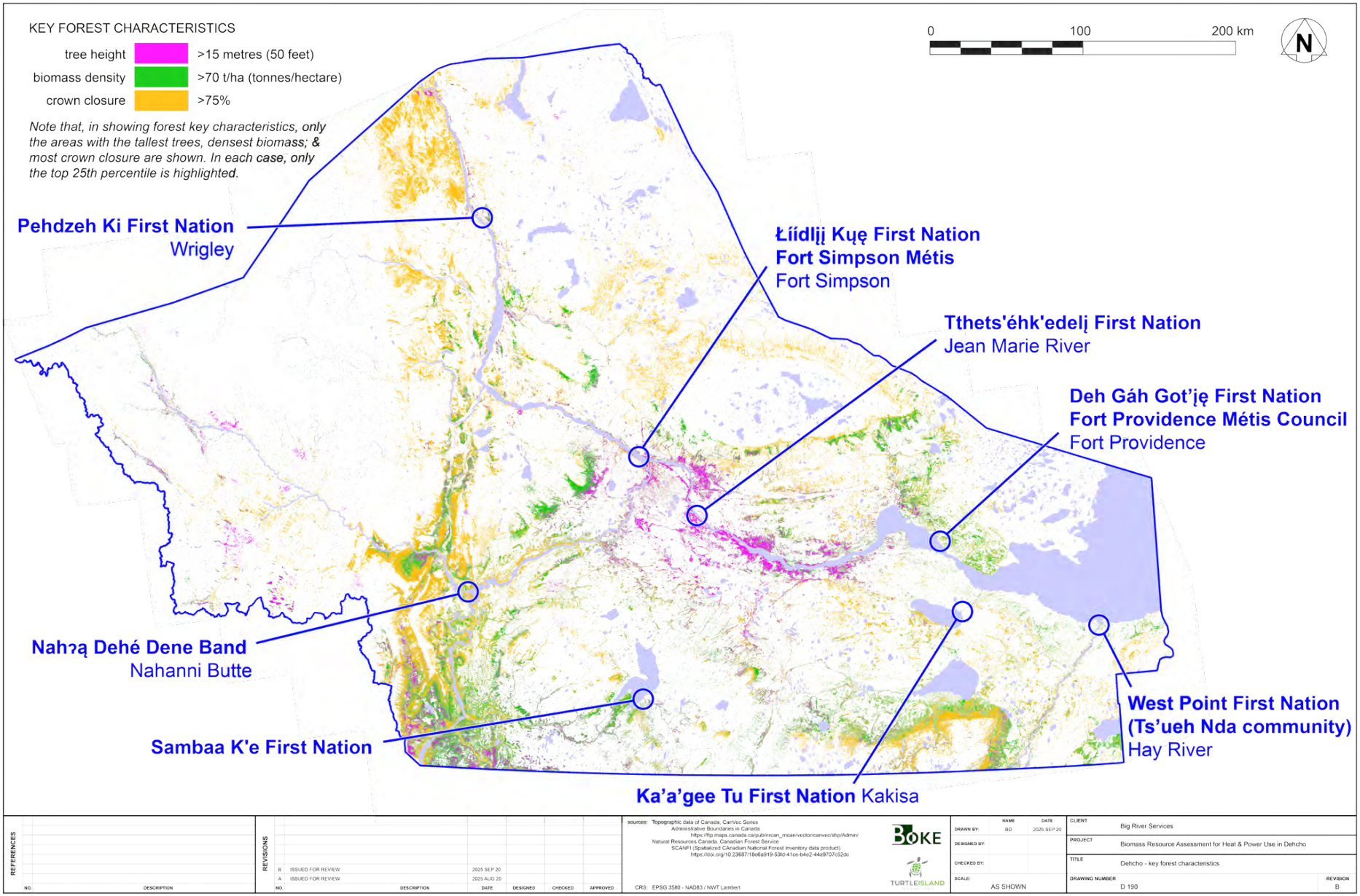

0
100
200 km
N
crown closure
(percentage of area covered by tree canopy in summer)
100%
80%
60%
40%
20%
0%
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
REFERENCES
NO. DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 15
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Services
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - crown closure
DRAWING NUMBER D 170
REVISION B

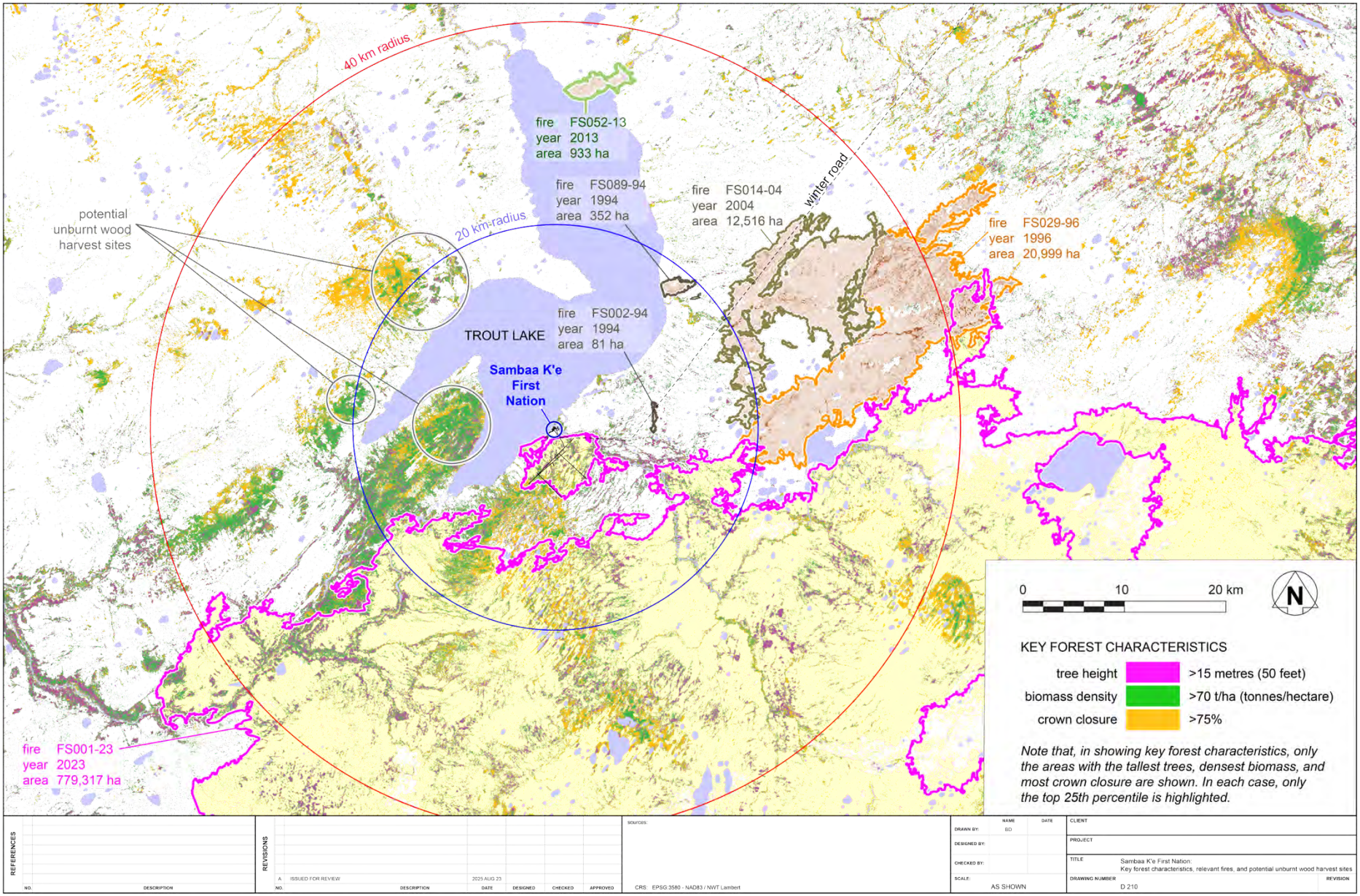

FIRES
2021-2024
2011-2020
2001-2010
1991-2000
1981-1990
1972-1980
treed areas - no fires since 1971
water
0
100
200 km
N
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
REFERENCES
NO. DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 07
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
sources: Topographic data of Canada, CanVec Series, Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
SCANFI
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
Fires:
1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - fires - aged (greyscale)
DRAWING NUMBER D 181
REVISION B

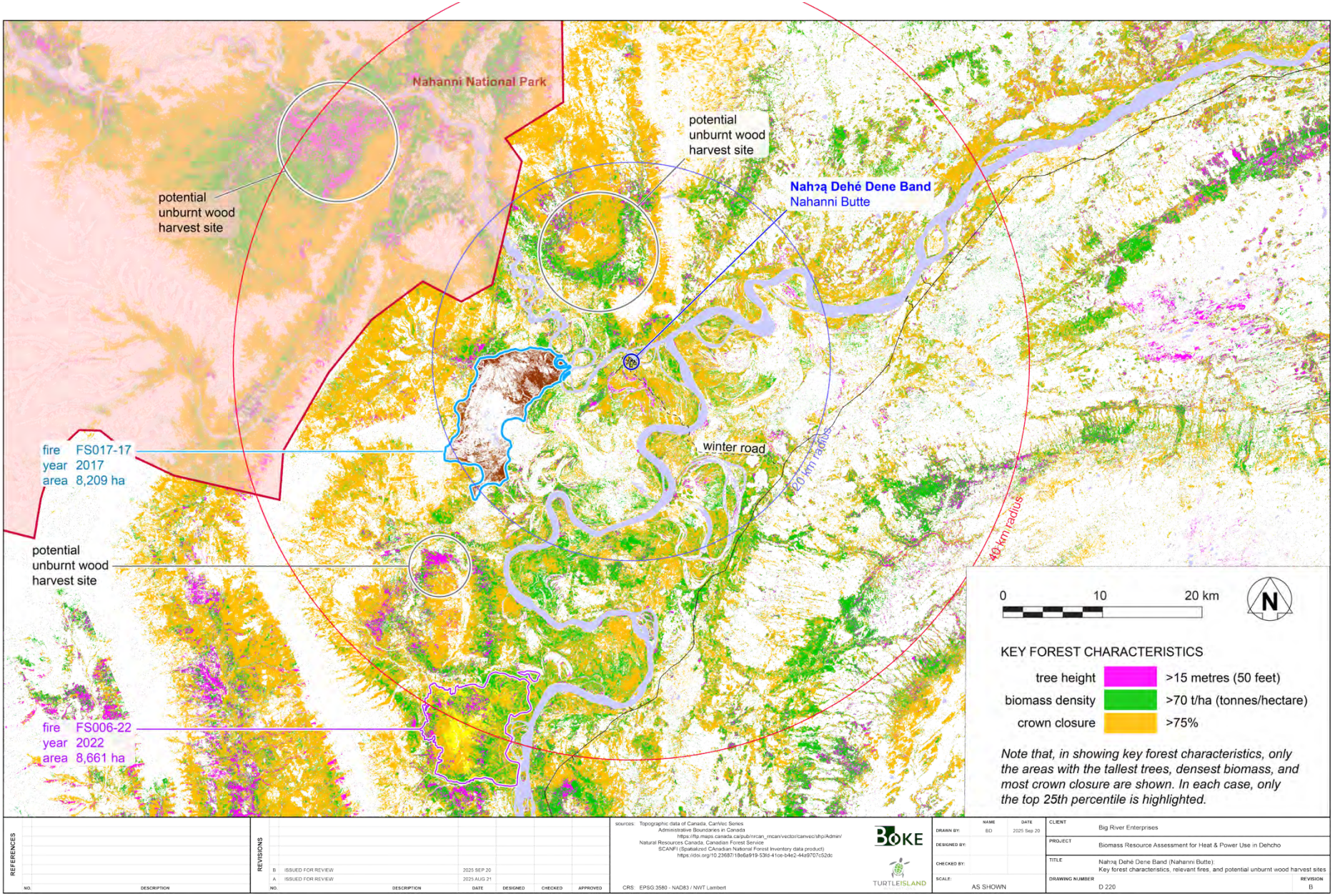

FIRES
2021-2024
2011-2020
2001-2010
1991-2000
1981-1990
1972-1980
treed areas - no fires since 1971
water
0
100
200 km
N
Pehdzeh Ki First Nation
Wrigley
Łíídlíį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
REFERENCES
NO.
DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 07
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
sources: Topographic data of Canada: CanVec Series. Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
SCANFI
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
Fires:
1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - fires - aged (colour)
DRAWING NUMBER D 182
REVISION B

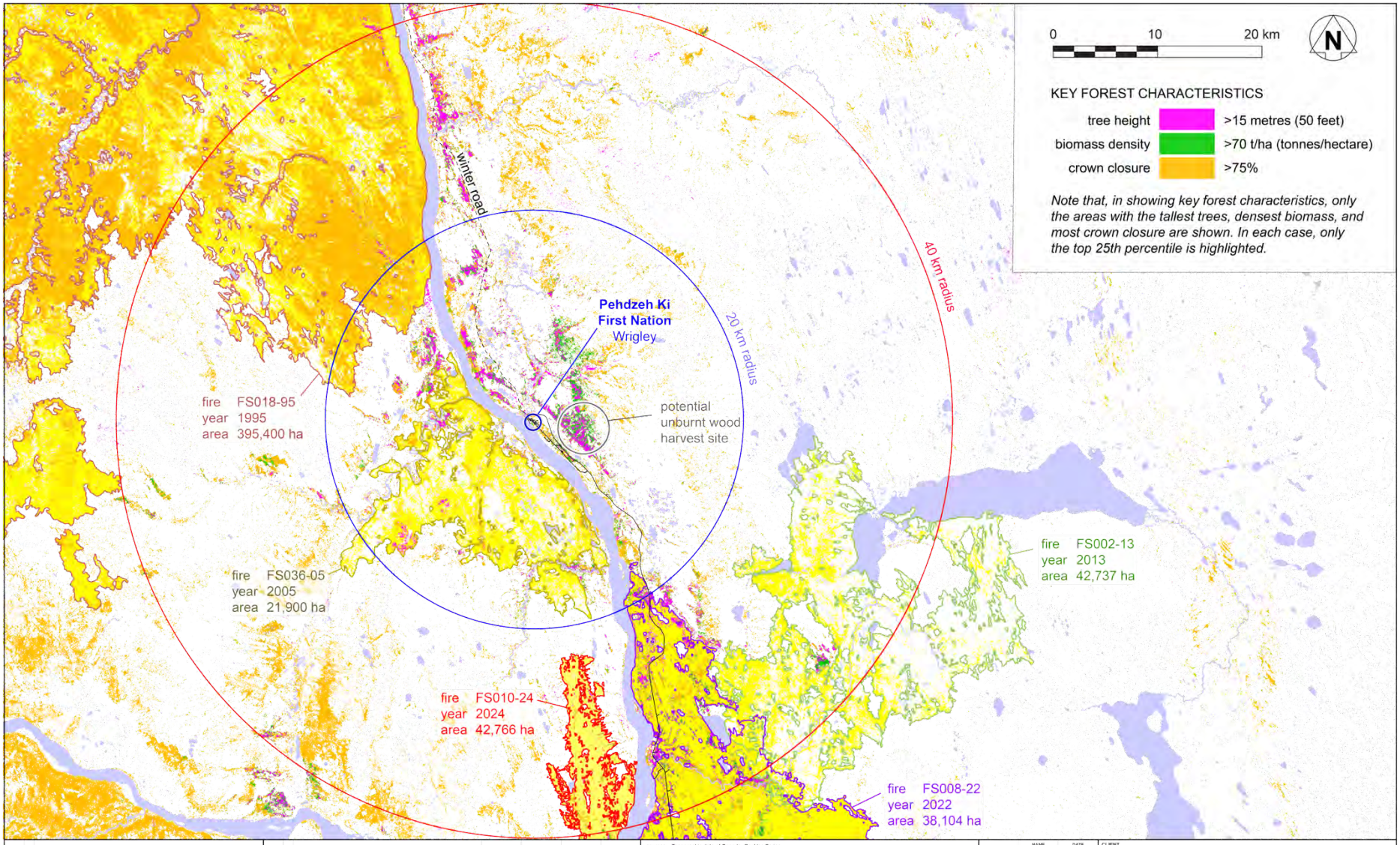

Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kųę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
DECADE OF FIRE
2021-2024
2011-2020
0
100
200 km
N
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 07
sources: Topographic data of Canada: CanVec Series. Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
SCANFI
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
Fires:
1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - relevant recent fires
DRAWING NUMBER D 183
REVISION B

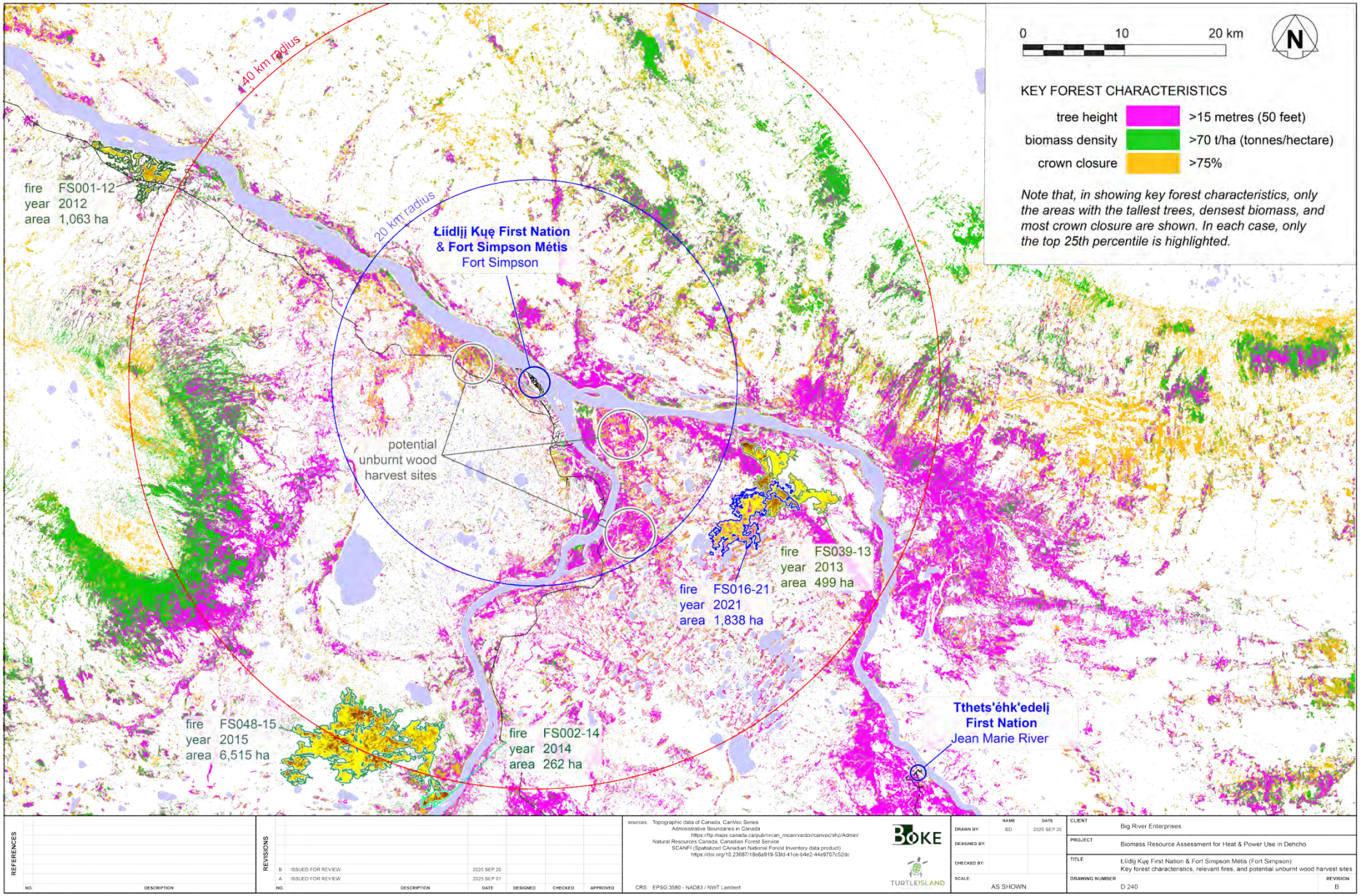

Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kųę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation
Kakisa
DECADE OF FIRE
2001-2010
1991-2000
1981-1990
1972-1980
0
100
200 km
N
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 08
sources: Topographic data of Canada, CanVec Series, Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
SCANFI
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
Fires:
1972 to 2020: Natural resources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Dehcho - Relevant Older Fires
DRAWING NUMBER D 184
REVISION B

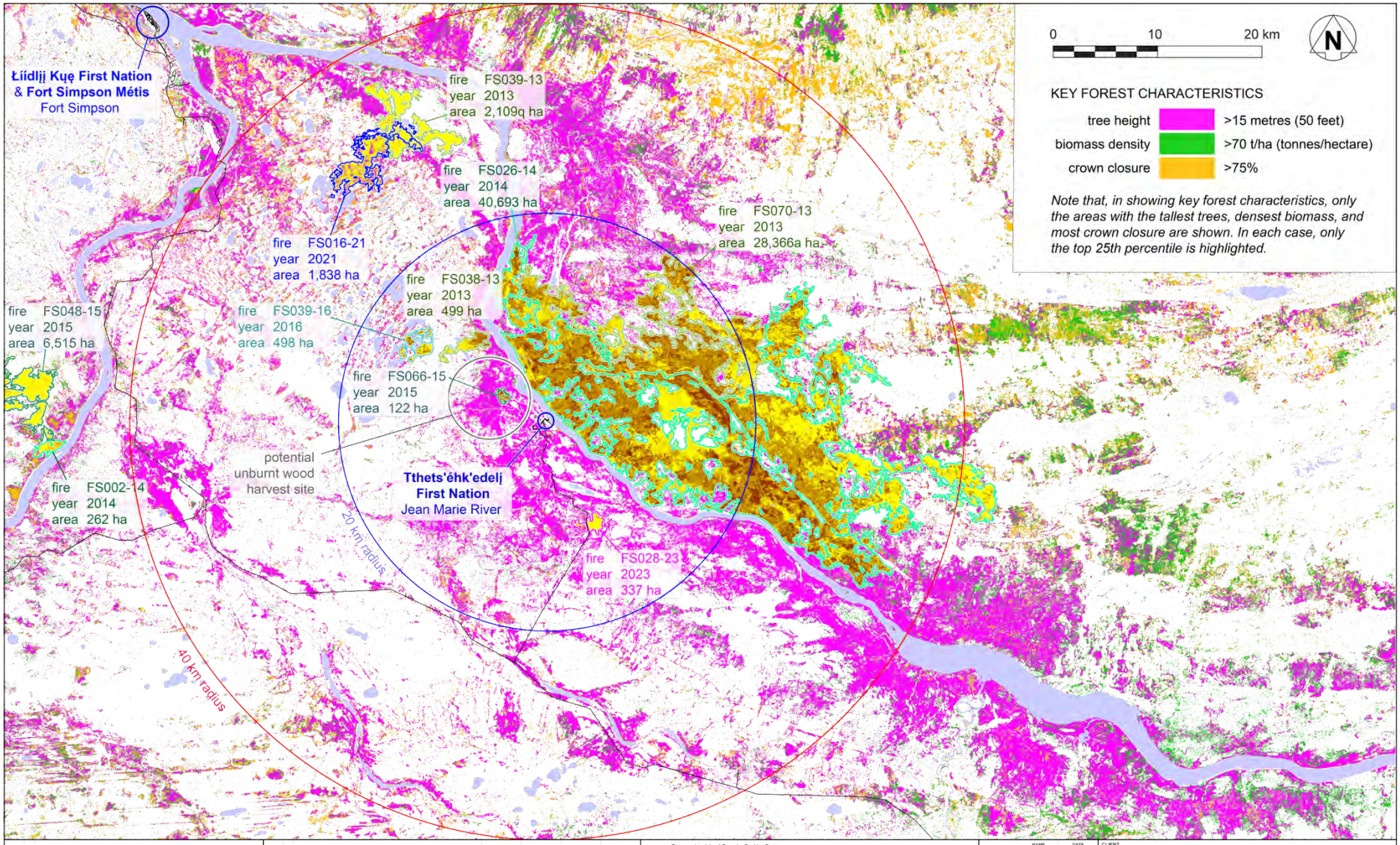

KEY FOREST CHARACTERISTICS
tree height >15 metres (50 feet)
biomass density >70 t/ha (tonnes/hectare)
crown closure >75%
Note that, in showing forest key characteristics, only the areas with the tallest trees, densest biomass; & most crown closure are shown. In each case, only the top 25th percentile is highlighted.
0
100
200 km
N
Pehdzeh Ki First Nation
Wrigley
Łíídlįį Kų́ę First Nation
Fort Simpson Métis
Fort Simpson
Tthets'éhk'edelį First Nation
Jean Marie River
Deh Gáh Got'įę First Nation
Fort Providence Métis Council
Fort Providence
Nahʔą Dehé Dene Band
Nahanni Butte
Sambaa K'e First Nation
West Point First Nation
(Ts'ueh Nda community)
Hay River
Ka'a'gee Tu First Nation Kakisa
REFERENCES
NO. DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 20
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT: Big River Services
PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE: Dehcho - key forest characteristics
DRAWING NUMBER: D 190
REVISION: B


40 km radius
20 km radius
potential unburnt wood harvest sites
fire FS052-13
year 2013
area 933 ha
fire FS089-94
year 1994
area 352 ha
fire FS014-04
year 2004
area 12,516 ha
winter road
fire FS029-96
year 1996
area 20,999 ha
TROUT LAKE
fire FS002-94
year 1994
area 81 ha
Sambaa K'e First Nation
fire FS001-23
year 2023
area 779,317 ha
0
10
20 km
N
KEY FOREST CHARACTERISTICS
tree height
>15 metres (50 feet)
biomass density
>70 t/ha (tonnes/hectare)
crown closure
>75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
REFERENCES
NO.
DESCRIPTION
REVISIONS
A
ISSUED FOR REVIEW
2025 AUG 23
DESIGNED
CHECKED
APPROVED
SOURCES:
CRS: EPSG:3580 - NAD83 / NWT Lambert
NAME
DATE
DRAWN BY:
BD
DESIGNED BY:
CHECKED BY:
SCALE:
AS SHOWN
CLIENT
PROJECT
TITLE
Sambaa K'e First Nation:
Key forest characteristics, relevant fires, and potential unburnt wood harvest sites
DRAWING NUMBER
D 210
REVISION


Nahanni National Park
potential unburnt wood harvest site
potential unburnt wood harvest site
Nahʔą Dehé Dene Band
Nahanni Butte
winter road
20 km radius
40 km radius
fire FS017-17
year 2017
area 8,209 ha
potential unburnt wood harvest site
fire FS006-22
year 2022
area 8,661 ha
0 10 20 km
N
KEY FOREST CHARACTERISTICS
tree height >15 metres (50 feet)
biomass density >70 t/ha (tonnes/hectare)
crown closure >75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 21
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
DRAWN BY: BD 2025 Sep 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Nahʔą Dehé Dene Band (Nahanni Butte):
Key forest characteristics, relevant fires, and potential unburnt wood harvest sites
DRAWING NUMBER D 220
REVISION B


0
10
20 km
N
KEY FOREST CHARACTERISTICS
tree height
>15 metres (50 feet)
biomass density
>70 t/ha (tonnes/hectare)
crown closure
>75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
winter road
Pehdzeh Ki First Nation
Wrigley
20 km radius
40 km radius
potential unburnt wood harvest site
fire FS018-95
year 1995
area 395,400 ha
fire FS036-05
year 2005
area 21,900 ha
fire FS010-24
year 2024
area 42,766 ha
fire FS002-13
year 2013
area 42,737 ha
fire FS008-22
year 2022
area 38,104 ha
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 AUG 25
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
DRAWN BY: BD 2025 Sep 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Pehdzeh Ki First Nation (Wrigley):
Key forest characteristics, relevant fires, and potential unburnt wood harvest site
DRAWING NUMBER D 230
REVISION B


40 km radius
20 km radius
0
10
20 km
N
KEY FOREST CHARACTERISTICS
tree height
>15 metres (50 feet)
biomass density
>70 t/ha (tonnes/hectare)
crown closure
>75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
fire FS001-12
year 2012
area 1,063 ha
Łíídlíį Kų́ę First Nation
& Fort Simpson Métis
Fort Simpson
potential
unburnt wood
harvest sites
fire FS039-13
year 2013
area 499 ha
fire FS016-21
year 2021
area 1,838 ha
fire FS048-15
year 2015
area 6,515 ha
fire FS002-14
year 2014
area 262 ha
Tthets'éhk'edelį
First Nation
Jean Marie River
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 SEP 01
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Łíídlíį Kų́ę First Nation & Fort Simpson Métis (Fort Simpson):
Key forest characteristics, relevant fires, and potential unburnt wood harvest sites
DRAWING NUMBER D 240
REVISION B



REFERENCES

NO.	DESCRIPTION

REVISIONS

NO.	DESCRIPTION	DATE	DESIGNED	CHECKED	APPROVED
B	ISSUED FOR REVIEW	2025 SEP 20			
A	ISSUED FOR REVIEW	2025 SEP 01			

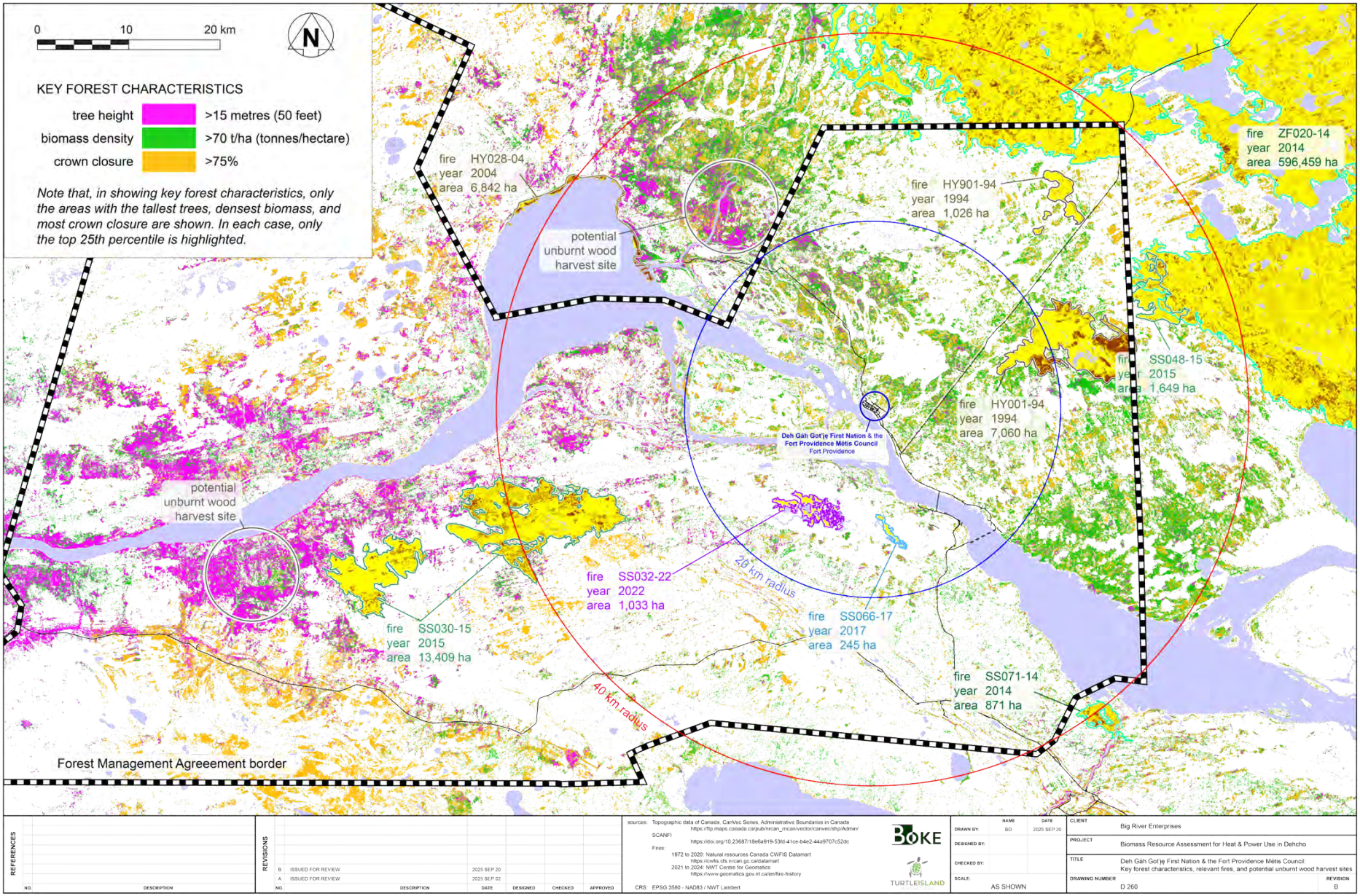
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc

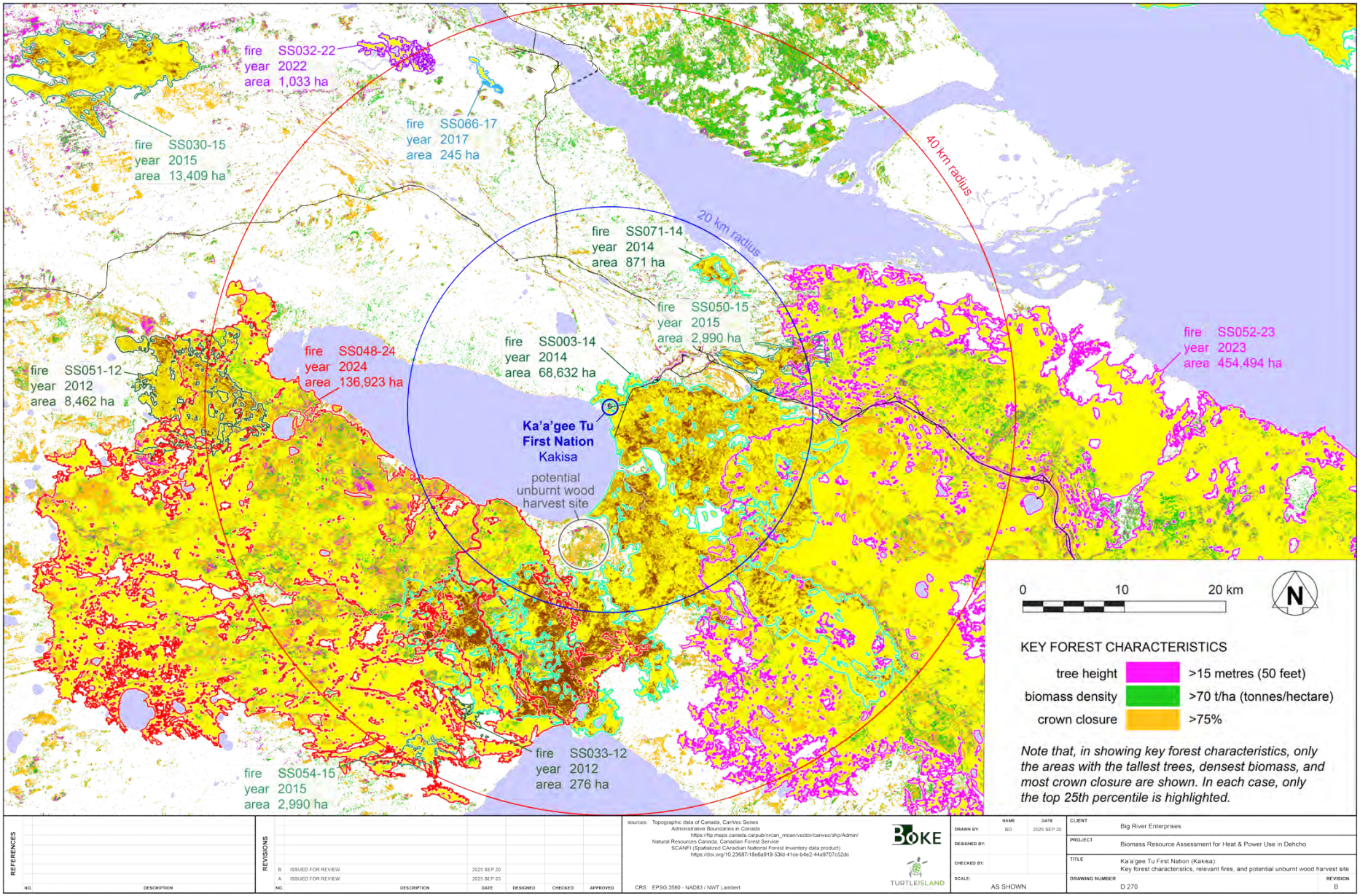
CRS: EPSG:3580 - NAD83 / NWT Lambert

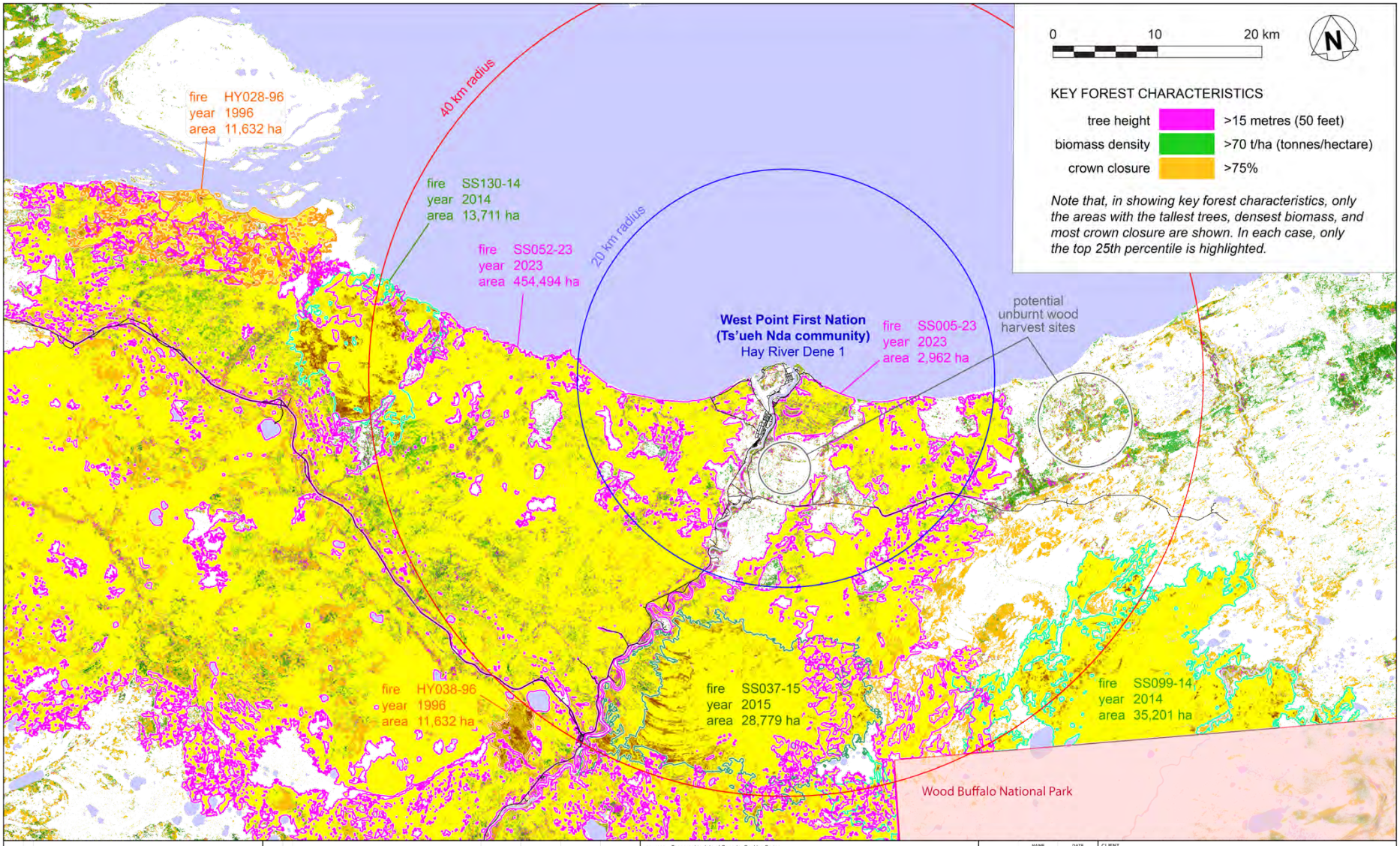
BOKE
TURTLEISLAND

	NAME	DATE
DRAWN BY:	BD	2025 Sep 20
DESIGNED BY:		
CHECKED BY:		
SCALE:	AS SHOWN	

CLIENT: Big River Enterprises
PROJECT: Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE: Tthets'ehk'edelį First Nation (Jean Marie River):
Key forest characteristics, relevant fires, and potential unburnt wood harvest site
DRAWING NUMBER: D 250
REVISION: B


0
10
20 km
N
KEY FOREST CHARACTERISTICS
tree height
>15 metres (50 feet)
biomass density
>70 t/ha (tonnes/hectare)
crown closure
>75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
fire HY028-04
year 2004
area 6,842 ha
potential unburnt wood harvest site
fire HY901-94
year 1994
area 1,026 ha
fire ZF020-14
year 2014
area 596,459 ha
SS048-15
2015
1,649 ha
fire HY001-94
year 1994
area 7,060 ha
Deh Gáh Got'ıe First Nation & the Fort Providence Métis Council
Fort Providence
potential unburnt wood harvest site
fire SS032-22
year 2022
area 1,033 ha
20 km radius
fire SS066-17
year 2017
area 245 ha
fire SS030-15
year 2015
area 13,409 ha
fire SS071-14
year 2014
area 871 ha
40 km radius
Forest Management Agreeement border
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 SEP 02
sources: Topographic data of Canada, CanVec Series, Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
SCANFI
https://doi.org/10.23687/18e6a919-53fd-41ce-b4e2-44a9707c52dc
Fires:
1972 to 2020: Natural ressources Canada CWFIS Datamart
https://cwfis.cfs.nrcan.gc.ca/datamart
2021 to 2024: NWT Centre for Geomatics
https://www.geomatics.gov.nt.ca/en/fire-history
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Deh Gáh Got'ıe First Nation & the Fort Providence Métis Council: Key forest characteristics, relevant fires, and potential unburnt wood harvest sites
DRAWING NUMBER D 260
REVISION B


fire SS032-22
year 2022
area 1,033 ha
fire SS066-17
year 2017
area 245 ha
fire SS030-15
year 2015
area 13,409 ha
40 km radius
20 km radius
fire SS071-14
year 2014
area 871 ha
fire SS050-15
year 2015
area 2,990 ha
fire SS052-23
year 2023
area 454,494 ha
fire SS003-14
year 2014
area 68,632 ha
fire SS048-24
year 2024
area 136,923 ha
fire SS051-12
year 2012
area 8,462 ha
Ka'a'gee Tu
First Nation
Kakisa
potential
unburnt wood
harvest site
fire SS033-12
year 2012
area 276 ha
fire SS054-15
year 2015
area 2,990 ha
0
10
20 km
N
KEY FOREST CHARACTERISTICS
tree height
>15 metres (50 feet)
biomass density
>70 t/ha (tonnes/hectare)
crown closure
>75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
REFERENCES
NO. DESCRIPTION
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 SEP 03
NO. DESCRIPTION DATE DESIGNED CHECKED APPROVED
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
NAME DATE
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE Ka'a'gee Tu First Nation (Kakisa):
Key forest characteristics, relevant fires, and potential unburnt wood harvest site
DRAWING NUMBER D 270
REVISION B


0
10
20 km
N
KEY FOREST CHARACTERISTICS
tree height
>15 metres (50 feet)
biomass density
>70 t/ha (tonnes/hectare)
crown closure
>75%
Note that, in showing key forest characteristics, only the areas with the tallest trees, densest biomass, and most crown closure are shown. In each case, only the top 25th percentile is highlighted.
40 km radius
20 km radius
fire HY028-96
year 1996
area 11,632 ha
fire SS130-14
year 2014
area 13,711 ha
fire SS052-23
year 2023
area 454,494 ha
West Point First Nation
(Ts'ueh Nda community)
Hay River Dene 1
fire SS005-23
year 2023
area 2,962 ha
potential unburnt wood harvest sites
fire HY038-96
year 1996
area 11,632 ha
fire SS037-15
year 2015
area 28,779 ha
fire SS099-14
year 2014
area 35,201 ha
Wood Buffalo National Park
REFERENCES
REVISIONS
B ISSUED FOR REVIEW 2025 SEP 20
A ISSUED FOR REVIEW 2025 SEP 04
sources: Topographic data of Canada, CanVec Series
Administrative Boundaries in Canada
https://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/shp/Admin/
Natural Resources Canada, Canadian Forest Service
SCANFI (Spatialized CAnadian National Forest Inventory data product)
https://doi.org/10.23687/18e8a919-53fd-41ce-b4e2-44a9707c52dc
CRS: EPSG:3580 - NAD83 / NWT Lambert
BOKE
TURTLEISLAND
DRAWN BY: BD 2025 SEP 20
DESIGNED BY:
CHECKED BY:
SCALE: AS SHOWN
CLIENT Big River Enterprises
PROJECT Biomass Resource Assessment for Heat & Power Use in Dehcho
TITLE West Point First Nation (Ts'ueh Nda community) (Hay River Dene 1):
Key forest characteristics, relevant fires, and potential unburnt wood harvest sites
DRAWING NUMBER D 280
REVISION B