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Using FPInterface to Estimate Availability of Forest-Origin Biomass in British Columbia: Arrowsmith TSA

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Abstract

Based on inventory information and a 20-year harvest queue, estimates of the amount of biomass available from forest harvest residues were estimated in $10 increments of delivered cost. For the Arrowsmith Timber Supply Area, at total of 22 500 ODT/year was projected to be available, while only 3 300 ODT/year were expected to be available at the economic price of $60/ODT.

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1. Executive summary

FPInnovations estimated the amount of forest-origin, harvest residue biomass available from the Arrowsmith timber supply area (TSA), largely following the process previously established for several TSAs in B.C. using FPInterface between 2010 and 2017. The biomass inventory was based on 20-year harvest data and road network plans for Crown land provided by B.C.'s Ministry of Forests, Lands and Natural Resource Operations and excludes Woodlot Licences, Tree Farm Licences, Community Forest Agreements, and First Nations tenures.

The yield of biomass from harvest residues for the Arrowsmith TSA was estimated at 35.3 oven-dried tonnes (ODT) per hectare.

The biomass ratio, which is the ratio of recovered biomass to recovered merchantable roundwood, was estimated at 13.7%. Over the next 20 years, an estimated total of 451 400 ODT of available biomass could be generated by harvest in the Arrowsmith TSA, or approximately 22 500 ODT/year. Of this amount, approximately 65 400 ODT in total, or 3 300 ODT/year, is expected to be available at the economic price of $60/ODT. Approximately 60% of the total predicted volume is expected to be available at $90/ODT, which amounts to a total of 270 600 ODT, or 13 500 ODT/year.

A low-cost scenario was attempted by reducing the grinding cost by $5.05/ODT. At the economic rate of $60/ODT, availability increases by approximately 23 300 ODT over 20 years, or about 1 165 ODT/year. If increases in efficiency or decreases in cost can be realized, the biomass available could be increased by this amount.

Most of the biomass that is considered economically available (≤ $60/ODT) is located closer to the TSA's delivery points (Port Alberni, Chemainus, Nanaimo, and Victoria). The amount of economically available biomass is relatively consistent over time, with a slight increase in years 16 to 20. The amount of economically available biomass ranges from approximately 3 100 ODT/year in periods 1–3 (years 1-15) to 3 650 ODT/year in period 4 (years 16-20). This increase may be due to a decreased distance between the planned harvest area and the delivery locations in period 4.

2. Introduction

FPInnovations estimated the amount of forest-origin, harvest residue biomass from the Arrowsmith Timber Supply Area (TSA), largely following the process previously established for other TSAs in B.C. using FPInterface between 2010 and 2017. The biomass inventory was based on 20-year harvest data and road network plans for Crown land provided by B.C.'s Ministry of Forests, Lands and Natural Resource Operations (FLNRO) and excludes Woodlot Licences, Tree Farm Licences (TFLs), Community Forest Agreements (CFAs), and First Nations tenures.

Detailed introductory statements describing the background and rationale for this project and the greater project as a whole are in Friesen & Goodison (2018).

3. Objective

The objective of this project was to calculate the cost of forest-origin biomass as a feedstock in the Arrowsmith TSA.

Specific deliverables include:

a. An analysis showing the delivered cost of biomass from point of origin; and
b. An analysis showing the amount of biomass delivered at different price points. A value of $60 for one oven-dried tonne (ODT) is regarded as the market value for biomass, in accordance with previous analyses.

4. Methods

Overall process

The basic methodology for determining biomass supply in western Canada was established during analysis of the Quesnel and Williams Lake TSAs. The methodology is reviewed below.

The analysis focused on the Arrowsmith TSA and was based on polygon data (tree characteristics) and a road data set supplied by the FLNRO. The analysis did not include any nearby woodlots, TFLs, CFAs, or First Nations tenures. Including some of these areas could alter the supply of biomass that is available.

Additionally, small-piece size stands that are not considered merchantable were also excluded from the analysis. The analysis focused on recovering harvest residues from merchantable stands. Purpose-harvesting unmerchantable stands for biomass could add to the biomass supply, and further analysis could be undertaken to determine its profitability. Recent analyses have shown that harvesting these stands is not yet profitable.

The process map in Figure 1 displays the steps taken to build the final inventory of economically available biomass for the Quesnel TSA. A similar process was used for the analysis of the Arrowsmith TSA.

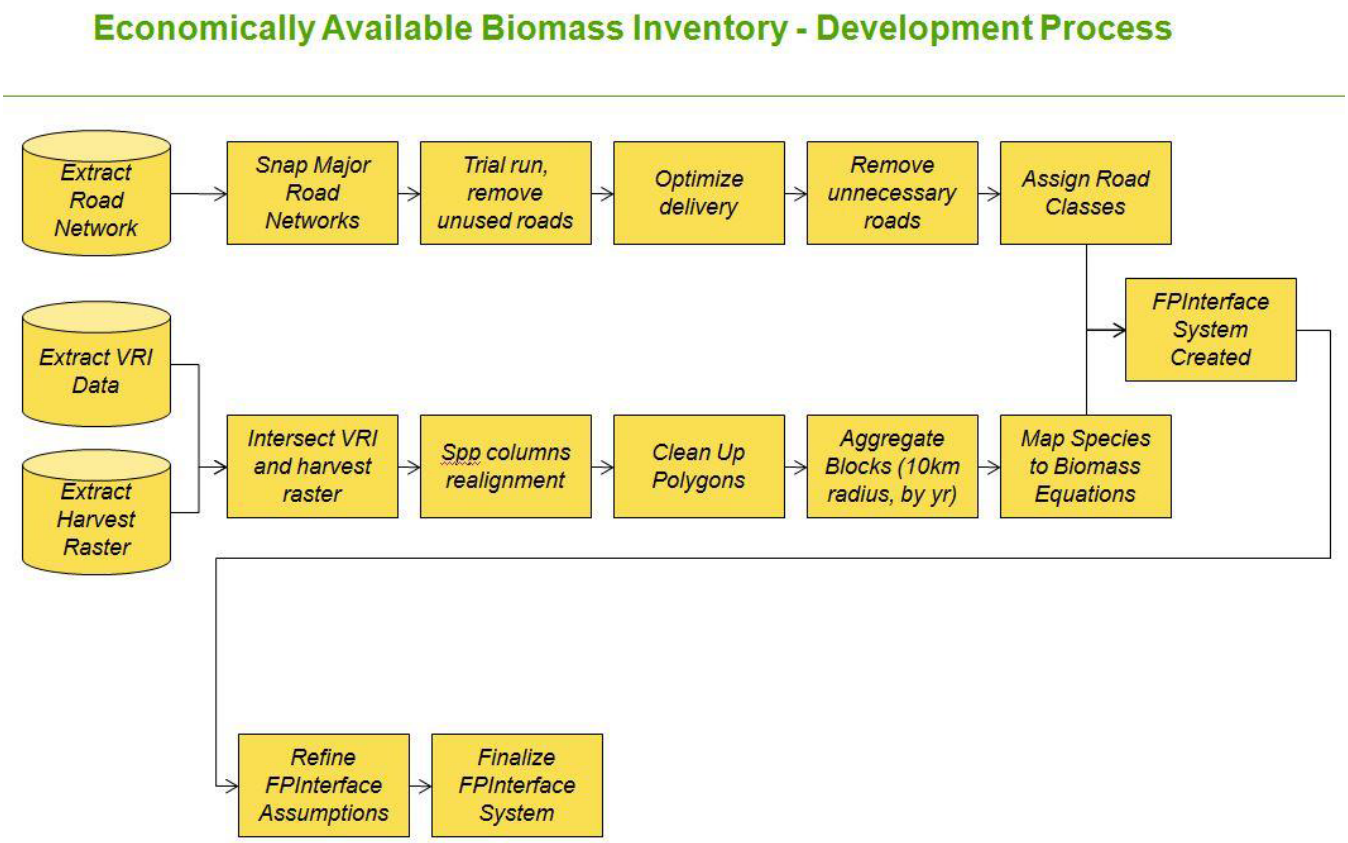


Figure 1. The steps taken to build the final inventory of economically available biomass.

Data acquisition

Data layers were acquired from the FLNRO for the Arrowsmith TSA (excluding Woodlot Licenses, TFLs, CFAs, and any First Nations tenures), including vegetation resource inventory (VRI) polygons with attributes, and road linework with attributes. The polygon data was for 20 years of harvest over four consecutive 5-year periods.

The total 20-year harvest raster is a point-in-time snapshot. It indicates which polygons are expected to be harvested in the next 20 years. No attempt was made to model possible growth or mortality during the 20-year period. Any projections of growth or mortality are already accounted for in the harvestable proportion contained in the harvest raster data.

Data transformation

FPInterface requires two major inputs: a polygon layer of harvestable blocks with attributes, and a road layer. The polygon layer must also have a harvest queue built into it, indicating which polygons are to be cut in which time period. To calculate biomass amounts, FPInterface requires both tree size data (height and diameter at breast height) and either stand density (stems per hectare) or volume per hectare by species in each polygon. When the polygon layer is uploaded, it is necessary to associate the species in the resultant with the species names in FPInterface.

To expedite calculation, polygons with little or no merchantable volume were targeted for elimination. Polygons with no volume were removed from the resultant. Some of these polygons resulted from the process of intersecting the VRI and the harvest raster layers. Aggregation rules meant that blocks were grouped if they had an identical harvest year and were within a 10 km radius of each other.

FPInterface calculates cost in part by finding a transport route from a product's origin within a polygon (block) to the mill or delivery site. It relies on a continuous path along the road network. If digital road segments are not joined together (snapped), the program cannot find a path between block and mill, or may find a sub-optimal, circuitous path.

Examination of the received data set showed that road snapping was required. A program was used to identify gaps in the road network and close them.

Biomass equations

To perform the analysis, tree species indicated in the inventory are tied to single-tree biomass equations in FPInterface. For the Quesnel analysis in 2010–11, these equations were based on "Canadian national tree aboveground biomass equations" (Lambert et al. 2005). Although this equation set includes trees from across Canada, including western and northern Canada, very few samples were from B.C. More recently, Ung et al. (2008) have released tree equations for B.C. (accepted by FLNRO), and these were incorporated into FPInterface for the Williams Lake and subsequent analyses, including this one.

FPInterface parameters

Tree species associations

Table 1 shows the species associations that were made.

Table 1. Species associations

FPInterface species	System label	Named	Original data set
Spruce, white	S	white spruce	S, SS
Aspen, trembling	AT	trembling aspen	AC, AT, ACT
Fir, alpine	BA	subalpine fir	BA, BL, B, BG
Cedar, western red	CW	western redcedar	CW
Alder, red	DR	red alder	DR, MB, RA
Hemlock, western	HW	western hemlock	H, HW, HM
Pine, lodgepole	PL	lodgepole pine	PL, PLC, PA
Pine, western white	PW	western white pine	PW
Douglas-fir	FD	douglas-fir	FD, FDC
Cedar, yellow	YC	yellow cedar	YC

Road classes

Unlike the Quesnel data set, the Arrowsmith road data set contained no road classes. However, FPInterface has the ability to assign road classes based on the amount of volume hauled over each section of road. The volume hauled is for merchantable volume, as calculated by FPInterface. To create a continuous road network from harvest blocks along coastal areas to the delivery locations, roads were created over water in the Arrowsmith TSA. The roads over water used the same classification system as the land-based roads. Although transport over water is generally less expensive than by road, the costs of loading and unloading associated with water transport over shorter distances tend to cancel the savings. Over long distances, water transport is cheaper, but for the distances required in this TSA, the costs were thought to be about equal, on average. The volume and speeds associated with each road class were assigned as shown in Table 2.

Table 2. Road class associations

FPInterface road class	Volume (m^3)		Road speed (km/h)		
	Minimum	Maximum	Posted speed	Empty haul[a]	Loaded haul[b]
Paved	10 000 001	50 000 000	90	86	77
Class 1 (off highway)	0	0	70	67	60
Class 1	2 000 001	10 000 000	70	67	60
Class 2	1 000 001	2 000 000	50	48	43
Class 3	500 001	1 000 000	40	38	34
Class 4	5 001	500 000	20	19	17
Class 4 (operational)	0	0	20	19	17
Class 5 (winter)	0	5 000	20	19	17

[a] 95% of posted speed

[b] 85% of posted speed

General parameters

The price of fuel can have significant impacts on model results. Some equipment in the model can use diesel and some can use marked fuel. A price of $1.25/L was assigned, which is slightly higher than current rates for diesel, but is an approximate medium-term average.

The program's default values for productivities and costs of forestry equipment rely on FPInnovations' studies and information. If a user has specific values or costs they wish to apply to any phase or machine, these can be used instead of the defaults. For this project, only the default values were used.

Based on a terrain classification system developed by the Canadian Pulp and Paper Association (CPPA) (Mellgren, 1980), average slope for the Arrowsmith TSA was assigned CPPA Class 3 (20 to

32%). Ground strength was rated CPPA Class 3 (moderate), and ground roughness was rated CPPA Class 3 (uneven).

Comminution cost

The working time for B.C. conditions was based on previous base case studies and consists of one 12-hour shift per day, 200 days per year. Grinder utilization was set at 60% and fuel used per productive machine hour (PMH) for the grinder was the standard 135 L/PMH. The same standard base case parameters were used in previous FPInnovations studies and enable comparison to those studies. Here, they produced a grinding cost of $27.55/ODT.

However, developments in the industry have lowered grinding costs, so these parameters were changed in a low-cost scenario to 75% efficiency and fuel use of 100 L/PMH, to represent the new conditions. This produced a grinding cost of $22.50/ODT. This is thought to be achievable for Arrowsmith TSA conditions by an experienced operator.

Topping diameter

Although BC regulations require a topping diameter of 10.0 cm for most merchantable species, this analysis used 12.5 cm to reflect the more common industrial practice. Topping diameter can have a significant impact on the volume of a tree available for biomass use.

Parameters as entered into FPInterface

A summary of some of the parameters entered into FPInterface for the base case, which produces grinding costs of $27.55/ODT, is presented in Table 3. An alternative, low-cost scenario (Arrowsmith – LowCostAll) was also attempted, producing a grinding cost of $22.50/ODT. For this scenario, the grinder efficiency and grinder fuel use parameters were adjusted to 75% and 100 L/PMH.

Table 3. FPInterface parameters: Base case

Run descriptor	Value
run name	Arrowsmith Jan24th
output name	Biomass – Arrowsmith Jan24th
block system	biomass_blocks_ARR.shp
road system	roads_v2.shp
transfer yard(s)	Port Alberni, Nanaimo, Chemainus, Victoria
cost per transfer yard, respectively	0
year(s) analyzed	all
species attribute linking	BC
automatic assignment of road class by volume	yes
road maintenance	yes
haul speeds	graduated
haul speeds at 95%/85% of posted	yes

transport shifts/day	1
transport hours/shift	12
transport days/year	200
transport fuel price/litre	$1.25
ground strength	3 – moderate
ground roughness	3 – uneven
average slope (%)	20–32
slash used for biomass	yes
full stem used for biomass	no
chip destination	Port Alberni, Nanaimo, Chemainus, Victoria
topping diameter	12.5 cm
truck used for logs	3-axle
truck used for chips	Tridem B-train
harvesting fuel price/litre (x3)	$1.25
harvesting shifts/day (x3)	1
harvesting hours/shift (x3)	12
harvesting days/year (x3)	200
harvesting system	full tree with roadside processing
felling & processing	mechanized and bunched
skid type	skidder with grapple
type of roadside processing	cut-to-length
on site biomass treatment (roadside)	comminution
recovery season	winter
slash freshness	>3 months
slash pre-piled at roadside	yes
grinder size type	horizontal 600 kW
biomass fuel price/litre (x2)	$1.25
biomass hours/shift (x2)	12
biomass shifts/day (x2)	1
biomass days/year (x2)	200
grinder efficiency	60%[a]
grinder fuel use (L/PMH)	135[b]
indirect costs – biomass ($ value)	$0.00

indirect costs – harvesting ($ value)	$0.00

[a] Parameter was adjusted to 75% in the low-cost scenario.
[b] Parameter was adjusted to 100 L/PMH in the low-cost scenario.

Delivery locations

All harvest residues from in-woods operations (not from mills) were directed to large industrial areas in the Arrowsmith TSA. In this model, Port Alberni, Chemainus, Nanaimo, and Victoria were used as the delivery locations. Initial comminution was set to take place at the roadside, and costs were calculated for biomass transported to the delivery locations.

Biomass calculations

The biomass calculations in FPInterface produce a volume of total biomass available once merchantable roundwood has been removed. For this project, only biomass transported to the roadside was considered recoverable, and biomass that was likely to remain at the stump or dispersed on the cutblock was not. Once it is transported to the roadside, some biomass becomes unavailable due to handling and technical losses. The remainder is considered recovered biomass. Figure 2 shows this breakdown with the values from the 20-year harvest of the base case with normal grinder utilization of 60% and fuel use of 135 L/PMH.

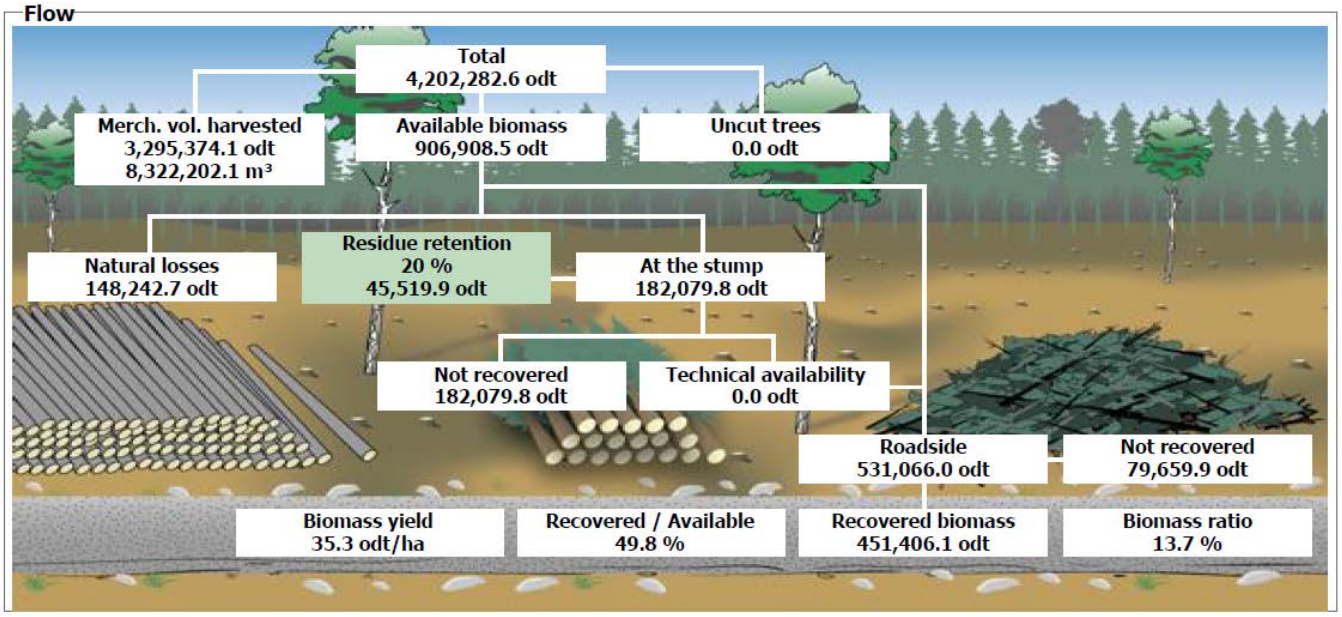


Figure 2. Recoverable biomass at delivery locations.

5. Results and discussion

Summary of key results

All results from the runs performed in FPInterface are summarized in Appendix 1. The FPInterface analysis of biomass supply in the Arrowsmith TSA, based on inventory information and the road

network supplied by the FLNRO, indicates an average biomass yield of 35.3 ODT/ha for the base case. This is in the form of comminuted hog fuel and comes from harvest residues only – tops, branches, and other roadside logging waste. The model does not calculate estimates of mill residues.

Amount of biomass available

For the base case (normal grinder utilization of 60% and fuel use of 135 L/PMH), an estimated total of 451 406 ODT of biomass can be recovered from the roadside and transported to the delivery locations over the course of 20 years. The amount of available biomass at any price point is relatively consistent throughout all periods, with a slight decrease each period. Despite a consistent decrease of planned harvest volume, the amount of available biomass remains relatively steady each period due in part to the relative increase in biomass ratio. The biomass ratio increases from 13.9% in period 1 to 15.7% in period 4. The amount of biomass available each year works out to approximately 22 570 ODT/year at any price point in the study area. However, the amount of biomass available in each 5-year period varies from as much as 24 300 ODT/year in period 1 to as low as 21 800 ODT/year in period 3. The economically available volume is estimated at 3 269 ODT/year (Table 4).

Table 4. Key amounts of biomass available in the Arrowsmith TSA

	Volume at $60/ODT (ODT)[a]	Volume at $90/ODT (ODT)	Total volume ($230/ODT) (ODT)
Over 20-year period	65 386	270 618	451 406
Per year	3 269	13 531	22 570

[a] ODT: oven-dried tonne

Additionally, the model indicates that there are about 375 842 ODT of biomass that would be left on the cutblock and would not make it to the roadside. This includes material that falls off trees naturally and material that breaks off logs and is left on the ground during normal harvesting operations. This large amount of material retained in the forest is equal to 83% of the amount removed for biomass and is much higher than that deemed necessary to replenish the forest floor and prevent nutrient degradation in the soil. Further, 79 660 ODT of biomass material that makes it to the roadside is not recovered due to technical handling efficiencies; that is, the material is too small or too large for machine handling or is incorrectly positioned for economic accessibility.

Biomass ratio

The biomass ratio, which is the ratio of recovered biomass to recovered merchantable roundwood, is 13.7% for the base case scenario. In this case, 3 295 374 ODT of roundwood is expected, along with 451 406 ODT of biomass. Knowing the biomass ratio for an area can be useful in estimating the amount of harvest residue available if the amount of merchantable timber harvest is known.

Cost availability

FPInterface breaks down the available supply into delivered cost in $10 increments. At the presumed market rate of $60/ODT, the estimated amount available over 20 years is 65 386 ODT, or about 3 300 ODT/year. The complete results in $10 increments for the entire 20-year period are presented in Table 5 and Figure 3.

Table 5. Cost availability of biomass in the Arrowsmith TSA: Base case

Cost ($/ODT)[a]	Total (ODT)	Annual (ODT)
10	–	–
20	–	–
30	161.3	8.1
40	725.6	36.3
50	21 797.4	1 089.9
60	65 385.6	3 269.3
70	117 387.9	5 869.4
80	188 326.0	9 416.3
90	270 617.8	13 530.9
100	329 909.0	16 495.5
110	346 262.6	17 313.1
120	355 485.0	17 774.3
130	368 902.7	18 445.1
140	399 292.2	19 964.6
150	426 354.3	21 317.7
160	435 960.2	21 798.0
170	441 911.2	22 095.6
180	445 360.8	22 268.0
190	448 675.0	22 433.8
200	451 192.1	22 559.6
210	451 258.9	22 562.9
220	451 379.4	22 569.0
230	451 406.1	22 570.3

[a] ODT: oven-dried tonne

The amounts are cumulative, so the amount available at $60/ODT, for example, includes all the biomass at $50/ODT and the additional biomass available between $50/ODT and $60/ODT.

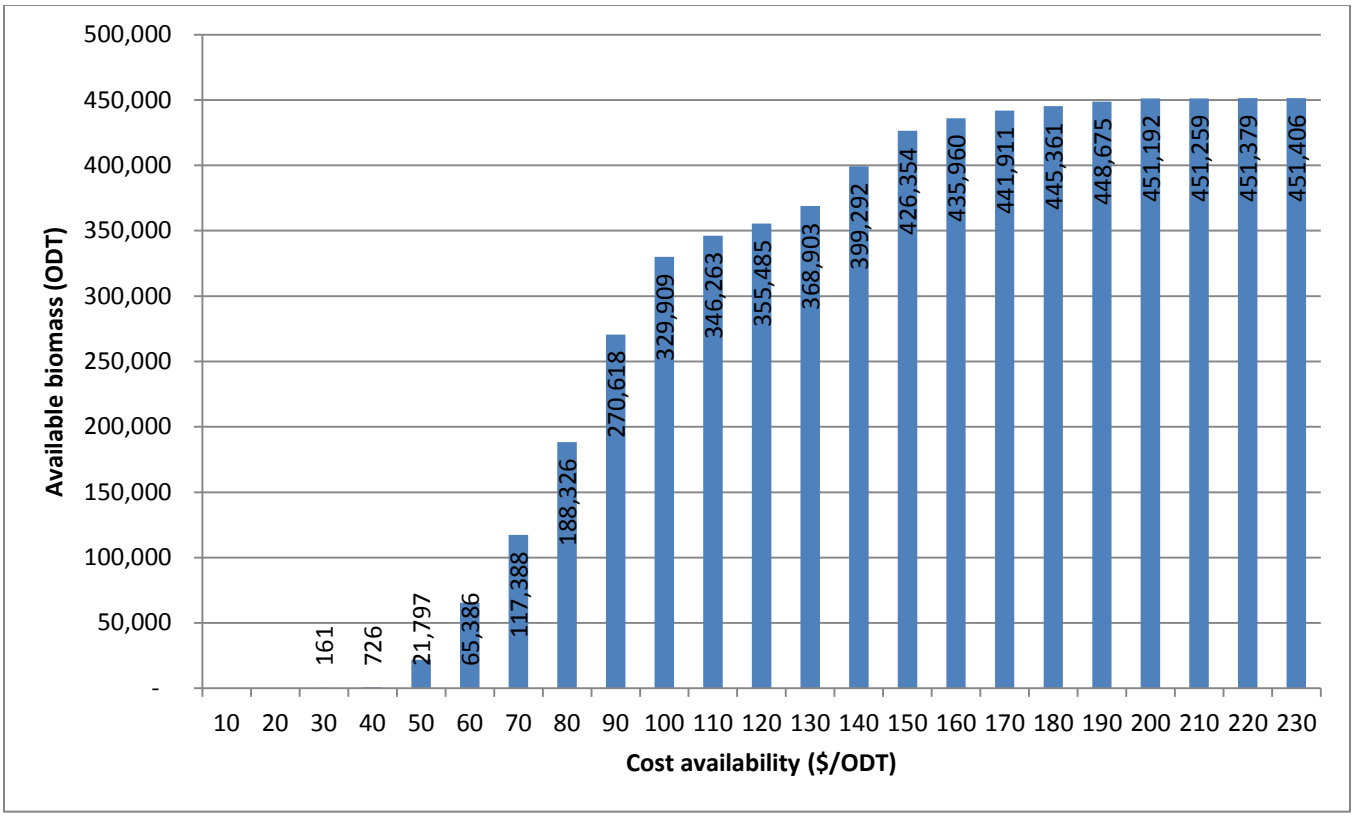


Figure 3. Cost availability of biomass in the Arrowsmith TSA, over 20 years: Base case.

Low-cost scenario

In addition to the base case scenario, with a grinding cost of $27.55/ODT, a scenario with a grinding cost of $22.50/ODT was examined ($5.05 less than the base case). Although this cost was achieved by manipulating the grinder utilization and fuel consumption values, differences in delivered cost can also be created by changes to equipment or practices that raise or lower operating costs or a lower fuel price, for example. Thus, if greater efficiency in grinding technology is realized, the amount of biomass that is economically available can be increased dramatically, especially at the lower price points (Table 6 and Figure 4).

Table 6. Cost availability of biomass in the Arrowsmith TSA: Comparison of the base case and low-cost grinding scenarios

	Biomass available (grinding cost of $27.55/ODT)[a]		Biomass available (grinding cost of $22.50/ODT)	
Cost ($/ODT)	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)
10	–	–	–	–
20	–	–	–	–
30	161.3	8.1	161.3	8.1
40	725.6	36.3	6,139.4	307.0
50	21 797.4	1 089.9	40 992.0	2 049.6
60	65 385.6	3 269.3	88 756.5	4 437.8
70	117 387.9	5 869.4	154 347.6	7 717.4
80	188 326.0	9 416.3	234 627.4	11 731.4
90	270 617.8	13 530.9	307 969.8	15 398.5
100	329 909.0	16 495.5	339 083.7	16 954.2
110	346 262.6	17 313.1	350 493.1	17 524.7
120	355 485.0	17 774.3	361 059.0	18 053.0
130	368 902.7	18 445.1	382 217.5	19 110.9
140	399 292.2	19 964.6	416 041.6	20 802.1
150	426 354.3	21 317.7	428 868.5	21 443.4
160	435 960.2	21 798.0	439 390.7	21 969.5
170	441 911.2	22 095.6	443 932.2	22 196.6
180	445 360.8	22 268.0	448 142.9	22 407.1
190	448 675.0	22 433.8	451 082.6	22 554.1
200	451 192.1	22 559.6	451 192.4	22 559.6
210	451 258.9	22 562.9	451 379.4	22 569.0
220	451 379.4	22 569.0	451 379.4	22 569.0
230	451 406.1	22 570.3	451 406.1	22 570.3

[a] ODT: oven-dried tonne

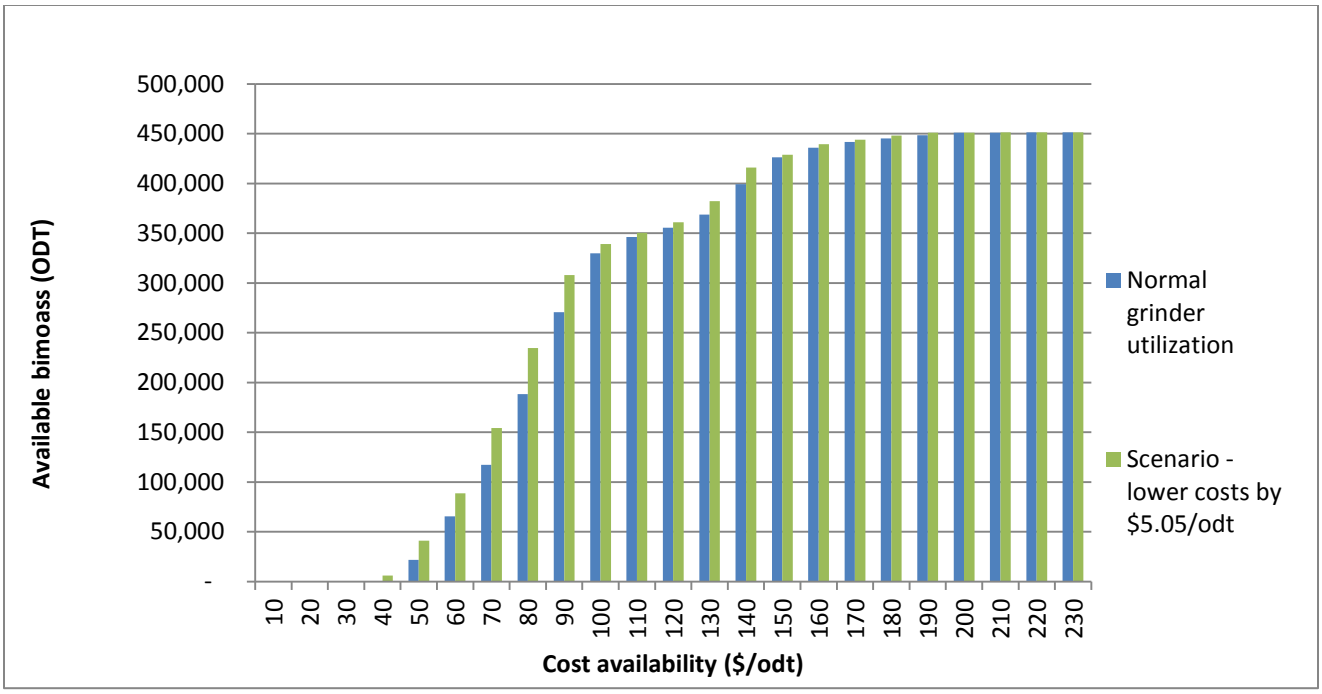


Figure 4. Cost availability of biomass in the Arrowsmith TSA, over 20-year period: Comparison of the base case and low-cost grinding scenarios.

Decreasing costs by $5.05/ODT produces some increases in availability at lower price points. At $60/ODT, more than 23 300 ODT of biomass would be available over 20 years at the lower grinding cost; approximately 35% more would be available than in the base case. This equates to over 1 165 ODT more per year. This difference of availability at $60/ODT, the presumed market rate for biomass, is highlighted in Figure 5.

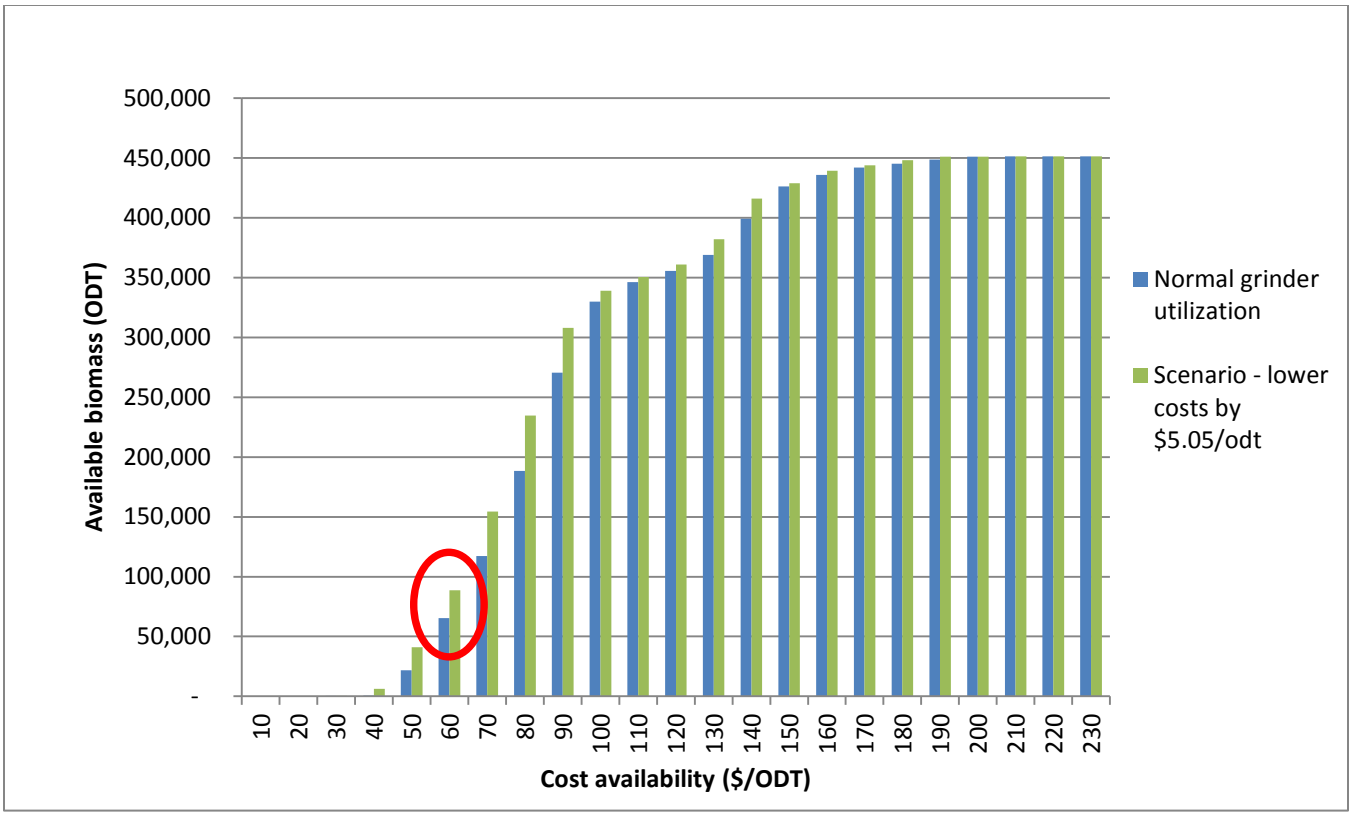


Figure 5. Cost availability of biomass in the Arrowsmith TSA, over 20-year period: Comparison of the base case low-cost grinding scenarios, with the difference at $60/ODT highlighted.

Much more biomass is available when fuel costs are lower. The actual difference in cost per delivered tonne of biomass is only $5.05, but the impact this has on availability is much greater because of the spatial distribution of biomass. The average price for delivered biomass across the study area is shown in Table 7.

Table 7. Average cost of delivered biomass across entire Arrowsmith TSA

Fuel price	Average cost of delivered biomass ($/ODT)[a]
Base case – Grinding at $27.55/ODT	91.62
Low-cost scenario – Grinding at $22.50/ODT	86.57

[a] ODT: oven-dried tonne

Mapping

FPInterface shows the distribution of costs by cutblock graphically with a colour scale ranging from lime to pink, as seen in Figure 6. The costs ranged up to $229/ODT for the blocks farthest from the delivery point. The blocks are indicated in colour increments, with the greenest points representing the lowest delivered biomass costs, and the pinkest ones being the highest, with a gray transition in the middle.

Figure 6. Cost of delivered biomass in the Arrowsmith TSA, in increments of $10/ODT, as shown in FPInterface.

The delivery points (Port Alberni, Chemainus, Nanaimo, and Victoria) are represented by the blue triangles. All biomass from the study area was scheduled for delivery to these points.

Showing the roads on the map makes it a little more difficult to distinguish the blocks, but these are shown in Figure 7.

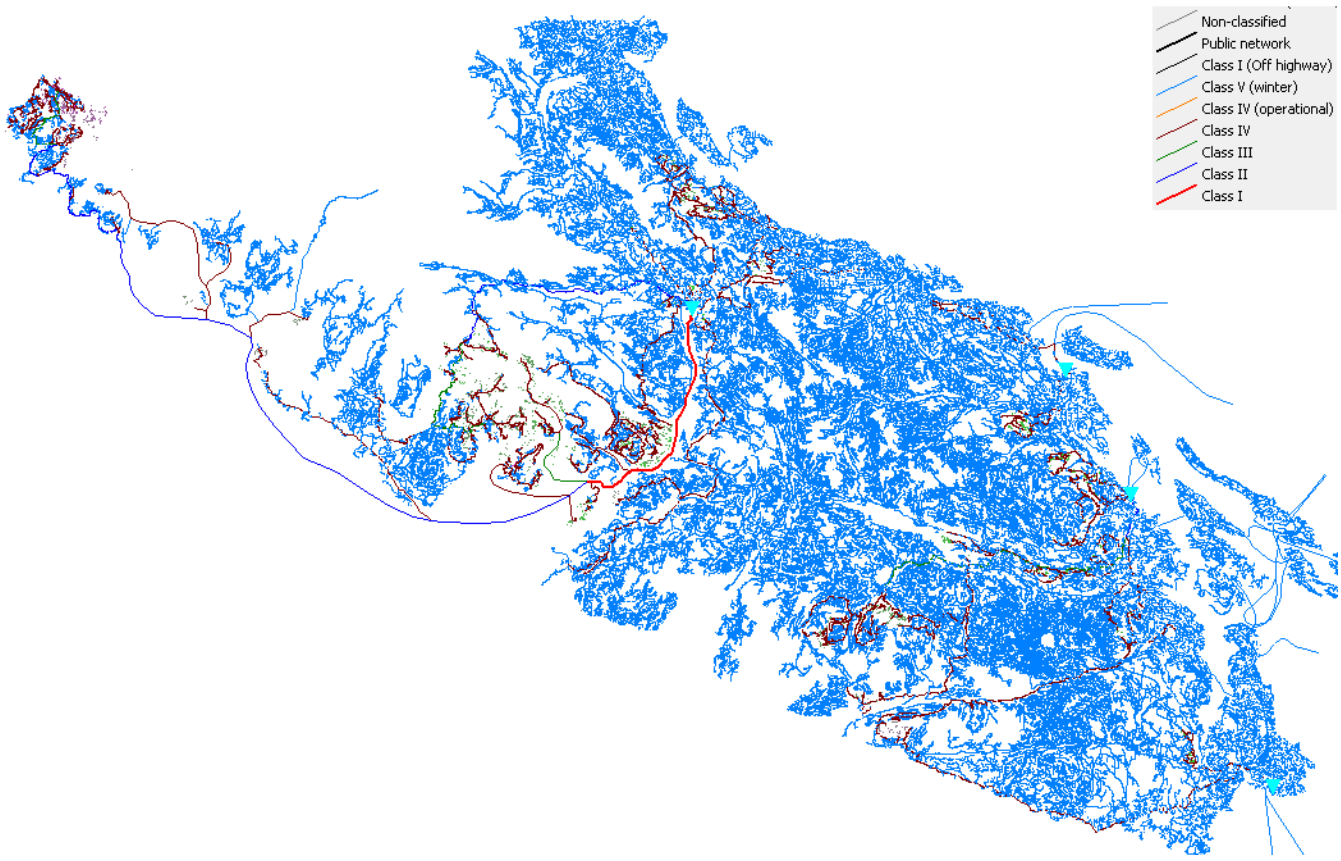


Figure 7. Blocks with road access in the Arrowsmith TSA, as shown in FPInterface.

The colours associated with the roads represent different road classes. Each road class has a unique set of speed associations assigned for loaded and empty trucks that help to determine the cycle times used to calculate the delivery cost for biomass (Table 2). Most of the slowest roads are in blue on this map, while the fastest ones are in red and black. Road class is determined by the amount of harvest that passes over the road. As previously mentioned, some roads were created over water in order to access the coastal areas in the Arrowsmith TSA.

Temporal distribution of harvest

The harvest data contains a temporal period assigned to each cutblock. There are four periods in the data representing five-year periods. The first period covers the first five years of harvest cutblocks, and so on.

The harvest projection shows a relatively steady supply of biomass available between each harvest period (Figure 8).

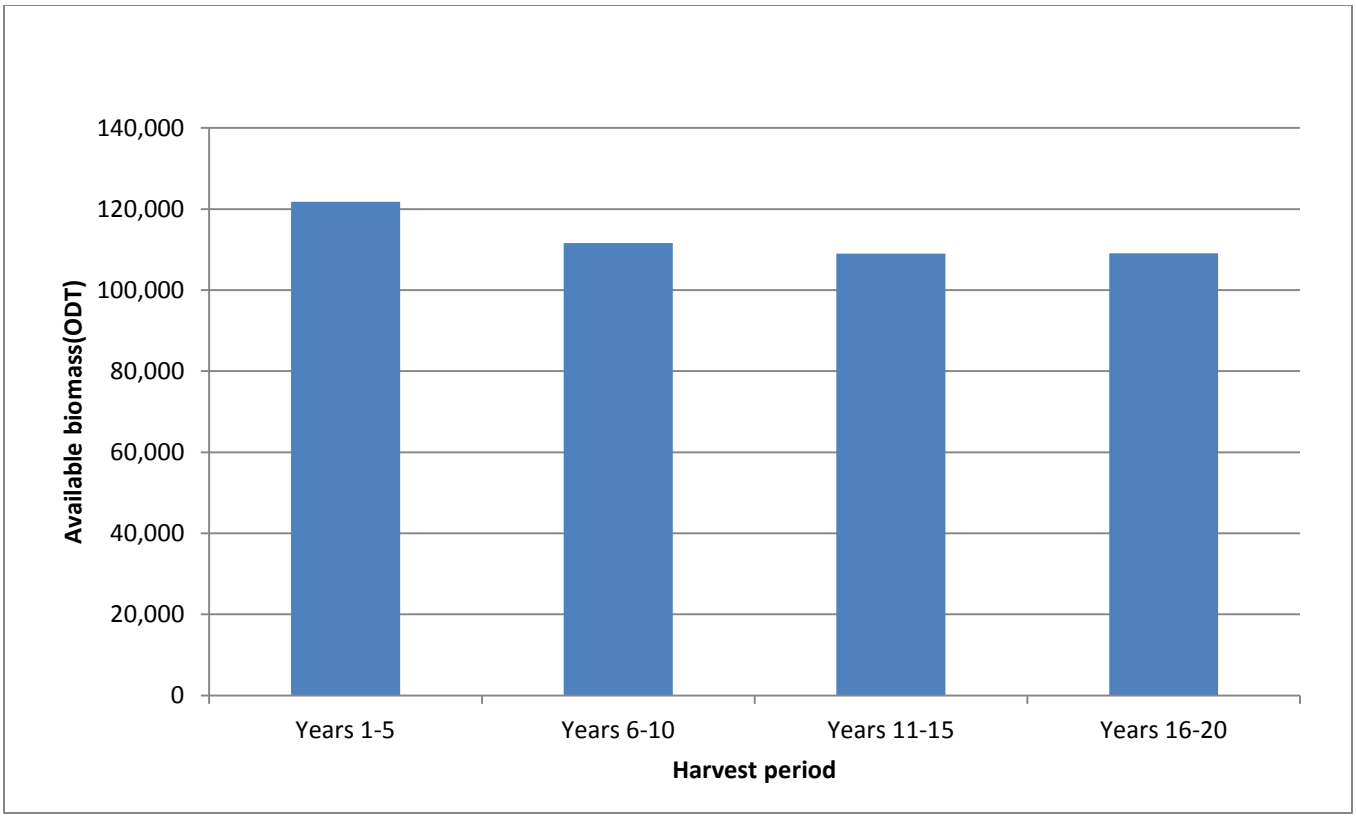


Figure 8. Availability of biomass in the Arrowsmith TSA, by 5-year harvest period at $60/oven dried tonne.

Looking at the economic biomass available, which is the amount of biomass available at $60/ODT, as seen in Figure 9, there is a slight increase in years 16 to 20 (compared to Figure 8). This may be due to a decreased distance between the planned harvest areas and the delivery locations.

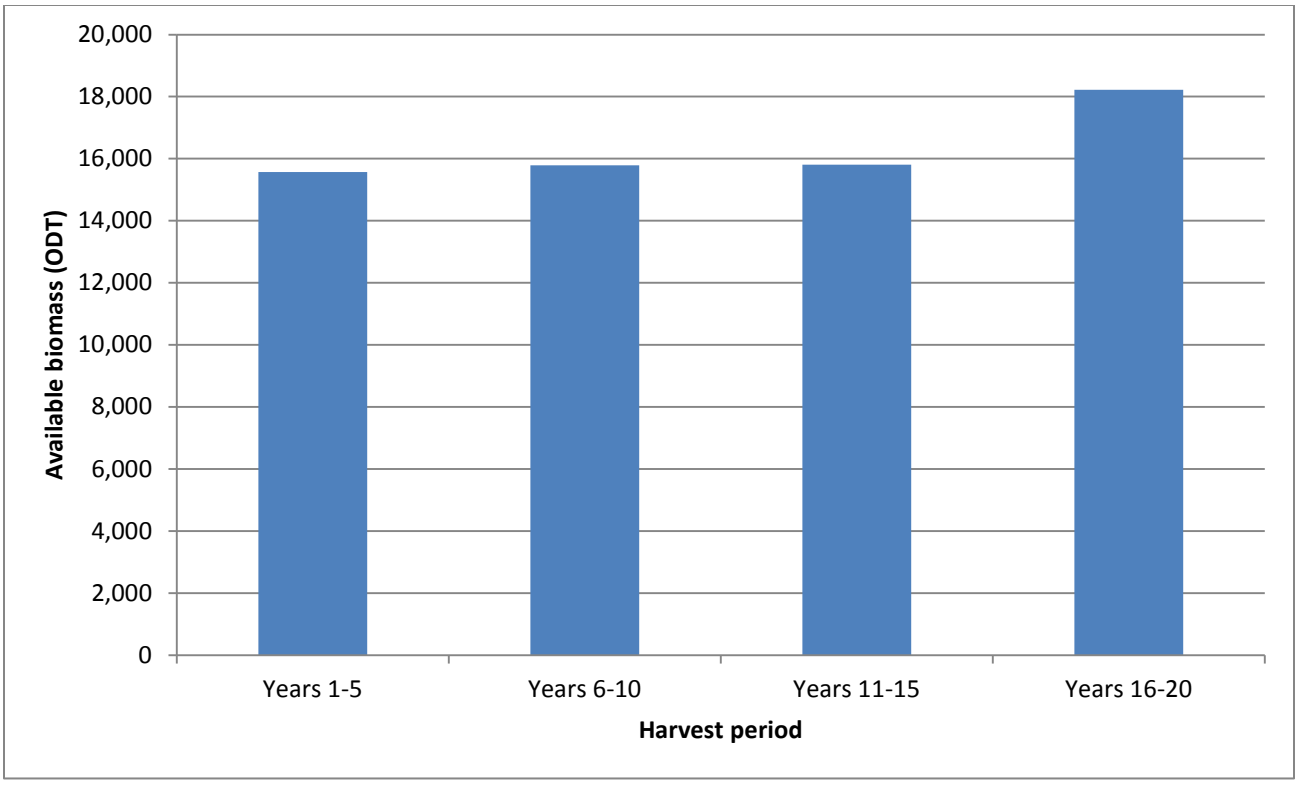


Figure 9. Availability of economic biomass in the Arrowsmith TSA, by 5-year harvest period, at ≤$60/oven dried tonne.

The data for cost availability by period at all price points in $10 increments is shown in Tables 8 and 9 for both the base case and the low-cost scenario.

Table 8. Cost availability of biomass in the Arrowsmith TSA, by 5-year period: Base case

Base case	Period 1 (years 1-5)		Period 2 (years 6-10)		Period 3 (years 11-15)		Period 4 (years 16-20)	
Cost $/ODT[a]	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)
10	–	–	–	–	–	–	–	–
20	–	–	–	–	–	–	–	–
30	161.3	32.3	–	–	–	–	–	–
40	161.3	32.3	304.7	60.9	–	–	259.6	51.9
50	5 877.2	1 175.4	6 322.0	1 264.4	5 682.7	1 136.5	3 915.4	783.1
60	15 569.6	3 113.9	15 781.9	3 156.4	15 809.7	3 161.9	18 224.4	3 644.9
70	31 015.5	6 203.1	27 161.9	5 432.4	29 008.7	5 801.7	30 201.9	6 040.4
80	52 078.1	10 415.6	48 754.5	9 750.9	44 461.0	8 892.2	43 032.4	8 606.5
90	76 382.6	15 276.5	68 860.4	13 772.1	64 455.4	12 891.1	60 919.4	12 183.9
100	90 596.0	18 119.2	86 330.6	17 266.1	78 434.9	15 687.0	74 547.4	14 909.5
110	96 829.9	19 366.0	89 086.8	17 817.4	82 775.5	16 555.1	77 570.4	15 514.1
120	100 283.3	20 056.7	90 660.9	18 132.2	84 883.3	16 976.7	79 657.4	15 931.5
130	102 338.2	20 467.6	92 215.7	18 443.1	89 257.8	17 851.6	85 091.0	17 018.2
140	111 377.4	22 275.5	99 257.2	19 851.4	99 156.7	19 831.3	89 500.9	17 900.2
150	120 608.5	24 121.7	110 829.0	22 165.8	104 058.1	20 811.6	90 858.7	18 171.7
160	121 513.3	24 302.7	111 573.2	22 314.6	107 381.8	21 476.4	95 492.0	19 098.4
170	121 675.9	24 335.2	–	–	108 207.7	21 641.5	100 454.4	20 090.9
180	121 746.5	24 349.3	–	–	108 236.6	21 647.3	103 804.5	20 760.9
190	–	–	–	–	108 804.8	21 761.0	106 550.5	21 310.1
200	–	–	–	–	109 008.3	21 801.7	108 864.1	21 772.8
210	–	–	–	–	–	–	108 930.9	21 786.2
220	–	–	–	–	–	–	109 051.4	21 810.3
230	–	–	–	–	–	–	109 078.1	21 815.6

[a] ODT: oven-dried tonne

Table 9. Cost availability of biomass in the Arrowsmith TSA, by 5-year period: Low-cost scenario

	Period 1 (years 1-5)		Period 2 (years 6-10)		Period 3 (years 11-15)		Period 4 (years 16-20)	
Cost ($/ODT)[a]	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)	Total (ODT)	Annual (ODT)
10	–	–	–	–	–	–	–	–
20	–	–	–	–	–	–	–	–
30	161.3	32.3	–	–	–	–	–	–
40	1 902.6	380.5	1 829.1	365.8	1 455.5	291.1	952.2	190.4
50	11 590.2	2 318.0	12 059.9	2 412.0	9 757.6	1 951.5	7 584.3	1 516.9
60	22 760.5	4 552.1	19 607.3	3 921.5	20 874.2	4 174.8	25 514.5	5 102.9
70	42 002.0	8 400.4	40 143.0	8 028.6	35 725.2	7 145.0	36 477.3	7 295.5
80	63 675.1	12 735.0	61 546.9	12 309.4	57 425.7	11 485.1	51 979.7	10 395.9
90	83 855.2	16 771.0	79 634.2	15 926.8	73 128.4	14 625.7	71 351.9	14 270.4
100	93 207.1	18 641.4	88 051.2	17 610.2	81 381.9	16 276.4	76 443.6	15 288.7
110	98 395.0	19 679.0	89 952.7	17 990.5	83 927.8	16 785.6	78 217.6	15 643.5
120	101 674.4	20 334.9	91 096.9	18 219.4	86 702.1	17 340.4	81 585.6	16 317.1
130	106 267.4	21 253.5	94 769.9	18 954.0	93 446.4	18 689.3	87 733.9	17 546.8
140	115 967.9	23 193.6	107 559.2	21 511.8	101 778.7	20 355.7	90 735.8	18 147.2
150	121 140.8	24 228.2	111 428.2	22 285.6	105 031.5	21 006.3	91 267.9	18 253.6
160	121 574.5	24 314.9	111 573.2	22 314.6	107 976.0	21 595.2	98 267.0	19 653.4
170	121 746.5	24 349.3	–	–	108 236.6	21 647.3	102 375.9	20 475.2
180	–	–	–	–	108 804.8	21 761.0	106 018.4	21 203.7
190	–	–	–	–	109 008.3	21 801.7	108 754.6	21 750.9
200	–	–	–	–	–	–	108 864.4	21 772.9
210	–	–	–	–	–	–	109 051.4	21 810.3
220	–	–	–	–	–	–	109 051.4	21 810.3
230	–	–	–	–	–	–	109 078.1	21 815.6

[a] ODT: oven-dried tonne

Results appendices

The runs performed in FPInterface and their results are included in Appendix 1.

6. Conclusion

The estimated yield of biomass from harvest residues for the Arrowsmith TSA is 35.3 ODT/ha. Over the next 20 years, an estimated total of 451 400 ODT of biomass could be generated by harvest in the TSA, or approximately 22 500 ODT/year. Of this amount, approximately 65 400 ODT in total, or 3 300 ODT/year, is expected to be available at the economic price of $60/ODT. Approximately 60% of the available amount is expected to be available at $90/ODT: a total of 270 600 ODT, or 13 500 ODT/year. The biomass ratio, which is the ratio of recovered biomass to recovered merchantable roundwood, is estimated at 13.7%.

A low-cost scenario was attempted, with grinding costs reduced by $5.05/ODT. At the economic rate of $60/ODT, availability of biomass increased by approximately 23 300 ODT over 20 years, or about 1 165 ODT/year. If increases in efficiency or decreases in cost can be realized, the biomass available could be increased by this amount.

Most of the biomass that is considered economically available (≤$60/ODT) is located closer to the TSA's delivery points. The amount of economically available biomass increases in period 4 (years 16 to 20) and may be due to a decreased distance between the planned harvest area and the delivery locations.

7. References

Friesen, C., & Goodison, A. (2018). *Using FPInterface to estimate available forest-origin biomass in British Columbia: Quesnel TSA* (Technical Report No. 7). Vancouver, British Columbia: FPInnovations.

Lambert, M.-C., Ung, C.-H., & Raulier, F. (2005). Canadian national tree aboveground biomass equations. *Canadian Journal of Forest Research, 35(8)*, 1996–2018.

Mellgren, P. G. (1980). *Terrain classification for Canadian forestry*. Canadian Pulp and Paper Association.

Ung, C.-H., Bernier, P., & Guo, X.-J. (2008). Canadian national biomass equations: New parameter estimates that include British Columbia data. *Canadian Journal of Forest Research, 38(5)*, 1123-1132.

8. Appendix

- Biomass - Arrowsmith Jan24th.pdf
- Biomass - Arrowsmith Jan24thBase.pdf
- Biomass - Arrowsmith Jan24thBaseP1.pdf
- Biomass - Arrowsmith Jan24thBaseP2.pdf
- Biomass - Arrowsmith Jan24thBaseP3.pdf
- Biomass - Arrowsmith Jan24thBaseP4.pdf
- Biomass - Arrowsmith Jan24th-LowCostAll.pdf
- Biomass - Arrowsmith Jan24th-LowCostP1.pdf
- Biomass - Arrowsmith Jan24th-LowCostP2.pdf
- Biomass - Arrowsmith Jan24th-LowCostP3.pdf
- Biomass - Arrowsmith Jan24th-LowCostP4.pdf
- Forest supply - Arrowsmith Jan24th.pdf
- Forest supply - Arrowsmith Jan24thBase.pdf
- Forest supply - Arrowsmith Jan24thBaseP1.pdf
- Forest supply - Arrowsmith Jan24thBaseP2.pdf
- Forest supply - Arrowsmith Jan24thBaseP3.pdf
- Forest supply - Arrowsmith Jan24thBaseP4.pdf

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	12,783.5 ha
Number of cut blocks	3994
Recovered biomass	451,406.1 odt
Biomass yield	35.3 odt/ha
Biomass odt / Merchantable m^3	0.0628 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	28 : 1
Available energy	1,740,385 MWh
Fuel consumption	15.6 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	27.55 $/odt
Transfer yard	0.00 $/odt
Transportation	49.42 $/odt
Loading/unloading	13.39 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.26 $/odt
Indirect costs	0.00 $/odt
Total	91.62 $/odt

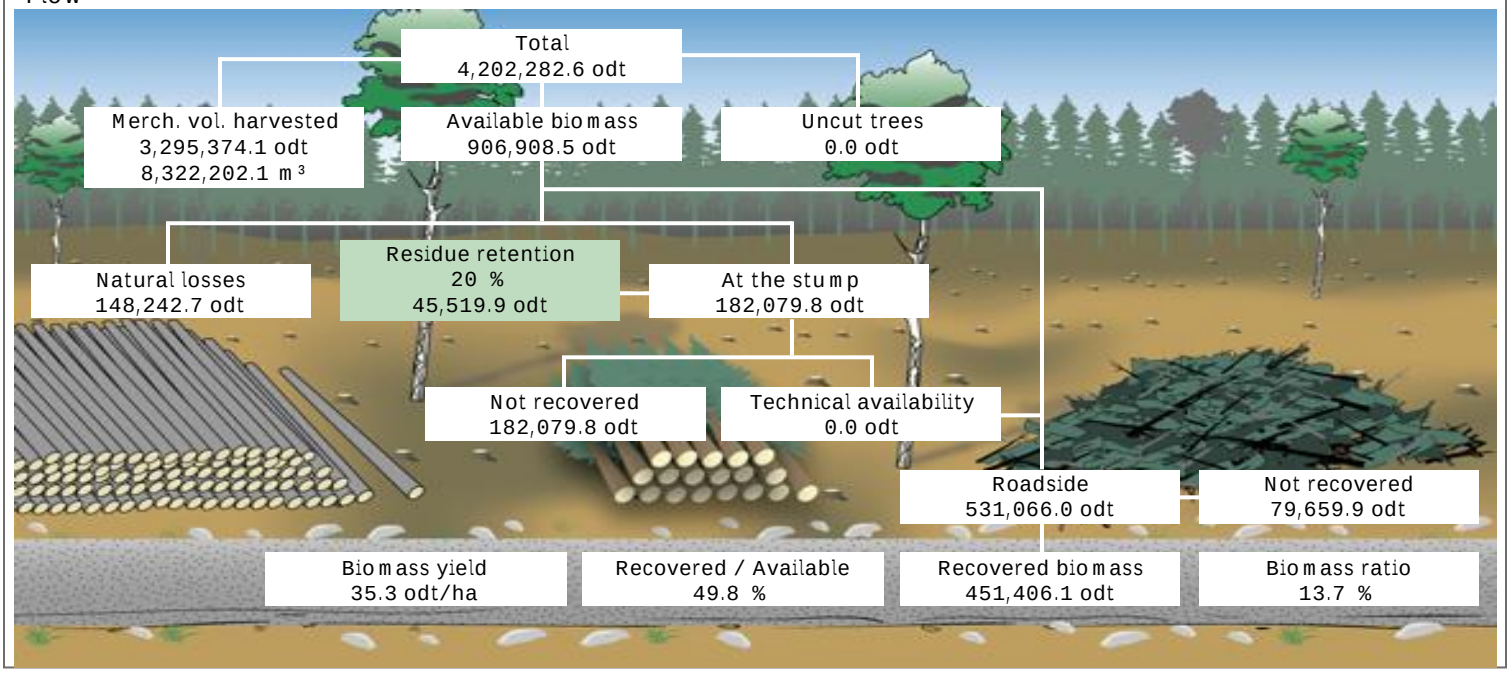
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-91.62 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	133,107.5	0.0617	10.41
Douglas Fir (residues)	131,240.4	0.0645	10.27
Western Red Cedar (residues)	108,200.9	0.0641	8.46
Subalpine Fir (residues)	38,302.5	0.0563	3.00
Yellow Cedar (residues)	20,749.7	0.0502	1.62
Red Alder (residues)	16,653.0	0.0991	1.30
White Spruce (residues)	2,570.0	0.0600	0.20
Lodgepole Pine (residues)	399.2	0.0528	0.03
Western White Pine (residues)	123.9	0.0884	0.01
Trembling Aspen (residues)	58.8	0.0670	0.00
	451,406.1	0.0628	35.31

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	451,406.1	12,783.5	3,994
• Recovery season			
Summer	0.0	0.0	0
Winter	451,406.1	12,783.5	3,994
• Residue freshness			
Fresh	0.0	0.0	0
Brown	451,406.1	12,783.5	3,994
Brittle	0.0	0.0	0

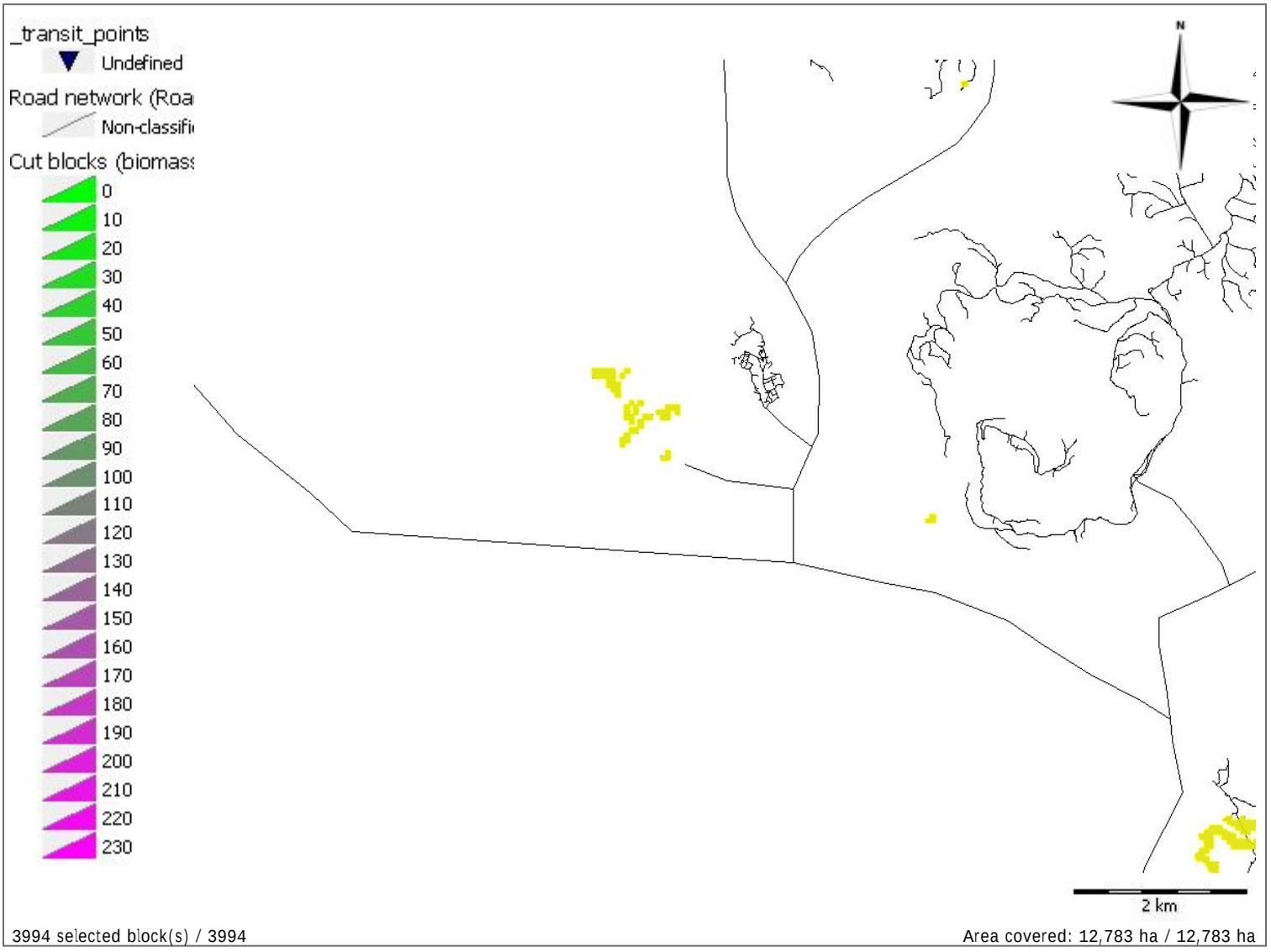
Supply summary

Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	161.3	161.3
40 $/odt	0.0	725.6	725.6
50 $/odt	0.0	21,797.4	21,797.4
60 $/odt	0.0	65,385.6	65,385.6
70 $/odt	0.0	117,387.9	117,387.9
80 $/odt	0.0	188,326.0	188,326.0
90 $/odt	0.0	270,617.8	270,617.8
100 $/odt	0.0	329,909.0	329,909.0
110 $/odt	0.0	346,262.6	346,262.6
120 $/odt	0.0	355,485.0	355,485.0
130 $/odt	0.0	368,902.7	368,902.7
140 $/odt	0.0	399,292.2	399,292.2
150 $/odt	0.0	426,354.3	426,354.3
160 $/odt	0.0	435,960.2	435,960.2
170 $/odt	0.0	441,911.2	441,911.2
180 $/odt	0.0	445,360.8	445,360.8
190 $/odt	0.0	448,675.0	448,675.0
200 $/odt	0.0	451,192.1	451,192.1
210 $/odt	0.0	451,258.9	451,258.9
220 $/odt	0.0	451,379.4	451,379.4
230 $/odt	0.0	451,406.1	451,406.1
Maximum cost	0.00 $/odt	229.02 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock (residues)	Chips	91	0
	Western Red Cedar (residues)	Chips	55	0
	White Spruce (residues)	Chips	15	0
			161	0
Nanaimo				
	Douglas Fir (residues)	Chips	15,789	23
	Lodgepole Pine (residues)	Chips	5	34
	Red Alder (residues)	Chips	539	27
	Subalpine Fir (residues)	Chips	2	27
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	90	25
	Western Red Cedar (residues)	Chips	175	32
			16,599	23
Chemainus				
	Douglas Fir (residues)	Chips	52,161	32
	Lodgepole Pine (residues)	Chips	150	80
	Red Alder (residues)	Chips	5,355	29
	Subalpine Fir (residues)	Chips	11,146	82
	Trembling Aspen (residues)	Chips	45	32
	Western Hemlock (residues)	Chips	18,228	74
	Western Red Cedar (residues)	Chips	8,029	82
	Western White Pine (residues)	Chips	108	23
	White Spruce (residues)	Chips	925	101
	Yellow Cedar (residues)	Chips	2,329	97
			98,477	51

Victoria				
	Douglas Fir (residues)	Chips	4,130	26
	Lodgepole Pine (residues)	Chips	20	38
	Red Alder (residues)	Chips	273	32
	Subalpine Fir (residues)	Chips	0	28
	Western Hemlock (residues)	Chips	43	25
	Western Red Cedar (residues)	Chips	301	23
	Western White Pine (residues)	Chips	0	27
			4,767	26
Port Alberni				
	Douglas Fir (residues)	Chips	59,160	64
	Lodgepole Pine (residues)	Chips	224	78
	Red Alder (residues)	Chips	10,486	67
	Subalpine Fir (residues)	Chips	27,155	118
	Trembling Aspen (residues)	Chips	14	51
	Western Hemlock (residues)	Chips	114,654	118
	Western Red Cedar (residues)	Chips	99,641	126
	Western White Pine (residues)	Chips	16	119
	White Spruce (residues)	Chips	1,630	127
	Yellow Cedar (residues)	Chips	18,421	130
			331,401	110
			451,406	93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140
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190
200
210
220
230
N
2 km
3994 selected block(s) / 3994
Area covered: 12,783 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	12,783.5 ha
Number of cut blocks	3994
Recovered biomass	451,406.1 odt
Biomass yield	35.3 odt/ha
Biomass odt / Merchantable m^3	0.0628 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	28 : 1
Available energy	1,740,385 MWh
Fuel consumption	15.6 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	27.55 $/odt
Transfer yard	0.00 $/odt
Transportation	49.42 $/odt
Loading/unloading	13.39 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.26 $/odt
Indirect costs	0.00 $/odt
Total	91.62 $/odt

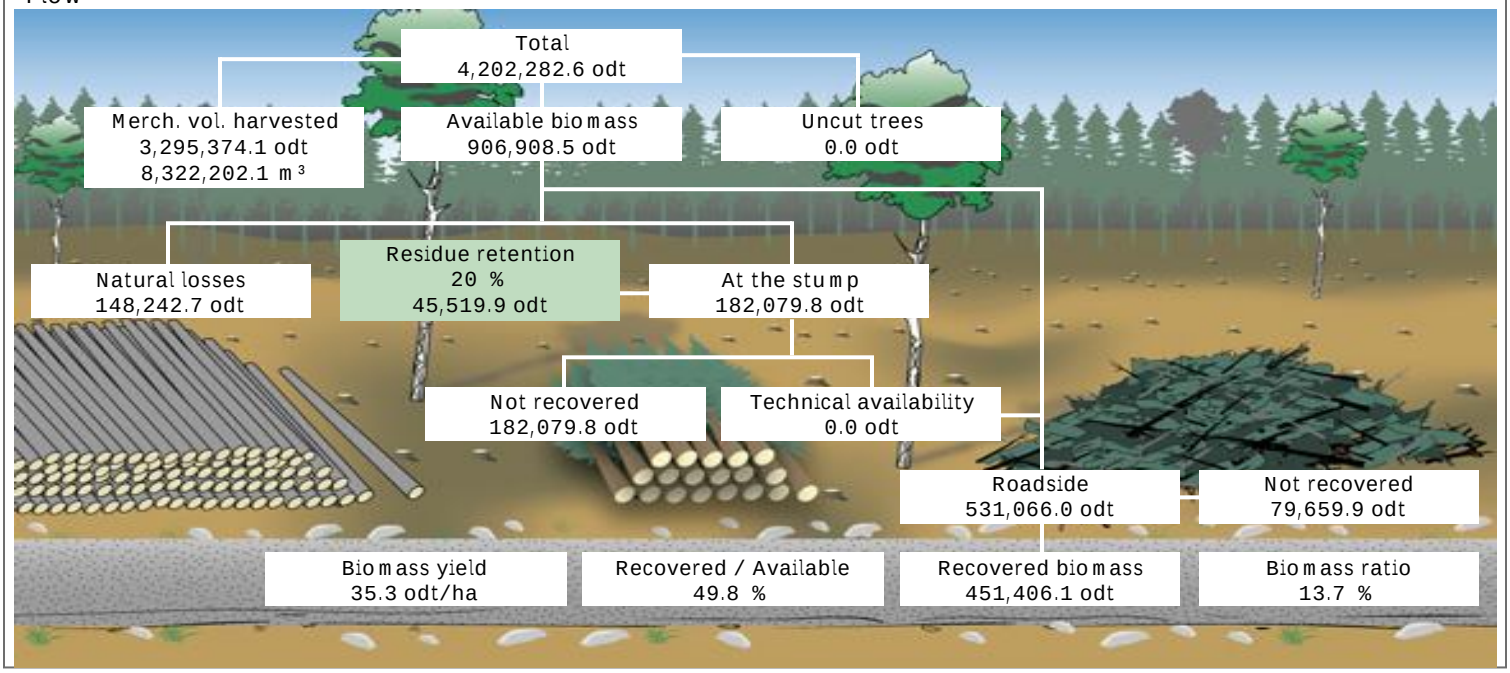
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-91.62 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
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Douglas Fir (residues)	131,240.4	0.0645	10.27
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Subalpine Fir (residues)	38,302.5	0.0563	3.00
Yellow Cedar (residues)	20,749.7	0.0502	1.62
Red Alder (residues)	16,653.0	0.0991	1.30
White Spruce (residues)	2,570.0	0.0600	0.20
Lodgepole Pine (residues)	399.2	0.0528	0.03
Western White Pine (residues)	123.9	0.0884	0.01
Trembling Aspen (residues)	58.8	0.0670	0.00
	451,406.1	0.0628	35.31

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	451,406.1	12,783.5	3,994
• Recovery season			
Summer	0.0	0.0	0
Winter	451,406.1	12,783.5	3,994
• Residue freshness			
Fresh	0.0	0.0	0
Brown	451,406.1	12,783.5	3,994
Brittle	0.0	0.0	0

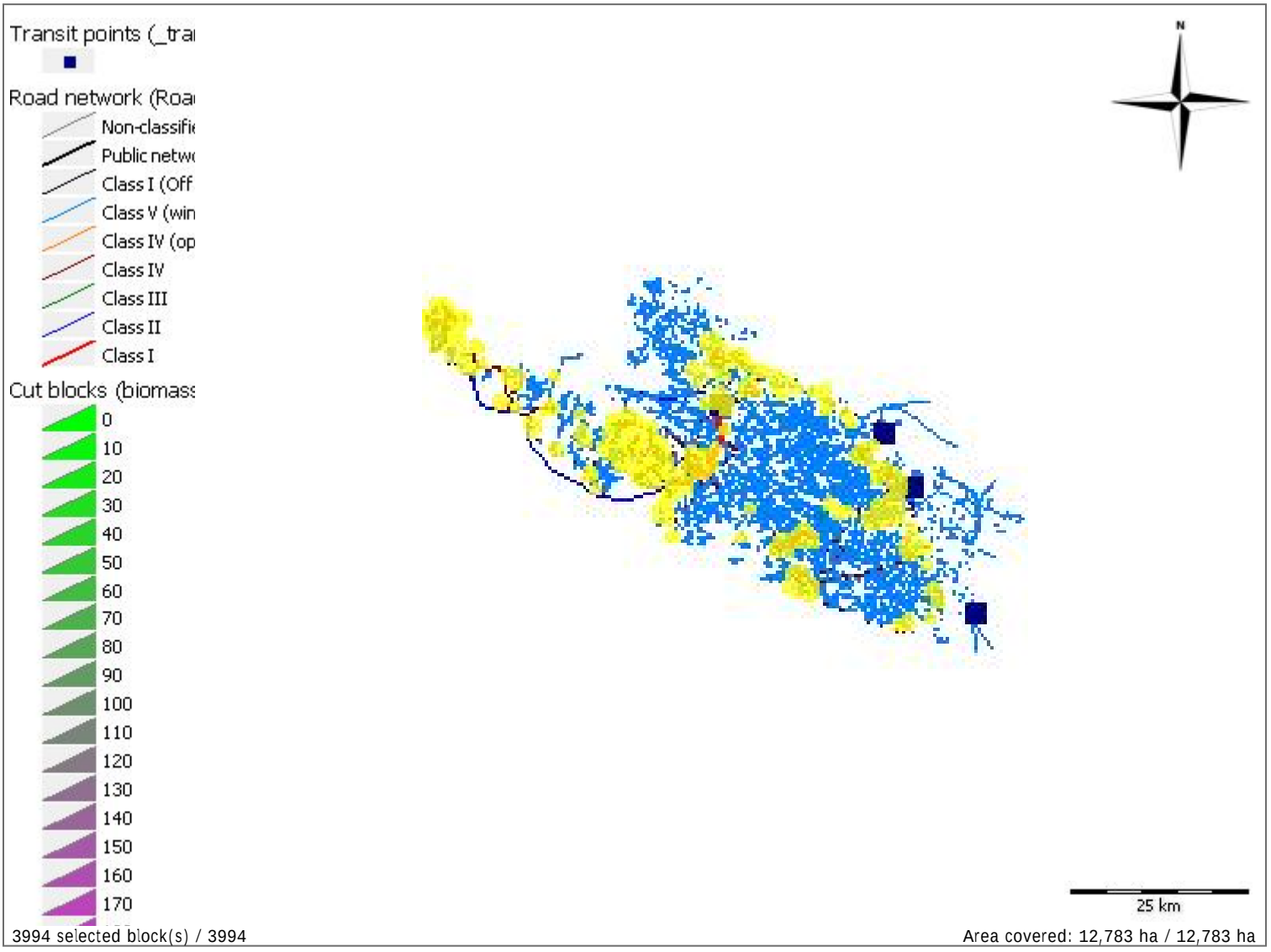
Supply summary

Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	161.3	161.3
40 $/odt	0.0	725.6	725.6
50 $/odt	0.0	21,797.4	21,797.4
60 $/odt	0.0	65,385.6	65,385.6
70 $/odt	0.0	117,387.9	117,387.9
80 $/odt	0.0	188,326.0	188,326.0
90 $/odt	0.0	270,617.8	270,617.8
100 $/odt	0.0	329,909.0	329,909.0
110 $/odt	0.0	346,262.6	346,262.6
120 $/odt	0.0	355,485.0	355,485.0
130 $/odt	0.0	368,902.7	368,902.7
140 $/odt	0.0	399,292.2	399,292.2
150 $/odt	0.0	426,354.3	426,354.3
160 $/odt	0.0	435,960.2	435,960.2
170 $/odt	0.0	441,911.2	441,911.2
180 $/odt	0.0	445,360.8	445,360.8
190 $/odt	0.0	448,675.0	448,675.0
200 $/odt	0.0	451,192.1	451,192.1
210 $/odt	0.0	451,258.9	451,258.9
220 $/odt	0.0	451,379.4	451,379.4
230 $/odt	0.0	451,406.1	451,406.1
Maximum cost	0.00 $/odt	229.02 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock (residues)	Chips	91	0
	Western Red Cedar (residues)	Chips	55	0
	White Spruce (residues)	Chips	15	0
			161	0
Nanaimo				
	Douglas Fir (residues)	Chips	15,789	23
	Lodgepole Pine (residues)	Chips	5	34
	Red Alder (residues)	Chips	539	27
	Subalpine Fir (residues)	Chips	2	27
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	90	25
	Western Red Cedar (residues)	Chips	175	32
			16,599	23
Chemainus				
	Douglas Fir (residues)	Chips	52,161	32
	Lodgepole Pine (residues)	Chips	150	80
	Red Alder (residues)	Chips	5,355	29
	Subalpine Fir (residues)	Chips	11,146	82
	Trembling Aspen (residues)	Chips	45	32
	Western Hemlock (residues)	Chips	18,228	74
	Western Red Cedar (residues)	Chips	8,029	82
	Western White Pine (residues)	Chips	108	23
	White Spruce (residues)	Chips	925	101
	Yellow Cedar (residues)	Chips	2,329	97
			98,477	51

Victoria				
	Douglas Fir (residues)	Chips	4,130	26
	Lodgepole Pine (residues)	Chips	20	38
	Red Alder (residues)	Chips	273	32
	Subalpine Fir (residues)	Chips	0	28
	Western Hemlock (residues)	Chips	43	25
	Western Red Cedar (residues)	Chips	301	23
	Western White Pine (residues)	Chips	0	27
			4,767	26
Port Alberni				
	Douglas Fir (residues)	Chips	59,160	64
	Lodgepole Pine (residues)	Chips	224	78
	Red Alder (residues)	Chips	10,486	67
	Subalpine Fir (residues)	Chips	27,155	118
	Trembling Aspen (residues)	Chips	14	51
	Western Hemlock (residues)	Chips	114,654	118
	Western Red Cedar (residues)	Chips	99,641	126
	Western White Pine (residues)	Chips	16	119
	White Spruce (residues)	Chips	1,630	127
	Yellow Cedar (residues)	Chips	18,421	130
			331,401	110
			451,406	93


Transit points (_trai
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Cut blocks (biomass
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25 km
3994 selected block(s) / 3994
Area covered: 12,783 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	3,588.7 ha
Number of cut blocks	1189
Recovered biomass	121,746.5 odt
Biomass yield	33.9 odt/ha
Biomass odt / Merchantable m^3	0.0590 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	29 : 1
Available energy	470,711 MWh
Fuel consumption	15.5 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	27.55 $/odt
Transfer yard	0.00 $/odt
Transportation	48.60 $/odt
Loading/unloading	11.58 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.23 $/odt
Indirect costs	0.00 $/odt
Total	88.96 $/odt

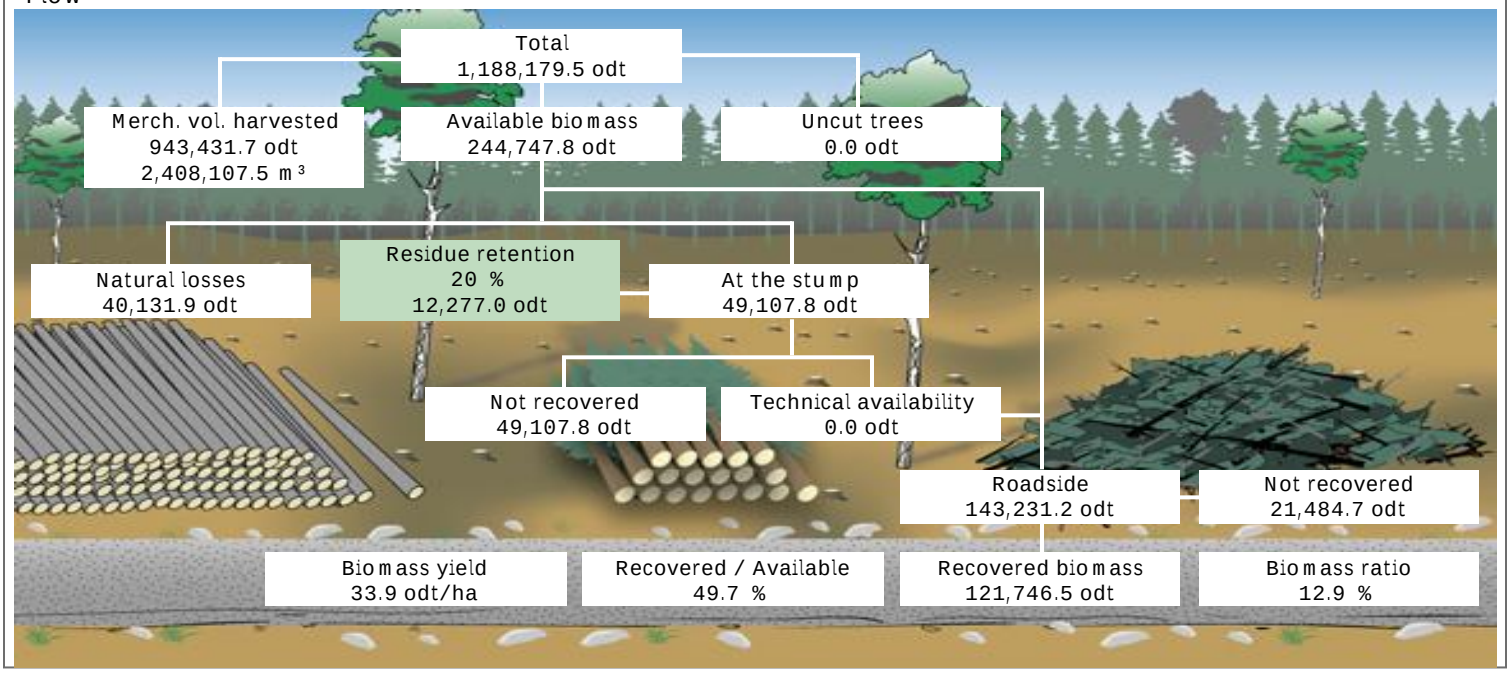
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-88.96 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	35,477.5	0.0579	9.89
Western Red Cedar (residues)	32,202.6	0.0622	8.97
Douglas Fir (residues)	27,542.2	0.0581	7.67
Subalpine Fir (residues)	12,871.0	0.0565	3.59
Yellow Cedar (residues)	8,823.3	0.0506	2.46
Red Alder (residues)	3,892.9	0.0930	1.08
White Spruce (residues)	641.2	0.0604	0.18
Lodgepole Pine (residues)	189.1	0.0494	0.05
Western White Pine (residues)	104.2	0.0877	0.03
Trembling Aspen (residues)	2.5	0.0607	0.00
	121,746.5	0.0590	33.93

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	121,746.5	3,588.7	1,189
• Recovery season			
Summer	0.0	0.0	0
Winter	121,746.5	3,588.7	1,189
• Residue freshness			
Fresh	0.0	0.0	0
Brown	121,746.5	3,588.7	1,189
Brittle	0.0	0.0	0

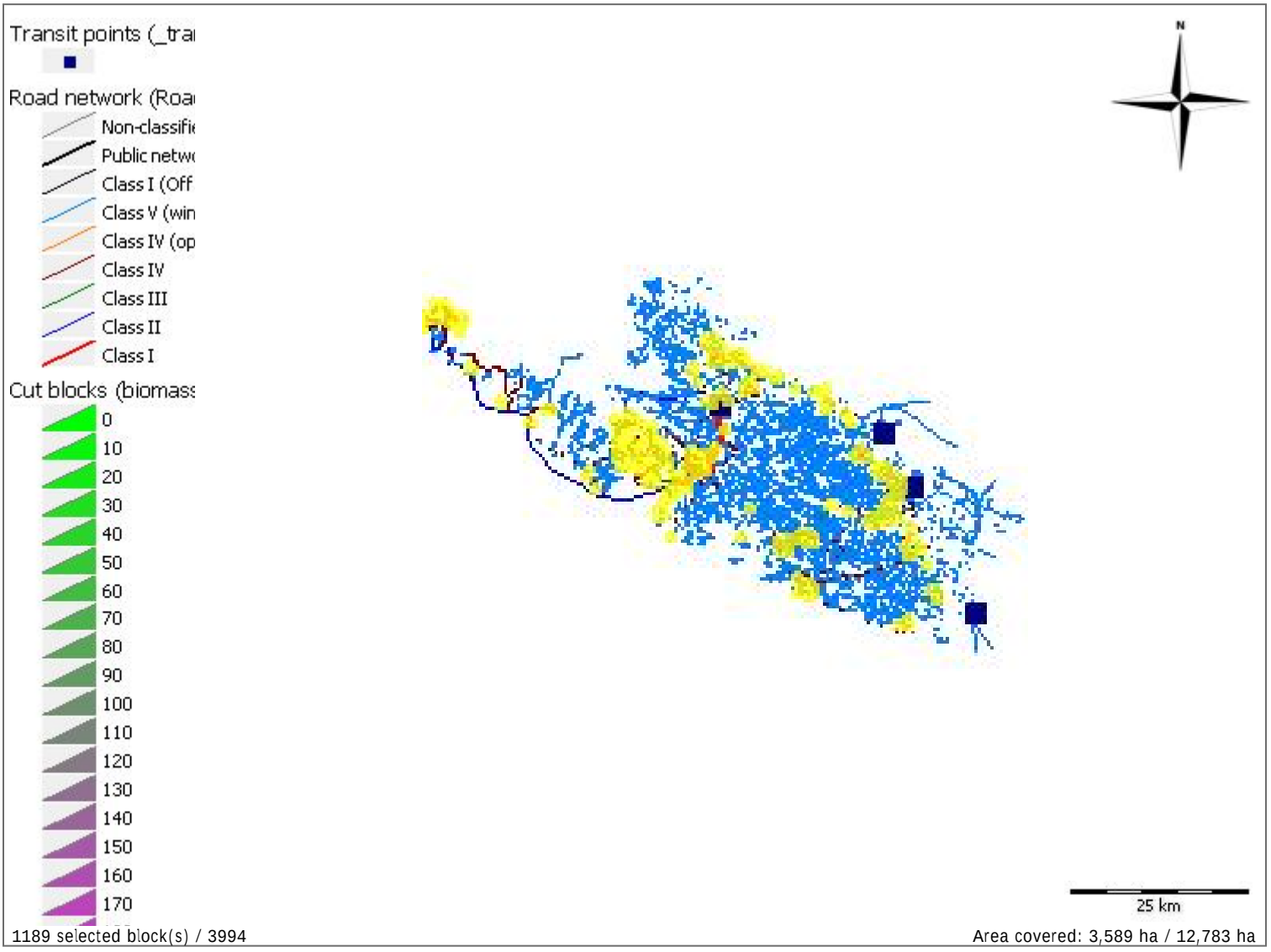
Supply summary

Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	161.3	161.3
40 $/odt	0.0	161.3	161.3
50 $/odt	0.0	5,877.2	5,877.2
60 $/odt	0.0	15,569.6	15,569.6
70 $/odt	0.0	31,015.5	31,015.5
80 $/odt	0.0	52,078.1	52,078.1
90 $/odt	0.0	76,382.6	76,382.6
100 $/odt	0.0	90,596.0	90,596.0
110 $/odt	0.0	96,829.9	96,829.9
120 $/odt	0.0	100,283.3	100,283.3
130 $/odt	0.0	102,338.2	102,338.2
140 $/odt	0.0	111,377.4	111,377.4
150 $/odt	0.0	120,608.5	120,608.5
160 $/odt	0.0	121,513.3	121,513.3
170 $/odt	0.0	121,675.9	121,675.9
180 $/odt	0.0	121,746.5	121,746.5
Maximum cost	0.00 $/odt	171.11 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock (residues)	Chips	91	0
	Western Red Cedar (residues)	Chips	55	0
	White Spruce (residues)	Chips	15	0
			161	0
Nanaimo				
	Douglas Fir (residues)	Chips	4,521	22
	Lodgepole Pine (residues)	Chips	3	33
	Red Alder (residues)	Chips	205	27
	Subalpine Fir (residues)	Chips	1	28
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	49	25
	Western Red Cedar (residues)	Chips	65	30
			4,844	22
Chemainus				
	Douglas Fir (residues)	Chips	11,783	25
	Lodgepole Pine (residues)	Chips	110	95
	Red Alder (residues)	Chips	1,457	23
	Subalpine Fir (residues)	Chips	5,404	84
	Trembling Aspen (residues)	Chips	1	32
	Western Hemlock (residues)	Chips	6,404	83
	Western Red Cedar (residues)	Chips	3,192	93
	Western White Pine (residues)	Chips	103	23
	White Spruce (residues)	Chips	17	107
	Yellow Cedar (residues)	Chips	1,650	101
			30,122	59

Victoria				
	Douglas Fir (residues)	Chips	1,233	27
	Lodgepole Pine (residues)	Chips	1	27
	Red Alder (residues)	Chips	87	35
	Subalpine Fir (residues)	Chips	0	28
	Western Hemlock (residues)	Chips	5	27
	Western Red Cedar (residues)	Chips	8	24
			1,334	28
Port Alberni				
	Douglas Fir (residues)	Chips	10,006	59
	Lodgepole Pine (residues)	Chips	75	54
	Red Alder (residues)	Chips	2,144	50
	Subalpine Fir (residues)	Chips	7,465	102
	Trembling Aspen (residues)	Chips	1	42
	Western Hemlock (residues)	Chips	28,928	110
	Western Red Cedar (residues)	Chips	28,882	125
	Western White Pine (residues)	Chips	1	171
	White Spruce (residues)	Chips	609	118
	Yellow Cedar (residues)	Chips	7,174	116
			85,284	107
			121,747	91


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
1189 selected block(s) / 3994
Area covered: 3,589 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	3,201.6 ha
Number of cut blocks	999
Recovered biomass	111,573.2 odt
Biomass yield	34.8 odt/ha
Biomass odt / Merchantable m^3	0.0585 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	28 : 1
Available energy	430,520 MWh
Fuel consumption	15.6 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	27.55 $/odt
Transfer yard	0.00 $/odt
Transportation	48.72 $/odt
Loading/unloading	11.31 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.26 $/odt
Indirect costs	0.00 $/odt
Total	88.84 $/odt

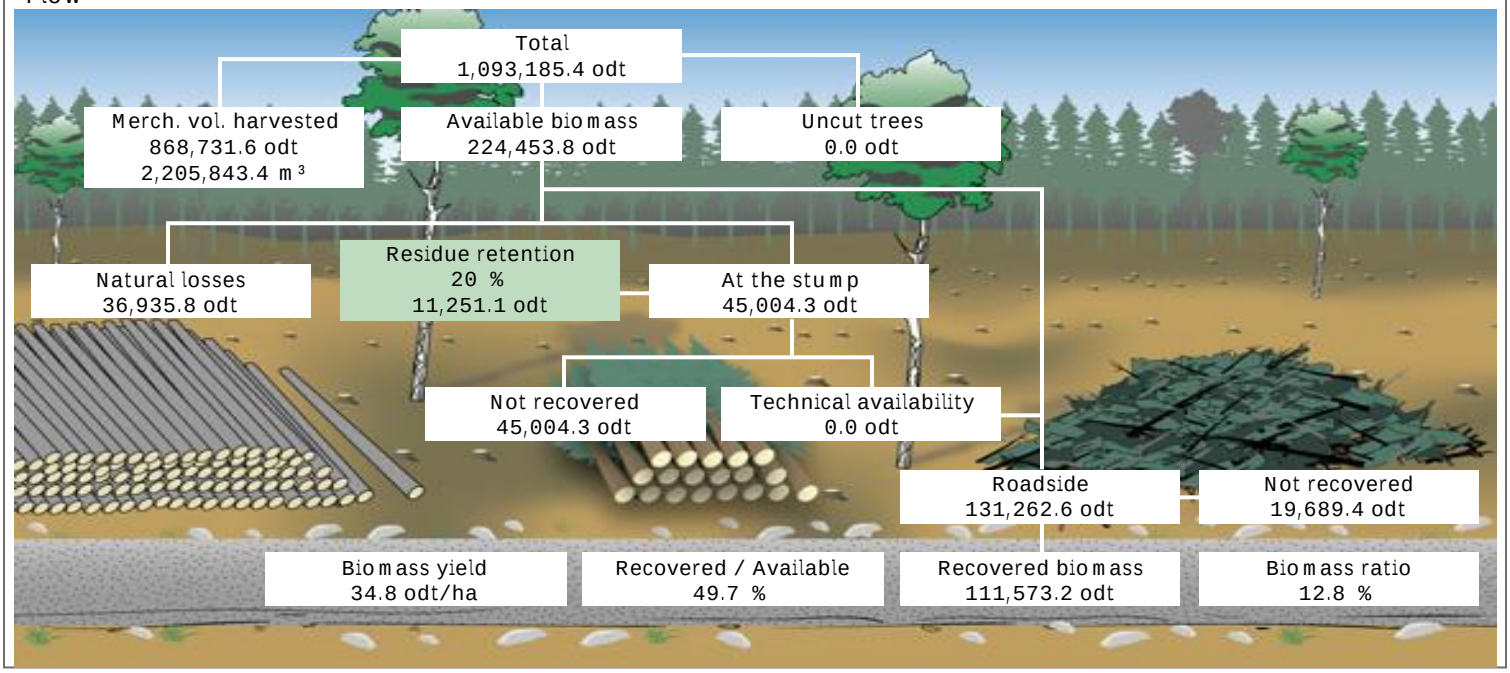
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-88.84 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	32,448.2	0.0571	10.14
Douglas Fir (residues)	30,154.4	0.0582	9.42
Western Red Cedar (residues)	28,938.2	0.0610	9.04
Subalpine Fir (residues)	10,931.4	0.0556	3.41
Yellow Cedar (residues)	5,067.5	0.0487	1.58
Red Alder (residues)	3,690.7	0.0939	1.15
White Spruce (residues)	242.4	0.0623	0.08
Lodgepole Pine (residues)	83.3	0.0576	0.03
Trembling Aspen (residues)	15.8	0.0679	0.00
Western White Pine (residues)	1.1	0.0761	0.00
	111,573.2	0.0585	34.85

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	111,573.2	3,201.6	999
• Recovery season			
Summer	0.0	0.0	0
Winter	111,573.2	3,201.6	999
• Residue freshness			
Fresh	0.0	0.0	0
Brown	111,573.2	3,201.6	999
Brittle	0.0	0.0	0

Supply summary

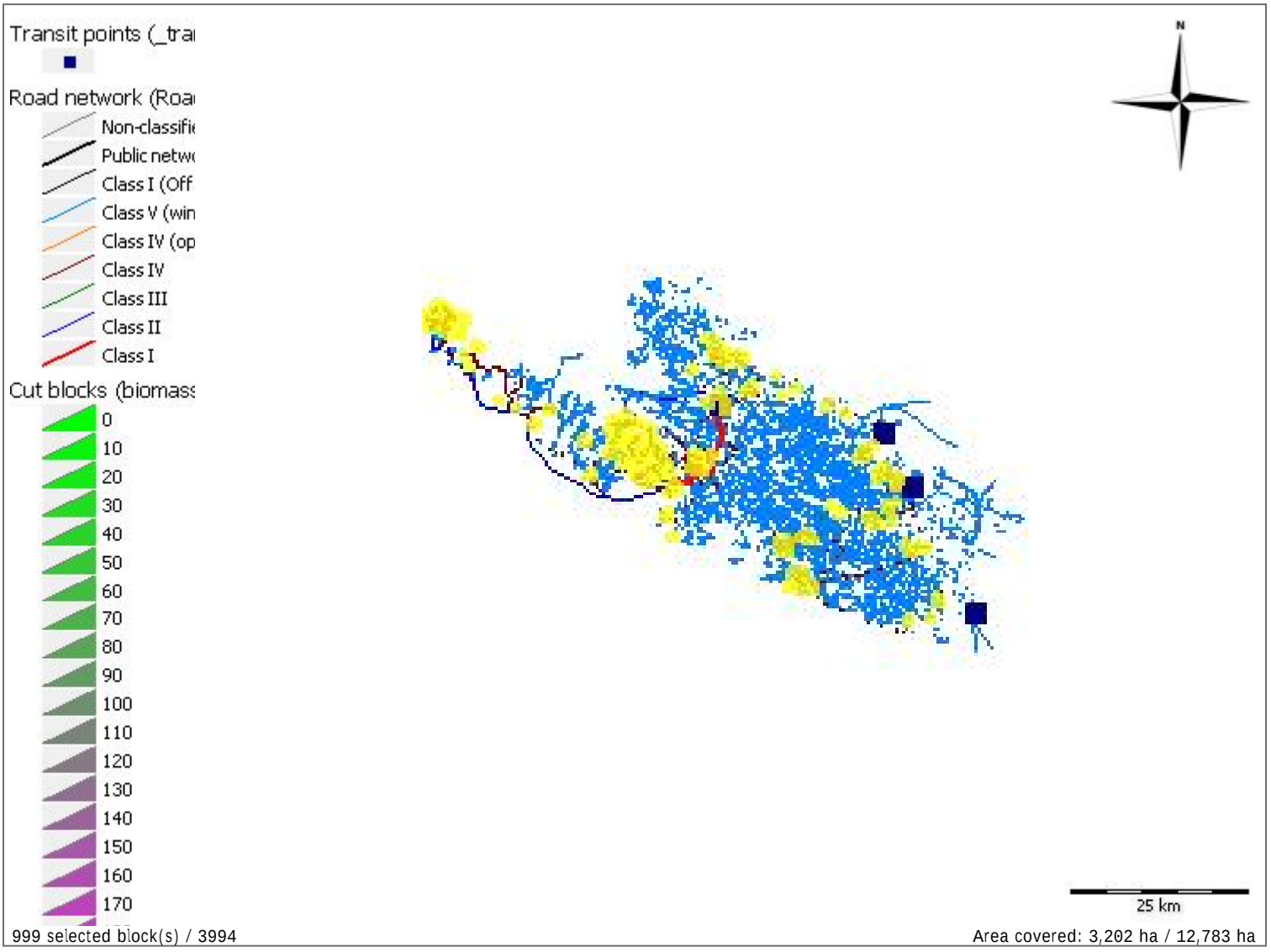
Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	0.0	0.0
40 $/odt	0.0	304.7	304.7
50 $/odt	0.0	6,322.0	6,322.0
60 $/odt	0.0	15,781.9	15,781.9
70 $/odt	0.0	27,161.9	27,161.9
80 $/odt	0.0	48,754.5	48,754.5
90 $/odt	0.0	68,860.4	68,860.4
100 $/odt	0.0	86,330.6	86,330.6
110 $/odt	0.0	89,086.8	89,086.8
120 $/odt	0.0	90,660.9	90,660.9
130 $/odt	0.0	92,215.7	92,215.7
140 $/odt	0.0	99,257.2	99,257.2
150 $/odt	0.0	110,829.0	110,829.0
160 $/odt	0.0	111,573.2	111,573.2
Maximum cost	0.00 $/odt	158.89 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
Nanaimo				
	Douglas Fir (residues)	Chips	4,053	22
	Lodgepole Pine (residues)	Chips	2	34
	Red Alder (residues)	Chips	104	27
	Subalpine Fir (residues)	Chips	0	19
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	28	26
	Western Red Cedar (residues)	Chips	34	31
			4,221	22
Chemainus				
	Douglas Fir (residues)	Chips	12,190	28
	Lodgepole Pine (residues)	Chips	4	111
	Red Alder (residues)	Chips	1,402	30
	Subalpine Fir (residues)	Chips	3,570	80
	Trembling Aspen (residues)	Chips	14	33
	Western Hemlock (residues)	Chips	4,377	77
	Western Red Cedar (residues)	Chips	1,854	80
	Western White Pine (residues)	Chips	0	22
	White Spruce (residues)	Chips	23	98
	Yellow Cedar (residues)	Chips	494	90
			23,929	50
Victoria				
	Douglas Fir (residues)	Chips	943	23
	Red Alder (residues)	Chips	89	34
	Western Hemlock (residues)	Chips	7	24
	Western Red Cedar (residues)	Chips	95	21
			1,134	24

Port Alberni

Douglas Fir (residues)	Chips	12,969	52
Lodgepole Pine (residues)	Chips	78	103
Red Alder (residues)	Chips	2,095	48
Subalpine Fir (residues)	Chips	7,361	124
Trembling Aspen (residues)	Chips	2	65
Western Hemlock (residues)	Chips	28,035	123
Western Red Cedar (residues)	Chips	26,956	125
Western White Pine (residues)	Chips	1	47
White Spruce (residues)	Chips	219	96
Yellow Cedar (residues)	Chips	4,573	109
		82,289	110
		111,573	93


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
999 selected block(s) / 3994
Area covered: 3,202 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	3,041.0 ha
Number of cut blocks	960
Recovered biomass	109,008.3 odt
Biomass yield	35.8 odt/ha
Biomass odt / Merchantable m^3	0.0631 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	28 : 1
Available energy	420,063 MWh
Fuel consumption	15.6 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	27.55 $/odt
Transfer yard	0.00 $/odt
Transportation	49.12 $/odt
Loading/unloading	13.32 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.27 $/odt
Indirect costs	0.00 $/odt
Total	91.26 $/odt

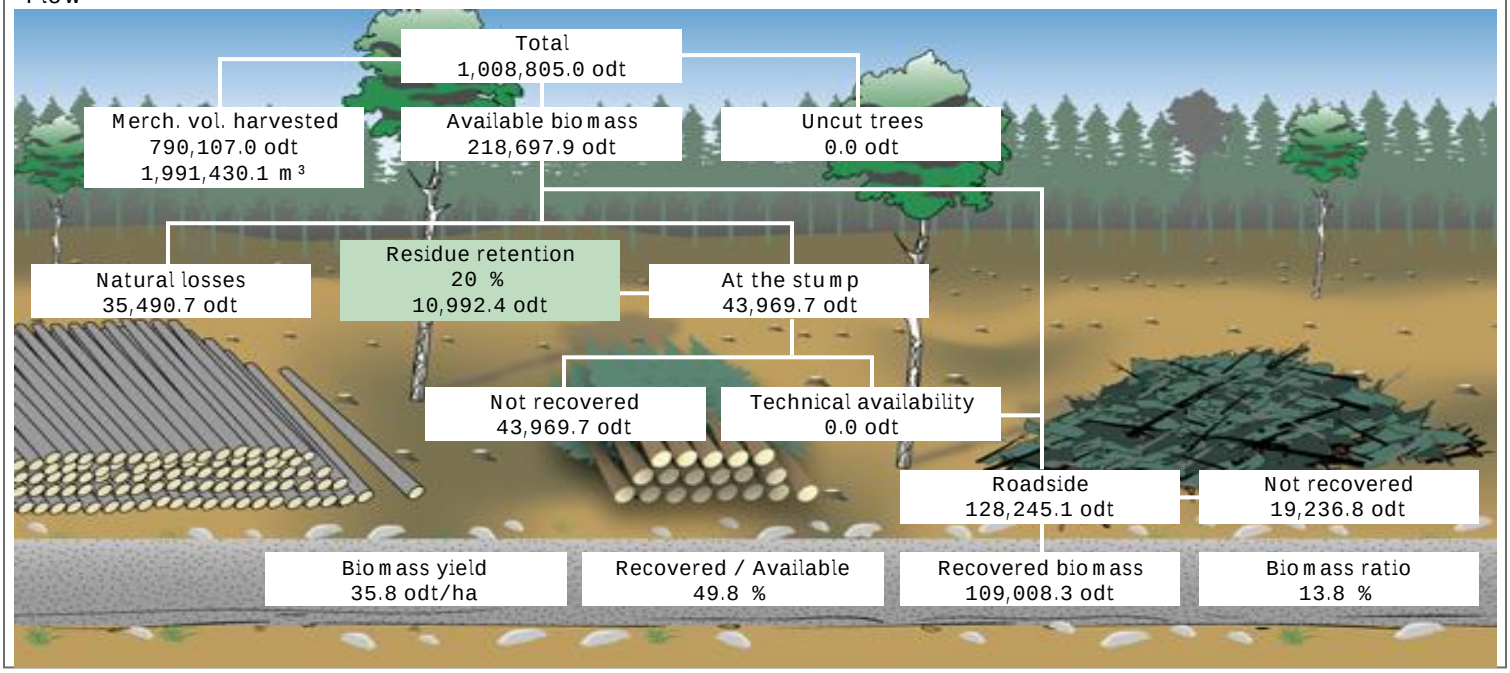
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-91.26 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	33,437.8	0.0609	11.00
Douglas Fir (residues)	32,098.6	0.0645	10.56
Western Red Cedar (residues)	27,097.3	0.0648	8.91
Subalpine Fir (residues)	7,820.9	0.0560	2.57
Red Alder (residues)	3,973.9	0.1021	1.31
Yellow Cedar (residues)	3,729.2	0.0525	1.23
White Spruce (residues)	746.8	0.0650	0.25
Lodgepole Pine (residues)	74.4	0.0602	0.02
Trembling Aspen (residues)	23.0	0.0689	0.01
Western White Pine (residues)	6.5	0.0798	0.00
	109,008.3	0.0631	35.85

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	109,008.3	3,041.0	960
• Recovery season			
Summer	0.0	0.0	0
Winter	109,008.3	3,041.0	960
• Residue freshness			
Fresh	0.0	0.0	0
Brown	109,008.3	3,041.0	960
Brittle	0.0	0.0	0

Supply summary

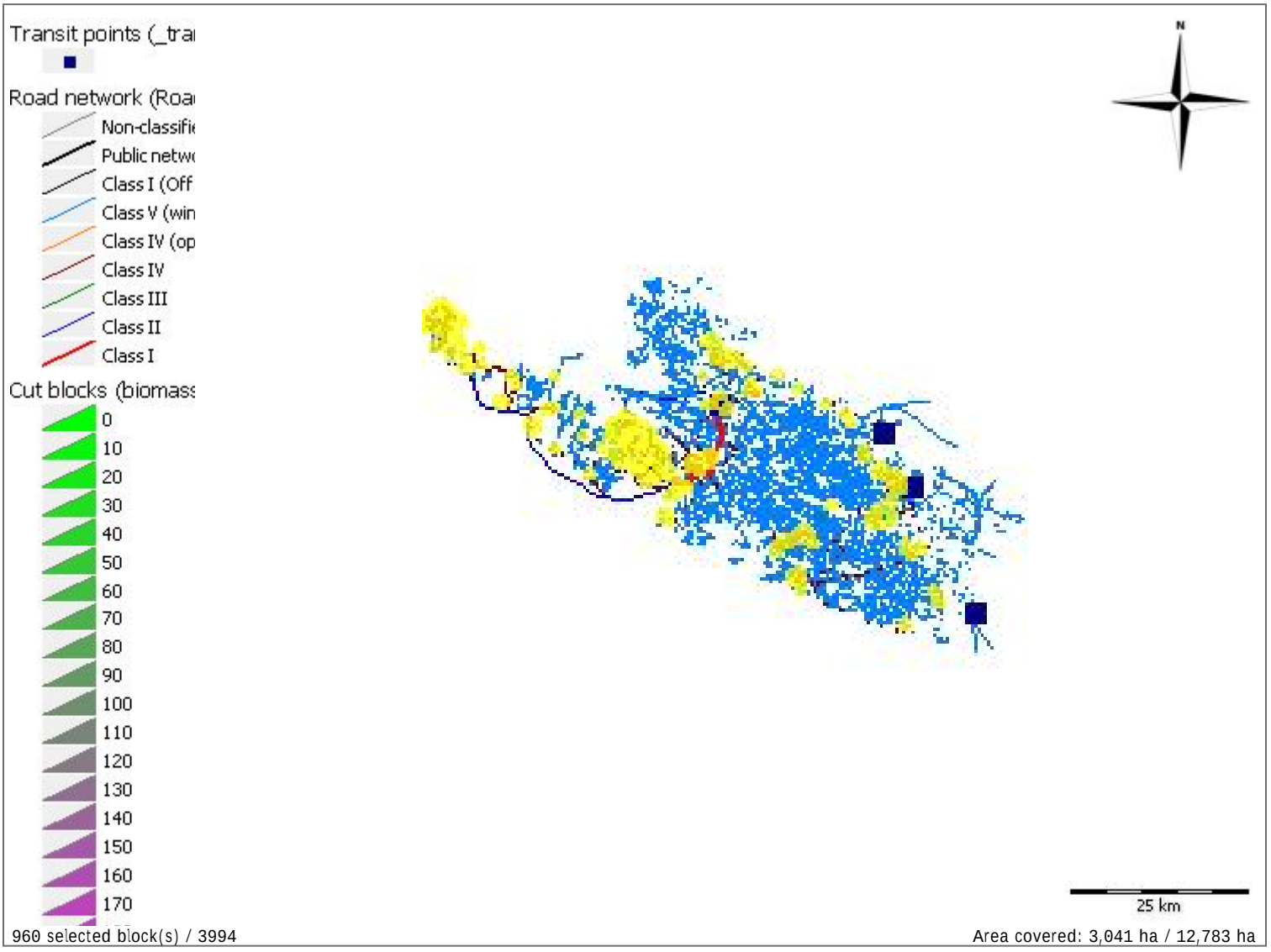
Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	0.0	0.0
40 $/odt	0.0	0.0	0.0
50 $/odt	0.0	5,682.7	5,682.7
60 $/odt	0.0	15,809.7	15,809.7
70 $/odt	0.0	29,008.7	29,008.7
80 $/odt	0.0	44,461.0	44,461.0
90 $/odt	0.0	64,455.4	64,455.4
100 $/odt	0.0	78,434.9	78,434.9
110 $/odt	0.0	82,775.5	82,775.5
120 $/odt	0.0	84,883.3	84,883.3
130 $/odt	0.0	89,257.8	89,257.8
140 $/odt	0.0	99,156.7	99,156.7
150 $/odt	0.0	104,058.1	104,058.1
160 $/odt	0.0	107,381.8	107,381.8
170 $/odt	0.0	108,207.7	108,207.7
180 $/odt	0.0	108,236.6	108,236.6
190 $/odt	0.0	108,804.8	108,804.8
200 $/odt	0.0	109,008.3	109,008.3
Maximum cost	0.00 $/odt	190.63 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
Nanaimo				
	Douglas Fir (residues)	Chips	3,779	24
	Red Alder (residues)	Chips	139	26
	Western Hemlock (residues)	Chips	7	20
	Western Red Cedar (residues)	Chips	43	33
			3,968	24
Chemainus				
	Douglas Fir (residues)	Chips	13,090	33
	Lodgepole Pine (residues)	Chips	33	24
	Red Alder (residues)	Chips	1,234	31
	Subalpine Fir (residues)	Chips	1,288	82
	Trembling Aspen (residues)	Chips	19	32
	Western Hemlock (residues)	Chips	4,092	70
	Western Red Cedar (residues)	Chips	1,734	78
	Western White Pine (residues)	Chips	2	21
	White Spruce (residues)	Chips	334	100
	Yellow Cedar (residues)	Chips	122	78
			21,948	47
Victoria				
	Douglas Fir (residues)	Chips	939	25
	Lodgepole Pine (residues)	Chips	14	41
	Red Alder (residues)	Chips	37	30
	Western Hemlock (residues)	Chips	22	24
	Western Red Cedar (residues)	Chips	101	22
			1,113	25

Port Alberni

Douglas Fir (residues)	Chips	14,290	59
Lodgepole Pine (residues)	Chips	27	114
Red Alder (residues)	Chips	2,564	69
Subalpine Fir (residues)	Chips	6,533	134
Trembling Aspen (residues)	Chips	4	62
Western Hemlock (residues)	Chips	29,317	117
Western Red Cedar (residues)	Chips	25,219	122
Western White Pine (residues)	Chips	5	46
White Spruce (residues)	Chips	412	156
Yellow Cedar (residues)	Chips	3,607	145
		81,979	110
		109,008	93


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
960 selected block(s) / 3994
Area covered: 3,041 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	2,952.3 ha
Number of cut blocks	846
Recovered biomass	109,078.1 odt
Biomass yield	36.9 odt/ha
Biomass odt / Merchantable m^3	0.0730 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	28 : 1
Available energy	419,090 MWh
Fuel consumption	15.9 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	27.55 $/odt
Transfer yard	0.00 $/odt
Transportation	51.32 $/odt
Loading/unloading	17.63 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.28 $/odt
Indirect costs	0.00 $/odt
Total	97.78 $/odt

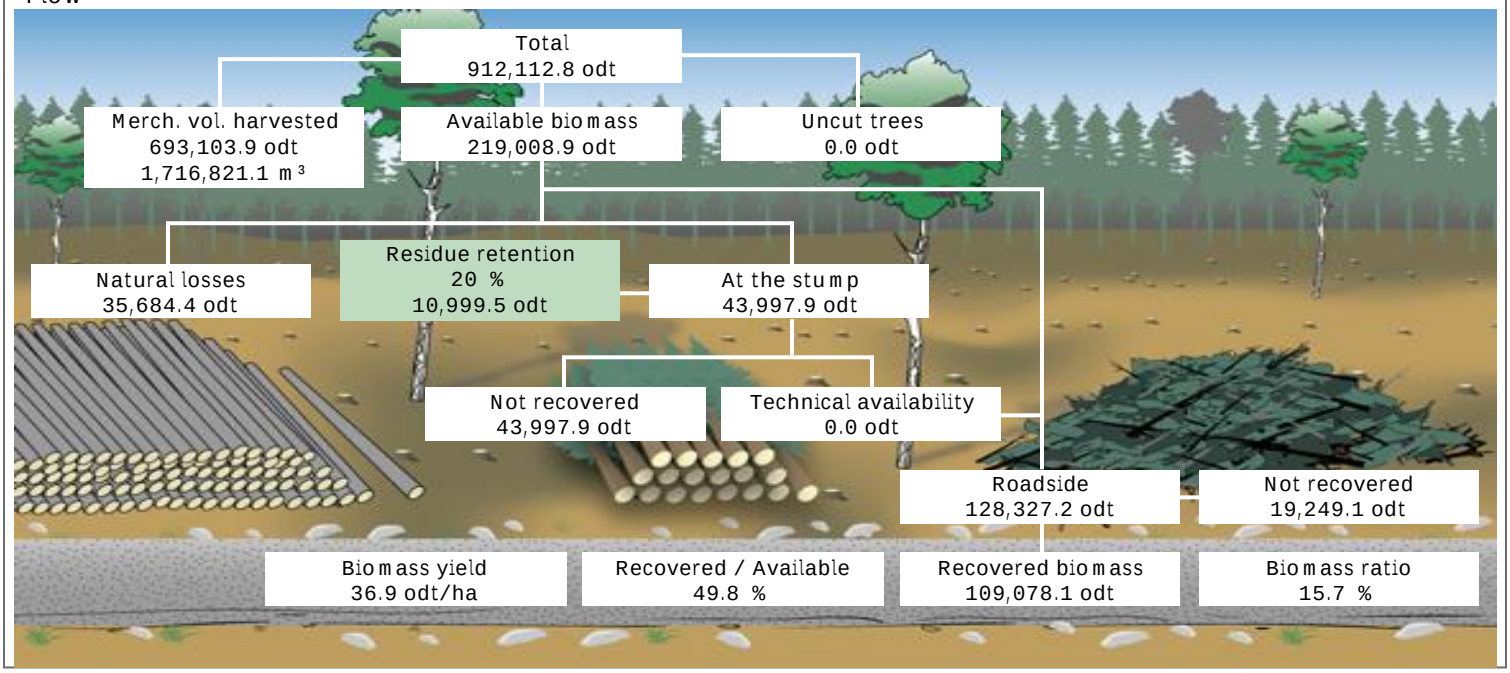
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-97.78 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Douglas Fir (residues)	41,445.2	0.0762	14.04
Western Hemlock (residues)	31,743.9	0.0742	10.75
Western Red Cedar (residues)	19,962.9	0.0722	6.76
Subalpine Fir (residues)	6,679.3	0.0578	2.26
Red Alder (residues)	5,095.5	0.1063	1.73
Yellow Cedar (residues)	3,129.6	0.0487	1.06
White Spruce (residues)	939.6	0.0557	0.32
Lodgepole Pine (residues)	52.5	0.0501	0.02
Trembling Aspen (residues)	17.5	0.0647	0.01
Western White Pine (residues)	12.1	0.1035	0.00
	109,078.1	0.0730	36.95

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	109,078.1	2,952.3	846
• Recovery season			
Summer	0.0	0.0	0
Winter	109,078.1	2,952.3	846
• Residue freshness			
Fresh	0.0	0.0	0
Brown	109,078.1	2,952.3	846
Brittle	0.0	0.0	0

Supply summary

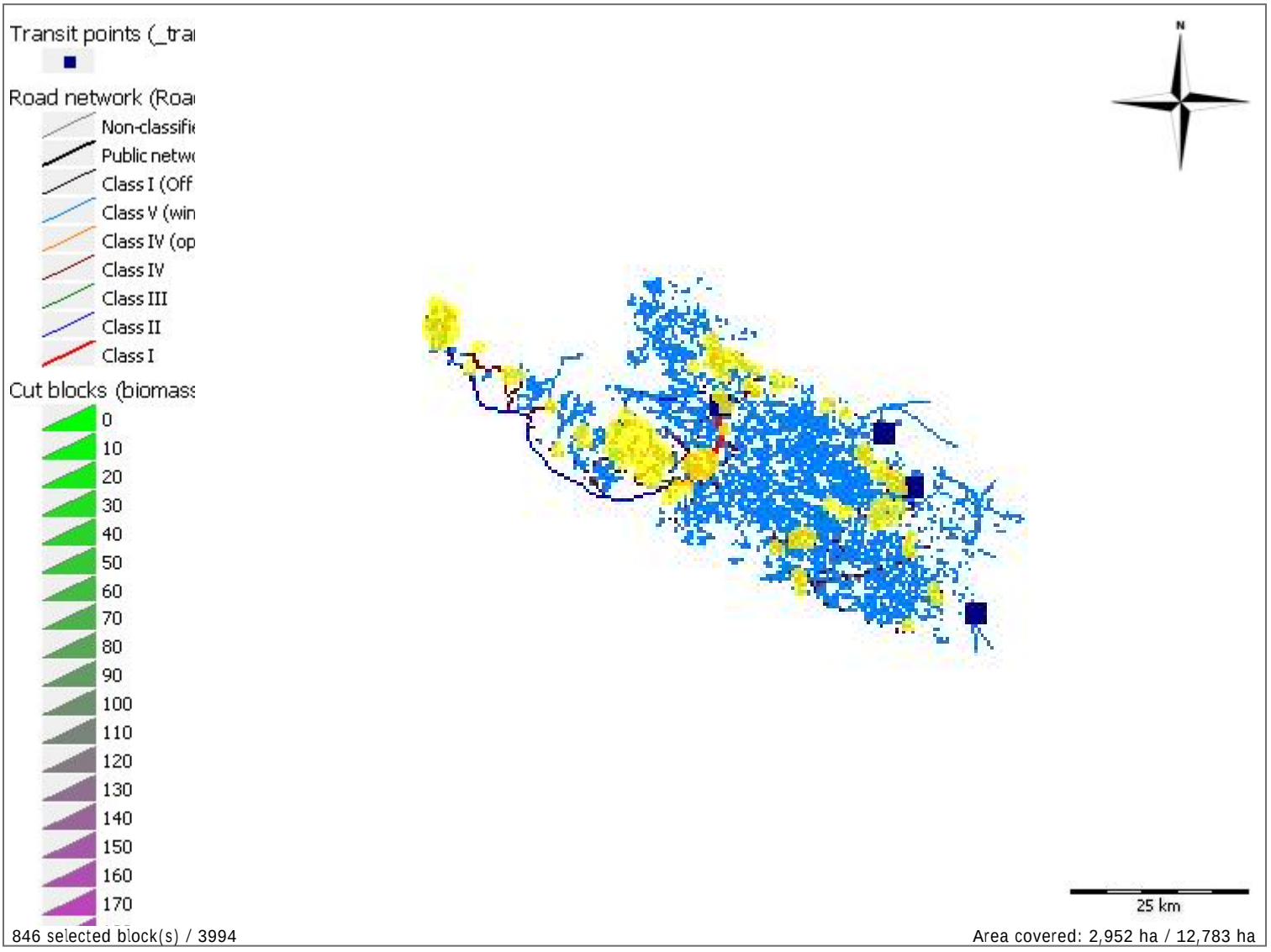
Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	0.0	0.0
40 $/odt	0.0	259.6	259.6
50 $/odt	0.0	3,915.4	3,915.4
60 $/odt	0.0	18,224.4	18,224.4
70 $/odt	0.0	30,201.9	30,201.9
80 $/odt	0.0	43,032.4	43,032.4
90 $/odt	0.0	60,919.4	60,919.4
100 $/odt	0.0	74,547.4	74,547.4
110 $/odt	0.0	77,570.4	77,570.4
120 $/odt	0.0	79,657.4	79,657.4
130 $/odt	0.0	85,091.0	85,091.0
140 $/odt	0.0	89,500.9	89,500.9
150 $/odt	0.0	90,858.7	90,858.7
160 $/odt	0.0	95,492.0	95,492.0
170 $/odt	0.0	100,454.4	100,454.4
180 $/odt	0.0	103,804.5	103,804.5
190 $/odt	0.0	106,550.5	106,550.5
200 $/odt	0.0	108,864.1	108,864.1
210 $/odt	0.0	108,930.9	108,930.9
220 $/odt	0.0	109,051.4	109,051.4
230 $/odt	0.0	109,078.1	109,078.1
Maximum cost	0.00 $/odt	229.02 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
Nanaimo				
	Douglas Fir (residues)	Chips	3,436	23
	Lodgepole Pine (residues)	Chips	1	35
	Red Alder (residues)	Chips	91	28
	Western Hemlock (residues)	Chips	6	22
	Western Red Cedar (residues)	Chips	32	34
			3,566	23
Chemainus				
	Douglas Fir (residues)	Chips	15,098	39
	Lodgepole Pine (residues)	Chips	3	108
	Red Alder (residues)	Chips	1,262	31
	Subalpine Fir (residues)	Chips	884	82
	Trembling Aspen (residues)	Chips	10	31
	Western Hemlock (residues)	Chips	3,354	58
	Western Red Cedar (residues)	Chips	1,250	67
	Western White Pine (residues)	Chips	3	24
	White Spruce (residues)	Chips	550	102
	Yellow Cedar (residues)	Chips	63	86
			22,477	46
Victoria				
	Douglas Fir (residues)	Chips	1,015	26
	Lodgepole Pine (residues)	Chips	5	34
	Red Alder (residues)	Chips	60	29
	Western Hemlock (residues)	Chips	9	25
	Western Red Cedar (residues)	Chips	97	25
	Western White Pine (residues)	Chips	0	27
			1,186	26

Port Alberni

	Douglas Fir (residues)	Chips	21,895	77
	Lodgepole Pine (residues)	Chips	44	53
	Red Alder (residues)	Chips	3,683	86
	Subalpine Fir (residues)	Chips	5,796	113
	Trembling Aspen (residues)	Chips	7	43
	Western Hemlock (residues)	Chips	28,374	124
	Western Red Cedar (residues)	Chips	18,584	134
	Western White Pine (residues)	Chips	9	154
	White Spruce (residues)	Chips	390	128
	Yellow Cedar (residues)	Chips	3,066	178
			81,849	113
			109,078	96


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
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140
150
160
170
N
25 km
846 selected block(s) / 3994
Area covered: 2,952 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	12,783.5 ha
Number of cut blocks	3994
Recovered biomass	451,406.1 odt
Biomass yield	35.3 odt/ha
Biomass odt / Merchantable m^3	0.0628 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	31 : 1
Available energy	1,740,385 MWh
Fuel consumption	14.2 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	22.50 $/odt
Transfer yard	0.00 $/odt
Transportation	49.42 $/odt
Loading/unloading	13.39 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.26 $/odt
Indirect costs	0.00 $/odt
Total	86.57 $/odt

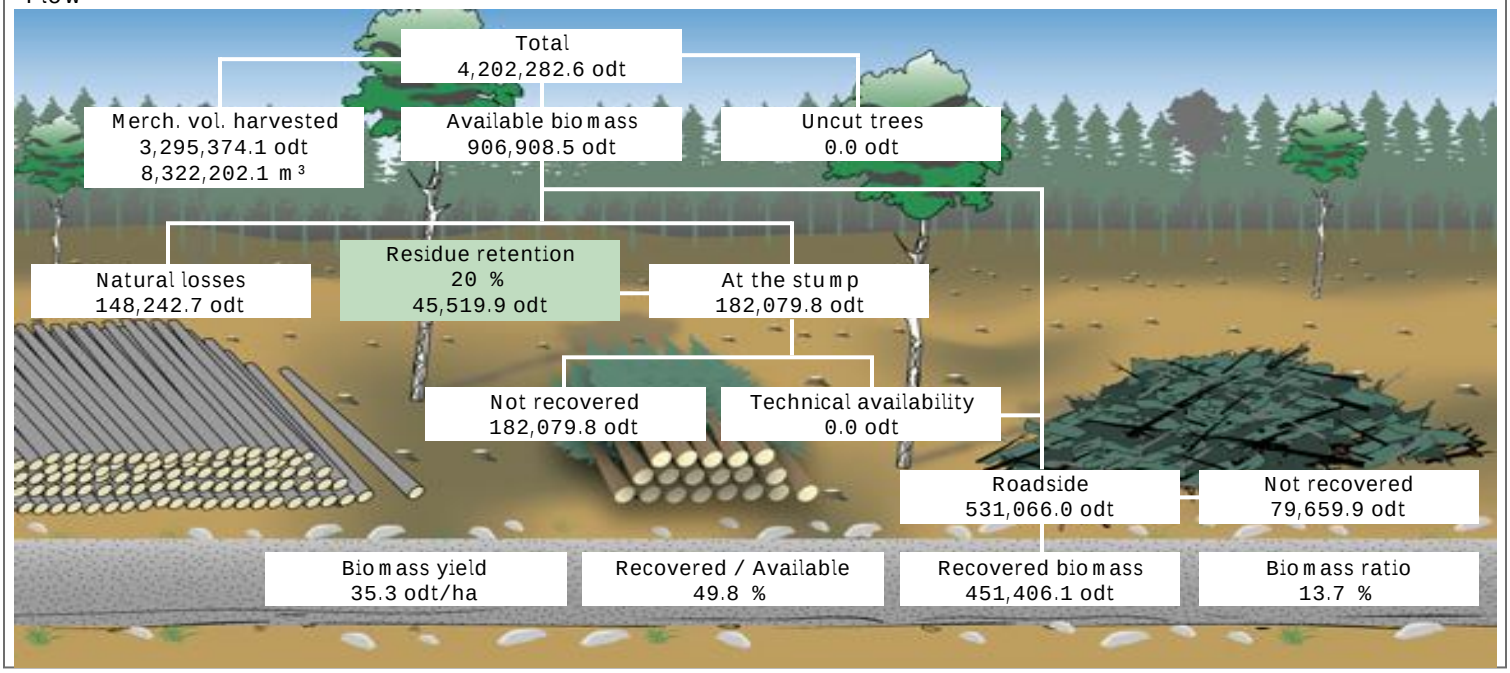
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-86.57 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	133,107.5	0.0617	10.41
Douglas Fir (residues)	131,240.4	0.0645	10.27
Western Red Cedar (residues)	108,200.9	0.0641	8.46
Subalpine Fir (residues)	38,302.5	0.0563	3.00
Yellow Cedar (residues)	20,749.7	0.0502	1.62
Red Alder (residues)	16,653.0	0.0991	1.30
White Spruce (residues)	2,570.0	0.0600	0.20
Lodgepole Pine (residues)	399.2	0.0528	0.03
Western White Pine (residues)	123.9	0.0884	0.01
Trembling Aspen (residues)	58.8	0.0670	0.00
	451,406.1	0.0628	35.31

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	451,406.1	12,783.5	3,994
• Recovery season			
Summer	0.0	0.0	0
Winter	451,406.1	12,783.5	3,994
• Residue freshness			
Fresh	0.0	0.0	0
Brown	451,406.1	12,783.5	3,994
Brittle	0.0	0.0	0

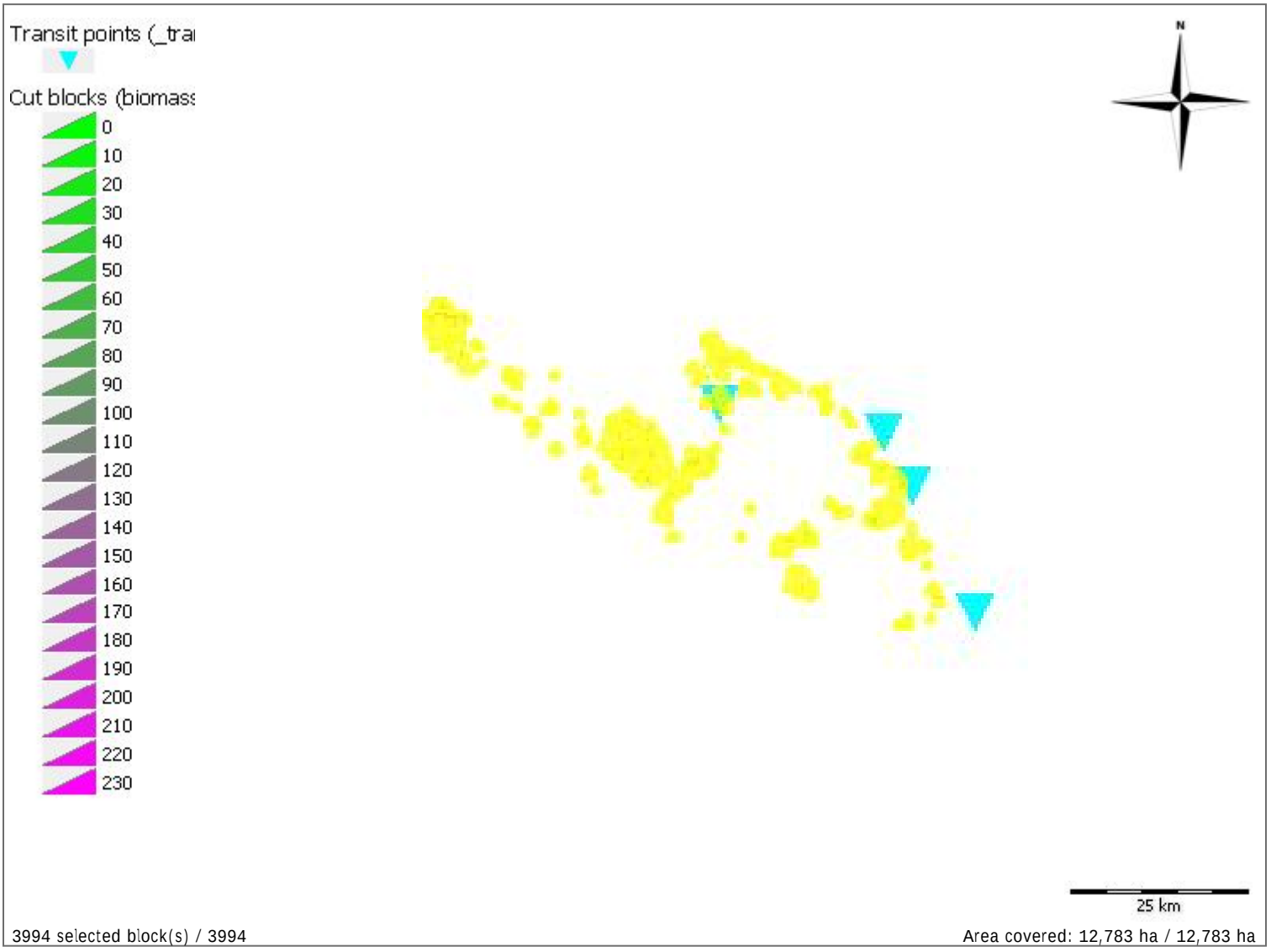
Supply summary

Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	161.3	161.3
40 $/odt	0.0	6,139.4	6,139.4
50 $/odt	0.0	40,992.0	40,992.0
60 $/odt	0.0	88,756.5	88,756.5
70 $/odt	0.0	154,347.6	154,347.6
80 $/odt	0.0	234,627.4	234,627.4
90 $/odt	0.0	307,969.8	307,969.8
100 $/odt	0.0	339,083.7	339,083.7
110 $/odt	0.0	350,493.1	350,493.1
120 $/odt	0.0	361,059.0	361,059.0
130 $/odt	0.0	382,217.5	382,217.5
140 $/odt	0.0	416,041.6	416,041.6
150 $/odt	0.0	428,868.5	428,868.5
160 $/odt	0.0	439,390.7	439,390.7
170 $/odt	0.0	443,932.2	443,932.2
180 $/odt	0.0	448,142.9	448,142.9
190 $/odt	0.0	451,082.6	451,082.6
200 $/odt	0.0	451,192.4	451,192.4
210 $/odt	0.0	451,379.4	451,379.4
220 $/odt	0.0	451,379.4	451,379.4
230 $/odt	0.0	451,406.1	451,406.1
Maximum cost	0.00 $/odt	223.97 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock (residues)	Chips	91	0
	Western Red Cedar (residues)	Chips	55	0
	White Spruce (residues)	Chips	15	0
			161	0
Nanaimo				
	Douglas Fir (residues)	Chips	15,789	23
	Lodgepole Pine (residues)	Chips	5	34
	Red Alder (residues)	Chips	539	27
	Subalpine Fir (residues)	Chips	2	27
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	90	25
	Western Red Cedar (residues)	Chips	175	32
			16,599	23
Chemainus				
	Douglas Fir (residues)	Chips	52,161	32
	Lodgepole Pine (residues)	Chips	150	80
	Red Alder (residues)	Chips	5,355	29
	Subalpine Fir (residues)	Chips	11,146	82
	Trembling Aspen (residues)	Chips	45	32
	Western Hemlock (residues)	Chips	18,228	74
	Western Red Cedar (residues)	Chips	8,029	82
	Western White Pine (residues)	Chips	108	23
	White Spruce (residues)	Chips	925	101
	Yellow Cedar (residues)	Chips	2,329	97
			98,477	51

Victoria				
	Douglas Fir (residues)	Chips	4,130	26
	Lodgepole Pine (residues)	Chips	20	38
	Red Alder (residues)	Chips	273	32
	Subalpine Fir (residues)	Chips	0	28
	Western Hemlock (residues)	Chips	43	25
	Western Red Cedar (residues)	Chips	301	23
	Western White Pine (residues)	Chips	0	27
			4,767	26
Port Alberni				
	Douglas Fir (residues)	Chips	59,160	64
	Lodgepole Pine (residues)	Chips	224	78
	Red Alder (residues)	Chips	10,486	67
	Subalpine Fir (residues)	Chips	27,155	118
	Trembling Aspen (residues)	Chips	14	51
	Western Hemlock (residues)	Chips	114,654	118
	Western Red Cedar (residues)	Chips	99,641	126
	Western White Pine (residues)	Chips	16	119
	White Spruce (residues)	Chips	1,630	127
	Yellow Cedar (residues)	Chips	18,421	130
			331,401	110
			451,406	93


Transit points (_trai
Cut blocks (biomass
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100
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120
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160
170
180
190
200
210
220
230
N
25 km
3994 selected block(s) / 3994
Area covered: 12,783 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	3,588.7 ha
Number of cut blocks	1189
Recovered biomass	121,746.5 odt
Biomass yield	33.9 odt/ha
Biomass odt / Merchantable m^3	0.0590 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	32 : 1
Available energy	470,711 MWh
Fuel consumption	14.1 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	22.50 $/odt
Transfer yard	0.00 $/odt
Transportation	48.60 $/odt
Loading/unloading	11.58 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.23 $/odt
Indirect costs	0.00 $/odt
Total	83.91 $/odt

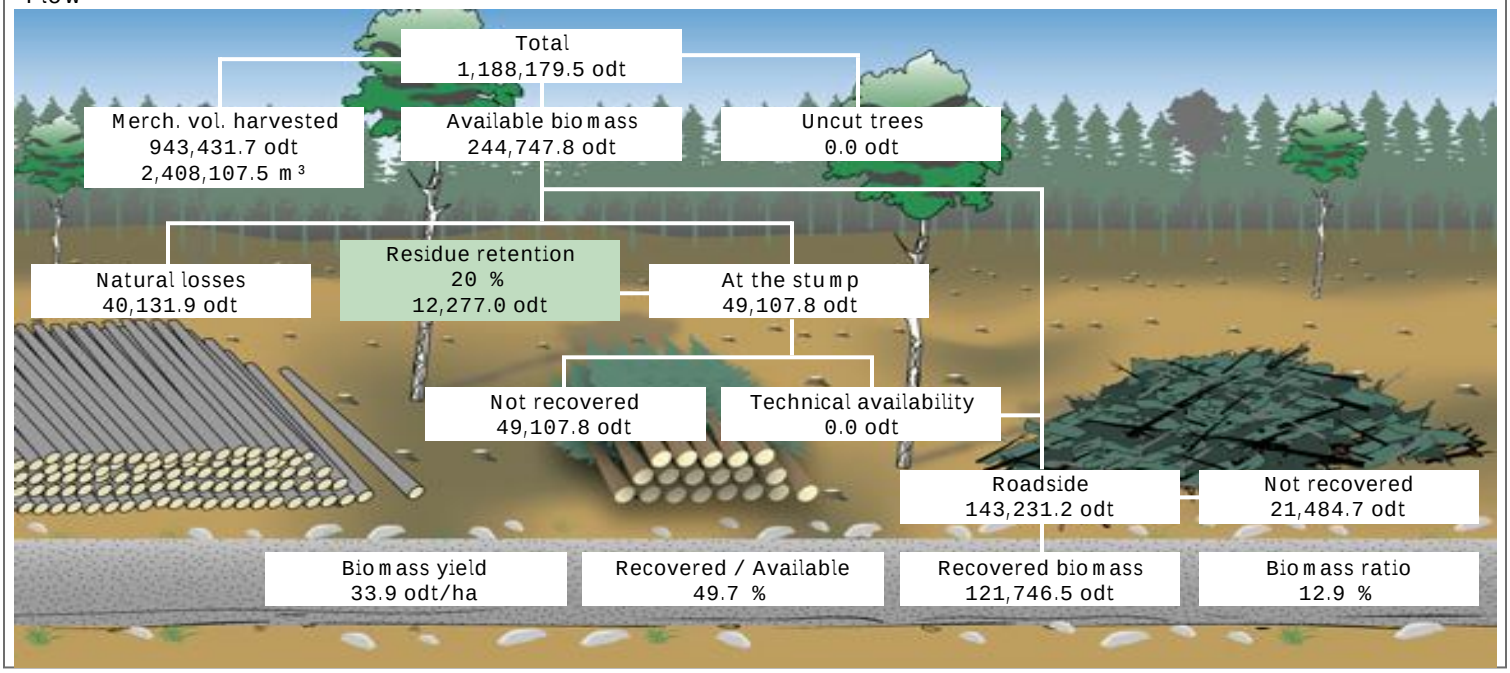
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-83.91 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	35,477.5	0.0579	9.89
Western Red Cedar (residues)	32,202.6	0.0622	8.97
Douglas Fir (residues)	27,542.2	0.0581	7.67
Subalpine Fir (residues)	12,871.0	0.0565	3.59
Yellow Cedar (residues)	8,823.3	0.0506	2.46
Red Alder (residues)	3,892.9	0.0930	1.08
White Spruce (residues)	641.2	0.0604	0.18
Lodgepole Pine (residues)	189.1	0.0494	0.05
Western White Pine (residues)	104.2	0.0877	0.03
Trembling Aspen (residues)	2.5	0.0607	0.00
	121,746.5	0.0590	33.93

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	121,746.5	3,588.7	1,189
• Recovery season			
Summer	0.0	0.0	0
Winter	121,746.5	3,588.7	1,189
• Residue freshness			
Fresh	0.0	0.0	0
Brown	121,746.5	3,588.7	1,189
Brittle	0.0	0.0	0

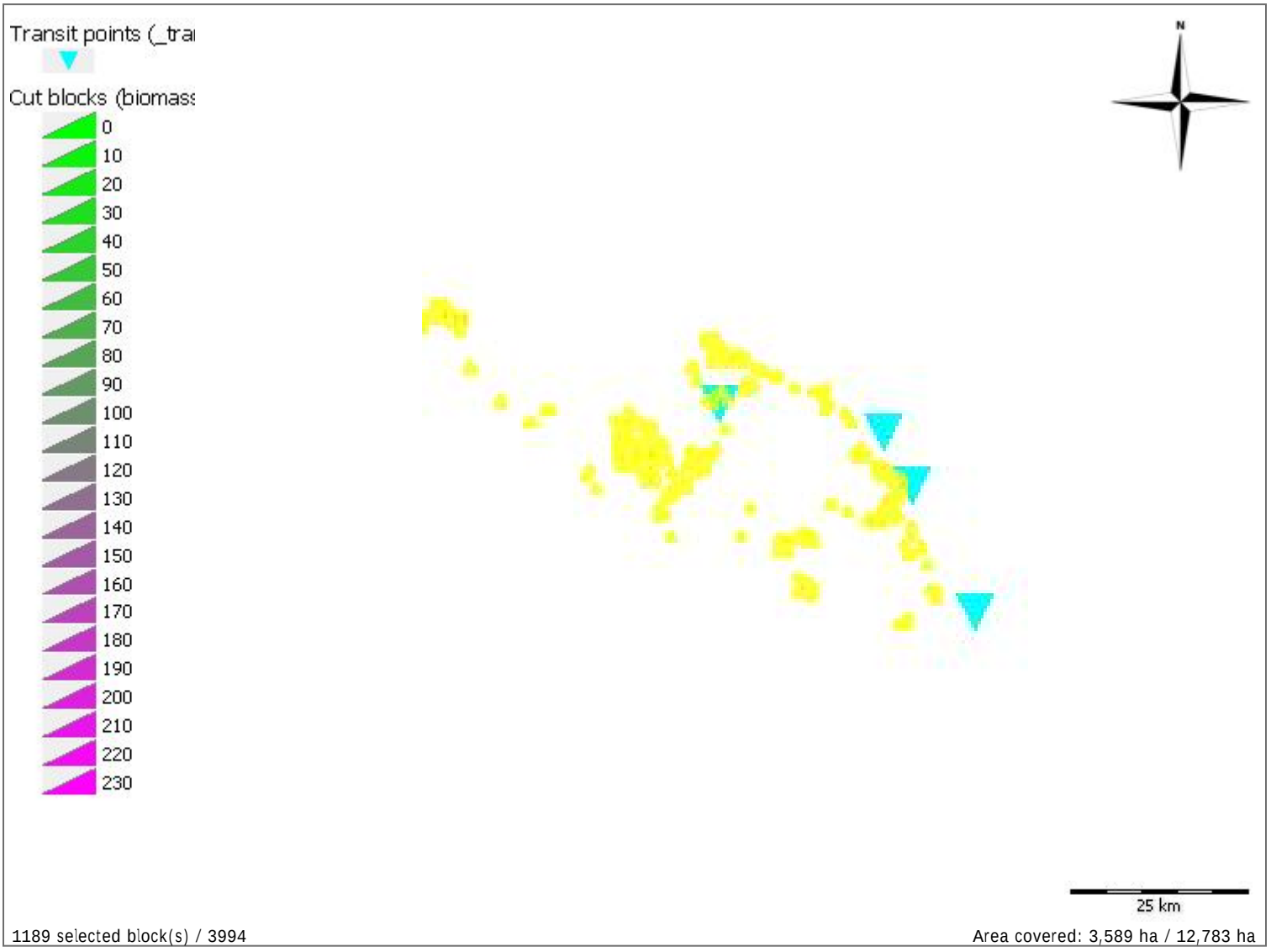
Supply summary

Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	161.3	161.3
40 $/odt	0.0	1,902.6	1,902.6
50 $/odt	0.0	11,590.2	11,590.2
60 $/odt	0.0	22,760.5	22,760.5
70 $/odt	0.0	42,002.0	42,002.0
80 $/odt	0.0	63,675.1	63,675.1
90 $/odt	0.0	83,855.2	83,855.2
100 $/odt	0.0	93,207.1	93,207.1
110 $/odt	0.0	98,395.0	98,395.0
120 $/odt	0.0	101,674.4	101,674.4
130 $/odt	0.0	106,267.4	106,267.4
140 $/odt	0.0	115,967.9	115,967.9
150 $/odt	0.0	121,140.8	121,140.8
160 $/odt	0.0	121,574.5	121,574.5
170 $/odt	0.0	121,746.5	121,746.5
Maximum cost	0.00 $/odt	166.06 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock (residues)	Chips	91	0
	Western Red Cedar (residues)	Chips	55	0
	White Spruce (residues)	Chips	15	0
			161	0
Nanaimo				
	Douglas Fir (residues)	Chips	4,521	22
	Lodgepole Pine (residues)	Chips	3	33
	Red Alder (residues)	Chips	205	27
	Subalpine Fir (residues)	Chips	1	28
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	49	25
	Western Red Cedar (residues)	Chips	65	30
			4,844	22
Chemainus				
	Douglas Fir (residues)	Chips	11,783	25
	Lodgepole Pine (residues)	Chips	110	95
	Red Alder (residues)	Chips	1,457	23
	Subalpine Fir (residues)	Chips	5,404	84
	Trembling Aspen (residues)	Chips	1	32
	Western Hemlock (residues)	Chips	6,404	83
	Western Red Cedar (residues)	Chips	3,192	93
	Western White Pine (residues)	Chips	103	23
	White Spruce (residues)	Chips	17	107
	Yellow Cedar (residues)	Chips	1,650	101
			30,122	59

Victoria				
	Douglas Fir (residues)	Chips	1,233	27
	Lodgepole Pine (residues)	Chips	1	27
	Red Alder (residues)	Chips	87	35
	Subalpine Fir (residues)	Chips	0	28
	Western Hemlock (residues)	Chips	5	27
	Western Red Cedar (residues)	Chips	8	24
			1,334	28
Port Alberni				
	Douglas Fir (residues)	Chips	10,006	59
	Lodgepole Pine (residues)	Chips	75	54
	Red Alder (residues)	Chips	2,144	50
	Subalpine Fir (residues)	Chips	7,465	102
	Trembling Aspen (residues)	Chips	1	42
	Western Hemlock (residues)	Chips	28,928	110
	Western Red Cedar (residues)	Chips	28,882	125
	Western White Pine (residues)	Chips	1	171
	White Spruce (residues)	Chips	609	118
	Yellow Cedar (residues)	Chips	7,174	116
			85,284	107
			121,747	91


Transit points (_trai
Cut blocks (biomass
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140
150
160
170
180
190
200
210
220
230
N
25 km
1189 selected block(s) / 3994
Area covered: 3,589 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	3,201.6 ha
Number of cut blocks	999
Recovered biomass	111,573.2 odt
Biomass yield	34.8 odt/ha
Biomass odt / Merchantable m^3	0.0585 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	31 : 1
Available energy	430,520 MWh
Fuel consumption	14.2 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	22.50 $/odt
Transfer yard	0.00 $/odt
Transportation	48.72 $/odt
Loading/unloading	11.31 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.26 $/odt
Indirect costs	0.00 $/odt
Total	83.79 $/odt

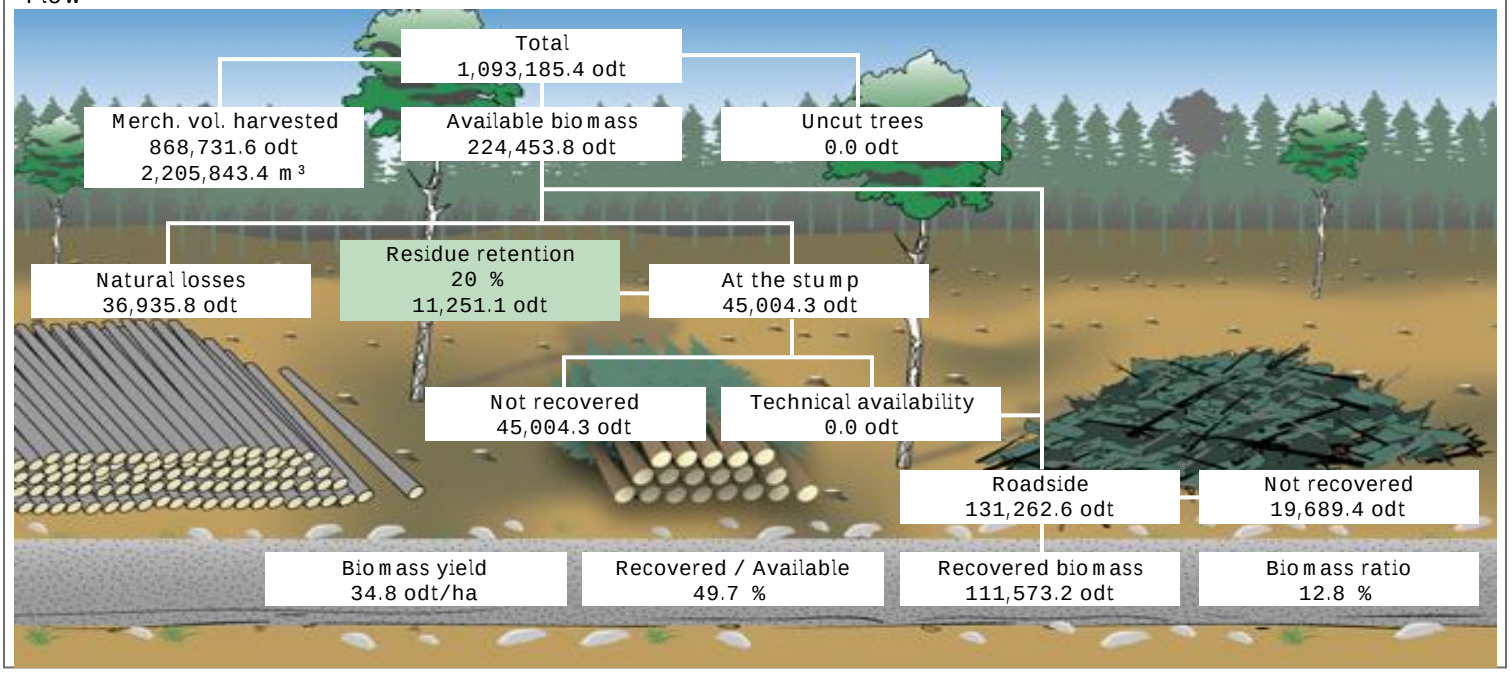
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-83.79 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	32,448.2	0.0571	10.14
Douglas Fir (residues)	30,154.4	0.0582	9.42
Western Red Cedar (residues)	28,938.2	0.0610	9.04
Subalpine Fir (residues)	10,931.4	0.0556	3.41
Yellow Cedar (residues)	5,067.5	0.0487	1.58
Red Alder (residues)	3,690.7	0.0939	1.15
White Spruce (residues)	242.4	0.0623	0.08
Lodgepole Pine (residues)	83.3	0.0576	0.03
Trembling Aspen (residues)	15.8	0.0679	0.00
Western White Pine (residues)	1.1	0.0761	0.00
	111,573.2	0.0585	34.85

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	111,573.2	3,201.6	999
• Recovery season			
Summer	0.0	0.0	0
Winter	111,573.2	3,201.6	999
• Residue freshness			
Fresh	0.0	0.0	0
Brown	111,573.2	3,201.6	999
Brittle	0.0	0.0	0

Supply summary

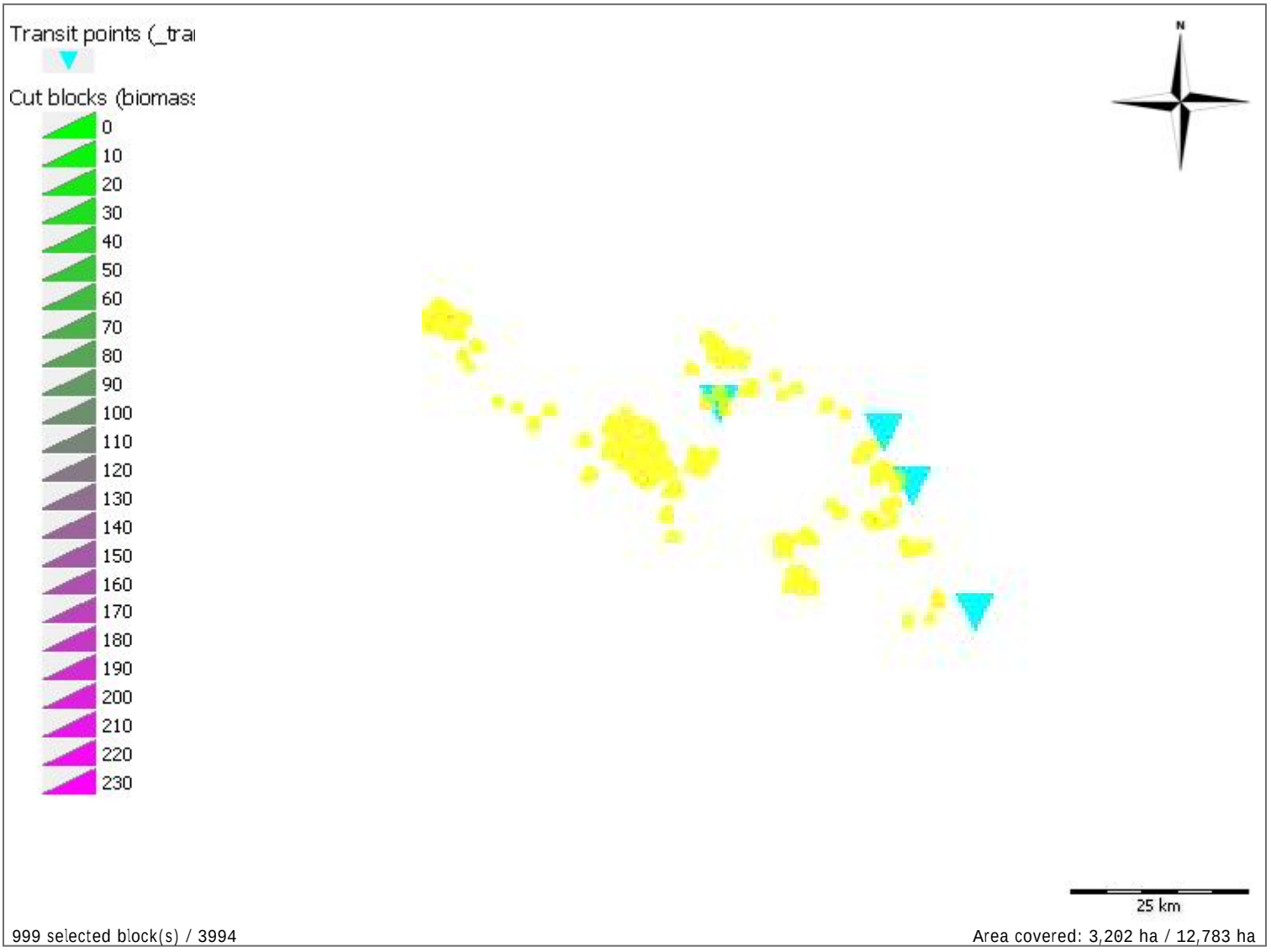
Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	0.0	0.0
40 $/odt	0.0	1,829.1	1,829.1
50 $/odt	0.0	12,059.9	12,059.9
60 $/odt	0.0	19,607.3	19,607.3
70 $/odt	0.0	40,143.0	40,143.0
80 $/odt	0.0	61,546.9	61,546.9
90 $/odt	0.0	79,634.2	79,634.2
100 $/odt	0.0	88,051.2	88,051.2
110 $/odt	0.0	89,952.7	89,952.7
120 $/odt	0.0	91,096.9	91,096.9
130 $/odt	0.0	94,769.9	94,769.9
140 $/odt	0.0	107,559.2	107,559.2
150 $/odt	0.0	111,428.2	111,428.2
160 $/odt	0.0	111,573.2	111,573.2
Maximum cost	0.00 $/odt	153.84 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
Nanaimo				
	Douglas Fir (residues)	Chips	4,053	22
	Lodgepole Pine (residues)	Chips	2	34
	Red Alder (residues)	Chips	104	27
	Subalpine Fir (residues)	Chips	0	19
	Trembling Aspen (residues)	Chips	0	19
	Western Hemlock (residues)	Chips	28	26
	Western Red Cedar (residues)	Chips	34	31
			4,221	22
Chemainus				
	Douglas Fir (residues)	Chips	12,190	28
	Lodgepole Pine (residues)	Chips	4	111
	Red Alder (residues)	Chips	1,402	30
	Subalpine Fir (residues)	Chips	3,570	80
	Trembling Aspen (residues)	Chips	14	33
	Western Hemlock (residues)	Chips	4,377	77
	Western Red Cedar (residues)	Chips	1,854	80
	Western White Pine (residues)	Chips	0	22
	White Spruce (residues)	Chips	23	98
	Yellow Cedar (residues)	Chips	494	90
			23,929	50
Victoria				
	Douglas Fir (residues)	Chips	943	23
	Red Alder (residues)	Chips	89	34
	Western Hemlock (residues)	Chips	7	24
	Western Red Cedar (residues)	Chips	95	21
			1,134	24

Port Alberni

	Douglas Fir (residues)	Chips	12,969	52
	Lodgepole Pine (residues)	Chips	78	103
	Red Alder (residues)	Chips	2,095	48
	Subalpine Fir (residues)	Chips	7,361	124
	Trembling Aspen (residues)	Chips	2	65
	Western Hemlock (residues)	Chips	28,035	123
	Western Red Cedar (residues)	Chips	26,956	125
	Western White Pine (residues)	Chips	1	47
	White Spruce (residues)	Chips	219	96
	Yellow Cedar (residues)	Chips	4,573	109
			82,289	110
			111,573	93


Transit points (_trai
Cut blocks (biomass
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140
150
160
170
180
190
200
210
220
230
N
25 km
999 selected block(s) / 3994
Area covered: 3,202 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	3,041.0 ha
Number of cut blocks	960
Recovered biomass	109,008.3 odt
Biomass yield	35.8 odt/ha
Biomass odt / Merchantable m^3	0.0631 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	31 : 1
Available energy	420,063 MWh
Fuel consumption	14.2 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	22.50 $/odt
Transfer yard	0.00 $/odt
Transportation	49.12 $/odt
Loading/unloading	13.32 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.27 $/odt
Indirect costs	0.00 $/odt
Total	86.21 $/odt

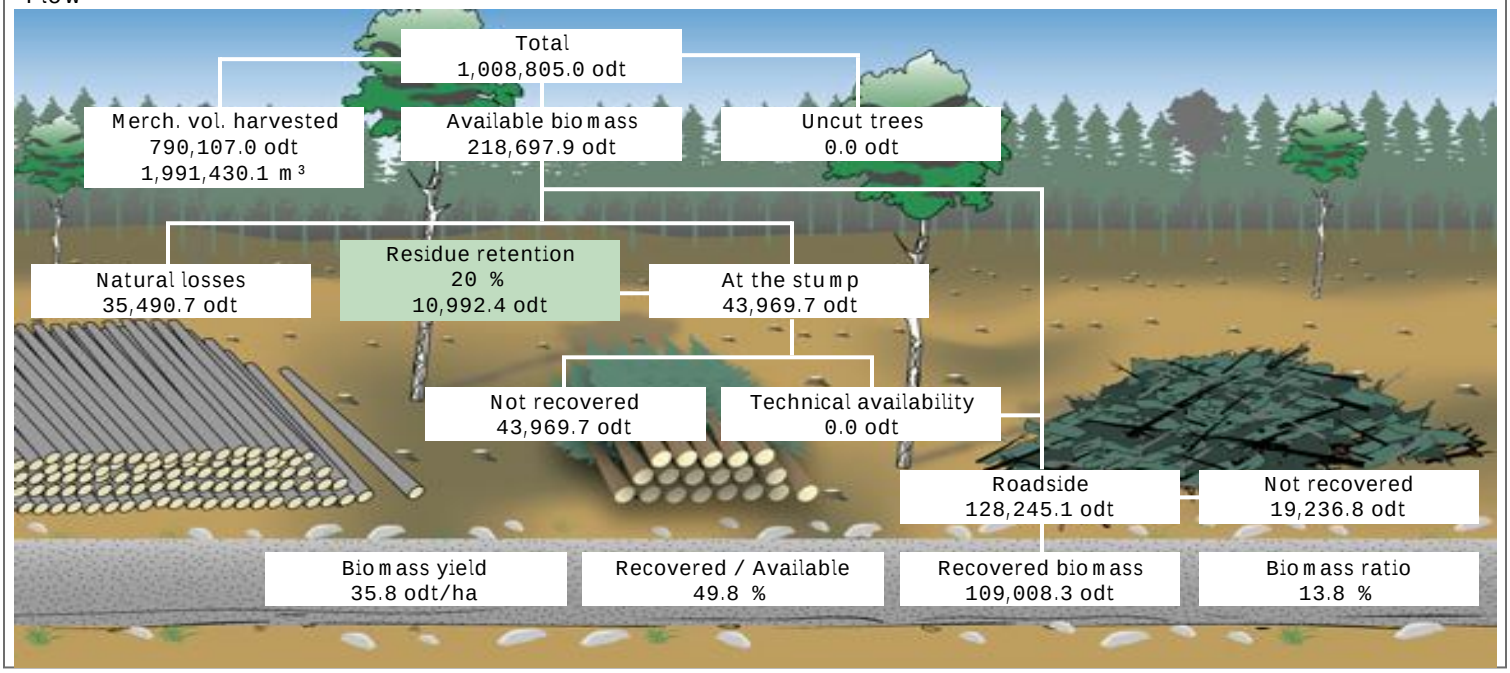
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-86.21 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Western Hemlock (residues)	33,437.8	0.0609	11.00
Douglas Fir (residues)	32,098.6	0.0645	10.56
Western Red Cedar (residues)	27,097.3	0.0648	8.91
Subalpine Fir (residues)	7,820.9	0.0560	2.57
Red Alder (residues)	3,973.9	0.1021	1.31
Yellow Cedar (residues)	3,729.2	0.0525	1.23
White Spruce (residues)	746.8	0.0650	0.25
Lodgepole Pine (residues)	74.4	0.0602	0.02
Trembling Aspen (residues)	23.0	0.0689	0.01
Western White Pine (residues)	6.5	0.0798	0.00
	109,008.3	0.0631	35.85

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	109,008.3	3,041.0	960
• Recovery season			
Summer	0.0	0.0	0
Winter	109,008.3	3,041.0	960
• Residue freshness			
Fresh	0.0	0.0	0
Brown	109,008.3	3,041.0	960
Brittle	0.0	0.0	0

Supply summary

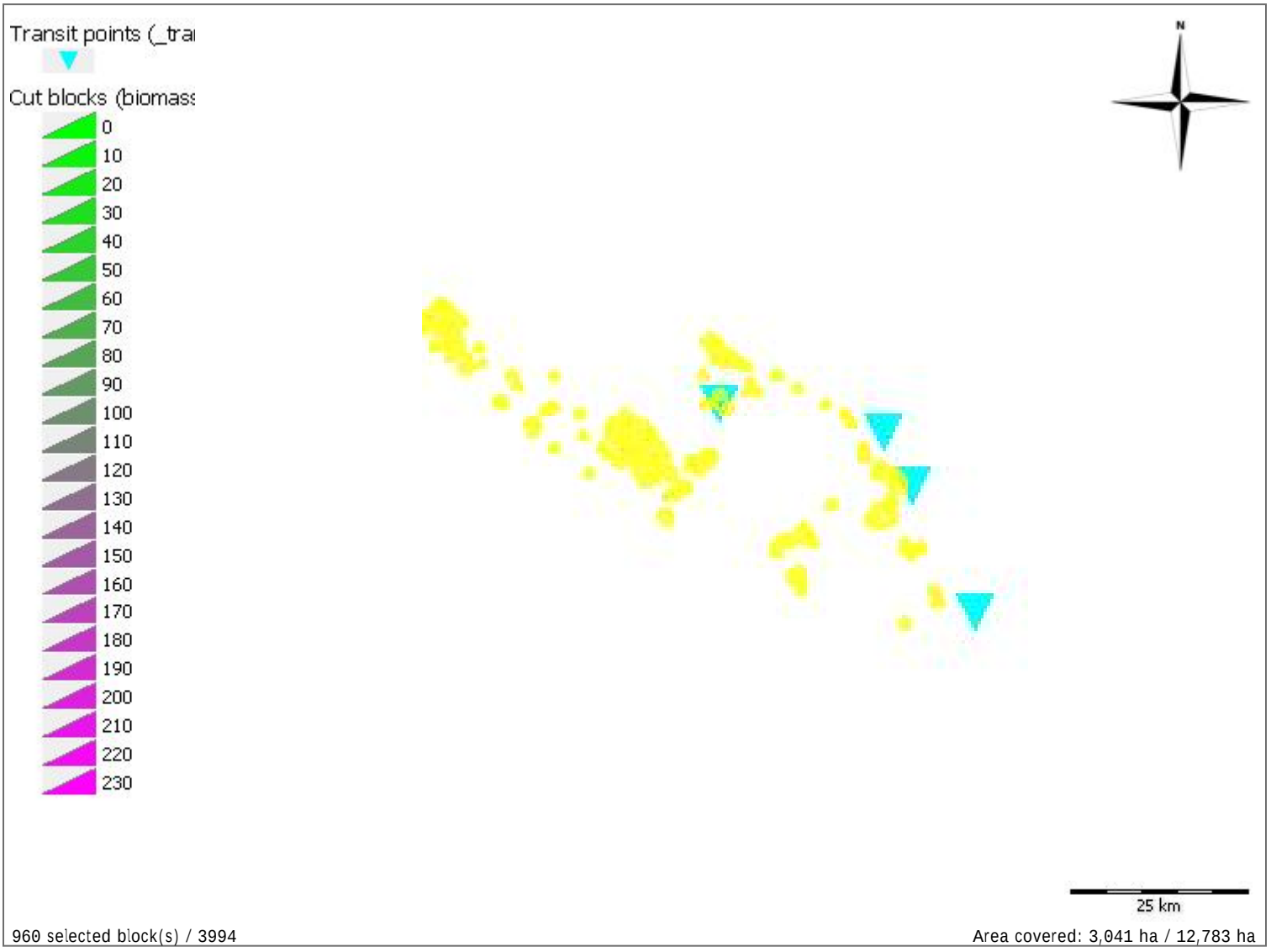
Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	0.0	0.0
40 $/odt	0.0	1,455.5	1,455.5
50 $/odt	0.0	9,757.6	9,757.6
60 $/odt	0.0	20,874.2	20,874.2
70 $/odt	0.0	35,725.2	35,725.2
80 $/odt	0.0	57,425.7	57,425.7
90 $/odt	0.0	73,128.4	73,128.4
100 $/odt	0.0	81,381.9	81,381.9
110 $/odt	0.0	83,927.8	83,927.8
120 $/odt	0.0	86,702.1	86,702.1
130 $/odt	0.0	93,446.4	93,446.4
140 $/odt	0.0	101,778.7	101,778.7
150 $/odt	0.0	105,031.5	105,031.5
160 $/odt	0.0	107,976.0	107,976.0
170 $/odt	0.0	108,236.6	108,236.6
180 $/odt	0.0	108,804.8	108,804.8
190 $/odt	0.0	109,008.3	109,008.3
Maximum cost	0.00 $/odt	185.58 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
Nanaimo				
	Douglas Fir (residues)	Chips	3,779	24
	Red Alder (residues)	Chips	139	26
	Western Hemlock (residues)	Chips	7	20
	Western Red Cedar (residues)	Chips	43	33
			3,968	24
Chemainus				
	Douglas Fir (residues)	Chips	13,090	33
	Lodgepole Pine (residues)	Chips	33	24
	Red Alder (residues)	Chips	1,234	31
	Subalpine Fir (residues)	Chips	1,288	82
	Trembling Aspen (residues)	Chips	19	32
	Western Hemlock (residues)	Chips	4,092	70
	Western Red Cedar (residues)	Chips	1,734	78
	Western White Pine (residues)	Chips	2	21
	White Spruce (residues)	Chips	334	100
	Yellow Cedar (residues)	Chips	122	78
			21,948	47
Victoria				
	Douglas Fir (residues)	Chips	939	25
	Lodgepole Pine (residues)	Chips	14	41
	Red Alder (residues)	Chips	37	30
	Western Hemlock (residues)	Chips	22	24
	Western Red Cedar (residues)	Chips	101	22
			1,113	25

Port Alberni

Douglas Fir (residues)	Chips	14,290	59
Lodgepole Pine (residues)	Chips	27	114
Red Alder (residues)	Chips	2,564	69
Subalpine Fir (residues)	Chips	6,533	134
Trembling Aspen (residues)	Chips	4	62
Western Hemlock (residues)	Chips	29,317	117
Western Red Cedar (residues)	Chips	25,219	122
Western White Pine (residues)	Chips	5	46
White Spruce (residues)	Chips	412	156
Yellow Cedar (residues)	Chips	3,607	145
		81,979	110
		109,008	93


Transit points (_trai
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
N
25 km
960 selected block(s) / 3994
Area covered: 3,041 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Statistics - Selected Items

Area	2,952.3 ha
Number of cut blocks	846
Recovered biomass	109,078.1 odt
Biomass yield	36.9 odt/ha
Biomass odt / Merchantable m^3	0.0730 odt/m^3
Delivered products	
• Chips	100 %
• Bundles	0 %
• Trunks and Residues	0 %
Energy balance	31 : 1
Available energy	419,090 MWh
Fuel consumption	14.5 L/odt

Cost

Harvesting	0.00 $/odt
Biomass recovery	22.50 $/odt
Transfer yard	0.00 $/odt
Transportation	51.32 $/odt
Loading/unloading	17.63 $/odt
Stumpage fees	0.00 $/odt
Road network - Maintenance	1.28 $/odt
Indirect costs	0.00 $/odt
Total	92.73 $/odt

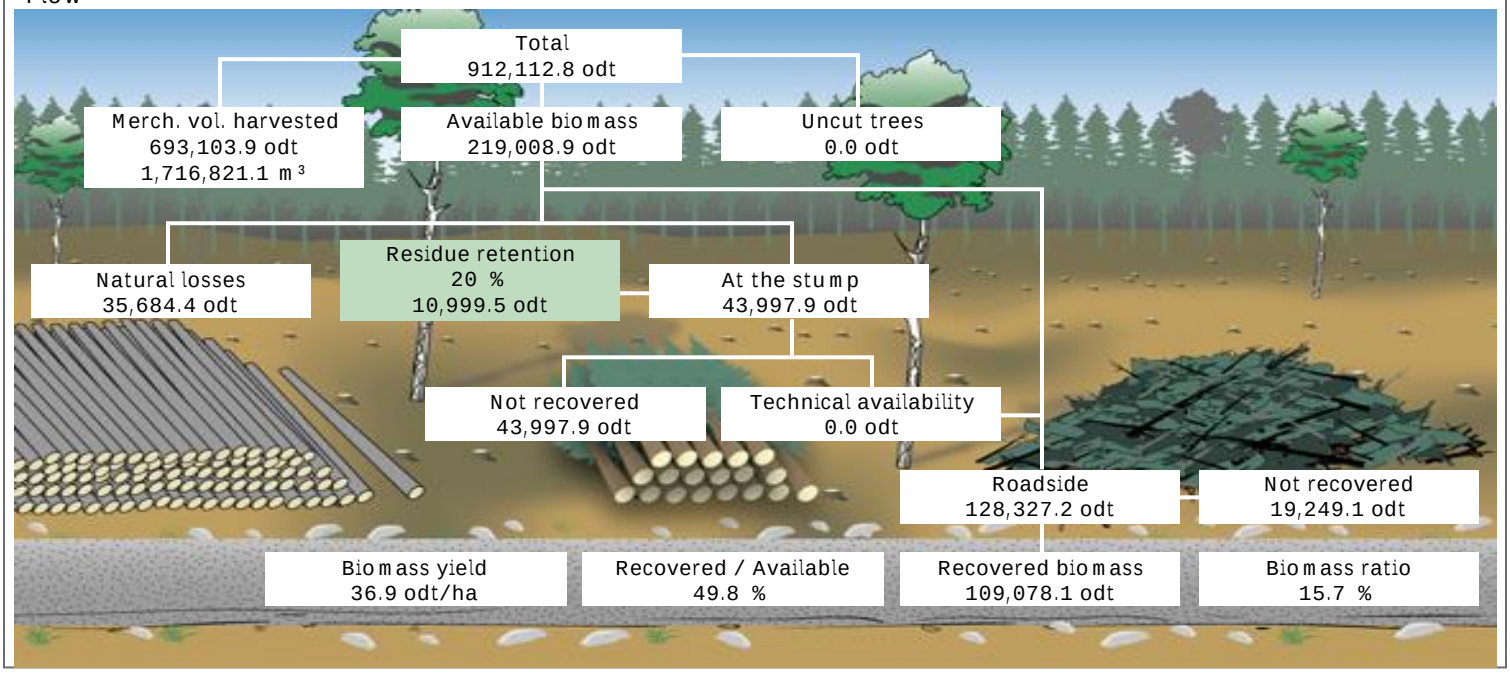
Revenue

Sale value	0.00 $/odt
Silvicultural discount	0.00 $/odt

Net

Profit	-92.73 $/odt

Flow



Products

Product name	odt	odt/m³	odt/ha
Douglas Fir (residues)	41,445.2	0.0762	14.04
Western Hemlock (residues)	31,743.9	0.0742	10.75
Western Red Cedar (residues)	19,962.9	0.0722	6.76
Subalpine Fir (residues)	6,679.3	0.0578	2.26
Red Alder (residues)	5,095.5	0.1063	1.73
Yellow Cedar (residues)	3,129.6	0.0487	1.06
White Spruce (residues)	939.6	0.0557	0.32
Lodgepole Pine (residues)	52.5	0.0501	0.02
Trembling Aspen (residues)	17.5	0.0647	0.01
Western White Pine (residues)	12.1	0.1035	0.00
	109,078.1	0.0730	36.95

Recovery summary

	Volume(odt)	Area(ha)	Number of cut blocks
• Biomass recovery location			
At the stump	0.0	0.0	0
Roadside	109,078.1	2,952.3	846
• Recovery season			
Summer	0.0	0.0	0
Winter	109,078.1	2,952.3	846
• Residue freshness			
Fresh	0.0	0.0	0
Brown	109,078.1	2,952.3	846
Brittle	0.0	0.0	0

Supply summary

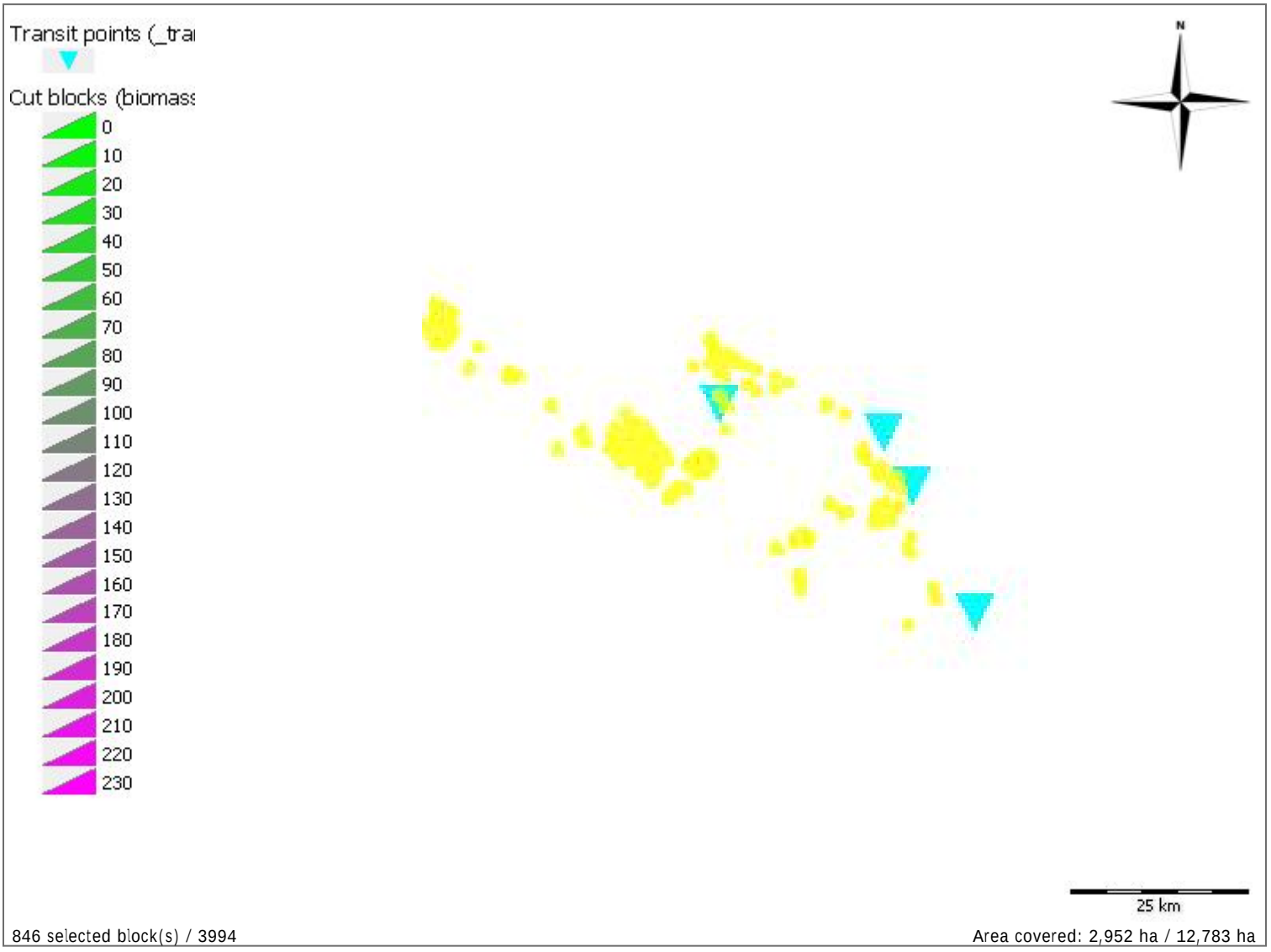
Recovered biomass to	Merchantable volume (odt)	Residues (odt)	Total biomass (odt)
10 $/odt	0.0	0.0	0.0
20 $/odt	0.0	0.0	0.0
30 $/odt	0.0	0.0	0.0
40 $/odt	0.0	952.2	952.2
50 $/odt	0.0	7,584.3	7,584.3
60 $/odt	0.0	25,514.5	25,514.5
70 $/odt	0.0	36,477.3	36,477.3
80 $/odt	0.0	51,979.7	51,979.7
90 $/odt	0.0	71,351.9	71,351.9
100 $/odt	0.0	76,443.6	76,443.6
110 $/odt	0.0	78,217.6	78,217.6
120 $/odt	0.0	81,585.6	81,585.6
130 $/odt	0.0	87,733.9	87,733.9
140 $/odt	0.0	90,735.8	90,735.8
150 $/odt	0.0	91,267.9	91,267.9
160 $/odt	0.0	98,267.0	98,267.0
170 $/odt	0.0	102,375.9	102,375.9
180 $/odt	0.0	106,018.4	106,018.4
190 $/odt	0.0	108,754.6	108,754.6
200 $/odt	0.0	108,864.4	108,864.4
210 $/odt	0.0	109,051.4	109,051.4
220 $/odt	0.0	109,051.4	109,051.4
230 $/odt	0.0	109,078.1	109,078.1
Maximum cost	0.00 $/odt	223.97 $/odt	

Delivery to mills

Destination	Product	Format	odt	Transport average distance (Km)
Nanaimo				
	Douglas Fir (residues)	Chips	3,436	23
	Lodgepole Pine (residues)	Chips	1	35
	Red Alder (residues)	Chips	91	28
	Western Hemlock (residues)	Chips	6	22
	Western Red Cedar (residues)	Chips	32	34
			3,566	23
Chemainus				
	Douglas Fir (residues)	Chips	15,098	39
	Lodgepole Pine (residues)	Chips	3	108
	Red Alder (residues)	Chips	1,262	31
	Subalpine Fir (residues)	Chips	884	82
	Trembling Aspen (residues)	Chips	10	31
	Western Hemlock (residues)	Chips	3,354	58
	Western Red Cedar (residues)	Chips	1,250	67
	Western White Pine (residues)	Chips	3	24
	White Spruce (residues)	Chips	550	102
	Yellow Cedar (residues)	Chips	63	86
			22,477	46
Victoria				
	Douglas Fir (residues)	Chips	1,015	26
	Lodgepole Pine (residues)	Chips	5	34
	Red Alder (residues)	Chips	60	29
	Western Hemlock (residues)	Chips	9	25
	Western Red Cedar (residues)	Chips	97	25
	Western White Pine (residues)	Chips	0	27
			1,186	26

Port Alberni

	Douglas Fir (residues)	Chips	21,895	77
	Lodgepole Pine (residues)	Chips	44	53
	Red Alder (residues)	Chips	3,683	86
	Subalpine Fir (residues)	Chips	5,796	113
	Trembling Aspen (residues)	Chips	7	43
	Western Hemlock (residues)	Chips	28,374	124
	Western Red Cedar (residues)	Chips	18,584	134
	Western White Pine (residues)	Chips	9	154
	White Spruce (residues)	Chips	390	128
	Yellow Cedar (residues)	Chips	3,066	178
			81,849	113
			109,078	96


Transit points (_trai
Cut blocks (biomass
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100
110
120
130
140
150
160
170
180
190
200
210
220
230
N
25 km
846 selected block(s) / 3994
Area covered: 2,952 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Cut blocks

Area	12,783.5 ha
Number of cut blocks	3994
Harvested volume	7,199,765 m^3
Average skidding dist.	250 m
Volume/km	0 m^3/km
Area/km	0 ha/km

Cut type

Clearcut	12,783.5 ha

Harvesting system

Full-tree with roadside processing	12,783.5 ha

Costs

Harvesting	12.22 $/$m^3$
Equipment transport	0.75 $/$m^3$
Road network - Construction	0.00 $/$m^3$
Road network - Repair	0.00 $/$m^3$
Road network - Improvement	0.00 $/$m^3$
Road network - Maintenance	0.46 $/$m^3$
Transportation	14.37 $/$m^3$
Loading/unloading	2.50 $/$m^3$
Transfer yard	0.00 $/$m^3$
Stumpage fees	0.00 $/$m^3$
Indirect costs	0.00 $/$m^3$
Stand establishment	N/A
Total	30.30 $/$m^3$

Revenue

Value	0.00 $/$m^3$
Reimbursements (silv.)	N/A

Net

Profit	-30.30 $/$m^3$

Products

Name	Format	m³	m³/ha	m³/stem	%/total
Western Hemlock	Logs	2,160,545	169.0	0.745	30
Douglas Fir	Logs	2,034,467	159.1	0.892	28
Western Red Cedar	Logs	1,688,370	132.1	0.759	23
Subalpine Fir	Logs	681,572	53.3	0.928	9
Yellow Cedar	Logs	413,703	32.4	0.702	6
Red Alder	Logs	168,391	13.2	0.684	2
White Spruce	Logs	42,879	3.4	1.595	1
Lodgepole Pine	Logs	7,559	0.6	0.542	0
Western White Pine	Logs	1,402	0.1	0.437	0
Trembling Aspen	Logs	879	0.1	0.880	0
		7,199,765	563.2	0.798	100

Delivery to mills

Destination	Product	Format	m³	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock	Logs	1,841	0
	Western Red Cedar	Logs	1,010	0
	White Spruce	Logs	229	0
			3,080	0
Nanaimo				
	Douglas Fir	Logs	291,213	23
	Lodgepole Pine	Logs	87	34
	Red Alder	Logs	5,669	27
	Subalpine Fir	Logs	26	26
	Trembling Aspen	Logs	0	19
	Western Hemlock	Logs	1,416	24
	Western Red Cedar	Logs	3,326	32
			301,737	23

Chemainus				
	Douglas Fir	Logs	909,430	30
	Lodgepole Pine	Logs	2,660	87
	Red Alder	Logs	57,849	28
	Subalpine Fir	Logs	201,083	82
	Trembling Aspen	Logs	679	32
	Western Hemlock	Logs	328,008	76
	Western Red Cedar	Logs	142,322	83
	Western White Pine	Logs	1,261	23
	White Spruce	Logs	17,675	101
	Yellow Cedar	Logs	51,871	96
			1,712,837	52
Victoria				
	Douglas Fir	Logs	92,214	25
	Lodgepole Pine	Logs	422	37
	Red Alder	Logs	2,943	32
	Subalpine Fir	Logs	1	28
	Western Hemlock	Logs	993	25
	Western Red Cedar	Logs	7,076	23
	Western White Pine	Logs	0	27
			103,649	25

Port Alberni

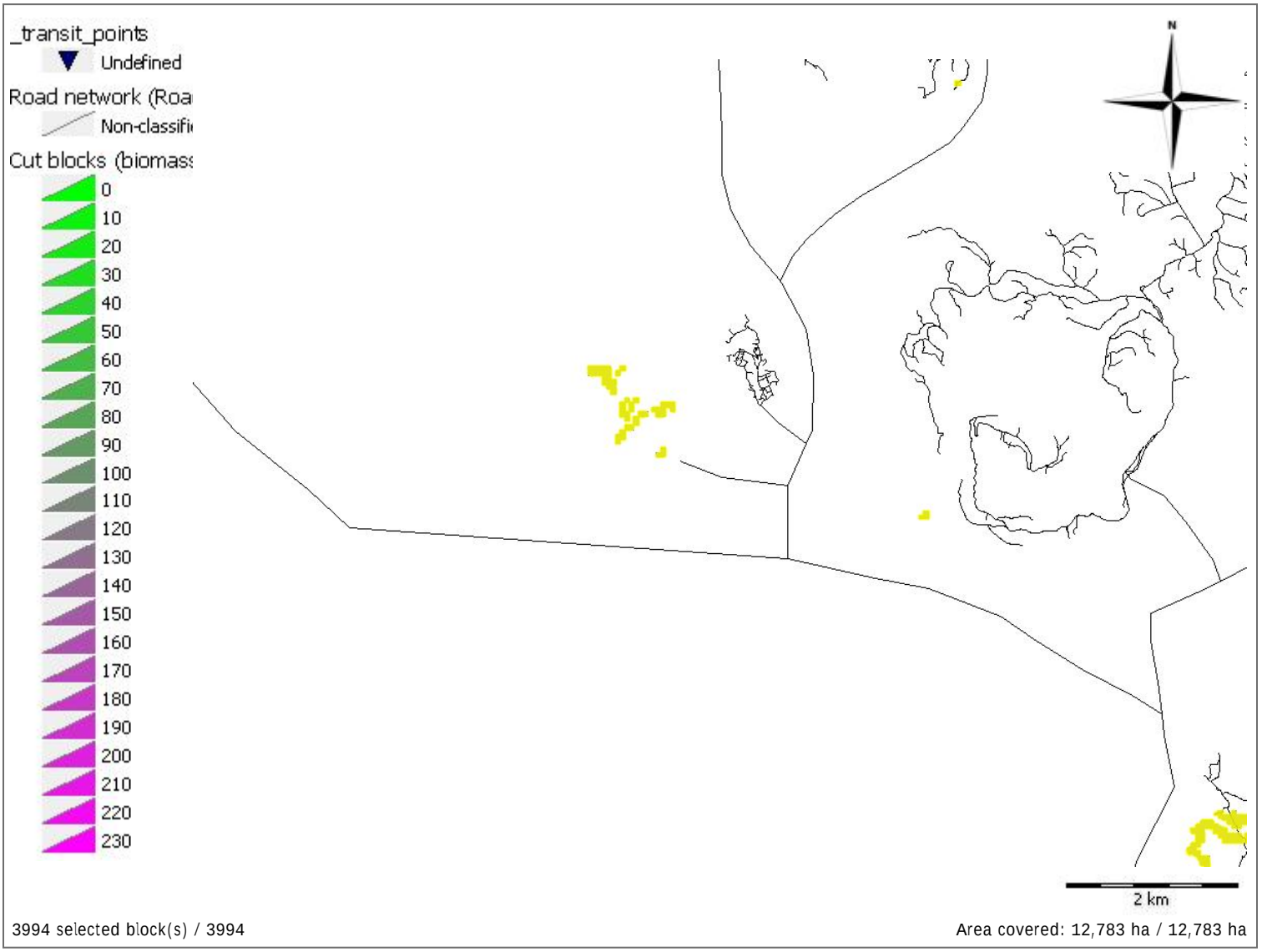
	Douglas Fir	Logs	741,610	55
	Lodgepole Pine	Logs	4,391	80
	Red Alder	Logs	101,930	62
	Subalpine Fir	Logs	480,461	118
	Trembling Aspen	Logs	200	49
	Western Hemlock	Logs	1,828,287	116
	Western Red Cedar	Logs	1,534,636	123
	Western White Pine	Logs	141	101
	White Spruce	Logs	24,974	123
	Yellow Cedar	Logs	361,832	130
			5,078,461	109
			7,199,765	91

Harvesting season

	m^3	ha
Summer	0	0.0
Fall	0	0.0
Winter	7,199,765	12,783.5
	7,199,765	12,783.5

Terrain conditions

CPPA class	Ground strength (%)	Roughness (%)	Slope (%)
1	-	-	-
2	-	-	-
3	100	100	100
4	-	-	-
5	-	-	-


_transit_points
Undefined
Road network (Roa
Non-classifi
Cut blocks (biomass
0
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60
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80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
N
2 km
3994 selected block(s) / 3994
Area covered: 12,783 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Cut blocks

Area	12,783.5 ha
Number of cut blocks	3994
Harvested volume	7,199,765 m^3
Average skidding dist.	250 m
Volume/km	0 m^3/km
Area/km	0 ha/km

Cut type

Clearcut	12,783.5 ha

Harvesting system

Full-tree with roadside processing	12,783.5 ha

Costs

Harvesting	12.22 $/$m^3$
Equipment transport	0.75 $/$m^3$
Road network - Construction	0.00 $/$m^3$
Road network - Repair	0.00 $/$m^3$
Road network - Improvement	0.00 $/$m^3$
Road network - Maintenance	0.46 $/$m^3$
Transportation	14.37 $/$m^3$
Loading/unloading	2.50 $/$m^3$
Transfer yard	0.00 $/$m^3$
Stumpage fees	0.00 $/$m^3$
Indirect costs	0.00 $/$m^3$
Stand establishment	N/A
Total	30.30 $/$m^3$

Revenue

Value	0.00 $/$m^3$
Reimbursements (silv.)	N/A

Net

Profit	-30.30 $/$m^3$

Products

Name	Format	m³	m³/ha	m³/stem	%/total
Western Hemlock	Logs	2,160,545	169.0	0.745	30
Douglas Fir	Logs	2,034,467	159.1	0.892	28
Western Red Cedar	Logs	1,688,370	132.1	0.759	23
Subalpine Fir	Logs	681,572	53.3	0.928	9
Yellow Cedar	Logs	413,703	32.4	0.702	6
Red Alder	Logs	168,391	13.2	0.684	2
White Spruce	Logs	42,879	3.4	1.595	1
Lodgepole Pine	Logs	7,559	0.6	0.542	0
Western White Pine	Logs	1,402	0.1	0.437	0
Trembling Aspen	Logs	879	0.1	0.880	0
		7,199,765	563.2	0.798	100

Delivery to mills

Destination	Product	Format	m³	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock	Logs	1,841	0
	Western Red Cedar	Logs	1,010	0
	White Spruce	Logs	229	0
			3,080	0
Nanaimo				
	Douglas Fir	Logs	291,213	23
	Lodgepole Pine	Logs	87	34
	Red Alder	Logs	5,669	27
	Subalpine Fir	Logs	26	26
	Trembling Aspen	Logs	0	19
	Western Hemlock	Logs	1,416	24
	Western Red Cedar	Logs	3,326	32
			301,737	23

Chemainus

	Douglas Fir	Logs	909,430	30
	Lodgepole Pine	Logs	2,660	87
	Red Alder	Logs	57,849	28
	Subalpine Fir	Logs	201,083	82
	Trembling Aspen	Logs	679	32
	Western Hemlock	Logs	328,008	76
	Western Red Cedar	Logs	142,322	83
	Western White Pine	Logs	1,261	23
	White Spruce	Logs	17,675	101
	Yellow Cedar	Logs	51,871	96
			1,712,837	52

Victoria

	Douglas Fir	Logs	92,214	25
	Lodgepole Pine	Logs	422	37
	Red Alder	Logs	2,943	32
	Subalpine Fir	Logs	1	28
	Western Hemlock	Logs	993	25
	Western Red Cedar	Logs	7,076	23
	Western White Pine	Logs	0	27
			103,649	25

Port Alberni

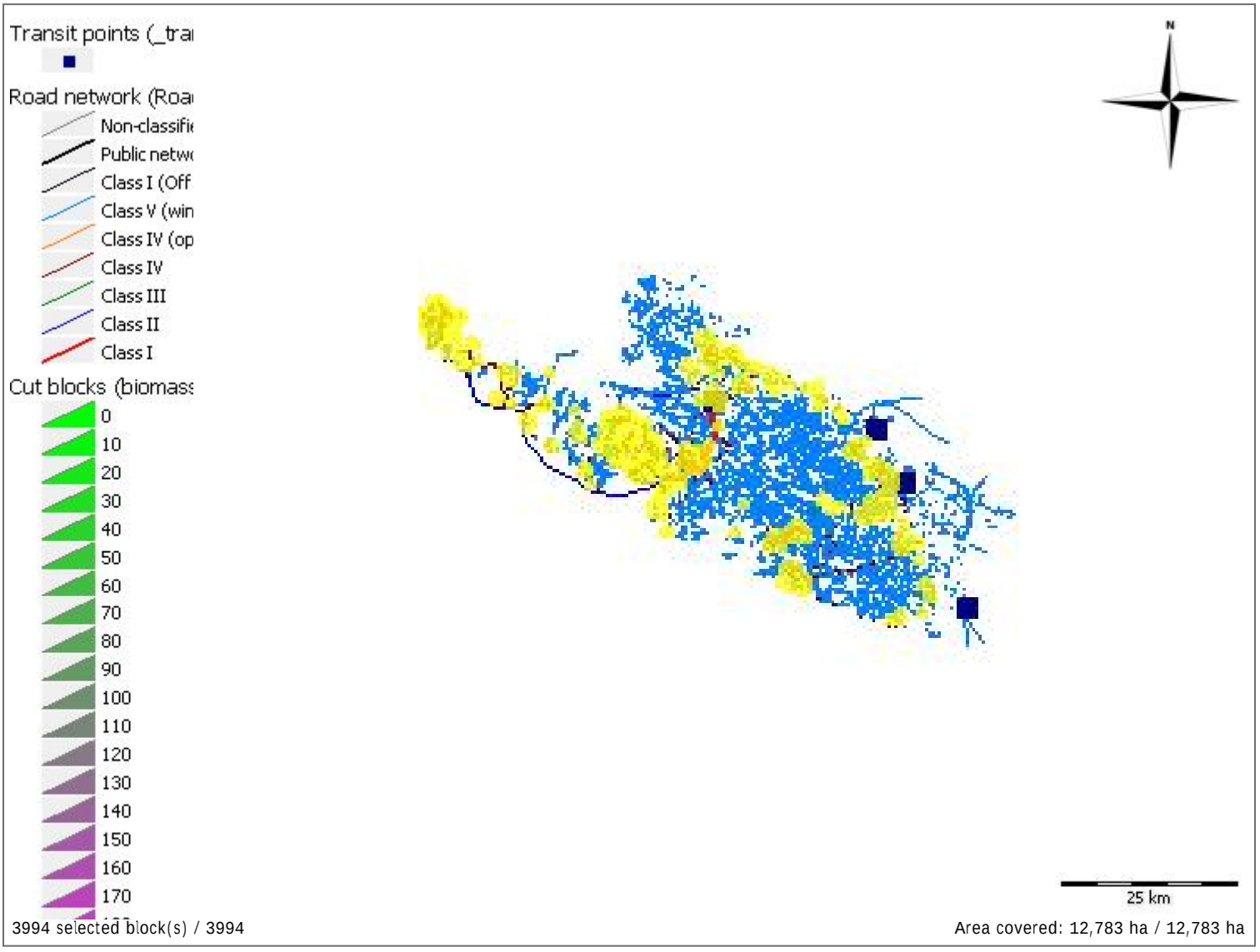
	Douglas Fir	Logs	741,610	55
	Lodgepole Pine	Logs	4,391	80
	Red Alder	Logs	101,930	62
	Subalpine Fir	Logs	480,461	118
	Trembling Aspen	Logs	200	49
	Western Hemlock	Logs	1,828,287	116
	Western Red Cedar	Logs	1,534,636	123
	Western White Pine	Logs	141	101
	White Spruce	Logs	24,974	123
	Yellow Cedar	Logs	361,832	130
			5,078,461	109
			7,199,765	91

Harvesting season

	m^3	ha
Summer	0	0.0
Fall	0	0.0
Winter	7,199,765	12,783.5
	7,199,765	12,783.5

Terrain conditions

CPPA class	Ground strength (%)	Roughness (%)	Slope (%)
1	-	-	-
2	-	-	-
3	100	100	100
4	-	-	-
5	-	-	-


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
3994 selected block(s) / 3994
Area covered: 12,783 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Cut blocks

Area	3,588.7 ha
Number of cut blocks	1189
Harvested volume	2,064,881 m^3
Average skidding dist.	250 m
Volume/km	0 m^3/km
Area/km	0 ha/km

Cut type

Clearcut	3,588.7 ha

Harvesting system

Full-tree with roadside processing	3,588.7 ha

Costs

Harvesting	11.74 $/$m^3$
Equipment transport	0.75 $/$m^3$
Road network - Construction	0.00 $/$m^3$
Road network - Repair	0.00 $/$m^3$
Road network - Improvement	0.00 $/$m^3$
Road network - Maintenance	0.46 $/$m^3$
Transportation	14.39 $/$m^3$
Loading/unloading	2.50 $/$m^3$
Transfer yard	0.00 $/$m^3$
Stumpage fees	0.00 $/$m^3$
Indirect costs	0.00 $/$m^3$
Stand establishment	N/A
Total	29.84 $/$m^3$

Revenue

Value	0.00 $/$m^3$
Reimbursements (silv.)	N/A

Net

Profit	-29.84 $/$m^3$

Products

Name	Format	m³	m³/ha	m³/stem	%/total
Western Hemlock	Logs	612,945	170.8	0.868	30
Western Red Cedar	Logs	517,940	144.3	0.833	25
Douglas Fir	Logs	474,320	132.2	1.089	23
Subalpine Fir	Logs	227,869	63.5	0.975	11
Yellow Cedar	Logs	174,286	48.6	0.692	8
Red Alder	Logs	41,843	11.7	0.983	2
White Spruce	Logs	10,617	3.0	1.628	1
Lodgepole Pine	Logs	3,831	1.1	0.604	0
Western White Pine	Logs	1,189	0.3	0.443	0
Trembling Aspen	Logs	41	0.0	1.221	0
		2,064,881	575.4	0.895	100

Delivery to mills

Destination	Product	Format	m³	Transport average distance (Km)
<Closest transfer yard>				
	Western Hemlock	Logs	1,841	0
	Western Red Cedar	Logs	1,010	0
	White Spruce	Logs	229	0
			3,080	0
Nanaimo				
	Douglas Fir	Logs	80,553	22
	Lodgepole Pine	Logs	44	33
	Red Alder	Logs	2,176	27
	Subalpine Fir	Logs	22	27
	Trembling Aspen	Logs	0	19
	Western Hemlock	Logs	806	25
	Western Red Cedar	Logs	1,163	30
			84,765	22

Chemainus				
	Douglas Fir	Logs	223,117	24
	Lodgepole Pine	Logs	2,106	98
	Red Alder	Logs	16,032	23
	Subalpine Fir	Logs	96,284	83
	Trembling Aspen	Logs	17	32
	Western Hemlock	Logs	110,871	83
	Western Red Cedar	Logs	53,755	91
	Western White Pine	Logs	1,177	23
	White Spruce	Logs	263	106
	Yellow Cedar	Logs	36,147	100
			539,768	59
Victoria				
	Douglas Fir	Logs	26,187	27
	Lodgepole Pine	Logs	44	27
	Red Alder	Logs	897	35
	Subalpine Fir	Logs	1	28
	Western Hemlock	Logs	124	27
	Western Red Cedar	Logs	176	24
			27,430	27
Port Alberni				
	Douglas Fir	Logs	144,463	58
	Lodgepole Pine	Logs	1,637	55
	Red Alder	Logs	22,737	50
	Subalpine Fir	Logs	131,561	103
	Trembling Aspen	Logs	24	42
	Western Hemlock	Logs	499,304	109
	Western Red Cedar	Logs	461,836	126
	Western White Pine	Logs	12	151
	White Spruce	Logs	10,125	120
	Yellow Cedar	Logs	138,139	115
			1,409,838	108

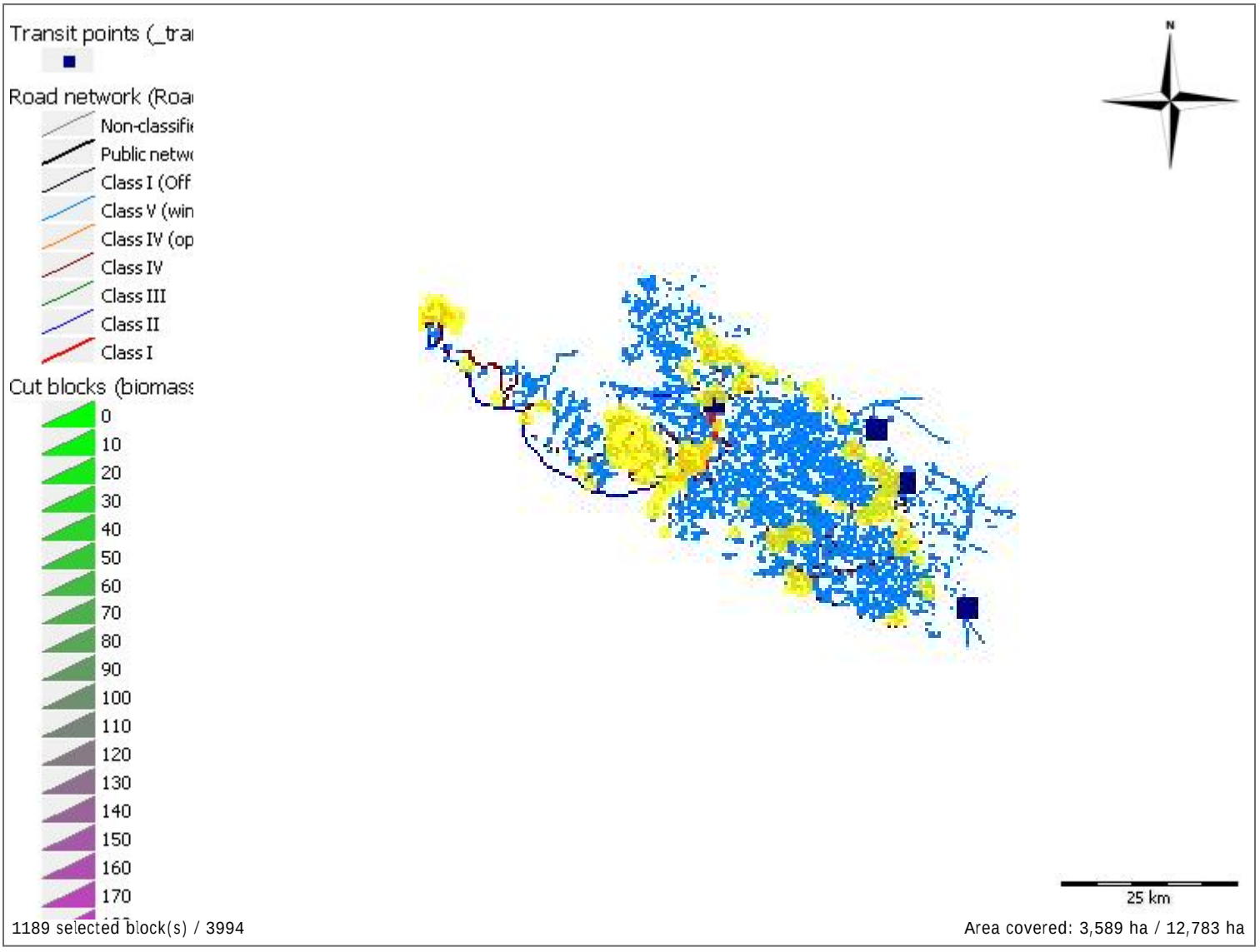
	2,064,881	91

Harvesting season

	m³	ha
Summer	0	0.0
Fall	0	0.0
Winter	2,064,881	3,588.7
	2,064,881	3,588.7

Terrain conditions

CPPA class	Ground strength (%)	Roughness (%)	Slope (%)
1	-	-	-
2	-	-	-
3	100	100	100
4	-	-	-
5	-	-	-


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
1189 selected block(s) / 3994
Area covered: 3,589 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Cut blocks

Area	3,201.6 ha
Number of cut blocks	999
Harvested volume	1,905,915 m^3
Average skidding dist.	250 m
Volume/km	0 m^3/km
Area/km	0 ha/km

Cut type

Clearcut	3,201.6 ha

Harvesting system

Full-tree with roadside processing	3,201.6 ha

Costs

Harvesting	11.33 $/$m^3$
Equipment transport	0.75 $/$m^3$
Road network - Construction	0.00 $/$m^3$
Road network - Repair	0.00 $/$m^3$
Road network - Improvement	0.00 $/$m^3$
Road network - Maintenance	0.47 $/$m^3$
Transportation	14.55 $/$m^3$
Loading/unloading	2.50 $/$m^3$
Transfer yard	0.00 $/$m^3$
Stumpage fees	0.00 $/$m^3$
Indirect costs	0.00 $/$m^3$
Stand establishment	N/A
Total	29.61 $/$m^3$

Revenue

Value	0.00 $/$m^3$
Reimbursements (silv.)	N/A

Net

Profit	-29.61 $/$m^3$

Products

Name	Format	m³	m³/ha	m³/stem	%/total
Western Hemlock	Logs	568,055	177.4	0.891	30
Douglas Fir	Logs	517,742	161.7	1.083	27
Western Red Cedar	Logs	474,415	148.2	0.867	25
Subalpine Fir	Logs	196,720	61.4	1.049	10
Yellow Cedar	Logs	104,099	32.5	0.737	5
Red Alder	Logs	39,301	12.3	0.924	2
White Spruce	Logs	3,889	1.2	1.436	0
Lodgepole Pine	Logs	1,446	0.5	0.474	0
Trembling Aspen	Logs	233	0.1	0.849	0
Western White Pine	Logs	14	0.0	0.569	0
		1,905,915	595.3	0.934	100

Delivery to mills

Destination	Product	Format	m³	Transport average distance (Km)
Nanaimo				
	Douglas Fir	Logs	74,824	22
	Lodgepole Pine	Logs	25	34
	Red Alder	Logs	1,085	28
	Subalpine Fir	Logs	4	19
	Trembling Aspen	Logs	0	19
	Western Hemlock	Logs	404	25
	Western Red Cedar	Logs	671	31
			77,013	22

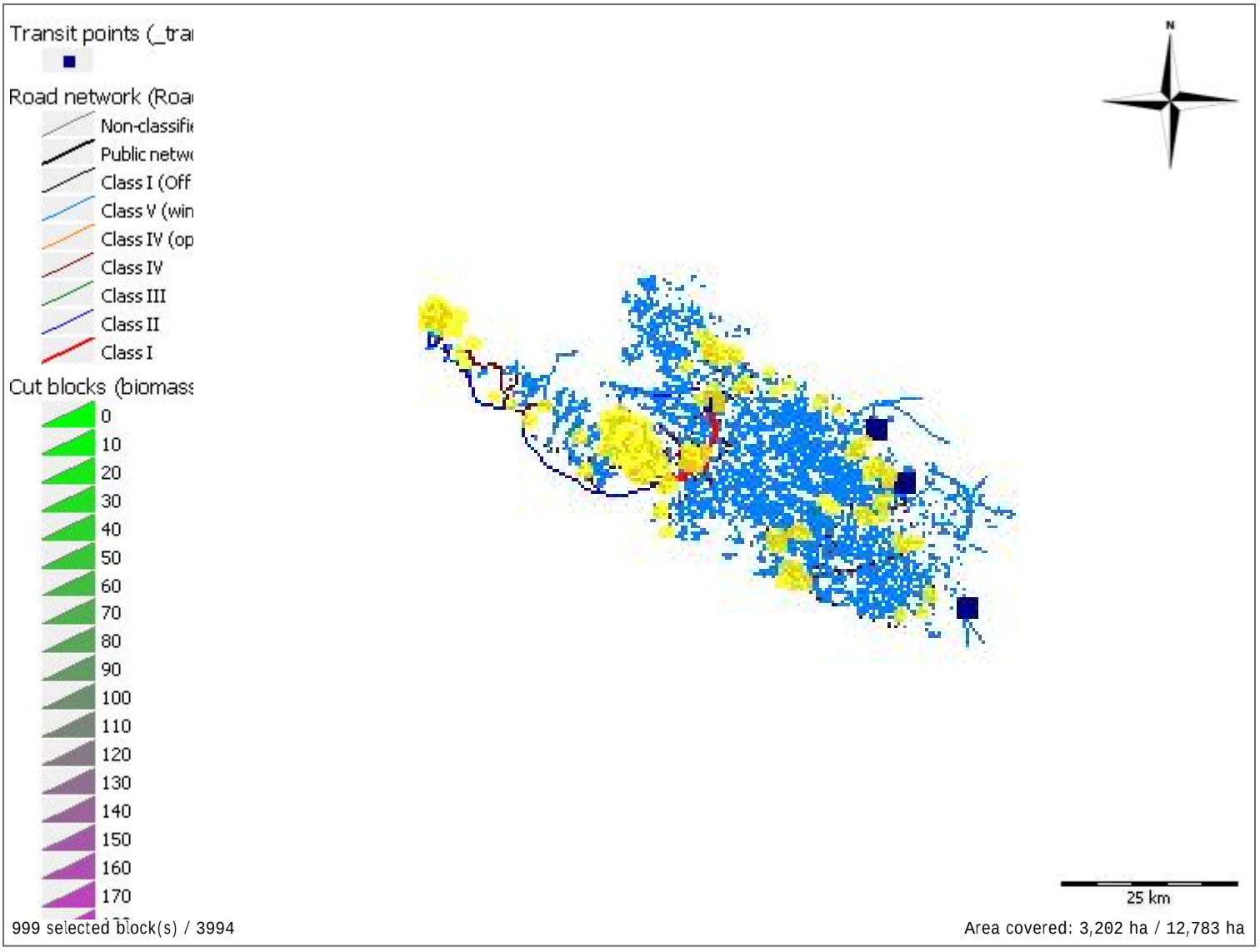
Chemainus				
	Douglas Fir	Logs	226,803	28
	Lodgepole Pine	Logs	65	111
	Red Alder	Logs	15,032	30
	Subalpine Fir	Logs	65,999	80
	Trembling Aspen	Logs	205	33
	Western Hemlock	Logs	83,560	78
	Western Red Cedar	Logs	33,620	81
	Western White Pine	Logs	6	22
	White Spruce	Logs	387	98
	Yellow Cedar	Logs	11,452	88
			437,130	51
Victoria				
	Douglas Fir	Logs	24,485	23
	Red Alder	Logs	986	34
	Western Hemlock	Logs	146	24
	Western Red Cedar	Logs	2,394	21
			28,011	23
Port Alberni				
	Douglas Fir	Logs	191,630	51
	Lodgepole Pine	Logs	1,355	112
	Red Alder	Logs	22,198	48
	Subalpine Fir	Logs	130,717	125
	Trembling Aspen	Logs	28	64
	Western Hemlock	Logs	483,946	123
	Western Red Cedar	Logs	437,730	125
	Western White Pine	Logs	8	49
	White Spruce	Logs	3,502	96
	Yellow Cedar	Logs	92,647	111
			1,363,761	112
			1,905,915	93

Harvesting season

	m³	ha
Summer	0	0.0
Fall	0	0.0
Winter	1,905,915	3,201.6
	1,905,915	3,201.6

Terrain conditions

CPPA class	Ground strength (%)	Roughness (%)	Slope (%)
1	-	-	-
2	-	-	-
3	100	100	100
4	-	-	-
5	-	-	-


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
999 selected block(s) / 3994
Area covered: 3,202 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Cut blocks

Area	3,041.0 ha
Number of cut blocks	960
Harvested volume	1,727,741 m³
Average skidding dist.	250 m
Volume/km	0 m³/km
Area/km	0 ha/km

Cut type

Clearcut	3,041.0 ha

Harvesting system

Full-tree with roadside processing	3,041.0 ha

Costs

Harvesting	12.21 $/m³
Equipment transport	0.75 $/m³
Road network - Construction	0.00 $/m³
Road network - Repair	0.00 $/m³
Road network - Improvement	0.00 $/m³
Road network - Maintenance	0.47 $/m³
Transportation	14.36 $/m³
Loading/unloading	2.50 $/m³
Transfer yard	0.00 $/m³
Stumpage fees	0.00 $/m³
Indirect costs	0.00 $/m³
Stand establishment	N/A
Total	30.29 $/m³

Revenue

Value	0.00 $/m³
Reimbursements (silv.)	N/A

Net

Profit	-30.29 $/m³

Products

Name	Format	m³	m³/ha	m³/stem	%/total
Western Hemlock	Logs	548,761	180.5	0.785	32
Douglas Fir	Logs	497,916	163.7	0.896	29
Western Red Cedar	Logs	418,347	137.6	0.756	24
Subalpine Fir	Logs	139,617	45.9	1.008	8
Yellow Cedar	Logs	71,023	23.4	0.653	4
Red Alder	Logs	38,939	12.8	0.623	2
White Spruce	Logs	11,488	3.8	1.132	1
Lodgepole Pine	Logs	1,235	0.4	0.442	0
Trembling Aspen	Logs	334	0.1	0.802	0
Western White Pine	Logs	82	0.0	0.523	0
		1,727,741	568.2	0.810	100

Delivery to mills

Destination	Product	Format	m³	Transport average distance (Km)
Nanaimo				
	Douglas Fir	Logs	71,408	24
	Red Alder	Logs	1,483	26
	Western Hemlock	Logs	99	21
	Western Red Cedar	Logs	845	33
			73,835	24

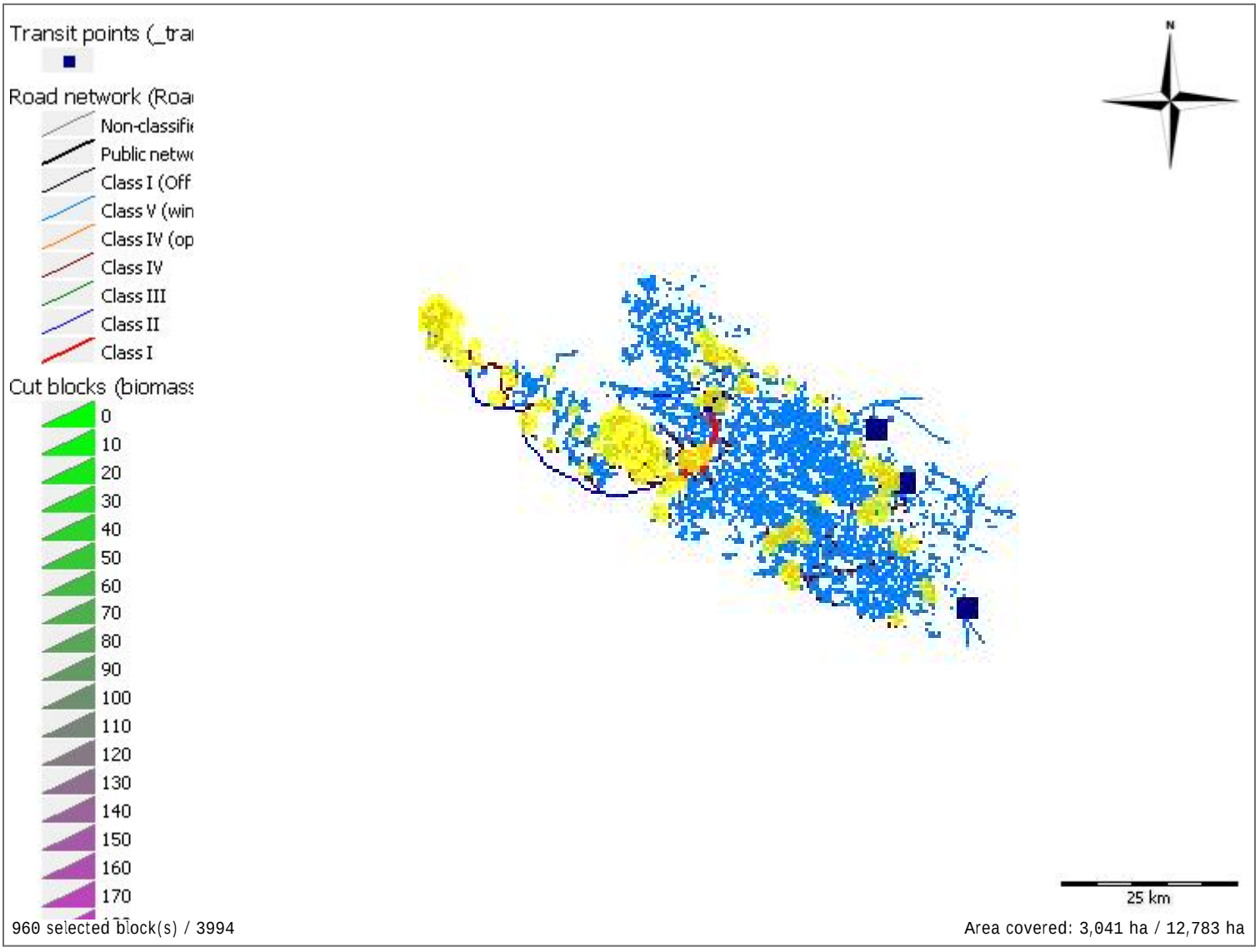
Chemainus				
	Douglas Fir	Logs	228,879	30
	Lodgepole Pine	Logs	430	24
	Red Alder	Logs	13,424	31
	Subalpine Fir	Logs	23,324	82
	Trembling Aspen	Logs	295	32
	Western Hemlock	Logs	74,869	73
	Western Red Cedar	Logs	32,435	80
	Western White Pine	Logs	34	21
	White Spruce	Logs	6,340	100
	Yellow Cedar	Logs	2,768	78
			382,797	47
Victoria				
	Douglas Fir	Logs	21,296	23
	Lodgepole Pine	Logs	257	40
	Red Alder	Logs	400	29
	Western Hemlock	Logs	548	24
	Western Red Cedar	Logs	2,441	22
			24,943	23
Port Alberni				
	Douglas Fir	Logs	176,333	54
	Lodgepole Pine	Logs	548	110
	Red Alder	Logs	23,631	63
	Subalpine Fir	Logs	116,293	134
	Trembling Aspen	Logs	39	62
	Western Hemlock	Logs	473,246	116
	Western Red Cedar	Logs	382,626	119
	Western White Pine	Logs	48	50
	White Spruce	Logs	5,148	147
	Yellow Cedar	Logs	68,255	140
			1,246,166	110
			1,727,741	91

Harvesting season

	m³	ha
Summer	0	0.0
Fall	0	0.0
Winter	1,727,741	3,041.0
	1,727,741	3,041.0

Terrain conditions

CPPA class	Ground strength (%)	Roughness (%)	Slope (%)
1	-	-	-
2	-	-	-
3	100	100	100
4	-	-	-
5	-	-	-


Transit points (_trai
Road network (Roa
Non-classifi
Public netw
Class I (Off
Class V (win
Class IV (op
Class IV
Class III
Class II
Class I
Cut blocks (biomass
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
N
25 km
960 selected block(s) / 3994
Area covered: 3,041 ha / 12,783 ha

Territory:	Unknown territory
Sector:	Unknown sector
Cut block:	<Multiple selection>

Cut blocks

Area	2,952.3 ha
Number of cut blocks	846
Harvested volume	1,501,228 m^3
Average skidding dist.	250 m
Volume/km	0 m^3/km
Area/km	0 ha/km

Cut type

Clearcut	2,952.3 ha

Harvesting system

Full-tree with roadside processing	2,952.3 ha

Costs

Harvesting	14.01 $/$m^3$
Equipment transport	0.75 $/$m^3$
Road network - Construction	0.00 $/$m^3$
Road network - Repair	0.00 $/$m^3$
Road network - Improvement	0.00 $/$m^3$
Road network - Maintenance	0.45 $/$m^3$
Transportation	14.13 $/$m^3$
Loading/unloading	2.50 $/$m^3$
Transfer yard	0.00 $/$m^3$
Stumpage fees	0.00 $/$m^3$
Indirect costs	0.00 $/$m^3$
Stand establishment	N/A
Total	31.84 $/$m^3$

Revenue

Value	0.00 $/$m^3$
Reimbursements (silv.)	N/A

Net

Profit	-31.84 $/$m^3$

Products

Name	Format	m³	m³/ha	m³/stem	%/total
Douglas Fir	Logs	544,488	184.4	0.672	36
Western Hemlock	Logs	430,783	145.9	0.502	29
Western Red Cedar	Logs	277,669	94.1	0.554	18
Subalpine Fir	Logs	117,366	39.8	0.671	8
Yellow Cedar	Logs	64,294	21.8	0.736	4
Red Alder	Logs	48,308	16.4	0.489	3
White Spruce	Logs	16,884	5.7	2.249	1
Lodgepole Pine	Logs	1,047	0.4	0.591	0
Trembling Aspen	Logs	271	0.1	0.987	0
Western White Pine	Logs	117	0.0	0.341	0
		1,501,228	508.5	0.591	100

Delivery to mills

Destination	Product	Format	m³	Transport average distance (Km)
Nanaimo				
	Douglas Fir	Logs	64,428	23
	Lodgepole Pine	Logs	17	35
	Red Alder	Logs	924	28
	Western Hemlock	Logs	107	22
	Western Red Cedar	Logs	647	34
			66,124	23

Chemainus				
	Douglas Fir	Logs	230,631	37
	Lodgepole Pine	Logs	59	108
	Red Alder	Logs	13,360	31
	Subalpine Fir	Logs	15,476	82
	Trembling Aspen	Logs	162	31
	Western Hemlock	Logs	58,708	61
	Western Red Cedar	Logs	22,512	69
	Western White Pine	Logs	44	23
	White Spruce	Logs	10,686	102
	Yellow Cedar	Logs	1,504	86
			353,142	47
Victoria				
	Douglas Fir	Logs	20,246	26
	Lodgepole Pine	Logs	120	32
	Red Alder	Logs	660	29
	Western Hemlock	Logs	177	25
	Western Red Cedar	Logs	2,064	25
	Western White Pine	Logs	0	27
			23,266	26
Port Alberni				
	Douglas Fir	Logs	229,183	57
	Lodgepole Pine	Logs	851	61
	Red Alder	Logs	33,363	78
	Subalpine Fir	Logs	101,890	113
	Trembling Aspen	Logs	109	43
	Western Hemlock	Logs	371,792	114
	Western Red Cedar	Logs	252,446	123
	Western White Pine	Logs	73	132
	White Spruce	Logs	6,199	125
	Yellow Cedar	Logs	62,791	180
			1,058,696	107

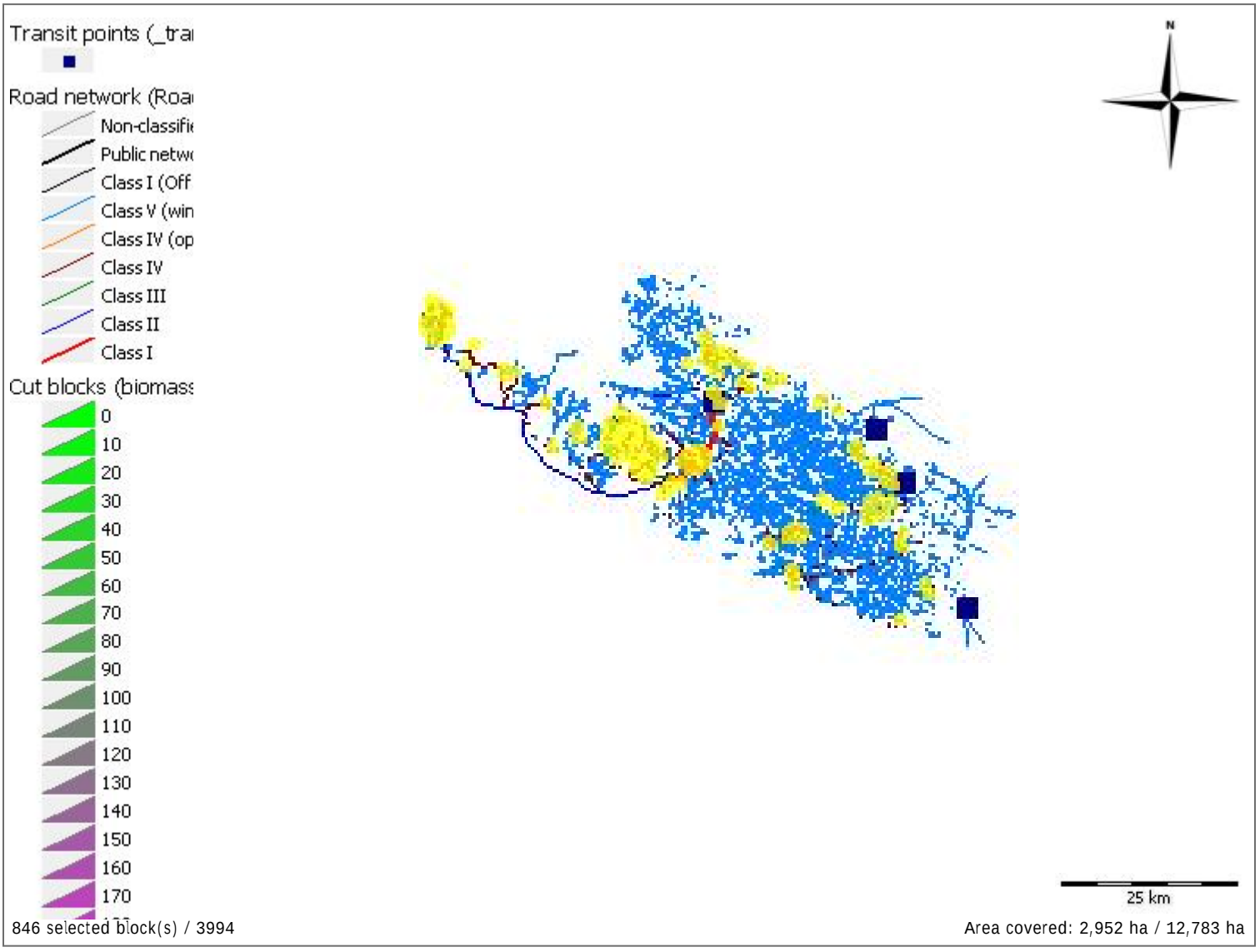
	1,501,228	88

Harvesting season

	m³	ha
Summer	0	0.0
Fall	0	0.0
Winter	1,501,228	2,952.3
	1,501,228	2,952.3

Terrain conditions

CPPA class	Ground strength (%)	Roughness (%)	Slope (%)
1	-	-	-
2	-	-	-
3	100	100	100
4	-	-	-
5	-	-	-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Class I
Cut blocks (biomass
0
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90
100
110
120
130
140
150
160
170
N
25 km
846 selected block(s) / 3994
Area covered: 2,952 ha / 12,783 ha

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