Assessment of the Potential Wood Availability in the East Cape Region

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REPORT INFORMATION SHEET

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Assessment of the Potential Wood Availability in the East Coast Region

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EXECUTIVE SUMMARY

Satellite remote sensing data were used to estimate the forest area by age class and distance from a proposed log barging site at Karakatuwhero River near Te Araroa. The area of forest by approximate five-year age class was determined from different versions of the national landcover database (LCDB). The distance of each forest from the proposed log barging site was calculated from a national road network map with allowances made for road slope. The total area by age class by distance class from the proposed barging site was then calculated.

A total of 64,040 ha of forests that are 21 years of age or older (i.e. planted during or after 1994) are recorded in the National Exotic Forest Description produced by the Ministry of Primary Industries. Of this area we estimated that approximately 18,830 ha are located within 100 km of Hicks Bay and 47,598 ha within 150 km. There is much less area in younger forests due to the pattern of afforestation in this region, whereby large areas of forests were established in the early to mid-1990s. It is important to note that the areas calculated from remote sensing are likely to be an overestimate of the harvestable forest resource as LCDB does not differentiate radiata pine trees from other exotic tree species.

We have also produced a map showing the potential supply catchment for the proposed log barging operation. This supply catchment includes all forests where the road distance to the proposed barging site is less than the distance to Gisborne Port.
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1. Introduction

As part of a feasibility study for a log barging operation based out of the Karakatuwhero River near Te Araroa, information on the area of mature forest by distance from the proposed location is required. This report provides an estimate of the area of forest by approximate five-year age class using remote sensing information. Information is also provided on the total forest area and standing volume for the Gisborne and Opotiki districts as reported in the National Exotic Forest Description, although it is important to note that these data are non-spatial.

2. Methods

2.1. Forest area and wood availability from NEFD

The total area and estimated standing volume in forests in the Gisborne and Opotiki districts were obtained from the National Exotic Forest Description (NEFD). The NEFD is the official statistical description of New Zealand's planted exotic forests, but is non-spatial. In particular, the Gisborne district is large, stretching all the way from Hicks Bay to the Mahia Peninsula (Figure 1).

Figure 1. Ministry for Primary Industries wood supply regions and territorial local authority regions within them.

2.2 Identification of forests from remote sensing

To identify the exotic forests in the study area national vegetation land cover data were used. The National Land Cover Database (LCDB) provides multi-year information on the vegetation cover of New Zealand. The database is a digital thematic map of land cover designed to be compatible in scale and accuracy with Land Information New Zealand's 1:50,000 topographic databases. LCDB data are verified across the different collection periods to reduce problems of matching data different datasets (Thompson, 2003). The datasets for summer 1996/97, summer 2001/02, summer 2008/09, and summer 20012/13 are known as LCDB1, 2, 3, and 4, respectively.

The temporal nature of LCDB allows approximation of stand age. For example, if an area is classified as harvested at one point in time and as exotic forest in the following LCDB, an age range can be approximated. The ranges of possible stand age were calculated based on the earliest and latest planting years possible (Hock et al 2015) given

- when the trees are visible in LCDB4, and
- the age that the trees become visible on satellite imagery

Figure 2 shows the temporal logic for new tree plantings. Note that each line indicating the presence of trees over time starts before the date that the trees become visible on LCDB because planted trees need to have grown sufficiently for detection on satellite imagery. A minimum of four years growth was assumed in this study in order for the radiata pine trees to be visible on satellite imagery; this period may be longer in some locations with slower growth rates.

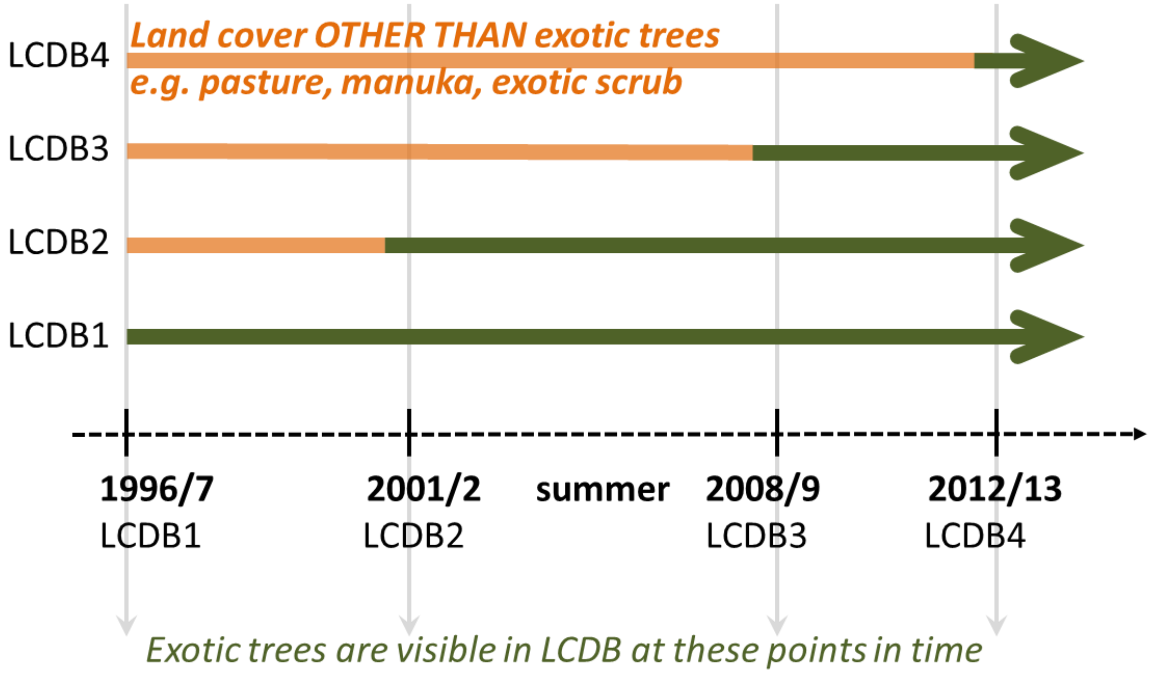

Figure 2. Example of methodology for approximating stand age

2.3. Calculation of forest area by distance from barging operation

The modelling used the location of the N2 bridge over the Karakatuwhero River near Te Araroa – labelled as Hicks Bay in the modelling process.

Once a particular forest was identified the distance to the proposed log barging site was calculated. This was done using the NZ Topo (1:250,000) road layer. These are public roads; the assumption was made that forest harvesting would be to "farm gate". In the calculations the assumption was made that the wood would be transported to the nearest road. As the East Coast is in part very hilly, road distance (horizontal distance) was converted to slope distance to more accurately reflect the true cost of travelling. All calculations were undertaken at a 30 m resolution.

The slope distance of the roads was used to calculate cumulative slope distances from Hicks Bay. The road distances were then allocated to the un-roaded lands, based on the Euclidean distance (nearest road). This layer was then overlain onto the LCDB-based forest age classes, and summarised by the road distance. Repeating the above steps on a destination layer that combined both Hicks Bay and Gisborne, allowed the potential "supply catchment" for each destination to be calculated. This supply catchment is based on closest travel distance on the public roads.

3. Results

Based on NEFD data, there is a total forested area of 171,841 ha in the Gisborne and Opotoki districts, of which 64,040 ha is in forests that are 21 years of age and over (Table 1).

Table 1. Forest area (ha) by age class in the Gisborne and Opotoki districts (MPI 2014)

	Forest area (ha) by age class								
District	**1-5**	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**	**31-35**	**36-40**	**41-50**
Gisborne	21,795	9,125	26,029	44,265	31,397	13,190	6,931	2,257	1,140
Opotiki	2,976	962	1,580	1,069	1,143	5,792	1,990	201	-
Total	**24,771**	**10,087**	**27,609**	**45,334**	**32,540**	**18,982**	**8,921**	**2,457**	**1,140**

The recently released wood availability forecasts for East Coast show that under a scenario where large forest owners (those with more than 1000 ha in at least three distinct age classes) harvest at their stated intentions and small forest owners harvest at age 28 years, the volume of wood available is predicted to increase from approximately 2.3 million m^3 in 2014 to 6.8 million m^3 in 2021 (Figure 3). However, this assumes that all wood that is available to harvest is actually able to be harvested. In reality, the availability of harvesting contractors and log trucks to transport logs would make it difficult to achieve. For this reason, the Ministry for Primary Industries consider what they call a split non-declining yield scenario, in which large owners harvest at their stated intentions and woodflow from small private growers is regulated to ensure a non-declining yield over a 20 year period to 2034. Under such a scenario the annual amount of wood available for harvest would be approximately 3.8 million m^3.

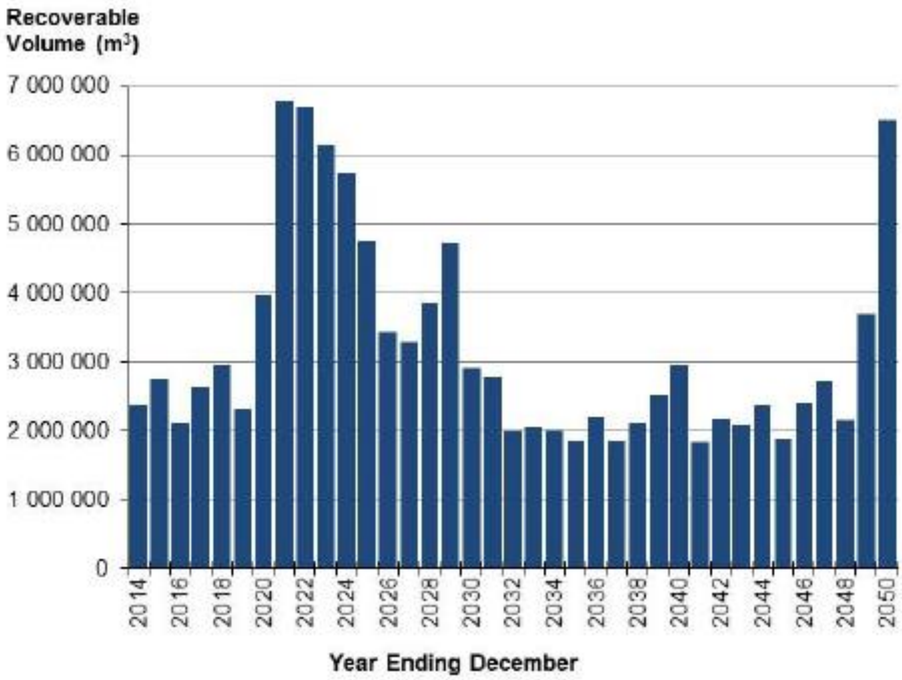

Figure 3. Radiata pine wood availability for the East Coast region under the scenario where large owners harvest at their stated intentions and small owners harvest at age 28 years (after MPI 2015).

Based on our mapping of forests into approximate age classes (planting years), we estimate that there is 18,830 ha of forests older than 22 years of age (i.e. 1992 plantings or older) within 100 km of Te Araroa and 47,598 ha within 150 km (Figure 4 & Appendix 1). There is a relatively smaller area of forest in younger age classes, which reflects the large amount of afforestation that occurred in this region in the early to mid-1990s. It is important to note that these values are likely to be an overestimate of the harvestable forest resource as LCDB does not differentiate radiata pine trees from other exotic tree species. For example, there is no differentiation between shelterbelts, riparian trees, and woodlots.

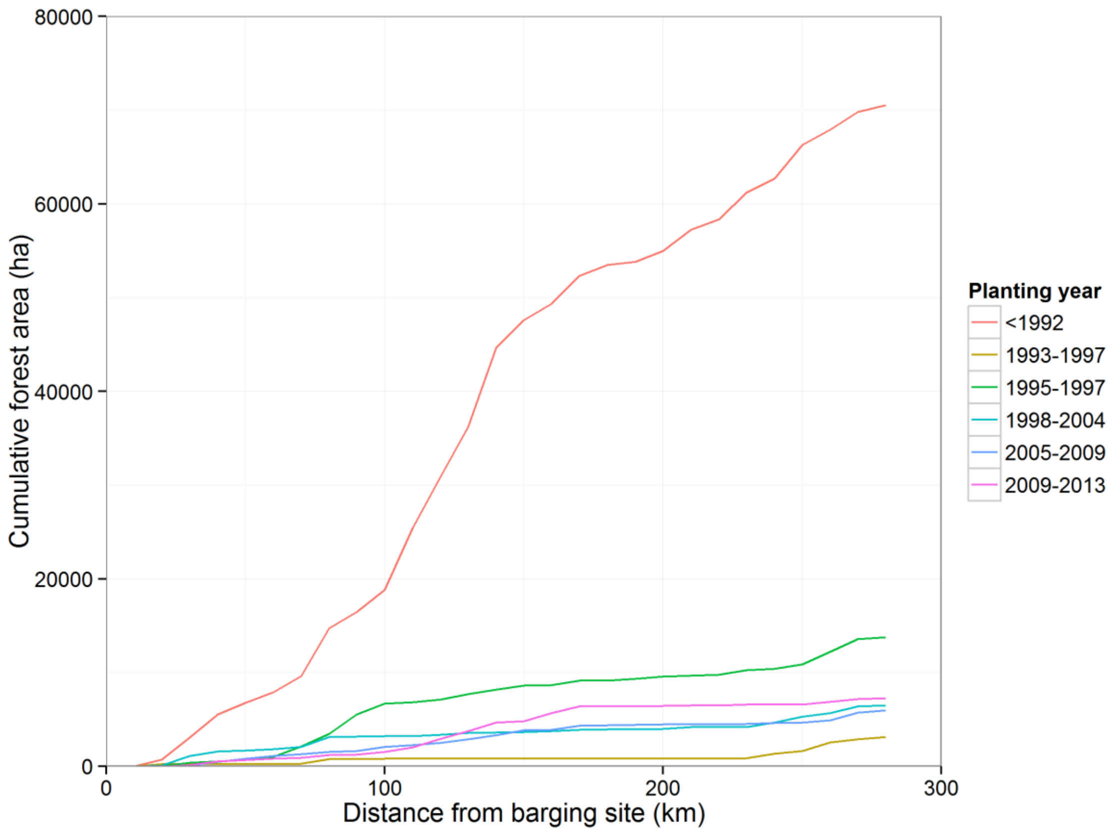

Figure 4. Estimated area of forest by distance from the proposed log barging site. Areas are broken down into approximate five-year planting dates.

The map of the distances, the resource age classes, and the modelled 'supply catchments' for the respective destinations are shown in Figure 5. This maps shows the boundary line past which the calculated road transport distance to Gisborne Port is shorter than the road distance to the proposed log barging site. A further map shows more details for areas within 100km (based on road distance) of the proposed site (Figure 6).

As an approximation there are roughly 7800 ha of forests planted during or before 1992 that are located within 60 ha of the proposed log barging site. Assuming that these forests are harvested over a 5-year period, then this is equivalent to 1560 ha harvested per year. Applying the average clearfell yield reported in the NEFD of 519 m^3/ha to this area gives an approximate volume harvested each year of 809,640 m^3. In the absence of a log barging facility this wood would presumably be transported to Gisborne Port or Tauranga/Whakatane via SH35.

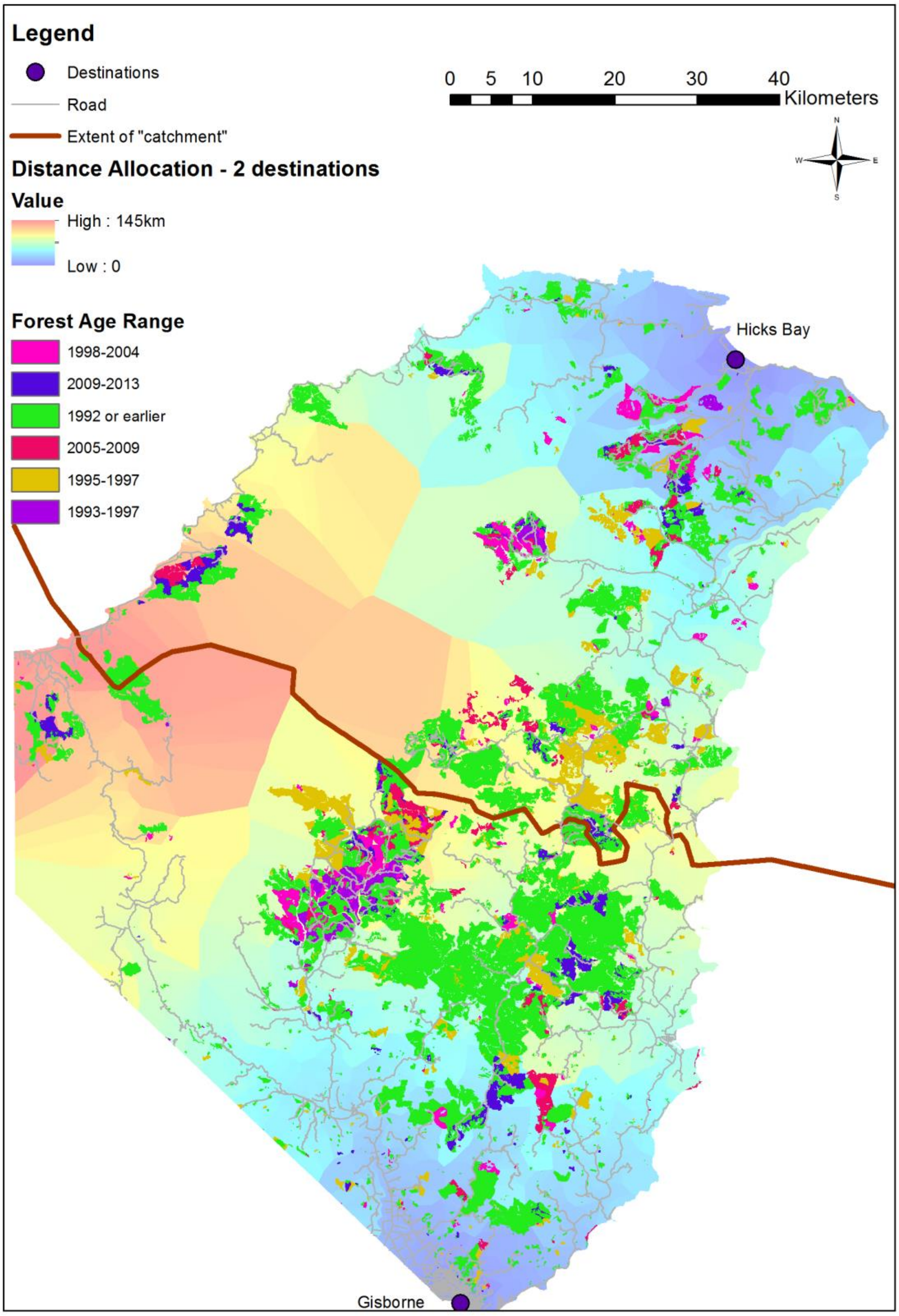

Figure 5. Map of the Gisborne and Opotoki districts showing the location of forests by planting year. The extent of the "supply catchment" within which the road transport distance to the proposed log barging site is shorter than the distance to Gisborne port is shown.

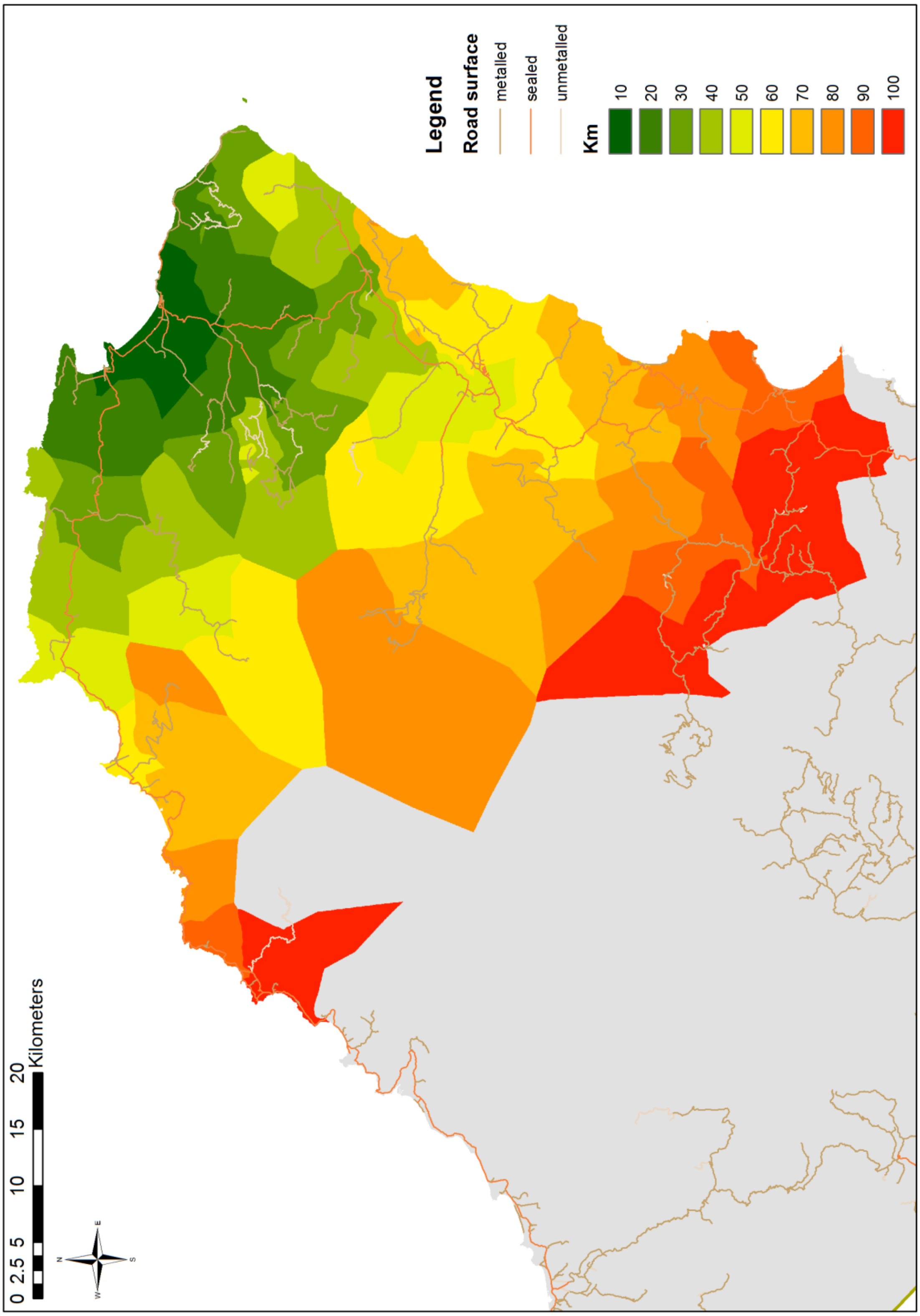

Figure 6. Detailed map of the first 100km from the proposed log barging site.

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Appendix 1 – Area of forest by age class and distance

	Area of forest by age class (ha) Where age is for the year 2014						
Distance	Age 1-5 2009-2013	Age 5-9 2005-2009	Age 10-16 1998-2004	Age 17-21 1995-1997	Age 17-23 1993-1997	Age 22plus 1992 or earlier	Grand Total
0-10	1.5	0.0	0.0	0.8	0.0	7.5	9.8
10-20	0.0	0.0	77.1	60.7	230.9	735.3	1,104.1
20-30	128.7	74.3	1,050.7	342.4	6.6	2,339.5	3,942.3
30-40	406.0	404.1	473.3	123.5	0.0	2,449.3	3,856.1
40-50	139.0	320.3	100.9	123.7	0.0	1,247.2	1,931.1
50-60	144.6	291.7	132.0	353.3	0.0	1,111.9	2,033.5
60-70	105.7	187.1	247.6	1,093.1	41.3	1,720.3	3,395.0
70-80	270.9	256.3	1,027.6	1,370.1	491.1	5,121.4	8,537.4
80-90	69.5	85.4	79.8	2,074.7	23.2	1,750.8	4,083.3
90-100	265.3	438.5	24.2	1,163.1	3.3	2,346.9	4,241.3
100-110	470.0	194.2	20.3	148.5	2.8	6,601.1	7,436.8
110-120	918.3	248.1	139.5	282.3	0.0	5,469.1	7,057.1
120-130	853.9	397.6	178.6	557.9	0.0	5,293.7	7,281.7
130-140	919.3	446.8	66.3	496.5	0.0	8,428.4	10,357.3
140-150	97.8	489.9	57.3	409.4	0.0	2,975.8	4,030.2
150-160	877.6	82.6	60.9	59.1	0.0	1,751.1	2,831.3
160-170	721.4	414.1	177.4	471.4	0.0	2,987.0	4,771.3
170-180	6.9	59.8	34.0	37.1	0.0	1,170.6	1,308.3
180-190	9.4	27.9	1.0	193.9	0.0	307.0	539.1
190-200	39.9	56.1	46.7	228.9	13.6	1,167.1	1,552.3
200-210	40.8	0.0	176.1	81.1	0.0	2,279.8	2,577.8
210-220	27.4	13.3	7.6	105.0	0.5	1,084.0	1,237.8
220-230	64.4	20.9	26.8	478.4	74.6	2,838.6	3,503.8
230-240	37.7	117.9	442.6	157.8	474.8	1,529.6	2,760.4
240-250	0.0	28.3	650.9	444.2	268.3	3,583.3	4,974.9
250-260	268.3	272.1	372.0	1,395.1	920.5	1,641.4	4,869.3
260-270	297.6	801.1	735.8	1,307.6	358.1	1,870.1	5,370.3
>270	99.2	239.1	115.8	224.9	207.4	725.6	1,612.0

Distance are calculated without catchment constraints, i.e. based on the assumption that all wood goes through Hicks Bay. This allows different competition scenarios between Gisborne and Hicks Bay to be explored