Appendices

TFL 25 Amendments

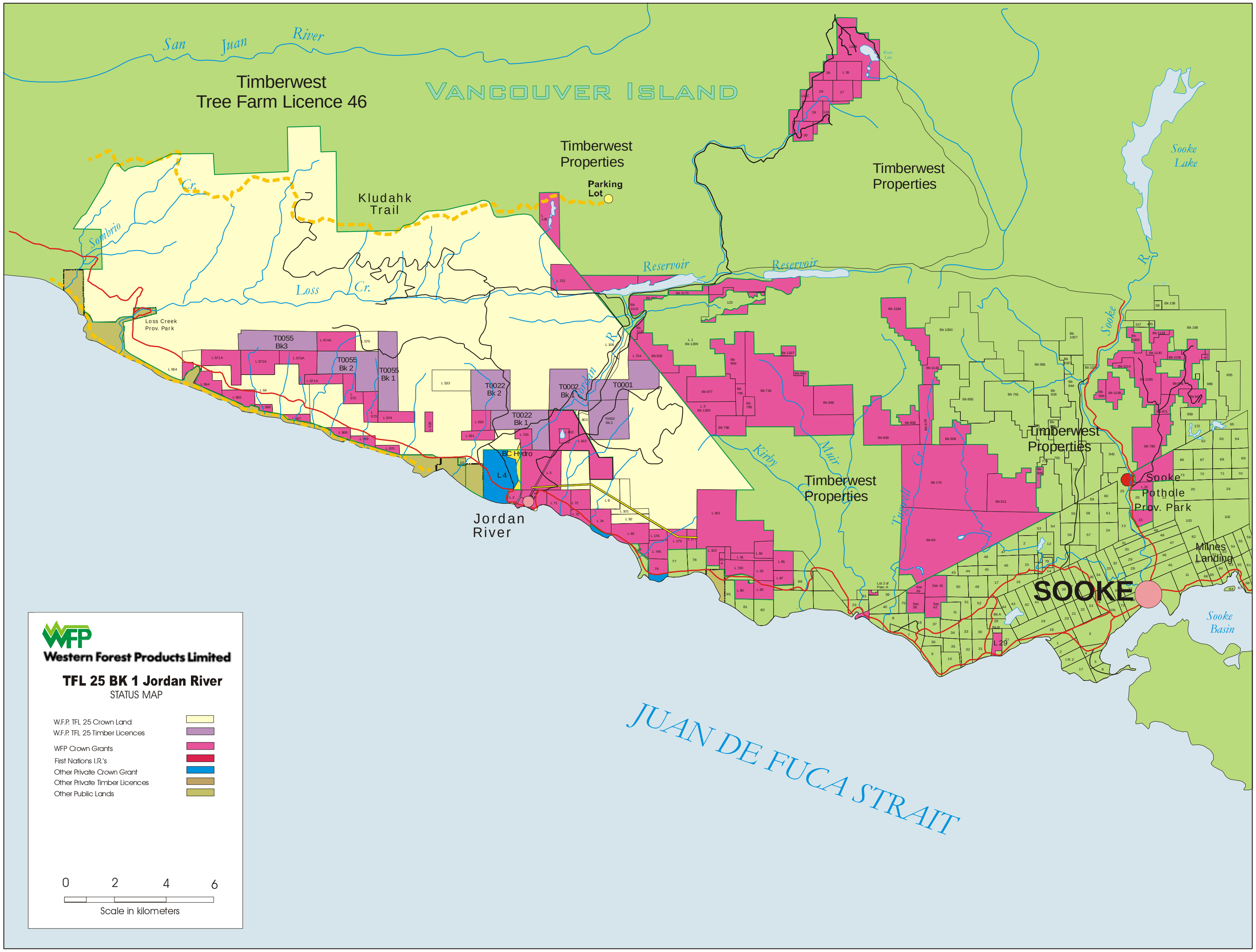
Amend. No.	Date	Schedule		Net Change	Amendment	TFL Block
		"A" (Ha)	"B" (Ha)			
1	11/8/58	61.86		61.86	1) Sec 81, except R/W Lot 868. 2) Sec 2 Plan 13R. 3) Parcel "A" Swc. 2 (D.D.88175-j) EXCEPT: a) part in plan 4194, b) parcel 1 of parcel "A" (D.D.130151-j), c) part in red on plan 843-R. 4) Lot 189 added to Sch. "A"	1
2	4/9/58			0	Keogh Main Road "centreline" corrected to read "easterly limit" in the description of Blk. 4 of Sch. "B"	2
3	7/11/58		-21.04	-21.04	Loss Creek Park site removed from Sch. "B"	1
4				0	Issued in error and cancelled	1
5				0	Issued in error and cancelled	
*6	21/05/59			0	Road right of way removed from Sch. "B" to permit removal of forest products from TSX77513, for the duration of SUP 3333. *It is assumed that SUP3333 has expired and road R/W reverted to Sch. "B"*	1
7	11/12/59			0	Clause 2 deleted from Agreement and replaced. Now appurtenant to all company "Manufacturing plants"	
8	2/12/60			0	Description of Blk. 2, Frazer Bay area revised to include Pt. Of Frazer Bay watershed	2
9	21/12/60	-357.34	357.34	0	Tbr. lease 140 (lot 54) transferred from Sch "A" to "B"	
10	22/12/60	84.18		84.18	Blks. 1119 and 1120 Malahat LD added to Sch. "A"	1
11	19/12/61	-256.58	256.58	0	TL 3304, Renfrew LD transferred to Sch. "B"	1
12				0	Cancelled - issued in error	1
13	23/05/62	-83.77	83.77	0	Lots 55 and 56, range 4 transferred from Sch A to Sch B.	5
14	23/05/62		-0.54	-0.54	50' powerline r/w in the vicinity of Loss Creek withdrawn from Sch. "B"	1
**15	18/06/62		-20.77	-20.77	40' powerline r/w within Blk.4 withdrawn from Sch. "B" **NOTE: Portions within Sch "A" not affected**	4
16	16/10/62	-60.82		-60.82	Pt. Sec 10 Renfrew LD removed from Sch "A" for park purposes	1
17	22/11/62	-1.29		-1.29	Lot A of DL 189 Renfrew LD withdrawn from Sch "A"	1
***18	7/3/63		-44.19	-44.19	Pt. Road r/w within sec.10, Renfrew LD withdrawn from Sch. "B" **it should have read Sch. "A"**	1
19	8/5/63	-64.75		-64.75	SW 1/4 Sec 35, Tp. 12withdrawn from Sch. "A"	4
20	19/06/63	1311.78		1311.78	Lot 176, Blks 780, 871, 891, 983, 994, 1035, 1069, Pcl. "A" of sec.s 38, 41, 42 taken into Sch "A"	1

Amend. No.	Date	Schedule "A" (Ha)	Schedule "B" (Ha)	Net Change	Amendment	TFL Block
21	29/01/64	-147.43		-147.43	Pts. Lying E of plan 356 R/W of sec. 14 and sec 11, Tp. 2, withdrawn from Sch. "A"	4
22	17/04/64	893.16		893.16	Blks. 1114, 1130, 1133, 1156, 1159 Malahat LD Sec 16, Tp 3, Sec. 21, Tp 2 and N1/2 of sec 16, Tp 2 Rupert taken into Sch "A"	1
23	3/7/64	-6.88		-6.88	Amended Pcl. "A" of Lot 39 withdrawn from Sch. "A"	1
24	16/11/64	941.04		941.04	Blks. 1172, 1173, 909, 977, 980, 1027, 1143, 1184, 984, Blk. "B" Lot 102 and blk. "A" of sec 91 taken into Sch. "A"	1
25	22/07/66	-258.6	258.6	0	TL 1959 transferred to Sch "B"	2
26	14/09/66	53.82		53.82	Sec. 76 Renfrew LD taken into Sch. "A"	1
N/A	23/02/67			0	Lot 532 is considered to be within Sch "B". See letter dated Feb. 23 1967 on file 253-2	
27	31/05/67	29.78		29.78	Sec.39, Otter LD added to Sch "A"	1
28	15/01/68			0	Clause 11A added to Agreement	
29	18/11/68	417.48		417.48	1) Lot 2 of Blk. 1299, Lot 3 Blk. 1299 and Lot 2 of Blk. 1298 added to Sch. "A"	1
29	18/11/68	-330.64		-330.64	2) 36 acre of Lot 1 of Blk. 1299, Lot 4 of Blk. 1299, 42 acre of Blk. 1298 and Lot 124 withdrawn from Sch. "A"	1
30	13/01/69		1161.47	1161.47	Description of Parcel "E" of Blk. 5 of TFL amended to include all of Crab lake and Owjaeumish Creek Watershed	5
31	23/03/71			0	Clause 31 amended	
32	16/02/71	-2.02		-2.02	Lot A of Sec. 93 is withdrawn from TFL	1
33	11/3/71		-3.44	-3.44	Blk. A of Sec.21, Tp 3 Rupert LD is withdrawn from TFL	4
34	2/4/71	-0.16		-0.16	Part sec. 2, Renfrew LD, Plan 23879 withdrawn from Sch. "A"	1
35	14/01/72	-2.75		-2.75	Lot A of Sec 22 and Sec 74 (Sooke Pot Holes Park) are withdrawn from TFL	1
36	19/07/72		-25.09	-25.09	BC Hydro Powerline withdrawn form TFL	
37	28/09/72		-4.05	-4.05	Part of Sec.21, Tp.3 Rupert LD withdrawn from TFL (BCH Station)	4
38	16/10/73	12.95		12.95	Lot 160, Renfrew LD added to Sch "A"	1
39	3/8/78		-26.24	-26.24	Blk B of Lot 106, Blk 4 of lot 830, Renfrew LD withdrawn from Blk. 1	1
40	27/08/79		-36.42	-36.42	Blk. A of sec. 24 and Blk. A of sec. 25, Tp 4 Rupert LD removed from Blk. 4 (Loran "C" site)	4
41	6/3/80			0	Revised Sch. A to 61 902.267 hectares	

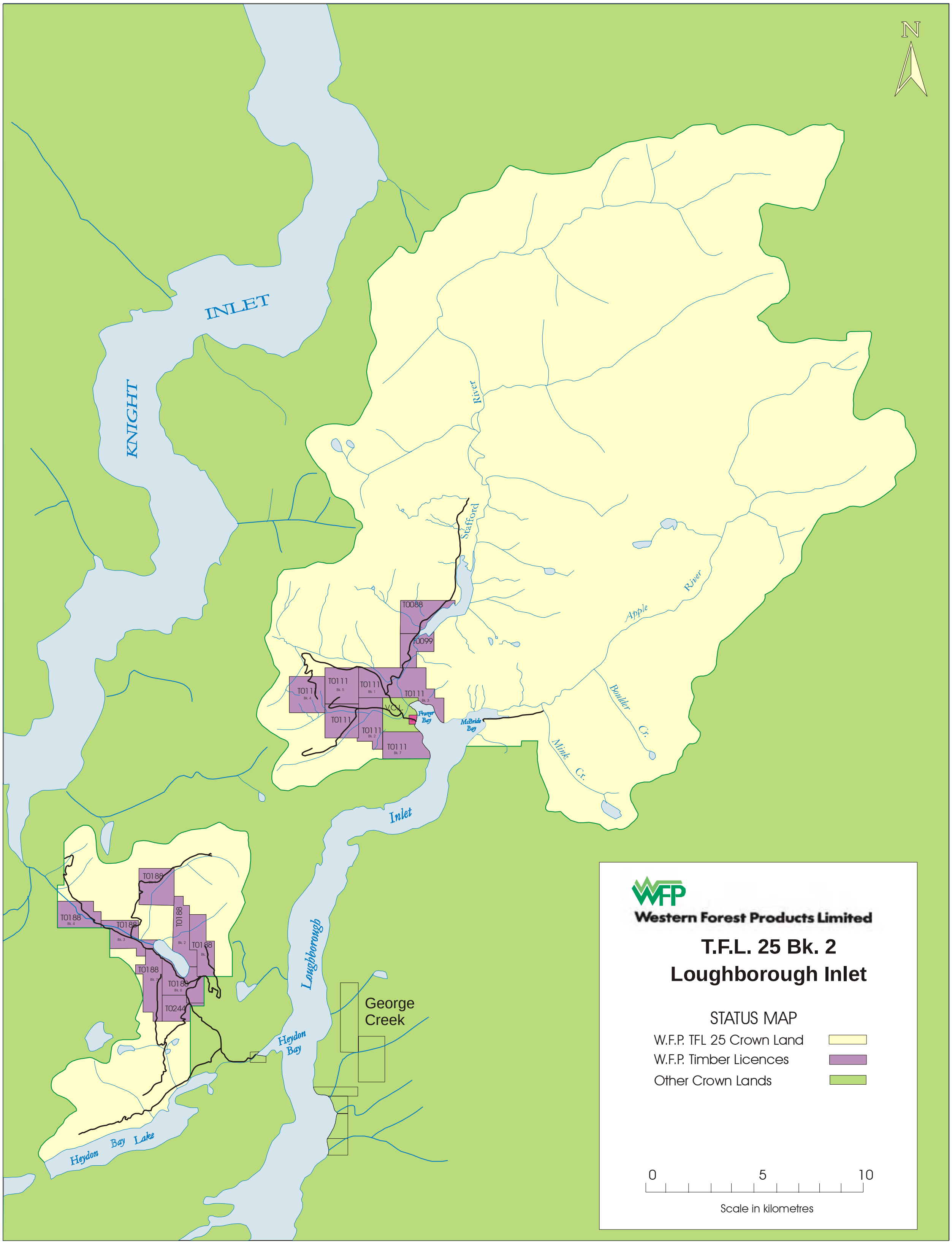
Amend. No.	Date	Schedule		Net Change	Amendment	TFL Block
		"A" (Ha)	"B" (Ha)			
42				0	Cancelled and replaced with instrument 46	
43				0	Cancelled and replaced with instrument 45	
44	30/03/82	-62.69	-1.44	-64.13	Withdraw Lot 1, Sec 16, Tp 3 and public road, Rupert LD	4
45	29/03/82	-26.25		-26.25	Delete Portion of lot 1 of Sec 9, Rupert LD	4
46	30/08/82	18.49		18.49	Lot 1, Sec 75, Plan 24134, Renfrew LD	1
47	30/08/82	18.49		18.49	S1/2 of E1/2 of Lot 22, Renfrew LD	1
48	11/7/83	-2.03		-2.03	Withdraw portion of Sec 3, Renfrew LD	1
49	24/10/84	307.57		307.57	Add W 30 chs, lot 26 and lots 27 to 30, Malahat LD	1
50	22/02/85			0	Redefines legal description of Blk. 2, parcel A	2
51	1/11/85			0	Amends TFL document to include District Manager in part 3	
52	30/12/97		-4.29	-4.29	Withdrawal of area around road through sec. 54, Renfrew LD	1
53	26/08/97	-17.2		-17.2	Portion of Sec 76, Renfrew LD is deleted from TFL 25	1
56	10/4/96	-486.4	712.1	225.7	Exchange of land in TFL 25 needed for Juan de Fuca Marine Park Trail	1
57	1/10/98			0	To exchange Timber Harvesting rights from Strathcona TSA to mitigate impart in VILUP and to transfer 8626m^3 from TFL 25 to SBFEP	
58	15/11/01		100.44	100.44	Addition of area in T0887 (Weyco) at Naka Cr	3
59	1/10/98	-9200.14	31540	22339.86	Transfers TFL 24 to TFL 25 Blk 6 and TFL 25 Blk 4 to TFL 6 Blk 2.	
60	Pending Sept 2001		-128.4	-128.4	Increased deletion of Robson Bight Ecological Reserve	3
61	*Cancelled* July 2001			0	Proposed deletion of Lots 1-21 Sec 74. Otter L.D. Proposal was cancelled Oct 1,2002	1
63	22/01/02	-9.64		-9.64	Deletion of Sec 23 Otter L.D. (mouth of Muir Cr)	1
		-6,514.68	33,212.39	26,697.71	**Total hectares added or deleted in TFL**	

Appendix II

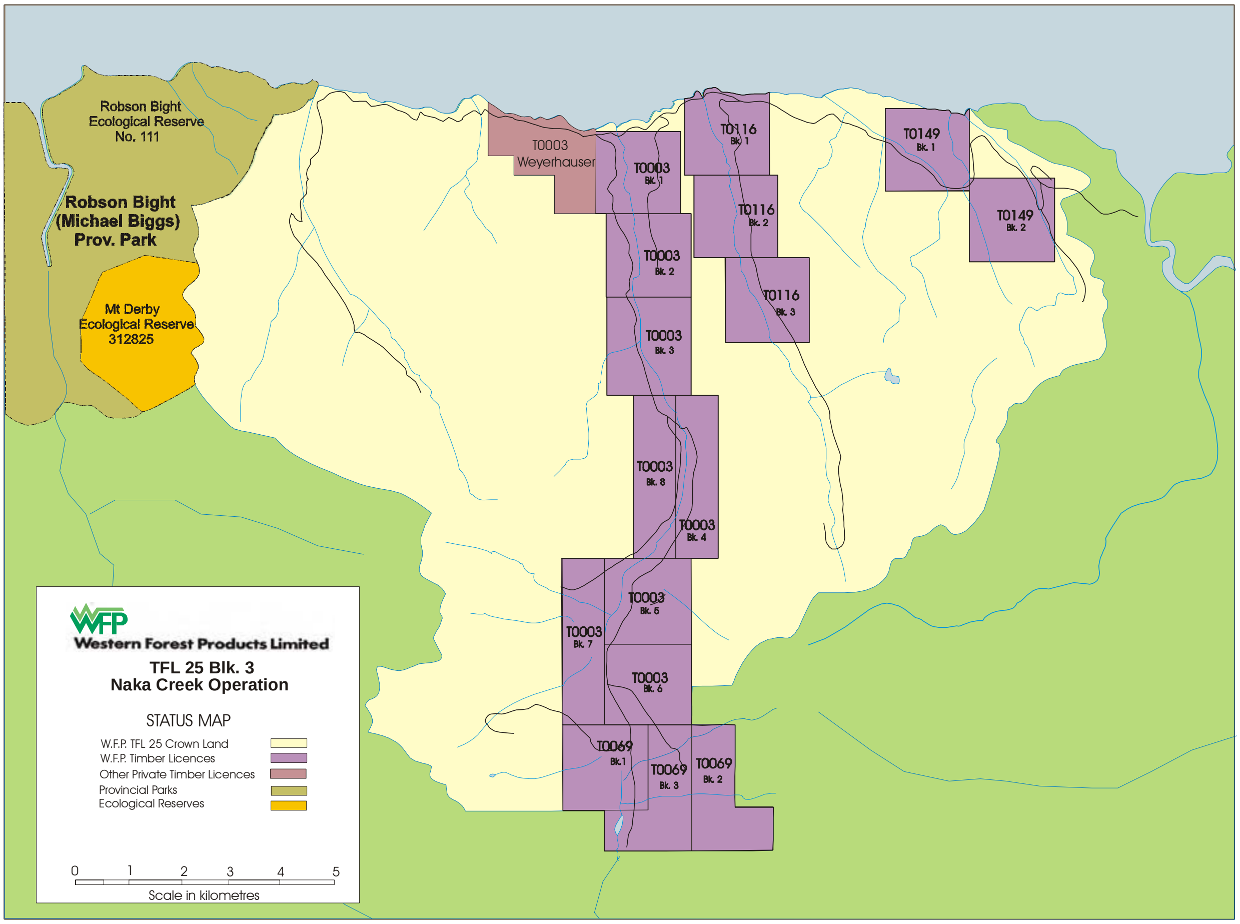
TFL 25 Block Maps and Tenures



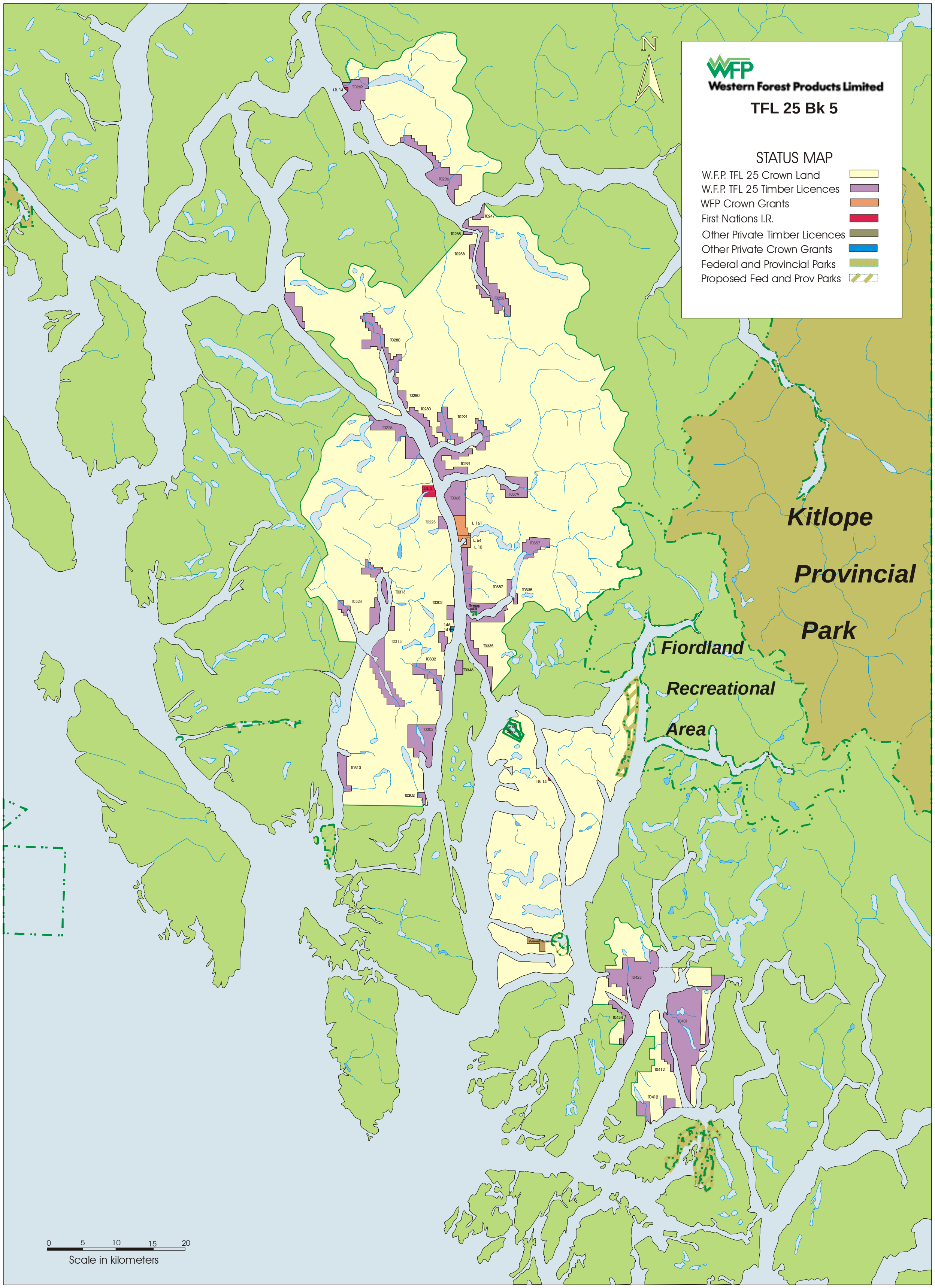
TFL 25 Block 1



TFL 25 Block 2



TFL 25 Block 3



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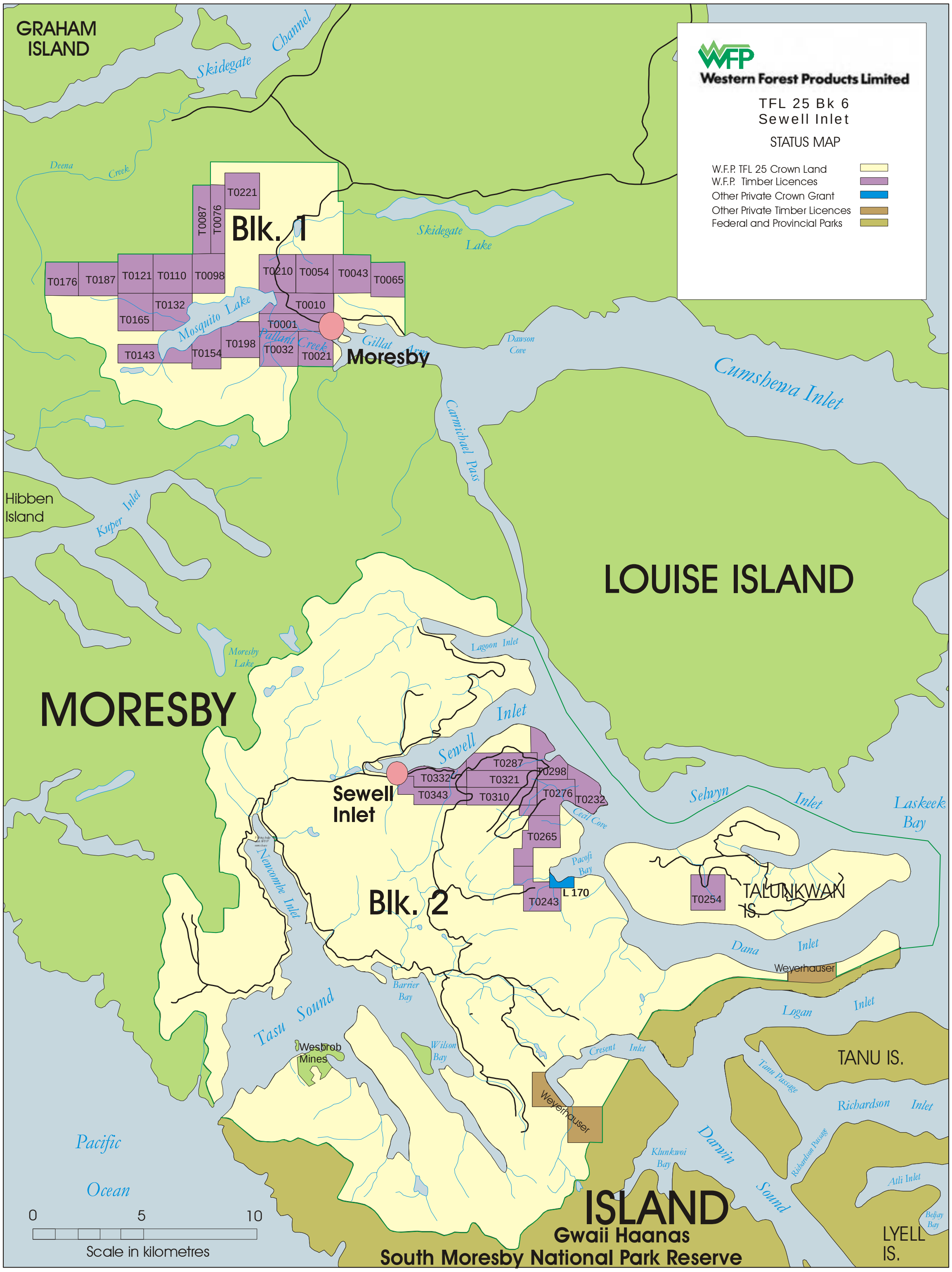
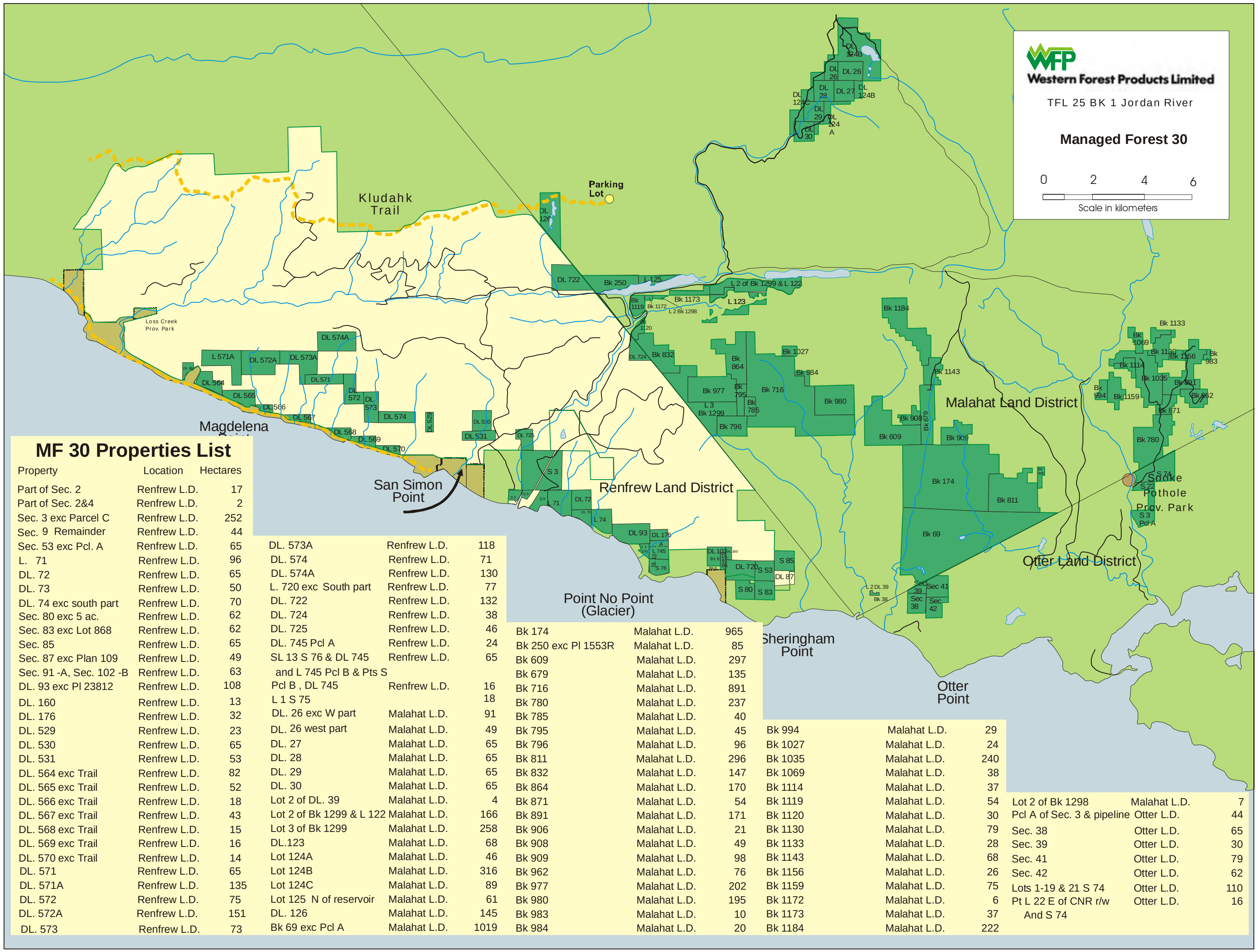


TFL 25 Block 6

Appendix III

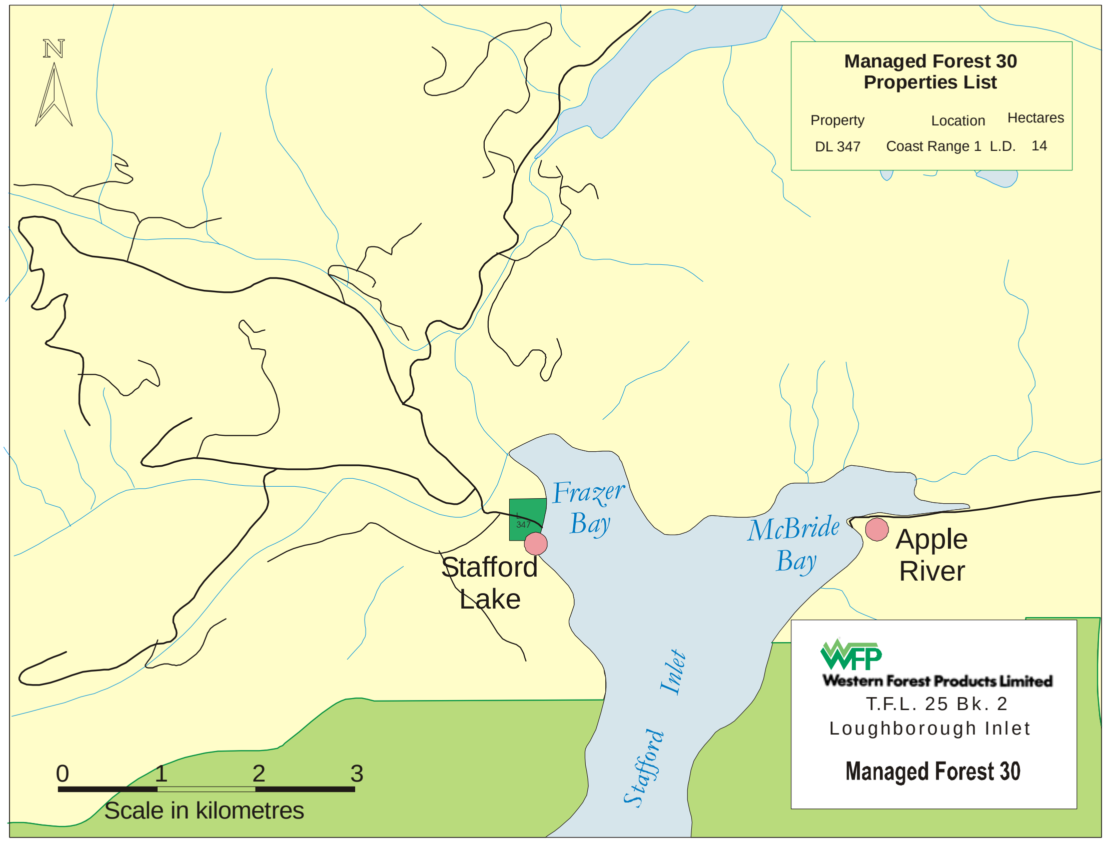
Managed Forest No. 30



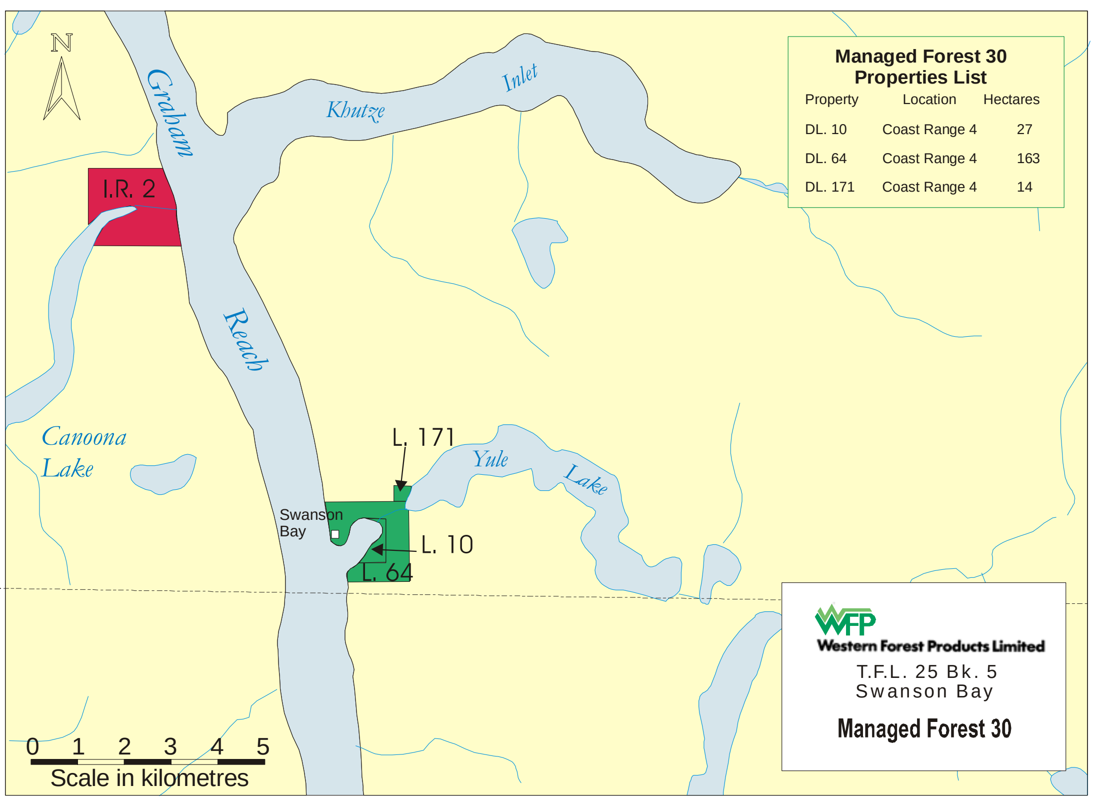
MF 30 Properties List

Property	Location	Hectares
Part of Sec. 2	Renfrew L.D.	17
Part of Sec. 2&4	Renfrew L.D.	2
Sec. 3 exc Parcel C	Renfrew L.D.	252
Sec. 9 Remainder	Renfrew L.D.	44
Sec. 53 exc Pcl. A	Renfrew L.D.	65
L. 71	Renfrew L.D.	96
DL. 72	Renfrew L.D.	65
DL. 73	Renfrew L.D.	50
DL. 74 exc south part	Renfrew L.D.	70
Sec. 80 exc 5 ac.	Renfrew L.D.	62
Sec. 83 exc Lot 868	Renfrew L.D.	62
Sec. 85	Renfrew L.D.	65
Sec. 87 exc Plan 109	Renfrew L.D.	49
Sec. 91 -A, Sec. 102 -B	Renfrew L.D.	63
DL. 93 exc Pl 23812	Renfrew L.D.	108
DL. 160	Renfrew L.D.	13
DL. 176	Renfrew L.D.	32
DL. 529	Renfrew L.D.	23
DL. 530	Renfrew L.D.	65
DL. 531	Renfrew L.D.	53
DL. 564 exc Trail	Renfrew L.D.	82
DL. 565 exc Trail	Renfrew L.D.	52
DL. 566 exc Trail	Renfrew L.D.	18
DL. 567 exc Trail	Renfrew L.D.	43
DL. 568 exc Trail	Renfrew L.D.	15
DL. 569 exc Trail	Renfrew L.D.	16
DL. 570 exc Trail	Renfrew L.D.	14
DL. 571	Renfrew L.D.	65
DL. 571A	Renfrew L.D.	135
DL. 572	Renfrew L.D.	75
DL. 572A	Renfrew L.D.	151
DL. 573	Renfrew L.D.	73
DL. 573A	Renfrew L.D.	118
DL. 574	Renfrew L.D.	71
DL. 574A	Renfrew L.D.	130
L. 720 exc South part	Renfrew L.D.	77
DL. 722	Renfrew L.D.	132
DL. 724	Renfrew L.D.	38
DL. 725	Renfrew L.D.	46
DL. 745 Pcl A	Renfrew L.D.	24
SL 13 S 76 & DL 745	Renfrew L.D.	65
and L 745 Pcl B & Pts S		
Pcl B , DL 745	Renfrew L.D.	16
L 1 S 75		18
DL. 26 exc W part	Malahat L.D.	91
DL. 26 west part	Malahat L.D.	49
DL. 27	Malahat L.D.	65
DL. 28	Malahat L.D.	65
DL. 29	Malahat L.D.	65
DL. 30	Malahat L.D.	65
Lot 2 of DL. 39	Malahat L.D.	4
Lot 2 of Bk 1299 & L 122	Malahat L.D.	166
Lot 3 of Bk 1299	Malahat L.D.	258
DL.123	Malahat L.D.	68
Lot 124A	Malahat L.D.	46
Lot 124B	Malahat L.D.	316
Lot 124C	Malahat L.D.	89
Lot 125 N of reservoir	Malahat L.D.	61
DL. 126	Malahat L.D.	145
Bk 69 exc Pcl A	Malahat L.D.	1019
Bk 174	Malahat L.D.	965
Bk 250 exc Pl 1553R	Malahat L.D.	85
Bk 609	Malahat L.D.	297
Bk 679	Malahat L.D.	135
Bk 716	Malahat L.D.	891
Bk 780	Malahat L.D.	237
Bk 785	Malahat L.D.	40
Bk 795	Malahat L.D.	45
Bk 796	Malahat L.D.	96
Bk 811	Malahat L.D.	296
Bk 832	Malahat L.D.	147
Bk 864	Malahat L.D.	170
Bk 871	Malahat L.D.	54
Bk 891	Malahat L.D.	171
Bk 906	Malahat L.D.	21
Bk 908	Malahat L.D.	49
Bk 909	Malahat L.D.	98
Bk 962	Malahat L.D.	76
Bk 977	Malahat L.D.	202
Bk 980	Malahat L.D.	195
Bk 983	Malahat L.D.	10
Bk 984	Malahat L.D.	20
Bk 994	Malahat L.D.	29
Bk 1027	Malahat L.D.	24
Bk 1035	Malahat L.D.	240
Bk 1069	Malahat L.D.	38
Bk 1114	Malahat L.D.	37
Bk 1119	Malahat L.D.	54
Bk 1120	Malahat L.D.	30
Bk 1130	Malahat L.D.	79
Bk 1133	Malahat L.D.	28
Bk 1143	Malahat L.D.	68
Bk 1156	Malahat L.D.	26
Bk 1159	Malahat L.D.	75
Bk 1172	Malahat L.D.	6
Bk 1173	Malahat L.D.	37
Bk 1184	Malahat L.D.	222
Lot 2 of Bk 1298	Malahat L.D.	7
Pcl A of Sec. 3 & pipeline	Otter L.D.	44
Sec. 38	Otter L.D.	65
Sec. 39	Otter L.D.	30
Sec. 41	Otter L.D.	79
Sec. 42	Otter L.D.	62
Lots 1-19 & 21 S 74	Otter L.D.	110
Pt L 22 E of CNR r/w And S 74	Otter L.D.	16

Managed Forest 30 – Jordan River



Managed Forest 30 – Loughborough Inlet



Managed Forest 30 – Swanson Bay

Managed Forest 30 Properties List

Assessment Roll	General Location	Legal Description	Area (ha.)
762-29030.010	Jordan River	Section 2	17.07
762-29030.020	Jordan River	Pt Sec 2&4 Pl 427-R	2.06
762-29030.030	Jordan River	Sec 3 Exc Pcl C (DD 170967-I)	251.71
762-29030.040	Jordan River	Sec 9 Rem (Exc Pcl A,B,C, etc)	43.71
762-29030.060	Jordan River	Sec 53 Exc Pcl A,Renfrew Dist.	64.75
762-29030.070	Jordan River	Lot 71, Renfrew District	96.32
762-29030.080	Jordan River	District Lot 72, Renfrew Dist.	64.75
762-29030.090	Jordan River	District Lot 73,Renfrew Dist.	49.78
762-29030.100	Jordan River	Lot 74 Exc Pt S of Pl 109RW	70.42
762-29030.120	Jordan River	Sec 80 Exc 5 Ac in NE Corner	61.92
762-29030.130	Jordan River	Sec 83 Exc L 868 and RW	61.86
762-29030.140	Jordan River	Section 85, Renfrew Dist.	64.75
762-29030.150	Jordan River	DL 87, Renfrew District	48.56
762-29030.160	Jordan River	Block A, DL 91, Renfrew District	63.33
762-29030.170	Jordan River	Dist Lot,93 Exc Pl 23812	108.05
762-29030.195	Jordan River	District Lot 160, Renfrew Dist	12.95
762-29030.200	Jordan River	District Lot 176,Renfrew Dist.	32.29
762-29030.220	Jordan River	District Lot 529,Renfrew Dist.	23.47
762-29030.230	Jordan River	District Lot 530,Renfrew Dist.	64.75
762-29030.240	Jordan River	District Lot 531,Renfrew Dist	53.42
762-29030.250	Jordan River	District Lot 564, Rem, Renfrew Dist	82.70
762-29030.260	Jordan River	District Lot 565, Rem, Renfrew Dist	51.87
762-29030.270	Jordan River	District Lot 566, Rem, Renfrew Dist	17.98
762-29030.280	Jordan River	District Lot 567, Rem, Renfrew Dist	42.83
762-29030.290	Jordan River	District Lot 568, Rem, Renfrew Dist	14.52
762-29030.300	Jordan River	District Lot 569, Rem, Renfrew Dist	16.00
762-29030.310	Jordan River	District Lot 570, Rem, Renfrew Dist	14.37
762-29030.320	Jordan River	District Lot 571,Renfrew Dist	64.75
762-29030.330	Jordan River	District Lot 571A,Renfrew Dist	134.76
762-29030.340	Jordan River	District Lot 572,Renfrew Dist	74.87
762-29030.350	Jordan River	District Lot 572A,Renfrew Dist	150.95
762-29030.360	Jordan River	District Lot 573,Renfrew Dist	72.84
762-29030.370	Jordan River	District Lot 573A,Renfrew Dist	117.76
762-29030.380	Jordan River	District Lot 574,Renfrew Dist	71.23
762-29030.390	Jordan River	District Lot 574A,Renfrew Dist	129.50
762-29030.400	Jordan River	Lot 720,Exc Pt S of Pl 868RW	76.89
762-29030.410	Jordan River	District Lot 722, Renfrew Dist	131.93
762-29030.420	Jordan River	District Lot 724,Renfrew Dist	38.04
762-29030.430	Jordan River	District Lot 725,Renfrew Dist	46.13
762-29030.440	Jordan River	District Lot 745,Pcl A	24.28
762-29030.445	Jordan River	Strata Lot 13, Section 76 & DL 745, Renfrew District	64.70
762-29030.450	Jordan River	Parcel B, District Lot 745, Renfrew Dist	16.21
762-29030.455	Jordan River	Lot 1,Sec 75,Pl 24134,Renfrew	18.49
762-29030.460	Jordan River	District Lot 26,Exc W 30 Chns	80.94
762-29030.462	Jordan River	The West 30 Chns of Lot 26	48.56
762-29030.464	Jordan River	District Lot 27,Renfrew Dist	64.75
762-29030.466	Jordan River	District Lot 28,Renfrew Dist	64.75
762-29030.468	Jordan River	District Lot 29,REnfrew Dist	64.75

Assessment Roll	General Location	Legal Description	Area (ha.)
762-29030.470	Jordan River	District Lot 30,Renfrew Dist	64.75
762-29030.475	Jordan River	Lot 2, DL 39, Pl 23012, Malahat Dist	4.05
762-29030.480	Jordan River	Lot 2,Blk 1299 & L122 Pl 20837	165.52
762-29030.490	Jordan River	Lot 3,Blk 1299 Pl 20837	257.79
762-29030.500	Jordan River	District Lot 123 on Pl 1554R	67.58
762-29030.510	Jordan River	District Lot 124A,Malahat Dist	45.73
762-29030.512	Jordan River	District Lot 124B,Malahat Dist	315.66
762-29030.514	Jordan River	District Lot 124C,Malahat Dist	89.03
762-29030.520	Jordan River	Lot 125,Pt N of Pl 1555R,Malah	61.11
762-29030.530	Jordan River	District Lot 126,Malahat Dist	144.88
762-29030.540	Jordan River	Block 69 Exc Pcl A,Malahat D	1019.00
762-29030.550	Jordan River	Block 174,Malahat District	965.18
762-29030.560	Jordan River	Block 250,Exc Pl 1554R,Malahat	84.98
762-29030.570	Jordan River	Block 609,Malahat District	297.44
762-29030.580	Jordan River	Block 679,Malahat District	135.41
762-29030.590	Jordan River	Block 716,Malahat District	891.12
762-29030.600	Jordan River	Block 780,Malahat District	237.15
762-29030.610	Jordan River	Block 785,Malahat District	40.47
762-29030.620	Jordan River	Block 795,Malahat District	44.52
762-29030.630	Jordan River	Block 796,Malahat District	96.23
762-29030.640	Jordan River	Block 811,Malahat District	295.83
762-29030.650	Jordan River	Block 832,Malahat District	146.50
762-29030.660	Jordan River	Block 864,Malahat District	169.97
762-29030.670	Jordan River	Block 871,Malahat District	53.62
762-29030.680	Jordan River	Block 891,Malahat District	171.18
762-29030.690	Jordan River	Block 906,Malahat District	20.64
762-29030.700	Jordan River	Block 908,Malahat District	48.56
762-29030.710	Jordan River	Block 909,Malahat District	97.93
762-29030.720	Jordan River	Block 962,Malahat District	76.20
762-29030.730	Jordan River	Block 977,Malahat District	202.34
762-29030.740	Jordan River	Block 980, Malahat District	195.46
762-29030.750	Jordan River	Block 983,Malahat District	10.04
762-29030.760	Jordan River	Block 984,Malahat District	20.23
762-29030.770	Jordan River	Block 994,Malahat District	29.34
762-29030.780	Jordan River	Block 1027,Malahat District	24.40
762-29030.790	Jordan River	Block 1035,Malahat District	239.78
762-29030.800	Jordan River	Block 1069,Malahat District	38.45
762-29030.810	Jordan River	Block 1114,Malahat District	37.43
762-29030.820	Jordan River	Block 1119,Malahat District	54.07
762-29030.830	Jordan River	Block 1120,Malahat District	30.08
762-29030.840	Jordan River	Block 1130,Malahat District	78.51
762-29030.850	Jordan River	Block 1133,Malahat District	27.88
762-29030.860	Jordan River	Block 1143,Malahat District	67.66
762-29030.870	Jordan River	Block 1156,Malahat District	26.31
762-29030.880	Jordan River	Block 1159,Malahat District	74.87
762-29030.890	Jordan River	Block 1172,Malahat District	6.48
762-29030.900	Jordan River	Block 1173,Malahat District	36.62
762-29030.910	Jordan River	Block 1184,Malahat District	222.13
762-29030.915	Jordan River	Lot 2,Block 1298,Plan 20838	6.72
762-29030.920	Jordan River	Pcl A,Sec 3,Exc Pl 3943 & Pipe	43.62

Assessment Roll	General Location	Legal Description	Area (ha.)
762-29030.950	Jordan River	Section 38,Pl DD18138,Otter D	64.75
762-29030.960	Jordan River	Section 39,Exc Plan 121 R/W	29.81
762-29030.970	Jordan River	Section 41,Pl DD551121 Otter d	79.32
762-29030.980	Jordan River	Section 42,Exc Pl 121R/W,Otter	62.00
762-29030.990	Jordan River	Section 74, Otter District, Plan 1419	109.53
762-29030.995	Jordan River	Pt Sec 20,PL.1419,Sec.74,Otter	16.19
772-29030.005	Cooper Reach	DL 347, R1, Coast Dist	14.16
780-29030.010	Swanson Bay	DL 10, R4, Coast Dist	27.52
780-29030.020	Swanson Bay	DL 64, R4, Coast Dist	163.09
780-29030.030	Swanson Bay	DL 171, R4, Coast Dist	14.17
Total			**11214.22**

Appendix IV

Timber Supply Analysis

Information Package

Tree Farm Licence 25

Timber Supply Analysis Information Package

MANAGEMENT PLAN 10

Revised

Submitted to the Ministry of Forests
Timber Supply Branch
Victoria, BC

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1.0 INTRODUCTION

1.1 Overview

This Information Package provides a summary of data, assumptions, and modelling procedures to be used in the Timber Supply Analysis for Western Forest Product's (WFP) Tree Farm Licence (TFL) 25 Management Plan (MP) 10. The timber supply analysis will be completed with spatially explicit management objectives and provide area-based and volume-based harvest alternatives; the information in this package is presented accordingly.

The forest estate model Complan® will be used to complete the timber supply analysis. Complan is a spatially-explicit harvest scheduling model for forest management planning and will allow the effects of adjacency to be modelled and incorporated in the timber supply analysis providing greater operational relevance. The result is a detailed analysis that will guide operational planning and that can be checked and verified as planning proceeds.

Complan is designed for simulating timber flow using volume regulation of harvest levels. The Licensee intends to test area regulation by requesting high volume harvests per period but using area constraints to limit harvesting to the specified area harvest per year. As per volume-regulated simulations, the area constraint will be changed incrementally until an optimum and constant annual area harvest is attained. A constraint to impose balanced cutting across eligible analysis units will be also invoked to ensure that harvesting is close to profile and disruptive oscillations in volume harvested are not induced as a result of area-regulation.

As a first step, strategies to model environmental protection through net downs of productive forest and yield curve volume reductions will be devised. The analysis of the residual timber supply will then estimate timber flow or area harvest over a 250-year planning horizon based on the residual harvestable land base, existing old forest timber volumes, and secondary forest growth rates. Spatial realism is an important consideration in environmental protection and non-timber resource management; where feasible these factors will be spatially modelled as part of the timber supply analysis. The harvest forecast will project the timber supply impacts of current environmental protection and management practices including operational requirements of the Forest Practices Code (FPC) and other regulations and guidelines. Scenario and sensitivity analyses will be performed to investigate the expected impacts of different management options, and to evaluate the relative importance of specific assumptions. These may include changing the land base, forest-cover retention, or growth & yield (G&Y) assumptions.

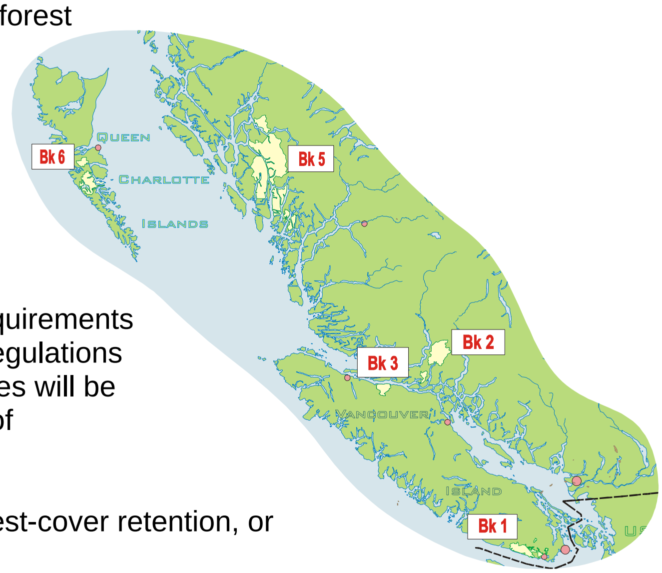

Figure 1 – TFL 25.

The timber supply forecast will attempt to achieve the long-term harvest potential, and minimize negative rates of change during the transition from the current level of harvest to the mid- and long-term sustainable levels. In meeting these objectives, model outputs may be analyzed to ensure that other indicators such as seral stage availability, hydrological characteristics, timber profile, or long term productivity are not disrupted through the planning horizon.

1.2 CCLRMP Interim Agreement

The Central Coast Land and Resource Management Plan (CCLRMP) process covers Block 2 and a significant portion of Block 5. In April 2001 an interim agreement for the CCLRMP was ratified by stakeholders, announced to the public and accepted by the provincial government. This agreement contained land use recommendations for designation of Candidate Protection Areas and "Option" Areas, and a commitment to define and implement Ecosystem Based Management in the planning area. The completion phase of the process is now underway. During this phase government intends to formally declare Candidate Protection and "Option" Areas through an Order in Council as "Designated Areas" under Part 13 of the Forest Act (Forest harvesting is suspended in these areas and a temporary, intrim AAC reduction is expected until land use objectives are resolved), and define and implement Ecosystem Based Management.

Since the outcome of the CCLRMP is still subject to uncertainity before final approval by government, current forest management assumptions do not incorportate the interim agreement decision announced in April 2001. Instead, sensitivity analysis will be undertaken to assess the influence proposed decisions will have on timber supply and provide guidance for adjusting the AAC to reflect the interim and final agreement.

2.0 PROCESS

2.1 Overview

This information package was developed under the latest management plan provisions of the Ministry of Forests (MOF) and reflects management commitments as outlined in Management Plan 10[4]. This information package is being submitted for review to the Timber Supply Forester at Timber Supply Branch. The revised and approved package will guide the timber supply analysis and with the timber supply analysis report will be appended to MP 10.

The TFL is divided into five geographically separated Blocks. Each block will be analyzed as a separate sustainable unit with a separate area- or volume-regulated harvest flow recommendation.

Block # (Name)	Operation (2001)
Block 1 (Jordan River)	Jordan River Forest Operation
Block 2 (Loughborough Inlet)	Stafford Lake Forest Operation
Block 3 (Naka Creek)	Naka Creek Forest Operation
Block 5 (Swanson Bay)	Roderick Island and Yeo Island Forest Operation
Block 6 (Queen Charlotte Islands)[5]	Sewell Inlet Forest Operation

2.2 Growth and Yield

Yield tables for existing stands will be divided into three groups based on age class. In Blocks 1 and 6, volumes of existing mature stands (>140 years) will be derived using Vegetation Resource Inventory attributes to generate VDYP estimates of stand volumes. Blocks 2, 3 and 5 will have mature volumes assigned using AVL (average volume lines) generated from the last Forest Inventory (see Table 5 for dates). For all blocks mature volumes will remain static (flat line) throughout the analysis, as the assumption for these mature stands is that growth net decay is zero.

Immature inventory (>40 and <141 years,) will have volumes projected with VDYP. In Blocks 1 and 6 VRI attributes will be used to generate VDYP output. In Blocks 2 and 3, ecosystem mapping will be used to assign SIBEC SI to immature polygons and augment inventory data lacking height assignments. In Block 5 ecological mapping is incomplete so SI will be assigned to inventory G-M-P classes based on a benchmark for “M” sites derived from local Permanent Sample Plots with adjustments to “G” and “P” sites based on inventory derived shifts from “M” sites.

Existing stands less than or equal to 40 years of age and future stands will have yields projected with TIPSY version 3.0. TIPSY yield projections will be assigned to existing NSR areas and simulated harvest areas according to their expected management regime and productivity group. With the exception of Block 5, ecosystem mapping will be the basis of analysis unit

1.1

[4] previously a Statement of Management Objectives, Options, and Procedures (SMOOP) was required.
[5] This block was added in October 1998 and was previously TFL 24. Block 4 is no longer included as it was transferred to TFL 6 at the same time.

assignment and site index estimation. In Block 5, G-M-P classification will be the basis of site index assignment.

3.0 TIMBER SUPPLY FORECASTS/OPTIONS/SENSITIVITY ANALYSES

3.1 Overview

This section describes the management scenarios to be included in the timber supply analysis. The details, assumptions, and sensitivities of each are also described.

3.2 Current Management Option

The current management option represents the present operational requirements and management practices on the TFL. The forecast of current management incorporates existing land use designations, including Resource Management Zones[6] (where applicable) and currently enforced regulations and guidelines including the FPC. This option is used as the basis for analysing various timber supply projections.

Current Management on TFL 25 includes:

- Harvest from operable land base of forested area accessible using conventional (Oc) and helicopter (Oh) methods.
- Silviculture to meet free growing requirements is carried out on all regenerated stands. Harvested areas are promptly reforested, primarily by planting, usually well before expiry of regeneration delay dates.
- Research-based estimates of tree improvement gains will be applied primarily to future regenerated stands. Theoretical gains expected within the next two decades are excluded.
- Visual quality classes (VQC) are modelled based on newly completed inventory revisions with upper range denudation assumed.
- Green-up heights are assigned based on Resource Management Zoning established in the Vancouver Island Higher Level Plan for Blocks 1 and 3. Special and General zones have a 3m green-up requirement while Enhanced zones have a 1.3m green-up requirement. Green-up heights for all other Blocks will be 3m.
- Future Wildlife Tree Patch retention within the THLB is accounted for by a blanket percent volume reduction in the timber supply model.
- Biodiversity and Landscape Units – seral stage targets for old seral will be applied to each landscape unit. For Blocks 2 and 5, the old seral target is based on target proportions of 10/45/45 for high/intermediate/low as per TSR 2 directives. For all other blocks, the old seral target is based on the Biodiversity Emphasis Options assigned to the individual Landscape Units.
- Minimum harvest age will be adjusted to ensure that second growth average harvest diameters are in the range of 30 – 45 cm or better.
- Deciduous leading stands are minor and are included in the THLB; any volume in these stands contributes to the analysis.

1.1 ————————————

[6] Resource Management Zones and Resource Management Zone objectives approved by Government in December 2000. Planning documents submitted after April 1, 2001 must conform to the RMZ management objectives.

- Harvest rules are set to harvest oldest stands first and to minimize growth loss.

The area available for timber production under Management Plan 10 is 138,078 ha (Table 1). The THLB under Management Plan 9[7] was approximately 115,798 ha. There has been an increase of forest land capable and available for timber production since the last MP due to refinements in operability mapping and riparian reserve estimates. Mapping refinements to the TFL boundary along various heights of land has both added and subtracted land from the total landbase.

Table 1 – TFL 25 landbase comparison for MP 10 compared to MP 9.

		MP 10	MP 9	Difference
Block 1	**Total Area**	32,201.6	32,247.9	(46.3)
	THLB Area	25,561.9	21,671.4	3,890.5
Block 2	**Total Area**	66,891.1	66,644.9	246.2
	THLB Area	15,002.4	13,108.9	1,893.5
Block 3	**Total Area**	15,985.0	16,305.0	(320.0)
	THLB Area	9,443.6	8,894.9	548.7
Block 5	**Total Area**	311,707.4	311,948.6	(241.2)
	THLB Area	62,901.1	48,608.5	14,292.6
Block 6[8]	**Total Area**	53,364.0	53,660.0	(296.0)
	THLB Area	25,168.5	23,514.0	1,654.5
Total	**Total Area**	480,149.1	480,806.4	(657.3)
	THLB Area	138,077.5	115,797.7	22,279.8

3.3 Alternate Harvest Flow

Under a volume regulation scenario, alternate harvest flows will investigate variations in the rate of transition to the mid and long term harvest levels and the effect of delaying or advancing start of the transition period. Under an area regulation scenario, area harvested will be kept constant through the simulation but constant harvest levels above and below the current management base case will be investigated as alternatives.

3.4 Sensitivity Analyses

Sensitivity analyses will be conducted for the current management scenario to examine the potential impact of uncertainty in several key attributes. These may include the removal of operable areas from the timber harvesting land base (THLB), imposing forest-cover harvest constraints, or changes in growth & yield (G&Y) estimates.

Sensitivities for the base case will include:

1) Operability: Operability classes have been developed that reflect current harvesting methods, timber quality, terrain stability, and economic accessibility. The purpose of this analysis is to examine potential timber supply impacts of changing economic conditions by excluding non-conventional systems or including operability classes that are currently not economic to harvest. Sensitivity analyses will model the impacts of:

1.1

[7] MP 9 statistics are adjusted to reflect the removal of TFL 25 Block 4 and addition of TFL 24 (as block 6) to the TFL.
[8] Block 6 landbase and THLB statistics are from TFL 24 MP 7 prepared in 1989.

- o Removing the non-conventional area (Oh), and;
- o Including areas that are considered economically marginal (Oce and Ohe).

2) Area Request: The harvest forecasts will be evaluated by adjusting the base case flatline area harvest request by ± 10%.

3) Site Productivity: Site indices (SI50) for existing managed and future stands in the base case will be reduced by 3 metres to test the uncertainties associated with assigned SI.

4) Harvest Age: Increasing and decreasing the base case minimum harvest ages by adjusting product size criteria by ± 3cm will test the effect of varying rotation length.

5) Visual Quality: Current management incorporates constraints from VQCs assigned by the revised landscape inventory completed for the TFL in 2000. A sensitivity analyses will be used to examine the impacts of varying the percentage of area below Visually Effective Green-up (VEG) to the mid range percent denudation limit recommended for the VQC class.

6) Biodiversity Emphasis Options: The current management option for Blocks 2 and 5 conforms to earlier TSR 2 procedures and does not consider assigned Biodiversity Emphasis Options (BEO) ratings for individual Landscape Units. BEO ratings on Landscape Units in Blocks 2 and 5 will be considered in a sensitivity analysis to study the implications of managing to maintain biodiversity at the landscape unit level. Old seral targets for the assigned BEO will be modelled within each Landscape Unit according to guidebook procedures for draw down in low emphasis units.

7) CCLCRMP Interim Agreement: To evaluate the implication for timber supply of 1) removing Candidate Protection Areas from the THLB, and 2) removing both Candidate Protection Area and “Options Areas” from the THLB.

During preparation of the timber supply analysis, further sensitivity analyses may be performed and if warranted some of these sensitivity analyses will be included in the timber supply analysis for consideration.

3.5 Other Options

Unconstrained options (operability the only constraint) representing the raw timber potential for each block of the TFL will be performed to indicate the magnitude of economic activity foregone to ensure protection of non-timber opportunities.

Table 2 – Summary of Current Management and Sensitivity Analyses

Issue Tested	Proposed Options / Sensitivity Analysis	
	Title	Reason for Analysis and Range to be tested
To project the timber supply based on current management practices, performance, operational requirements and currently enforced guidelines while meeting the objective of maintaining a timber supply which is not excessively variable over time and which maintains the long-term productivity of the TFL.	**Current Management Option**	Current Management Option includes the following: • Conventional and helicopter harvesting • Visual Quality based on known scenic areas within the TFL inventory • WTP – 3.25% volume net down to meet future WTP requirements (assuming 3/4 of the 13% WTP designated will be areas otherwise constrained) • Riparian reserves based on FPC requirements • Volume net down allowance for future retention and riparian management in THLB • Silviculture practices as described in Section 3.2 • Biodiversity Landscape Unit targets for old seral based on the 10/45/45, high intermediate, low proportions
	(1) Operability	The impact on the harvest flow will be evaluated by including different operability classes in the THLB as follows (current management practices for all): • Non-conventional areas removed. • Economically marginal areas included.
	(2) Area Request	The impact on the harvest flow will be evaluated by varying the flatline harvest request by ± 10%.
	(3) Site Productivity	Site Indices (SI50) for existing managed and future stands will be reduced by 3 metres to model uncertainties associated with assigned SI.
	(4) Harvest Age	Increasing and decreasing the minimum harvest ages by adjusting product size by ± 3cm will assess the effect of varying rotation length.
	(5) Visual Quality	The effects of varying the percent-denudated limit to the mid range.
	(6) Biodiversity Emphasis Options	The impact of current management for biodiversity in Block 2 and 5 where individual landscape units are constrained as dictated by the Biodiversity Emphasis Options (guidebook procedures for old seral targets requirements).
	(7) CCLCRMP Interim Agreement	The impact on timber supply due to potential land use decisions in Block 5 will be assessed by removing: • Candidate Protections Areas from the THLB • Candidate Protection Areas and "Option Areas" from the THLB

Table 3 – Other Analyses

Option	Issue to be Tested	Constraints
Unconstrained Run	To quantify timber potential and non-timber values in terms of annual harvest volume foregone.	No constraints will be imposed upon this run with the exception of operability.

4.0 HARVEST MODEL

4.1 Complan

This section presents a brief description of the analytical model used to produce harvest level and forest inventory projections. The proprietary forest estate simulation model Complan will be employed in TFL 25 to determine the harvest flows based on spatially explicit information.

Complan is a spatially explicit forest estate model that schedules harvests at the cutblock or stand level subject to adjacency (green-up) and non-timber resource constraints (cover constraints). The model's hierarchy of spatial units make it possible to evaluate many different scenarios with improved realism.

Complan software uses a hierarchical data structure that takes advantage of a compartment management approach to spatial data organization. Advantages of this approach include easy integration with GIS systems, adaptation to a wide variety of tenure administration structures and integration of both strategic and operational planning.

Tests have been completed which compare results of Complan with those from the B.C. Ministry of Forests' model FSSIM. These tests, done in cooperation with the MOF showed that Complan could produce results that are very similar to that of FSSIM. The minor differences are well understood and documented.

Key Features

Complan offers a number of key features that make it suited for both strategic and operational planning:

- Annual internal time increment allows accurate representation of growth, harvest, adjacency and constraint status.
- Yield table structures allow for many additional variables other than volume to be modelled.
- Constraints are localized to site-specific conditions (e.g. green-up time will be longer for cutblocks on poor sites compared with cutblocks on good sites).
- Cover constraints that address non-timber values can overlap so that it is not necessary to divide the area into management zones according to which constraint is most restrictive.
- All forested land base is retained in the simulation and contributes to cover requirements even if it is not part of the timber harvesting land base.
- Commercial thinning can be modelled.
- Spatially explicit nature allows harvest schedules to be easily mapped and verified.
- Flexible yield table columns and the ability to shift yield tables at different ages allow for modelling of succession as well as alternative silvicultural strategies.
- Several different prioritization algorithms are available, including minimize growth loss, oldest first, geographic priority and analysis unit priority.
- Cutblock aggregation can be used.
- Several options exist for "harvesting the profile".
- There are no artificial limitations on numbers of polygons, yield tables, or other model inputs.

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5.0 CURRENT FOREST COVER INVENTORY

5.1 Overview

The purpose of this section is to summarise:

1) History of the current forest-cover inventory.
2) Updates and changes to the inventory since the last timber supply analysis.
3) Area of the inventory.
4) Audits and reviews.
5) Plans for future updates.

5.2 History

The current forest cover inventory for TFL 25 is outlined below in Table 4. Each block has been maintained and updated to account for forest cover changes due to harvesting and reforestation activities. The data used in this analysis has been updated to January 1, 2001 and reflects area and volume changes in the land base due to logging, reforestation, growth and natural depletions occurring up until that date.

Table 4 – TFL 25 Forest Cover Status

Block	Status	Comments
1	Completed 1999 to Vegetative Resource Inventory (VRI) Standards.	VRI ratio adjustment process is still under review. Adjustments will be incorporated if resolved prior to analysis.
2	Completed 1971.	New inventory to VRI standards was started in September 2001.
3	Completed 1971	New inventory to VRI standards was started in September 2001.
5	Completed 1985	New inventory to VRI standards was initiated in 2000 but was put on hold until land use issues are resolved.
6	Completed 2000 to Vegetative Resource Inventory (VRI) Standards	VRI ratio adjustment process is still under review. Adjustments will be incorporated if resolved prior to analysis.

5.3 Updates

The inventory for the Timber Supply Analysis has been updated for depletion (harvesting and natural) and reforestation to January 1, 2001.

The inventory is maintained by WFP's Geomatics group and is currently in UTM NAD 83.

5.4 Inventory Audits

For the forest inventories conducted to VRI standards in Block 1 and 6, a comprehensive quality control audit was conducted both internally and by MOF. Checks were made on photo interpretation, ground sample selection and ground sample plots. Net volume adjustment factors (NVAF) have been determined from destructive sampling and are incorporated in the final inventory adjustments. Final ratio adjustments are still being reviewed due to the newness of procedures.

No other inventory audits have been conducted in the TFL. A MOF audit was planned for 1998 for Blocks 2 and 3 but was delayed.

5.5 Inventory Plans

Subject to availability of funds, forest inventories to VRI standards for Block 2, 3 and 5 should be completed over the next couple of years. The photo interpretation phase was started for Blocks 2 and 3 in September 2001 and will be completed by June 2002. Ground sampling is planned for 2002 but is dependent on funding. Block 5 has been delayed given land use uncertainties associated with the Central Coast Land and Resource Management Plan (CCLRMP). This LRMP process has a target completion date in early 2003 and given the outcome, scheduling of the Block 5 inventory will be revisited.

6.0 DESCRIPTION OF LAND BASE

6.1 Overview

This section describes the TFL 25 land base and the methods used to determine the portion of the land base that contributes to timber harvesting (THLB). Some portions of the productive land base, while not contributing to harvest, are crucial for sustaining non-timber resources.

6.2 Timber Harvesting Land Base Determination

The THLB and the total long-term land base in TFL 25 are presented in Table 5 thru Table 10. Areas are reported for both Schedule A and Schedule B land classes. Areas and volumes have been compiled from a stand database constructed for the preparation of this information package. Appendix I shows detailed area and volume summaries for the timber harvesting land base. Mature and immature stand volumes have been derived from growth and yield projections.

In the last timber supply analysis the total area (all blocks combined) of reductions applied against the forest land base amounted to 138,919.8 ha (approximately 55%). For MP10 the total area of reductions for all blocks combined is 130,773.8 ha, which is 49% of the forested land base. The difference is primarily due to revised operability mapping in Block 5 and a review of riparian net downs, which were overly conservative in the MP 9 analysis.

The following sections show total area classified by category as noted in Table 5 thru Table 10 and serve to summarise the area deducted from the timber harvesting land base including overlaps.

6.3 Total Area

The total area of the TFL is 480,149 ha. The total area in 1996 was 458,446.4 ha. The change in land base is due to the removal of Block 4 (31,300 ha), the addition of Block 6 (53,364 ha), the addition of crown land in exchange for the designation and withdrawal of the Juan de Fuca Marine Trail (no overall change in land base), the expansion of the Robson Bight Ecological Reserve which resulted in a 123 ha removal from Block 3, and mapping refinements to the TFL, which includes boundary revisions along TRIM defined heights of land.

Table 5 – Timber harvesting land base for TFL 25

Classification	Area (ha)			Mature Volume (m³)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	51,772.9	428,376.2	480,149.1	18,151,616.0	90,132,672.6	108,284,288.6
Less: Non-Forest	5,306.3	202,936.2	208,242.5	12,778.9	17,761.7	30,540.6
Less: Non-Productive Forest	234.4	2,820.9	3,055.3	26,823.2	365,435.5	392,258.7
Total Productive Forest	46,232.2	222,619.1	268,851.3	18,112,013.9	89,749,475.4	107,861,489.3
Less Reductions to Total Productive Forest:						
Non-Commercial	93.6	1,643.0	1,736.6	581.9	5,858.2	6,440.1
Low Sites	5,296.8	34,897.3	40,194.1	1,125,512.3	8,843,881.6	9,969,393.9
Riparian Reserves	868.2	3,262.1	4,130.3	376,753.6	1,304,592.7	1,681,346.3
Inoperable / Inaccessible (I, Oce, Ohe)	8,806.5	70,441.3	79,247.8	4,753,750.5	36,273,975.3	41,027,725.8
Environmentally Sensitive Areas	243.8	3,348.3	3,592.1	117,959.6	1,811,645.2	1,929,604.8
Unclassified Roads, Trails and Landings	446.9	1,426.0	1,872.9	16,710.2	62,110.8	78,821.0
Total Reductions to Productive Forest	15,755.8	115,018.0	130,773.8	6,391,268.1	48,302,063.8	54,693,331.9
Total Reduced Land Base	30,476.4	107,601.1	138,077.5	11,720,745.8	41,447,411.6	53,168,157.4
Less: Not Sufficiently Restocked Areas	657.0	1,968.0	2,625.0	0.0	0.0	0.0
Add: Not Sufficiently Restocked Areas	657.0	1,968.0	2,625.0	0.0	0.0	0.0
Timber Harvesting Land Base	30,476.4	107,601.1	138,077.5	11,720,745.8	41,447,411.6	53,168,157.4
Less: Future Roads, Trails and Landings	861.3	2,717.7	3,579.0	426,430.6	1,381,639.4	1,808,070.0
Less: Volume Reductions (WTP&RMZ – 8.5%)	2,008.1	6,845.1	8,853.2	863,472.6	2,884,862.9	3,748,335.5
Total Long Term Land Base	27,607	98,038.3	125,645.3	10,430,842.6	37,180,909.3	47,611,751.9

Table 6 – Timber harvesting land base for TFL 25 Block 1

Classification	Area (ha)			Mature Volume (m³)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	12,372.7	19,828.9	32,201.6	993,098.4	4,210,590.4	5,203,688.8
Less: Non-Forest	429.2	206.8	636.0	9,116.9	1,017.1	10,134.0
Less: Non-Productive Forest	180.0	908.3	1088.3	16,292.7	129,878.2	146,170.9
Total Productive Forest	11,763.5	18,713.8	30,477.3	967,688.8	4,079,695.1	5,047,383.9
Less Reductions to Total Productive Forest:						
Non-Commercial	19.4	7.2	26.6	101.8	268.1	369.9
Low Sites	1,587.5	519.5	2,107.0	189,387.1	160,506.3	349,893.4
Riparian Reserves	334.6	288.8	623.4	55,738.7	63,695.9	119,434.6
Inoperable / Inaccessible (I, Oce, Ohe)	371.9	1,093.2	1,465.1	100,548.7	565,916.6	666,465.3
Unclassified Roads, Trails and Landings	306.8	386.5	693.3	7,332.9	15,797.0	23,129.9
Total Reductions to Productive Forest	2,620.2	2,295.2	4,915.4	353,109.2	806,183.9	1,159,293.1
Total Reduced Land Base	9,143.3	16,418.6	25,561.9	614,579.6	3,273,511.2	3,888,090.8
Less: Not Sufficiently Restocked Areas	264.9	345.7	610.6	0	0	0
Add: Not Sufficiently Restocked Areas	264.9	345.7	610.6	0	0	0
Timber Harvesting Land Base	9,143.3	16,418.6	25,561.9	614,579.6	3,273,511.2	3,888,090.8
Less: Future Roads, Trails and Landings	190.1	377.4	567.5	20,484.2	127,194.1	147,678.3
Less: Volume Reductions (WTP&RMZ – 5%)	447.7	802.1	1,249.8	29,704.8	157,315.9	187,020.7
Total Long Term Land Base	8,505.5	15,239.1	23,744.6	564,390.6	2,989,001.2	3,553,391.8

Table 7 – Timber harvesting land base for TFL 25 Block 2

Classification	Area (ha)			Mature Volume (m³)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	1,767.3	65,123.8	66,891.1	583,391.1	10,051,151.8	10,634,542.9
Less: Non-Forest	203.6	38,375.1	38,578.7	0.0	0.0	0.0
Less: Non-Productive Forest	0.0	0.0	0.0	0.0	0.0	0.0
Total Productive Forest	1,563.7	26,748.7	28,312.4	583,391.1	10,051,151.8	10,634,542.9
Less Reductions to Total Productive Forest:						
Non-Commercial	11.2	741.8	753.0	0.0	0.0	0.0
Low Sites	150.4	3,304.8	3,455.2	39,894.1	993,245.7	1,033,139.8
Riparian Reserves	20.6	659.5	680.1	13,102.1	233,898.1	247,000.2
Inoperable / Inaccessible (I, Oce, Ohe)	368.7	7791.5	8,160.2	217,757.3	4,215,994.9	4,433,752.2
Unclassified Roads, Trails and Landings	21.7	239.8	261.5	2,699.4	10,869.9	13,569.3
Total Reductions to Productive Forest	572.6	12,737.4	13,310.0	273,452.9	5,454,008.6	5,727,461.5
Total Reduced Land Base	991.1	14,011.3	15,002.4	309,938.2	4,597,143.2	4,907,081.4
Less: Not Sufficiently Restocked Areas	7.7	564.4	572.1	0	0	0
Add: Not Sufficiently Restocked Areas	7.7	564.4	572.1	0	0	0
Timber Harvesting Land Base	991.1	14,011.3	15,002.4	309,938.2	4,597,143.2	4,907,081.4
Less: Future Roads, Trails and Landings	12.8	241.6	254.4	5,196.1	111,332.0	116,528.1
Less: Volume Reductions (WTP&RMZ – 5%)	48.9	688.5	737.4	15,237.1	224,290.6	239,527.7
Total Long Term Land Base	929.4	13,081.2	14,010.6	289,505	4,261,520.6	4,551,025.6

Table 8 – Timber harvesting land base for TFL 25 Block 3

Classification	Area (ha)			Mature Volume (m³)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	3,371.5	12,613.5	15,985.0	1,603,049.8	4,833,701.5	6,436,751.3
Less: Non-Forest	76.1	3,057.3	3,133.4	0.0	0.0	0.0
Less: Non-Productive Forest	0.0	0.0	0.0	0.0	0.0	0.0
Total Productive Forest	3,295.4	9,556.2	12,851.6	1,603,049.8	4,833,701.5	6,436,751.3
Less Reductions to Total Productive Forest:						
Non-Commercial	1.4	13.5	14.9	0.0	0.0	0.0
Low Sites	31.0	689.7	720.7	17,097.7	271,167.5	288,265.2
Riparian Reserves	119.7	177.0	296.7	61,870.3	60,661.4	122,531.7
Inoperable / Inaccessible (I, Oce, Ohe)	432.7	1,800.2	2,232.9	261,930.1	970,168.9	1,232,099.0
Unclassified Roads, Trails and Landings	53.0	89.8	142.8	3,158.2	3,717.2	6,875.4
Total Reductions to Productive Forest	637.8	2,770.2	3,408.0	344,056.3	1,305,715.0	1,649,771.3
Total Reduced Land Base	2,657.6	6,786.0	9,443.6	1,258,993.5	3,527,986.5	4,786,980.0
Less: Not Sufficiently Restocked Areas	59.4	54.2	113.6	0.0	0.0	0.0
Add: Not Sufficiently Restocked Areas	59.4	54.2	113.6	0.0	0.0	0.0
Timber Harvesting Land Base	2,657.6	6,786.0	9,443.6	1,258,993.5	3,527,986.5	4,786,980.0
Less: Future Roads, Trails and Landings	60.9	192.1	253.0	50,095.1	134,238.2	184,333.3
Less: Volume Reductions (WTP&RMZ – 5%)	129.8	329.7	459.5	60,444.9	169,687.4	230,132.3
Total Long Term Land Base	2,466.9	6,264.2	8,731.1	1,148,453.5	3,224,060.9	4,372,514.4

.

Table 9 – Timber harvesting land base for TFL 25 Block 5

Classification	Area (ha)			Mature Volume (m³)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	31,729.7	279,977.7	311,707.4	13,961,861.0	59,671,246.7	73,633,107.7
Less: Non-Forest	4,537.9	156,920.9	161,458.8	0.0	0.0	0.0
Less: Non-Productive Forest		0.0	0.0	0.0	0.0	0.0
Total Productive Forest	27,191.8	123,056.8	150,248.6	13,961,861.0	59,671,246.7	73,633,107.7
Less Reductions to Total Productive Forest:						
Non-Commercial	57.6	617.2	674.8	0.0	0.0	0.0
Low Sites	3,473.4	26,082.3	29,555.7	865,440.0	6,506,605.0	7,372,045.0
Riparian Reserves	346.7	1,129.8	1,476.5	215,823.1	664,817.0	880,640.1
Inoperable / Inaccessible (I, Oce, Ohe)	6,917.6	44,940.6	51,858.2	3,895,720.5	24,571,288.3	28,467,008.8
Environmentally Sensitive Areas	243.8	3,348.3	3,592.1	117,959.6	1,811,645.2	1,929,604.8
Unclassified Roads, Trails and Landings	53.5	136.7	190.2	3,090.2	21,602.9	24,693.1
Total Reductions to Productive Forest	11,092.6	76,254.9	87,347.5	5,098,033.4	33,575,958.4	38,673,991.8
Total Reduced Land Base	16,099.2	46,801.9	62,901.1	8,863,827.6	26,095,288.3	34,959,115.9
Less: Not Sufficiently Restocked Areas	313.7	785.5	1,099.2	0.0	0.0	0.0
Add: Not Sufficiently Restocked Areas	313.7	785.5	1,099.2	0.0	0.0	0.0
Timber Harvesting Land Base	16,099.2	46,801.9	62,901.1	8,863,827.6	26,095,288.3	34,959,115.9
Less: Future Roads, Trails and Landings	552.0	1,540.0	2,092.0	327,918.1	907,454.4	1,235,372.5
Less: Volume Reductions (WTP&RMZ – 8.5%)	1,321.5	3,847.3	5,168.8	725,552.3	2,140,965.9	2,866,518.2
Total Long Term Land Base	14,225.7	41,414.6	55,640.3	7,810,357.2	23,046,868	30,857,225.2

Table 10 – Timber harvesting land base for TFL 25 Block 6

Classification	Area (ha)			Mature Volume (m³)		
	Schedule A	Schedule B	Total	Schedule A	Schedule B	Total
Total Area	2,531.7	50,832.3	53,364.0	1,010,215.7	11,365,982.2	12,376,197.9
Less: Non-Forest	59.5	4,376.1	4,435.6	3,662.0	16,744.6	20,406.6
Less: Non-Productive Forest	54.4	1,912.6	1,967.0	10,530.5	235,557.3	246,087.8
Total Productive Forest	2,417.8	44,543.6	46,961.4	996,023.2	11,113,680.3	12,109,703.5
Less Reductions to Total Productive Forest:						
Non-Commercial	4.0	263.3	267.3	480.1	5,590.1	6,070.2
Low Sites	54.5	4,301.0	4,355.5	13,693.4	912,357.1	926,050.5
Riparian Reserves	46.6	1,007.0	1,053.6	30,219.4	281,520.3	311,739.7
Inoperable / Inaccessible (I, Oce, Ohe)	715.6	14,815.8	15,531.4	277,793.9	5,950,606.6	6,228,400.5
Unclassified Roads, Trails and Landings	11.9	573.2	585.1	429.5	10,123.8	10,553.3
Total Reductions to Productive Forest	832.6	20,960.3	21,792.9	322,616.3	7,160,197.9	7,482,814.2
Total Reduced Land Base	1,585.2	23,583.3	25,168.5	673,406.9	3,953,482.4	4,626,889.3
Less: Not Sufficiently Restocked Areas	11.3	218.2	229.5	0.0	0.0	0.0
Add: Not Sufficiently Restocked Areas	11.3	218.2	229.5	0.0	0.0	0.0
Timber Harvesting Land Base	1,585.2	23,583.3	25,168.5	673,406.9	3,953,482.4	4,626,889.3
Less: Future Roads, Trails and Landings	45.5	366.6	412.1	22,737.1	101,420.7	124,157.8
Less: Volume Reductions (WTP&RMZ – 5%)	77.0	1,160.8	1,237.8	32,533.5	192,603.1	225,136.6
Total Long Term Land Base	1,462.7	22,055.9	23,518.6	618,136.3	3,659,458.6	4,277,594.9

6.4 Non-Forest

The non-forest portion of TFL 25 includes area where merchantable tree species are largely absent. Most of this area is in alpine, rocks and slides, and wet areas (Table 11).

Table 11 – Non-forest area in TFL 25

Type	Block 1	Block 2	Block 3	Block 5	Block 6
Alpine	0.0	35,566.3	2,721.8	134,736.6	2,628.2
Rock and Slides	202.6	1,276.4	238.8	3,562.7	636.1
Swamp, Marsh, Creek, River, Lake	335.9	1,687.5	107.6	23,135.0	1,072.6
Town	17.0	0.0	0.0	0.0	0.0
Dump, Camps and Sort	15.4	6.1	13.4	6.3	8.6
Islands	0.1	31.3	0.0	12.1	4.4
Classified Roads and Pits	42.2	11.1	51.8	6.2	37.3
Hydro and Telephone R-of-Way	22.8	0.0	0.0	0.0	48.4
TOTAL	**636.0**	**38,578.7**	**3,133.4**	**161,458.9**	**4,435.6**

6.5 Non-Productive Forests

TFL 25 includes 3,055.3 ha of non-productive land (Table 12). Existing forest inventory mapping currently available for Blocks 2, 3 and 5 does delineate these non-productive types.

Table 12 – Non-productive area in TFL 25

Criteria	Block 1	Block 2	Block 3	Block 5	Block 6
Non-productive Forests	463.1	0.0	0.0	0.0	1,967.0
Forested Swamps	625.2	0.0	0.0	0.0	0.0
Total	**1,088.3**	**0.0**	**0.0**	**0.0**	**1,967.0**

6.6 Non-commercial Cover

Approximately 1,736.6 ha of TFL 25 are classified as non-commercial cover (Table 13). Most of this area is occupied by brush.

Table 13 – Non-commercial area

Non-Commercial	Block 1	Block 2	Block 3	Block 5	Block 6
NCD	0.0	261.9	3.9	187.9	0.0
Brush	26.6	491.1	11.0	486.9	267.3
Total	**26.6**	**753.0**	**14.9**	**674.8**	**267.3**

6.7 Low Sites

Low sites for all blocks except Block 5 are defined based on expert interpretation of ecosystem mapping. Table 14 defines the ecosystem type and area identified as low sites. For block 5, where ecosystem mapping is incomplete, low sites are identified based on the site class defined as part of the forest cover interpretation.

Table 14 – Low Sites Types– TFL 25

Block	Low Ecosystems	Total Area (ha)[9]	Reduction Area (ha)
1	A4, MH2, P, W, NV	3,149.4	2,107.0
2	A, AT, MH2, MH4, S11, ST11, P, W, NV	33,585.9	3,455.2
3	A, AT, MH2, MH4, S2P, S9, P, W, NV	3,308.9	720.7
5	Site Class – L	29,555.7	29,555.7
6	A, H3FO, H2, H11, H32, Q10, P, W	8,339.9	4,355.5

6.8 Riparian Reserves

Riparian mapping is ongoing for TFL 25. Primarily, operational stream inventories associated with development planning have been used to update riparian classification in all blocks.

This classification in conjunction with GIS modelling helped to obtain an overall estimate of the riparian classes for watercourses and reserve areas for the TFL. The approach employed in the timber supply analysis was to utilise the available stream classification in the GIS to apply reserves to all known and predicted fish bearing streams, in accordance to specifications in the Forest Practices Code.

Currently within the GIS, streams are classed as S1 to S6 (as per FPC definitions), and Unclassified (which are streams of unknown fish presence and width).

Double line streams – Within the GIS all double-lined streams are assigned a riparian reserve based on their classification. The perimeter of double line stream/river and lakes are provided for information only; as streams meander the perimeter distance multiplied by the reserve width does not accurately represent actual reserve area. Total area is the actual GIS-buffer riparian reserve area.

1.1

[9] Total area refers to the entire area covered by this classification including other, overlapping classifications that may already have been removed. Reduction area is the incremental reduction of the land base.

Table 15 – Riparian Reserve Zones – Double Line Water Features

Block	Riparian class	Stream Perimeter (km)	Reserve Width	Total Area (ha)	Total Reduction area (ha)
1	S1	47.4	50	337.9	312.3
	S2	32.4	30	138.6	128.1
	S5	63.4	0	0.0	0.0
	L1	1.9	10	2.7	2.5
	L3	7.2	0	0.0	0.0
2	S1	204.4	50	840.7	496.0
	S2	39.0	30	96.2	56.8
	S5	115.9	0	0.0	0.0
	L1	52.8	10	43.4	25.6
	L3	19.6	0	0.0	0.0
3	S1	0.2	50	1.0	1.0
	S2	49.3	30	152.9	141.7
	S5	25.6	0	0.0	0.0
	L3	3.4	0	0.0	0.0
5	S1	176.0	50	768.2	477.4
	S2	96.0	30	251.4	156.2
	S5	65.0	0	0.0	0.0
	L1	753.0	10	657.4	408.5
	L3	145.8	0	0.0	0.0
6	S1	13.5	50	61.2	58.0
	S2	171.2	30	465.1	440.6
	S3	1.3	20	2.3	2.2
	S5	44.6	0	0.0	0.0
	L1	48.0	10	43.5	41.2
	L3	11.2	0	0.0	0.0

Unclassified single-line streams – where unclassified streams exist in the TFL a GIS analysis (terrain model) was used to separate and class streams of less than 30% gradient as being potentially fish bearing. The 30% gradient parameter is more conservative than the normal assumption of <20% but considers the coarse nature of the digital elevation model (TRIM) and that fish have been identified, in some cases, in streams of >20% gradient. A weighted average riparian reserve zone width was calculated based on the proportion of fish bearing single line streams. This average reserve width was then applied to an identical proportion of the potentially fish bearing but unclassified streams within the TFL block. Table 16 outlines the calculation used to assign riparian reserves to unclassified streams.

Single line stream classification has been completed for Blocks 2 and 3, hence there are no unclassified streams identified in the GIS for these blocks.

Table 16 – Unclassified Stream Riparian Reserve Zones

Block	Riparian Feature Class	Stream Length (km) Topography <30% gradient	Stream Length (km) Topography >30% gradient	Proportion (%) of Class relative to total Classified Fish-Bearing Streams	Total Riparian Reserve width (metres)	Weighted Average Riparian Reserve Zone Unclassified Streams
1	S2	9.8	0.0	46%	30	13.7
	S3	3.3	0.0	15%	20	3.1
	S4	8.4	0.0	39%	0	0
	S5	42.5	9.7			
	S6	137.4	194.4			
	Unclassified	468.4	63.9			**16.8**
5	S2	21.1	0.0	13%	30	3.9
	S3	11.3	0.0	7%	20	1.4
	S4	133.8	0.0	80%	5*	4.0
	S5	6.4	18.6			
	S6	515.5	5,354.2			
	Unclassified	908.0	639.4			**9.3**
6	S2	13.7	0.0	4%	30	1.2
	S3	172.0	0.0	46%	20	9.2
	S4	186.8	0.0	50%	0	0.0
	S5	2.7	9.2			
	S6	345.8	1,366.5			
	Unclassified	59.7	6.5			**10.4**

* Based on current management practices a 5-metre riparian reserve zone was used to estimate the range of management zone practices.

Block 1

Based on the 201.4 km of known S2 to S6 classified single line streams identified as less than 30% gradient, it was estimated that 11% (21.5 km S2-S4 / 201.4 km S2-S6) of the unclassified single line streams are likely fish bearing. A weighted average riparian reserve width was then calculated (16.8 metres) for the known single line streams and applied to the 11% of unclassified single line streams. The 16.8 m implied riparian zone width was applied sequentially starting with the lower gradient unclassified streams until 11% (51.5 km) of the unclassified stream length was tagged with a reserve zone. This amounted to all of the unclassified streams on topography of less than or equal to 9.3%.

Block 5

Based on the 688.0 km of known S1 to S6 classified single line streams identified as less than 30% gradient, it was estimated that 24% (166.1 km S1-S4 / 688.0 km S1-S6) of the unclassified single line streams are likely fish bearing. A weighted average riparian reserve width was then calculated (9.3 metres) for the known single line streams and applied to the 24% of unclassified single line streams. The 9.3 m implied riparian zone width was applied sequentially starting with the lower gradient unclassified streams until 24% (217.9 km) of the unclassified stream length was tagged with a reserve zone. This amounted to all of the unclassified streams on topography of less than or equal to 10%.

Block 6

Based on the 721.0 km of known S1 to S6 classified single line streams identified as less than 30% gradient, it was estimated that 52% (372.5 km S1-S4 / 721.0 km S1-S6) of the unclassified single line streams are likely fish bearing. A weighted average riparian reserve width was then calculated (10.4 metres) for the known single line streams and applied to the 52% of unclassified single line streams. The 10.4 m implied riparian zone width was applied sequentially starting with the lower gradient unclassified streams until 52% (31.0 km) of the unclassified stream length was tagged with a reserve zone. This amounted to all of the unclassified streams on topography of less than or equal to 15.9%.

Table 17 – Riparian Reserve Zones – Single Line Water Features

Block	Riparian class	Stream Length (km)	Reserve Width	Total Area (ha)	Total Reduction area (ha)
1	S2	9.8	30	58.8	37.5
	S3	3.3	20	13.0	12.3
	S4	8.4	0	0.0	0.0
	S5	42.5	0	0.0	0.0
	S6	137.4	0	0.0	0.0
	Un Classed	468.4	16.8	159.3	130.7
2	S2	1.9	30	11.1	7.5
	S3	40.5	20	161.9	94.2
	S4	26.6	0	0.0	0.0
	S5	5.3	0	0.0	0.0
	S6	1472.8	0	0.0	0.0
3	S2	11.1	30	66.4	50.8
	S3	33.1	20	132.6	103.2
	S4	0.0	0	0.0	0.0
	S5	34.2	0	0.0	0.0
	S6	446.1	0	0.0	0.0
5	S2	21.1	30	126.4	96.0
	S3	11.3	20	45.4	31.2
	S4	133.9	5	133.8	111.1
	S5	25.0	0	0.0	0.0
	S6	5869.7	0	0.0	0.0
	Un Classed	908.0.	9.3	404.0	196.1
6	S2	13.7	30	82.2	56.8
	S3	172.0	20	687.9	428.7
	S4	186.8	0	0.0	0.0
	S5	2.7	0	0.0	0.0
	S6	345.8	0	0.0	0.0
	Un Classed	31.0	10.4	65.0	26.1

The reduction area (Table 17) applies only to those areas of the productive forested land that fall within the reserve buffer and were otherwise unconstrained. The total area refers to actual RRZ area.

Table 18 – Riparian reserves in TFL 25

Riparian Reserves	Total Area (ha)	Reduction Area (ha)
Block 1	710.3	623.4
Block 2	1153.3	680.1
Block 3	352.9	296.7
Block 5	2,389.6	1,476.5
Block 6	1,407.2	1,053.6

This methodology represents the best available estimate of reserve area associated with streams but there is limited uncertainty due to:

- In operational practice FPC minimum reserve widths are usually exceeded to some degree to ensure a margin of safety.
- Extrapolation of known stream classifications (from field work) to unclassified streams (from photo mapping) may be inappropriate if field classifications are adding significant kilometres of smaller RRZ streams that were not photo mapped.
- Management zone practices have been evolving and changing since the implementation of the FPC and prescriptions tend to be very site specific; hence it is difficult to appropriately characterize retention levels.

Subject to availability of resources, over the next five years the Licensee is considering development of a sampling protocol to confirm these estimates and capture typical management zone retention levels. For the purposes of this analysis, a volume reduction (Table 49) has been added to ensure that reserves and retention associated with riparian management are not underestimated. In Block 5 extrapolation is less certain due to the relatively short development/stream classification history, and in response to the “Great Bear Rainforest” campaign and Joint Solutions Project initiatives, higher stand retention levels are being incorporated in current operational plans. In this case the THLB volume reduction and buffer is arbitrarily tripled to allow for resolution of these uncertainties.

6.9 Inoperable/Inaccessible

Operability classes have been developed for TFL 25 that reflect the harvesting system, timber quality and volume, terrain stability, and economic accessibility. Methodology and assumptions used in completing the operability classification for TFL 25 can be found in Management Plan 10.

The first category relates to area not available for timber harvesting or inoperable (I) due to being physically inaccessible and/or unmerchantable. Physical inoperability relates to the presence of a physical barrier or terrain constraint leaving access virtually impossible. Unmerchantable relates to stands that do not produce wood volumes or quality that are profitable to harvest regardless of the historical range of market conditions. The second category uses economic criteria to identify stands potentially operable during the highest market cycles (Oce/Ohe). In this case, timber harvesting under normal market conditions is not justified given costs of harvesting and the expected value of the timber. Classifying areas as operable with an economic constraint relates to the inability to harvest stands in a cost-effective manner given the value of the timber. For the purpose of sensitivity analyses two classes are recognised: (1) Oce for areas that could be logged profitably by conventional harvesting systems should markets improve sufficiently and (2) Ohe for areas that could be heli-logged profitably should markets improve sufficiently.

Table 19 – Inoperable area (ha) by class

Block	Criteria	Total Area (ha)	Reduction Area (ha)
1	I	2,104.8	1,220.6
	Oce	349.9	243.0
	Ohe	1.5	1.5
Sub Total		*2,456.2*	*1,465.1*
2	I	49,938.6	7,600.8
	Oce	9.2	9.1
	Ohe	630.1	550.4
Sub Total		*50,577.9*	*8,160.3*
3	I	5753.8	2,015.7
	Oce	78.1	61.6
	Ohe	190.0	155.6
Sub Total		*6,021.9*	*2,232.9*
5	I	49,169.0	48,914.0
	Oce	205.1	204.6
	Ohe	2,741.0	2,739.6
Sub Total		*52,115.1*	*51,858.2*
6	I	25,419.5	14,802.2
	Oce	204.1	195.7
	Ohe	579.5	533.5
Sub Total		*26,203.1*	*15,531.4*
Total		**137,374.2**	**79,247.9**

6.10 Environmentally Sensitive Areas (ESAs)

Areas assessed as sensitive or valuable for other resource values have been defined by inventories completed before and after MP 9. With the exception of Block 5, land base reductions reflecting the presence of these areas are captured in other sections of the Information Package. These include terrain stability and soil sensitivity, which have been considered in the definition of operability classes (Section 6.9), and wildlife habitat (Section 6.11). Productive area net downs for riparian reserves (Section 6.8) and volume reductions (Section 1.1) are applied to capture the reservation of future Wildlife Tree Patches (WTP) and riparian management practices in the THLB.

For Block 5, terrain stability and ecosystem mapping are still unavailable for the majority of the area. To address areas of unstable terrain and areas where regeneration delays are expected after harvesting, ESA mapping completed in March 1984 is used. Three classes of environmental sensitivity have been identified in Block 5 – Es1, Ep and Es1p.

Table 20 – Environmentally Sensitive Areas (ESAs)

Block 5	Total Area (ha)	Reduction Area (ha)
Es1	1,264.5	103.4
Es1p	18,726.8	1,490.1
Ep	8,649.6	1,998.6
Total	28,640.9	3,592.1

Es1 – Soils

The Es1 designation was applied mainly to forest types occurring on shallow colluvial veneers overlying bedrock at lower elevations within the CWH zone. Such units typically are scarred by continual mass movement processes, predominantly debris slides and avalanches. Many of these units are characterized by a high density gully network.

Ep - Forest Regeneration

The Ep designation is used where forest types are anticipated to experience at least a 20-year regeneration delay after harvesting. Ep was applied in Block 5 most often to types immediately adjacent to or repeatedly cut by snow avalanche tracks and runout zones, where harvesting may result in the spreading and expansion of the avalanching snow. This is a particular concern in dealing with the open-slope type rather than the confined, gully type of avalanche. Ep was also applied to the open mountain hemlock parkland types that experience a particularly high snowpack. Such stands occur on moderately to gently sloping terrain near treeline.

Es1p – Soils and Forest Regeneration

The combined designation, Es1p, was mapped extensively on the very steep mid to upper slopes of the Coast Mountains portion of the Block. Such slopes are characterized by very shallow, discontinuous organic soils interspersed with pockets of rubbly colluvium and bare rock, and are marked throughout by many debris slide and snow avalanche scars. Within the Coast Mountains, Es1p types commonly form a band between treeline and productive stands of timber growing on deep, stable, lower slope and valley bottom colluvial and fluvial soils.

6.11 Wildlife Habitat

Since MP 9 a number of wildlife inventories have been undertaken or broadened in an effort to identify and classify potential wildlife habitat areas suitable for identified species. To date however, there has been no formal establishment of any designated wildlife habitat areas that require removal from THLB. The following section briefly identifies some wildlife studies that have occurred in the individual blocks of TFL 25 and provides a timber supply modelling rational for accounting for wildlife habitat.

Table 21 – Wildlife Habitat Management Strategy for Timber Supply

Block	Status	Management Strategy for Timber Supply Model
1	▪ Marbled Murrelet and Ungulate Winter Range habitat modeling 2000 ▪ Marbled Murrelet Nesting Habitat Evaluation – Nov 1999 Ecologic Consulting ▪ Marbled Murrelet detection surveys – 2000 Ecologic Consulting ▪ Elk habitat assessments (Weeks Lake) – 1998 to 2001	▪ Assume majority of critical wildlife habitat associated with mature forest will be meet by achieving old growth targets as defined in Section 10.3.1.4. ▪ Assume wildlife tree patch retention will supplement critical habitat needs.
2	▪ Deer Winter Range and Goat Assessments in the Stafford River Watershed – May 1996 D. Blood & Associates Ltd. ▪ Marbled Murrelet detection surveys – July 1996 D. Blood & Associates Ltd. ▪ Stafford Wildlife Assessment – 1993/97 R. McLaughlin ▪ Grizzly Bear Habitat Mapping – 2000 A.G.MacHutcheon ▪ Goat Study	
3	▪ Eagle nest survey – 1989 ▪ Peel Creek sedimentation study – effects on whale rub – ongoing. ▪ SPs contain some wildlife references.	
5	▪ Kermode Bear Report – May 97 D. Blood & Associates Ltd. ▪ Kermode Bear Genetics Project – 1997/01 UBC/Artemis ▪ Wildlife Survey and Habitat Map (Yeo, Pooley and Roderick Islands) – 1994/95 D. Blood & Associates Ltd.	
6	▪ Biodiversity Assessment of TFL 24 - 1996 D. Blood & Associates Ltd. ▪ Marbled Murrelet Inventory (Botany and Fairfax Inlet) – 1997/98 D. Blood and Associates Ltd.	

Future WTPs will be handled through a volume reduction in the timber supply analysis as described in Section 10.3.1.5. As per policy direction at least 75% of the WTPs are assumed incorporated in riparian reserves or other constrained areas.

6.12 Recreation Feature Inventory

Updating of recreation inventory mapping, including recreation feature significance and sensitivity to alteration, is currently being carried out for Blocks 1, 2, 3, and 6. To date no net downs of THLB have been assumed to deal with recreation in the TFL. Established campsites in Blocks 1, 3 and 6 are identified and removed as part of Section 6.4 and 6.9. A list of established campsites are outlined in Table 22. Other areas of significant recreation use in Block 1 include trails that provide access to marine shoreline (Juan de Fuca Marine Trail) and ridgeline meadows and forest (Kludahk Trail). The Juan de Fuca Marine trail has been designated to park status and removed from the TFL. The Kludahk trail is now within a Special Management Zone. Recreation opportunities will be reinforced through the integration of forest harvest planning and landscape inventories designed to maintain visual landscape quality and preserve known scenic values.

Table 22 – Established Campsites

Block	Campsite	Area (ha)
1	Jordan River Rec Site	6.3
2	Naka Creek	1.5
6	Moresby Dock	0.5
	Moresby Rec Area	1.8
	Mosquito Lake Rec Area	1.9
	Moresby Adventure Camp	1.0

6.13 Cultural Heritage Resource Reductions

An archaeological overview assessment for the CCLRMP area, which includes blocks 2 and 5 was completed in 1999. This overview deals with archaeological sites and resources and indicates where evidence of past human activities is most likely to be found. This assessment is used in operational planning. Areas with high potential of past activities are subject to field reconnaissance and inventory. No explicit reductions for cultural heritage resources have been made to the inventory file although the most common features such as culturally modified trees are commonly included in already-accounted-for reserves for riparian protection or wildlife tree patches.

6.14 Deciduous Stands

Table 23 shows the area of stands defined as deciduous leading in the THLB component of the inventory. This represents about 3.1% of the long-term harvestable land base. These are included in the THLB and for simplicity deciduous volume is harvested and will be included in modelled timber flows. In Block 1, deciduous sawlogs are routinely utilized. For Block 6 an analysis of deciduous volume harvested will be presented to indicate the magnitude of the harvest component under a volume-regulated harvest flow.

Table 23 – Area of Deciduous forest types

Block	Inventory Type Group	Total Area (ha) By Age					Total	% Of LT THLB
		0-20	21-40	41-60	61-80	80-120		
1	Pure Deciduous	3.5	0.8	0.0	0.0	0.0	**4.3**	
	Deciduous-Leading	47.4	176.8	321.5	235.5	8.4	**789.6**	
	Sub Total	***50.9***	***177.6***	***321.5***	***235.5***	***8.4***	***793.9***	***3.3%***
2	Pure Deciduous	0.0	73.1	50.1	0.0	37.0	**160.2**	
	Deciduous-Leading	0.0	82.2	29.5	0.0	35.3	**147.0**	
	Sub Total	***0.0***	***155.3***	***79.6***	***0.0***	***72.3***	***307.2***	***2.2%***
3	Pure Deciduous	0.0	0.0	0.0	0.0	9.4	**9.4**	
	Deciduous-Leading	0.0	0.0	4.5	0.0	0.0	**4.5**	
	Sub Total	***0.0***	***0.0***	***4.5***	***0.0***	***9.4***	***13.9***	***0.2%***
5	Pure Deciduous	0.0	2.5	6.7	84.1	32.6	**125.9**	
	Deciduous-Leading	0.0	125.6	493.0	186.5	43.7	**848.8**	
	Sub Total	***0.0***	***128.1***	***499.7***	***270.6***	***76.3***	***974.7***	***1.6%***
6	Pure Deciduous	102.9	269.5	183.6	56.0	6.5	**618.5**	
	Deciduous-Leading	184.1	459.6	562.7	63.4	0.0	**1269.8**	
	Sub Total	***287.0***	***729.1***	***746.3***	***119.4***	***6.5***	***1888.3***	***7.9%***
Total		***337.9***	***1,190.1***	***1,651.6***	***625.5***	***172.9***	***3,978.0***	***3.1%***

6.15 Trails and Landings

6.15.1 Classified Roads

Classified roads are those that are mapped as forest cover polygons distinctly separate from adjacent polygons. Only highways and/or mainline roads have been identified as separate polygons on the forest cover maps. Table 24 summarizes the areas of classified roads in the TFL.

Table 24 – Classified roads

Block	Total Area of Road (ha)	Total Area Reduction (ha)
1	42.2	42.2
2	11.1	11.1
3	51.8	51.8
5	6.2	6.2
6	37.3	37.3

6.15.2 Unclassified Roads, Trails and Landings

Unclassified roads on the TFL have been mapped as lineal features. For the purposes of determining the total area of unclassified roads, all are assumed to occupy a 10 metre unproductive width. As with classified trails and landings, all trails and the majority of the landings are rehabilitated and restocked immediately following logging and consequently the associated area reduction is thought insignificant. Table 25 indicates the area of unclassified roads in the TFL that is excluded from the timber harvesting land base.

Table 25 – Unclassified roads, trails and landings

Block	Total Road Length (km)	Total Area Reduction (ha)
1	765.1	693.3
2	292.2	261.5
3	158.7	142.8
5	218.1	190.6
6	647.3	585.1

6.15.3 Future Roads, Trails and Landings

A projected road system was developed as part of the operability classification for TFL 6. This road system was digitized into the GIS in conjunction with the operability classification, which allowed for the same approach used with unclassified roads to predict area summaries. Table 26 indicates the area of future roads in the TFL that have yet to be developed.

Table 26 – Future roads, trails and landings

Block	Total Road Length (km)	Total Area Reduction (ha)
1	628.1	567.5
2	285.5	254.4
3	266.1	253.0
5	2,435.2	2,092.0
6	447.1	412.1

7.0 INVENTORY AGGREGATION

7.1 Overview

This section describes the delineation of the TFL land base and definition of stand types needed to complete the timber supply analysis. The TFL area is categorized in a hierarchy of different management zones to allow for a variety of forest cover constraints (e.g., for wildlife habitat, VQOs, biodiversity, etc.). Stand types are grouped in analysis units based on similar leading species, history and productivity.

7.2 Management Zones

Unique forest cover objectives will be modelled through the different management zones. Landscape Units, Special Management Zones (SMZ) and Resource Management Zones (RMZ) are delineated in the data and may be used to report seral stage distributions or for selected sensitivity analyses (Table 27 and Table 28). Currently, only Blocks 1 and 3 are subject to higher-level plan objectives defined in the Vancouver Island Land Use Plan. Blocks 2 and 5 are within the Central Coast Land and Resource Management Plan, which is currently underway. Block 6 will be part of the Queen Charlottes - Haida Gwaii Land and Resource Management Plan, which is scheduled to start in the spring of 2002.

Table 27 – Management zones and landscape units

Block	Mgmt Zone	Mgmt Unit	Landscape Unit	Productive Forest (ha)	THLB (ha)	Management Considerations
1	EFZ 47	Loss-Jordan	Loss *Low BEO* Tugwell *Low BEO*	24,490	21,042	***Enhanced Forestry Zone,*** with enhanced timber harvesting, as well as enhanced silviculture and increased growth and yield opportunity; general integration of recreation, and tourism values, as well as visuals along road corridor and in Sombrio Creek area; other non-timber (including biodiversity) values are to be addressed at the basic level of stewardship in accordance with legislation and regulations.
	RMZ 34	E&N South	Koksilah *Low BEO* Sooke *Low BEO* Tugwell *Low BEO*	4,475	2,749	***General Management Zone***, with significant timber values and particular suitability for enhanced silviculture and growth and yield management on larger blocks of Crown provincial forest land; due to its proximity to population centres, the area offers significant recreation/scenery and tourism opportunities associated with intensively managed, roaded resource lands; fish and wildlife values are significant, and biodiversity conservation/restoration is recommended with an emphasis on retention, and where required, active restoration of mature and old seral forest attributes and age classes.
	RMZ 46	Gordon – Caycuse – San Juan	San Juan *Intermediate BEO*	107	83	***General Management Zone***, significant timber values combined with high fish, wildlife and biodiversity values, as well as recreation values.

Block	Mgmt Zone	Mgmt Unit	Landscape Unit	Productive Forest (ha)	THLB (ha)	Management Considerations
	SMZ 22	San Juan Ridge	Loss *Low BEO* *Tugwell* *Low BEO* San Juan *Intermediate BEO*	1,319	779	***Special Management Zone***, primary focus is on maintenance of recreational and scenic values and opportunities associated with the Kludahk Trail.
3	EFZ 27	Naka	Naka *Low BEO*	12,852	9,444	***Enhanced Forestry Zone*** suited for enhanced silviculture and limited opportunity for enhanced timber harvesting in remaining old forests; maintenance of coastal viewsheds and associated recreational values; objectives for biodiversity and other resources are to be integrated at the basic stewardship level.
	Total			**43,243**	**34,097**	

Table 28 – Area by landscape unit and BEC variant

Block 1 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Koksilah	CWH mm 1	Early	8.2	0.4	5%	7.8	95%
Low BEO	CWH mm 1 Total		8.2	0.4	5%	7.8	95%
Koksilah Total			8.2	0.4	5%	7.8	95%
Loss	CWH vm 1	Early	5156.3	381.2	4%	4775.1	51%
Low BEO		Mid	1821.2	69.4	1%	1751.8	19%
		Mature	96.7	15.4	0%	81.3	1%
		Old	2332.6	485.7	5%	1847.0	20%
	CWH vm 1 Total		9406.9	951.7	10%	8455.2	90%
	CWH vm 2	Early	1251.5	81.3	2%	1170.2	23%
		Mature	58.0	2.9	0%	55.1	1%
		Old	3689.0	1310.9	26%	2378.1	48%
	CWH vm 2 Total		4998.5	1395.1	28%	3603.5	72%
	CWH xm 2	Early	1.9	1.9	100%	0.0	0%
	CWH xm 2 Total		1.9	1.9	100%	0.0	0%
	MH mm 1	Early	73.3	4.8	1%	68.5	12%
		Old	498.9	198.0	35%	300.9	53%
	MH mm 1 Total		572.1	202.8	35%	369.3	65%
Loss Total			14979.5	2551.5	17%	12428.0	83%
San Juan	CWH vm 1	Old	5.6	1.8	32%	3.8	68%
Intermediate BEO	CWH vm 1 Total		5.6	1.8	32%	3.8	68%
	CWH vm 2	Early	0.1	0.1	0%	0.0	0%
		Mature	0.1	0.1	0%	0.0	0%
		Old	101.8	22.7	22%	79.0	78%
	CWH vm 2 Total		101.9	22.9	22%	79.0	78%
	MH mm 1	Old	25.8	7.2	28%	18.5	72%
	MH mm 1 Total		25.8	7.2	28%	18.5	72%
San Juan Total			133.3	31.9	24%	101.3	76%

Block 1 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Sooke	CWH mm 1	Early	213.1	27.6	8%	185.5	51%
Low BEO		Mid	46.1	11.9	3%	34.2	9%
		Mature	87.7	36.9	10%	50.8	14%
		Old	16.4	1.9	1%	14.6	4%
	CWH mm 1 Total		363.3	78.3	22%	285.1	78%
	CWH mm 2	Early	14.7	12.0	72%	2.7	16%
		Mature	2.0	1.7	10%	0.4	2%
	CWH mm 2 Total		16.7	13.6	82%	3.1	18%
	CWH xm 2	Early	934.5	428.6	15%	506.0	18%
		Mid	1308.9	410.5	15%	898.4	32%
		Mature	508.9	213.1	8%	295.9	11%
		Old	40.8	20.4	1%	20.5	1%
	CWH xm 2 Total		2793.2	1072.5	38%	1720.6	62%
Sooke Total			3173.2	1164.4	37%	2008.8	63%
Tugwell	CWH mm 1	Early	1691.3	165.5	7%	1525.8	69%
Low BEO		Mid	119.8	5.3	0%	114.5	5%
		Mature	161.4	64.2	3%	97.2	4%
		Old	251.7	119.2	5%	132.5	6%
	CWH mm 1 Total		2224.1	354.2	16%	1870.0	84%
	CWH mm 2	Early	490.4	60.4	9%	430.0	61%
		Mid	7.2	0.1	0%	7.1	1%
		Mature	78.2	69.9	10%	8.3	1%
		Old	123.8	50.3	7%	73.5	11%
	CWH mm 2 Total		699.6	180.7	26%	518.9	74%
	CWH vm 1	Early	1431.6	102.8	4%	1328.8	49%
		Mid	514.8	40.5	1%	474.3	17%
		Mature	19.8	5.9	0%	13.9	1%
		Old	752.1	193.0	7%	559.1	21%
	CWH vm 1 Total		2718.3	342.2	13%	2376.1	87%
	CWH vm 2	Early	993.3	63.6	3%	929.6	49%
		Mid	9.6	1.9	0%	7.7	0%
		Mature	56.6	4.1	0%	52.5	3%
		Old	842.4	282.2	15%	560.2	29%
	CWH vm 2 Total		1901.9	351.8	18%	1550.1	82%
	CWH xm 2	Early	2176.8	533.5	10%	1643.3	30%
		Mid	2936.9	279.2	5%	2657.7	48%
		Mature	303.5	100.0	2%	203.5	4%
		Old	111.2	14.4	0%	96.7	2%
	CWH xm 2 Total		5528.4	927.1	17%	4601.2	83%
	MH mm 1	Early	17.5	2.2	1%	15.4	8%
		Old	181.5	97.1	49%	84.4	42%
	MH mm 1 Total		199.0	99.3	50%	99.8	50%
Tugwell Total			13271.3	2255.3	17%	11016.1	83%
Block 1 Total			31565.5	6003.5	19%	25562.0	81%

Block 2 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Fulmore *Intermediate BEO*	CWH vm 1	Early	2127.3	116.8	3%	2010.4	45%
		Mid	1473.6	165.1	4%	1308.5	29%
		Mature	301.5	16.6	0%	284.9	6%
		Old	595.5	378.2	8%	217.4	5%
	CWH vm 1 Total		4497.9	676.7	15%	3821.2	85%
	CWH vm 2	Early	574.1	35.9	2%	538.2	33%
		Mid	0.1	0.0	0%	0.1	0%
		Mature	1.8	1.8	0%	0.0	0%
		Old	1048.2	867.0	53%	181.1	11%
	CWH vm 2 Total		1624.2	904.7	56%	719.5	44%
	MH mm 1	Early	0.8	0.0	0%	0.8	0%
		Old	233.0	229.6	98%	3.4	1%
	MH mm 1 Total		233.7	229.6	98%	4.2	2%
Fulmore Total			6355.8	1811.0	28%	4544.8	72%
Stafford *High BEO*	AT p	Mid	0.7	0.7	1%	0.0	0%
		Old	111.4	111.4	99%	0.0	0%
	AT p Total		112.1	112.1	100%	0.0	0%
	CWH vm 1	Early	3136.3	789.8	7%	2346.6	21%
		Mid	1452.7	162.2	1%	1290.5	12%
		Mature	424.2	101.0	1%	323.2	3%
		Old	5997.9	2585.9	23%	3412.0	31%
	CWH vm 1 Total		11011.0	3638.8	33%	7372.2	67%
	CWH vm 2	Early	708.2	323.9	4%	384.3	5%
		Mid	89.1	55.6	1%	33.5	0%
		Mature	104.2	62.6	1%	41.6	0%
		Old	7449.8	5031.4	60%	2418.4	29%
	CWH vm 2 Total		8351.2	5473.5	66%	2877.7	34%
	MH mm 1	Early	10.9	8.7	0%	2.2	0%
		Mid	9.3	8.4	0%	0.9	0%
		Mature	16.8	9.7	1%	7.1	0%
		Old	2445.3	2247.9	99%	197.4	8%
	MH mm 1 Total		2482.3	2274.6	92%	207.7	8%
Stafford Total			21956.6	11499.0	52%	10457.6	48%
Block 2 Total			28312.4	13310.0	47%	15002.4	53%

Block 3 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Naka	AT p	Old	50.6	49.2	97%	1.4	3%
Low BEO	AT p Total		50.6	49.2	97%	1.4	3%
	CWH vm 1	Early	1842.6	203.4	4%	1639.3	35%
		Mid	75.4	36.0	1%	39.4	1%
		Mature	273.6	49.1	1%	224.6	5%
		Old	2479.2	692.3	15%	1786.9	38%
	CWH vm 1 Total		4670.9	980.7	21%	3690.2	79%
	CWH vm 2	Early	1479.6	103.9	2%	1375.7	26%
		Mid	18.5	8.5	0%	10.1	0%
		Mature	134.2	11.6	0%	122.5	2%
		Old	3757.4	987.1	18%	2770.2	51%
	CWH vm 2 Total		5389.7	1111.1	21%	4278.5	79%
	MH mm 1	Early	170.4	10.5	0%	159.9	6%
		Mid	2.2	1.1	0%	1.1	0%
		Mature	21.1	3.6	0%	17.5	1%
		Old	2546.7	1251.8	46%	1294.8	47%
	MH mm 1 Total		2740.4	1267.0	46%	1473.4	54%
Naka Total			12851.6	3408.1	27%	9443.6	73%
Block 3 Total			12851.6	3408.1	27%	9443.6	73%

Block 5 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Aaltanhash	CWH vm 1	Early	208.5	37.7	1%	170.9	4%
Low BEO		Mid	103.0	56.6	1%	46.4	1%
		Mature	113.0	46.2	1%	66.8	1%
		Old	4194.6	2520.6	55%	1674.0	36%
	CWH vm 1 Total		4619.1	2661.1	58%	1958.1	42%
	CWH vm 2	Early	12.6	12.6	1%	0.0	0%
		Mid	43.0	43.0	2%	0.0	0%
		Mature	11.1	11.1	1%	0.0	0%
		Old	1923.9	1683.3	85%	240.6	12%
	CWH vm 2 Total		1990.7	1750.0	88%	240.6	12%
	MH mm 1	Mature	1.1	1.1	1%	0.0	0%
		Old	108.0	108.0	99%	0.0	0%
	MH mm 1 Total		109.1	109.1	100%	0.0	0%
Aaltanhash Total			6718.9	4520.2	67%	2198.7	33%
Bishop	CWH vm 1	Early	13.9	13.9	3%	0.0	0%
Low BEO		Mid	69.3	0.0	0%	69.3	15%
		Mature	2.1	2.1	0%	0.0	0%
		Old	379.3	281.4	61%	97.8	21%
	CWH vm 1 Total		464.6	297.4	64%	167.2	36%
	CWH vm 2	Early	21.9	21.9	6%	0.0	0%
		Mid	2.4	0.0	0%	2.4	1%
		Old	359.1	352.7	92%	6.4	2%
	CWH vm 2 Total		383.4	374.6	98%	8.8	2%
	MH mm 1	Early	13.3	13.3	2%	0.0	0%
		Mid	69.3	7.2	1%	62.2	8%
		Mature	25.1	16.3	2%	8.8	1%
		Old	627.3	411.9	56%	215.4	29%
	MH mm 1 Total		735.0	448.6	61%	286.3	39%
Bishop Total			1583.0	1120.7	71%	462.3	29%
Butedale	CWH vh 2	Old	1.2	1.2	100%	0.0	0%
Intermediate BEO	CWH vh 2 Total		1.2	1.2	100%	0.0	0%
	CWH vm 1	Early	157.7	143.2	2%	14.5	0%
		Mid	303.2	47.1	1%	256.1	3%
		Mature	63.3	33.3	0%	29.9	0%
		Old	7548.5	3665.2	45%	3883.3	48%
	CWH vm 1 Total		8072.7	3888.8	48%	4183.9	52%
	CWH vm 2	Early	6.5	6.5	0%	0.0	0%
		Mid	0.7	0.7	0%	0.0	0%
		Mature	16.3	16.3	1%	0.0	0%
		Old	1611.4	1457.7	89%	153.7	9%
	CWH vm 2 Total		1634.9	1481.1	91%	153.7	9%
	MH mm 1	Early	4.2	4.2	1%	0.0	0%
		Mature	1.8	1.8	1%	0.0	0%
		Old	331.3	294.2	87%	37.1	11%
	MH mm 1 Total		337.3	300.2	89%	37.1	11%
Butedale Total			10046.1	5671.3	56%	4374.8	44%

Block 5 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Crab	AT p	Old	6.0	6.0	100%	0.0	0%
Low BEO	AT p Total		6.0	6.0	100%	0.0	0%
	CWH vm 1	Early	1952.4	231.0	4%	1721.4	31%
		Mid	658.8	67.4	1%	591.4	11%
		Mature	74.4	47.9	1%	26.5	0%
		Old	2879.5	1995.2	36%	884.2	16%
	CWH vm 1 Total		5565.0	2341.6	42%	3223.5	58%
	CWH vm 2	Early	226.0	107.5	2%	118.5	2%
		Mid	70.9	36.3	1%	34.6	1%
		Mature	43.5	38.4	1%	5.1	0%
		Old	4586.5	4399.6	89%	186.9	4%
	CWH vm 2 Total		4926.9	4581.8	93%	345.1	7%
	MH mm 1	Mature	1.2	1.2	0%	0.0	0%
		Old	501.9	501.9	100%	0.0	0%
	MH mm 1 Total		503.1	503.1	100%	0.0	0%
Crab Total			11001.0	7432.5	68%	3568.5	32%
Green	CWH vm 1	Early	58.4	41.5	0%	16.9	0%
Intermediate BEO		Mid	246.2	156.1	1%	90.1	1%
		Mature	217.0	168.8	1%	48.2	0%
		Old	10887.3	5088.4	45%	5798.8	51%
	CWH vm 1 Total		11408.9	5454.9	48%	5954.0	52%
	CWH vm 2	Early	2.5	2.5	0%	0.0	0%
		Mid	82.1	82.1	3%	0.0	0%
		Mature	109.0	95.0	3%	14.0	0%
		Old	2709.4	2454.5	85%	254.9	9%
	CWH vm 2 Total		2902.9	2634.0	91%	268.9	9%
	MH mm 1	Mid	7.3	7.3	5%	0.0	0%
		Mature	4.5	4.5	3%	0.0	0%
		Old	139.4	139.4	92%	0.0	0%
	MH mm 1 Total		151.2	151.2	100%	0.0	0%
Green Total			14427.4	8240.1	57%	6222.9	43%
Khutze	CWH vm 1	Early	252.3	101.5	2%	150.8	3%
Intermediate BEO		Mid	270.3	185.0	3%	85.3	2%
		Mature	136.3	106.4	2%	30.0	1%
		Old	4732.0	3096.7	57%	1635.3	30%
	CWH vm 1 Total		5390.8	3489.5	65%	1901.3	35%
	CWH vm 2	Early	6.8	6.8	0%	0.0	0%
		Mid	16.8	16.8	1%	0.0	0%
		Mature	28.2	28.2	1%	0.0	0%
		Old	1880.7	1822.0	94%	58.6	3%
	CWH vm 2 Total		1932.4	1873.7	97%	58.6	3%
	MH mm 1	Old	131.6	131.6	100%	0.0	0%
	MH mm 1 Total		131.6	131.6	100%	0.0	0%
Khutze Total			7454.8	5494.8	74%	1960.0	26%

Block 5 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Don Peninsula *Intermediate BEO*	CWH vh 2	Early	8.2	4.2	0%	4.0	0%
		Mid	9.5	0.1	0%	9.4	0%
		Old	6619.0	2898.7	44%	3720.3	56%
	CWH vh 2 Total		6636.7	2903.0	44%	3733.8	56%
Don Peninsula Total			6636.7	2903.0	44%	3733.8	56%
Kiltuish *Low BEO*	CWH vm 1	Early	532.0	60.8	1%	471.2	12%
		Mid	463.3	124.2	3%	339.1	8%
		Mature	115.8	81.8	2%	34.0	1%
		Old	2944.8	1894.0	47%	1050.7	26%
	CWH vm 1 Total		4055.8	2160.7	53%	1895.1	47%
	CWH vm 2	Early	9.3	4.0	0%	5.3	0%
		Mid	19.8	19.8	1%	0.0	0%
		Mature	5.6	5.6	0%	0.0	0%
		Old	1345.3	1286.0	93%	59.3	4%
	CWH vm 2 Total		1380.0	1315.5	95%	64.6	5%
	MH mm 1	Mid	4.5	4.5	3%	0.0	0%
		Old	142.5	142.5	97%	0.0	0%
	MH mm 1 Total		147.0	147.0	100%	0.0	0%
Kiltuish Total			5582.8	3623.2	65%	1959.6	35%
Klekane *Low BEO*	CWH vm 1	Early	195.2	15.7	0%	179.5	4%
		Mid	245.8	55.1	1%	190.6	4%
		Mature	48.0	30.4	1%	17.6	0%
		Old	3990.4	2166.5	48%	1823.9	41%
	CWH vm 1 Total		4479.3	2267.7	51%	2211.6	49%
	CWH vm 2	Early	20.4	20.4	1%	0.0	0%
		Mid	6.3	6.3	0%	0.0	0%
		Mature	16.8	13.3	1%	3.5	0%
		Old	2224.5	2144.8	95%	79.7	4%
	CWH vm 2 Total		2268.0	2184.8	96%	83.2	4%
	MH mm 1	Old	248.1	233.2	94%	15.0	6%
	MH mm 1 Total		248.1	233.2	94%	15.0	6%
Klekane Total			6995.4	4685.7	67%	2309.7	33%
Surf *Intermediate BEO*	CWH vh 2	Mid	9.8	1.2	1%	8.6	7%
		Old	110.5	65.1	54%	45.5	38%
	CWH vh 2 Total		120.3	66.2	55%	54.1	45%
	CWH vm 1	Old	211.7	110.7	52%	101.0	48%
	CWH vm 1 Total		211.7	110.7	52%	101.0	48%
	CWH vm 2	Old	21.6	21.6	100%	0.0	0%
	CWH vm 2 Total		21.6	21.6	100%	0.0	0%
Surf Total			353.6	198.5	56%	155.1	44%
Swindle *Low BEO*	CWH vm 1	Old	119.1	40.6	34%	78.5	66%
	CWH vm 1 Total		119.1	40.6	34%	78.5	66%
Swindle Total			119.1	40.6	34%	78.5	66%

Block 5 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Laredo *Intermediate BEO*	CWH vh 2	Early	2.5	2.5	0%	0.0	0%
		Mid	62.5	41.9	1%	20.5	0%
		Mature	33.3	17.6	0%	15.7	0%
		Old	7462.3	5429.9	72%	2032.4	27%
	CWH vh 2 Total		7560.5	5491.8	73%	2068.7	27%
	CWH vm 1	Mid	49.6	36.1	0%	13.5	0%
		Mature	7.7	1.7	0%	6.0	0%
		Old	11438.8	4726.1	41%	6712.7	58%
	CWH vm 1 Total		11496.1	4763.9	41%	6732.2	59%
	CWH vm 2	Mid	13.5	12.1	1%	1.4	0%
		Mature	6.2	6.2	0%	0.0	0%
		Old	1700.5	1368.5	80%	332.0	19%
	CWH vm 2 Total		1720.1	1386.8	81%	333.4	19%
	MH mm 1	Old	28.1	28.1	100%	0.0	0%
	MH mm 1 Total		28.1	28.1	100%	0.0	0%
	MH wh 1	Mature	4.9	4.9	3%	0.0	0%
		Old	190.2	184.2	94%	6.0	3%
	MH wh 1 Total		195.1	189.1	97%	6.0	3%
Laredo Total			21000.0	11859.7	56%	9140.3	44%
Roderick *Low BEO*	AT p	Old	94.6	88.4	93%	6.3	7%
	AT p Total		94.6	88.4	93%	6.3	7%
	CWH vh 2	Early	1199.1	130.9	0%	1068.2	4%
		Mid	694.6	148.9	1%	545.8	2%
		Mature	58.0	17.7	0%	40.3	0%
		Old	27336.4	16204.9	55%	11131.5	38%
	CWH vh 2 Total		29288.2	16502.3	56%	12785.8	44%
	CWH vm 1	Early	158.1	11.8	0%	146.3	3%
		Mid	95.3	63.4	1%	31.9	1%
		Mature	9.6	9.6	0%	0.0	0%
		Old	4855.3	3525.3	69%	1330.0	26%
	CWH vm 1 Total		5118.1	3610.0	71%	1508.1	29%
	CWH vm 2	Mid	4.8	4.8	1%	0.0	0%
		Old	562.0	518.5	91%	43.5	8%
	CWH vm 2 Total		566.8	523.2	92%	43.5	8%
	MH wh 1	Old	2.8	2.8	100%	0.0	0%
	MH wh 1 Total		2.8	2.8	100%	0.0	0%
Roderick Total			35070.5	20726.8	59%	14343.7	41%

Block 5 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Tolmie	CWH vh 2	Old	3160.9	1561.3	49%	1599.7	51%
High BEO	CWH vh 2 Total		3160.9	1561.3	49%	1599.7	51%
	CWH vm 1	Mid	4.1	1.8	0%	2.3	0%
		Mature	51.6	50.0	1%	1.6	0%
		Old	6629.3	2331.1	35%	4298.2	64%
	CWH vm 1 Total		6685.0	2382.9	36%	4302.1	64%
	CWH vm 2	Mid	2.1	2.1	0%	0.0	0%
		Mature	3.8	3.8	0%	0.0	0%
		Old	834.0	679.7	81%	154.3	18%
	CWH vm 2 Total		839.9	685.6	82%	154.3	18%
	MH mm 1	Old	17.6	17.6	100%	0.0	0%
	MH mm 1 Total		17.6	17.6	100%	0.0	0%
	MH wh 1	Old	15.4	15.4	100%	0.0	0%
	MH wh 1 Total		15.4	15.4	100%	0.0	0%
Tolmie Total			10718.9	4662.9	44%	6056.1	56%
Triumph	CWH vm 1	Early	7.7	7.7	1%	0.0	0%
Low BEO		Mid	7.8	7.8	1%	0.0	0%
		Mature	16.8	7.0	1%	9.9	1%
		Old	835.7	530.8	61%	304.9	35%
	CWH vm 1 Total		868.1	553.4	64%	314.8	36%
	CWH vm 2	Mid	3.3	3.3	1%	0.0	0%
		Mature	0.9	0.9	0%	0.0	0%
		Old	372.1	350.2	93%	22.0	6%
	CWH vm 2 Total		376.3	354.3	94%	22.0	6%
	MH mm 1	Old	29.5	29.5	100%	0.0	0%
	MH mm 1 Total		29.5	29.5	100%	0.0	0%
Triumph Total			1274.0	937.2	74%	336.8	26%
Yeo	AT p	Old	25.4	23.7	93%	1.8	7%
Low BEO	AT p Total		25.4	23.7	93%	1.8	7%
	CWH vh 2	Early	286.5	36.8	0%	249.7	2%
		Mid	139.5	39.3	0%	100.2	1%
		Old	10779.3	5130.8	46%	5648.6	50%
	CWH vh 2 Total		11205.3	5206.8	46%	5998.5	54%
Yeo Total			11230.7	5230.5	47%	6000.3	53%
Block 5 Total			150248.5	87347.4	58%	62901.1	42%

Block 6 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Sewell *Intermediate BEO*	AT p	Early	3.8	3.8	6%	0.0	0%
		Mid	4.2	4.2	7%	0.0	0%
		Mature	42.9	42.9	71%	0.0	0%
		Old	9.9	9.9	16%	0.0	0%
	AT p Total		60.8	60.8	100%	0.0	0%
	CWH vh 2	Early	487.7	63.5	4%	424.2	28%
		Mid	9.4	9.4	1%	0.0	0%
		Mature	164.1	160.4	11%	3.6	0%
		Old	856.8	685.7	45%	171.2	11%
	CWH vh 2 Total		1518.1	919.0	61%	599.0	39%
	CWH wh 1	Early	7022.4	908.2	5%	6114.3	33%
		Mid	4357.3	543.6	3%	3813.8	20%
		Mature	1427.5	827.2	4%	600.3	3%
		Old	5882.6	2795.3	15%	3087.3	17%
	CWH wh 1 Total		18689.9	5074.3	27%	13615.6	73%
	CWH wh 2	Early	1135.4	263.7	5%	871.7	15%
		Mid	157.4	42.9	1%	114.5	2%
		Mature	1318.7	1228.6	22%	90.1	2%
		Old	3061.0	2336.4	41%	724.6	13%
	CWH wh 2 Total		5672.5	3871.5	68%	1800.9	32%
	MH wh 1	Mid	0.9	0.9	1%	0.0	0%
		Mature	42.2	42.2	53%	0.0	0%
		Old	36.5	36.5	46%	0.0	0%
	MH wh 1 Total		79.6	79.6	100%	0.0	0%
	MH wh 2	Early	64.3	59.0	4%	5.3	0%
		Mid	45.6	45.5	3%	0.1	0%
		Mature	535.8	532.3	41%	3.5	0%
		Old	665.8	650.0	50%	15.8	1%
	MH wh 2 Total		1311.5	1286.7	98%	24.7	2%
Sewell Total			27332.3	11292.0	41%	16040.3	59%
Skidegate Lake *Low BEO*	CWH wh 1	Early	640.9	39.3	2%	601.6	32%
		Mid	859.0	36.7	2%	822.4	43%
		Mature	69.4	18.3	1%	51.1	3%
		Old	327.7	117.4	6%	210.3	11%
	CWH wh 1 Total		1897.0	211.7	11%	1685.4	89%
	CWH wh 2	Early	594.3	27.7	3%	566.5	66%
		Mid	112.6	6.2	1%	106.4	12%
		Mature	58.3	46.3	5%	11.9	1%
		Old	92.1	15.7	2%	76.4	9%
	CWH wh 2 Total		857.2	96.0	11%	761.2	89%
	MH wh 2	Mature	0.1	0.1	5%	0.0	0%
		Old	2.1	2.1	95%	0.0	0%
	MH wh 2 Total		2.2	2.2	100%	0.0	0%
Skidegate Lake Total			2756.4	309.8	11%	2446.6	89%

Block 6 Landscape Unit	BEC	Seral Stage	Productive Forest (ha)	Non Contributing Area		THLB Area	
				ha	%	ha	%
Tasu *Low BEO*	AT p	Early	2.8	2.8	2%	0.0	0%
		Mature	110.5	110.5	79%	0.0	0%
		Old	25.9	25.5	18%	0.4	0%
	AT p Total		139.2	138.8	100%	0.4	0%
	CWH vh 2	Early	5551.8	872.5	5%	4679.3	28%
		Mid	158.1	149.7	1%	8.4	0%
		Mature	2595.4	2425.2	15%	170.3	1%
		Old	8405.7	6650.7	40%	1755.0	11%
	CWH vh 2 Total		16711.0	10098.0	60%	6613.0	40%
	CWH wh 1	Early	2.6	0.2	3%	2.3	28%
		Mature	4.7	1.5	18%	3.2	38%
		Old	1.2	0.3	3%	1.0	11%
	CWH wh 1 Total		8.5	2.0	24%	6.5	76%
	CWH wh 2	Early	15.0	2.4	2%	12.6	8%
		Mature	27.1	26.2	17%	0.9	1%
		Old	110.7	100.9	66%	9.8	6%
	CWH wh 2 Total		152.7	129.5	85%	23.3	15%
	MH wh 1	Early	44.5	44.4	3%	0.1	0%
		Mid	32.2	32.2	2%	0.0	0%
		Mature	642.0	637.8	47%	4.2	0%
		Old	642.3	616.3	45%	26.1	2%
	MH wh 1 Total		1361.0	1330.7	98%	30.3	2%
	MH wh 2	Early	23.8	23.1	5%	0.7	0%
		Mid	5.5	5.5	1%	0.0	0%
		Mature	170.6	170.6	37%	0.0	0%
		Old	267.5	260.0	56%	7.5	2%
	MH wh 2 Total		467.3	459.1	98%	8.2	2%
Tasu Total			18839.7	12158.1	65%	6681.6	35%
Block 6 Total			48928.4	23760.0	49%	25168.5	51%

7.3 Analysis Units

The forest area in the THLB is aggregated into groups of similar stands to produce growth and yield information needed to model timber supply. For existing stands, analysis units are based on leading species group and site productivity (as determined from the dominant ecosystem site series within each polygon for Blocks 1 – 3 and 6, and by site class for Block 5).

Table 29 – Analysis units for existing stands – Block 1

Analysis Unit*	Area (ha)	% THLB
B-A	233.4	0.9%
B-B	13.3	0.1%
B-C	320.3	1.3%
C-A	792.6	3.1%
C-B	152.9	0.6%
C-C	1780.3	7.0%
D-A	383.5	1.5%
D-B	367.7	1.4%
D-C	42.7	0.2%
F-A	2913.8	11.4%
F-B	3313.5	13.0%
F-C	3087.0	12.1%
H-A	3301.5	12.9%
H-B	1054.1	4.1%
H-C	4117.4	16.1%
P-B	77.0	0.3%
P-C	153.5	0.6%
S-A	55.2	0.2%
S-B	3.9	0.0%
S-C	4.4	0.0%
Y-A	28.8	0.1%
Y-B	8.9	0.0%
Y-C	2789.3	10.9%

Table 30 – Analysis units for existing stands – Block 2

Analysis Unit*	Area (ha)	% THLB
B-A	166.1	1.1%
B-B	1660.8	11.1%
B-C	238.2	1.6%
C-A	449.6	3.0%
C-B	2404.1	16.0%
C-C	964.0	6.4%
D-A	116.3	0.8%
D-B	186.4	1.2%
D-C	4.4	0.0%
F-A	187.7	1.3%
F-B	466.3	3.1%
F-C	77.6	0.5%
H-A	748.0	5.0%
H-B	5366.2	35.8%
H-C	735.5	4.9%
S-A	11.5	0.1%
S-B	62.8	0.4%
Y-A	14.6	0.1%
Y-B	303.4	2.0%
Y-C	266.7	1.8%

1.1

* See Table 35

Table 31 – Analysis units for existing stands – Block 3

Analysis Unit*	Area (ha)	% THLB
B-A	26.1	0.3%
B-B	587.0	6.2%
B-C	45.8	0.5%
C-A	30.1	0.3%
C-B	1308.2	13.9%
C-C	687.1	7.3%
D-A	2.9	0.0%
D-B	11.0	0.1%
F-A	7.5	0.1%
F-B	104.8	1.1%
F-C	36.0	0.4%
H-A	204.7	2.2%
H-B	4431.9	46.9%
H-C	811.9	8.6%
Y-A	5.7	0.1%
Y-B	586.4	6.2%
Y-C	442.7	4.7%

Table 32 – Analysis units for existing stands – Block 6

Analysis Unit*	Area (ha)	% THLB
C-A	250.0	1.0%
C-B	1524.8	6.1%
C-C	1342.0	5.3%
D-A	706.2	2.8%
D-B	1113.6	4.4%
D-C	72.2	0.3%
H-A	844.6	3.4%
H-B	8149.9	32.4%
H-C	2136.2	8.5%
P-C	9.0	0.0%
S-A	1039.6	4.1%
S-B	6354.3	25.2%
S-C	964.6	3.8%
Y-A	1.7	0.0%
Y-B	68.4	0.3%
Y-C	264.8	1.1%

Table 33 – Analysis units for existing stands – Block 5

Analysis Unit*	Area (ha)	% THLB
B-A	3709.7	5.9%
B-B	7201.6	11.4%
B-C	38.9	0.1%
C-A	192.8	0.3%
C-B	14405.8	22.9%
C-C	11052.8	17.6%
D-A	64.7	0.1%
D-B	902.7	1.4%
D-C	7.1	0.0%
H-A	1555.0	2.5%
H-B	19469.8	31.0%
H-C	1067.3	1.7%
S-A	1279.0	2.0%
S-B	244.3	0.4%
S-C	22.6	0.0%
Y-B	163.7	0.3%
Y-C	424.2	0.7%

1.1

* See Table 35

Analysis units for previously harvested and future stands are based on silvicultural strategies defined in *TFL 25 Management Plan #10*. Some amalgamation of future planting regimes has been done to simplify timber supply modelling.

Table 34 – Analysis units for future stands

Block	Analysis Unit*	Current NSR (ha)	% THLB
1	F-A-P	15.4	0.1%
1	S-A-P	0.3	0.0%
1	H-A-P	49.0	0.2%
1	F-B-P	225.1	0.9%
1	F-C-P	34.9	0.1%
1	C-C-P	31.9	0.1%
1	H-C-P	210.5	0.8%
2	S-A-P	14.3	0.1%
2	C-A-P	62.2	0.4%
2	H-B-P	309.6	2.1%
2	H-B-N	97.3	0.6%
2	H-C-P	25.6	0.2%
2	H-C-N	63.2	0.4%

Block	Analysis Unit*	Current NSR (ha)	% THLB
3	S-A-P	3.4	0.0%
3	H-B-P	82.3	0.9%
3	C-C-P	10.8	0.1%
3	Y-C-N	3.0	0.0%
3	H-C-P	14.1	0.1%
5	S-A-P	94.8	0.2%
5	H-A-P	0.0	0.0%
5	C-B-P	441.8	0.7%
5	H-B-X	0.0	0.0%
5	Y-B-P	31.0	0.0%
5	H-B-P	396.6	0.6%
5	H-C-P	96.6	0.2%
5	C-C-P	20.4	0.0%
5	Y-C-P	18.2	0.0%
5	H-C-N	0.0	0.0%
6	S-A-P	4.6	0.0%
6	S-B-P	153.4	0.6%
6	S-C-P	10.0	0.0%
6	H-C-P	158.5	0.6%

Table 35 – Analysis Units Legend

i.e. B-A-OG					
First Character *Leading Species*		Second Character *Productivity Group*		Third Character *Age Group*	
i.e. B	Ba / Bg	A	See Section 8.2	2M	Age Class 1 to 2 (managed)
H	Hw / Hm	B		2U	Age Class 3 to 6 (unmanaged)
C	Cw / Yc	C		OG	Age Class 7 to 9
				P or N	Future Stands (Planted / Natural)

1.1

* See Table 35

8.0 GROWTH AND YIELD

8.1 Overview

This section describes the approach used to develop yield tables for managed and natural stands. The general approach is to develop yield tables for existing and future stands, thus specific yield tables are developed for:

1) Existing natural mature stands or old growth (OG).
2) Existing natural immature 2nd growth stands (2U).
3) Existing managed 2nd growth stands (2M).
4) Future managed stands.

Table 36 describes the different input parameters for the four different yield tables. It also summarizes the main output results.

Table 36 – Modeling overview

	Existing Mature Natural Stands	Existing Immature Natural Stands	Existing Immature Managed Stands	Future Stands
Model	Flat Line	Batch VDYP (6.6d4)	Batch TIPSY (3.0)	Batch TIPSY (3.0)
Age Class	7-9	>40 and <141	> 0 and < 41	All
		Block 1		
Average Culm MAI	Past Culm	8.3 m^3/ha/yr	8.6 m^3/ha/yr	7.8 m^3/ha/yr
Average Culm Age		76 years	89 years	101 years
Average Volume at Culm Age		578 m^3/ha	732 m^3/ha	772 m^3/ha
		Block 2		
Average Culm MAI	Past Culm	7.8 m^3/ha/yr	8.9 m^3/ha/yr	8.6 m^3/ha/yr
Average Culm Age		79 years	92 years	99 years
Average Volume at Culm Age		587 m^3/ha	808 m^3/ha	823 m^3/ha
		Block 3		
Average Culm MAI	Past Culm	8.0 m^3/ha/yr	9.3 m^3/ha/yr	8.8m^3/ha/yr
Average Culm Age		75 years	96 years	105 years
Average Volume at Culm Age		560 m^3/ha	874 m^3/ha	908 m^3/ha
		Block 5		
Average Culm MAI	Past Culm	7.2 m^3/ha/yr	9.9 m^3/ha/yr	8.5m^3/ha/yr
Average Culm Age		58 years	83 years	103 years
Average Volume at Culm Age		401 m^3/ha	807 m^3/ha	782 m^3/ha
		Block 6		
Average Culm MAI	Past Culm	8.9 m^3/ha/yr	12.2 m^3/ha/yr	12.9m^3/ha/yr
Average Culm Age		55 years	81 years	83 years
Average Volume at Culm Age		480 m^3/ha	977 m^3/ha	1050 m^3/ha

8.2 Site Index

Block 1

Site index estimates for existing immature natural stands were calculated from the inventory database based on the primary tree layer leading species.

Site index estimates for existing managed stands and future stands were estimated by calculating a site index value for all major species for each existing immature natural stand in the inventory. Where the site index couldn't be calculated directly from forest attributes a site index conversion equation was used. Area summaries and weighted average site indices by ecosystem were calculated and sorted based on the ecologically appropriate species site index. Based on this summary and the estimated SI for most preferred species (highlighted), ecosystems were divided into productivity groups. Table 37 outlines the ecosystem and estimated site index by species, where Table 38 shows the weighted average site index by productivity group.

Table 37 – Ecosystem and Estimated Site Index – Block 1

	F		H		B		C/Yc		S		D	
Ecosystem	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**
S3	20.9	6.9	18.4	6.9	30.8	0.7	15.7	5.3	**38.4**	0.7	30.4	1.6
A5	**35.2**	423.8	31.4	425.6	28.8	265.6	25.9	303.1	34.7	268.2	27.4	225.9
S1HA	35.0	2088.4	**31.4**	2107.4	28.8	1939.5	26.1	2043.7	34.5	1979.9	27.3	39.6
S13	**33.9**	104.1	30.4	102.7	28.1	93.3	25.2	103.7	32.2	92.1	28.4	10.1
A1	**32.5**	2373.1	29.0	2393.8	27.3	1728.7	25.1	1805.2	32.1	1731.2	26.7	443.0
A2	**32.5**	414.6	28.7	416.8	26.7	221.8	25.0	308.3	31.0	222.5	27.2	95.7
L3	**30.6**	9.4	28.4	9.4	26.4	9.3	24.1	7.7	30.5	9.3	27.4	5.6
A6	30.8	29.1	27.4	29.5	27.1	12.1	**23.7**	17.0	29.2	15.4	23.8	17.6
L1	**28.7**	86.1	24.5	82.5	23.7	79.4	21.1	79.1	25.8	77.2	28.5	2.1
N1	**26.8**	244.1	23.6	245.4	23.4	232.2	21.9	230.4	24.8	232.2	26.5	3.8
L2	**24.4**	18.2	19.5	18.2	20.3	17.7	18.8	15.5	19.6	15.2	30.4	0.2
S2	25.5	39.2	**22.7**	36.1	22.4	34.8	19.5	39.4	23.2	34.8		
N2	**20.9**	10.9	22.2	7.8	19.6	10.9	18.3	10.9	22.8	7.8		
S1CH	26.8	134.0	25.2	103.1	24.3	101.5	**19.6**	133.4	26.5	101.8	20.9	6.0
S6	26.8	21.1	23.6	22.0	22.9	21.4	**18.9**	21.4	24.3	21.6	27.1	1.6
A3	**22.6**	608.0	20.1	604.7	24.1	161.9	22.4	190.2	26.7	158.6	23.7	40.9
M1	23.2	48.9	19.9	48.9	**21.0**	48.9	17.3	44.8	19.9	48.9		
MH1	21.7	1.8	16.7	1.8	**18.4**	1.8	16.7	1.3	16.0	1.8		
M4	20.2	24.9	17.8	24.9	19.1	24.7	**12.9**	24.4	17.2	24.4		
M2	20.8	17.1	15.6	16.5	17.6	16.5	**16.5**	17.1	14.6	16.5		

Table 38 – Site Index Estimates– Block 1

Productivity Group	Ecosystems	F	H	B	C/Yc	S	D
A	S3, A5, S13, S1HA	34.9	31.3	28.8	26.0	34.4	27.4
B	A1, A2, A6, L3, L1	32.3	28.8	27.1	25.0	31.7	26.7
C	N1, L2, S2, N2, S1CH, S6, A3, M1, MH1, M4, M2	24.1	21.4	23.0	20.6	24.4	23.7

Block 2

Site index estimates for existing managed, existing unmanaged and future stands were derived based on values provided in *Site Index Estimates by Site Series for Coniferous Tree Species in British Columbia* – 1997. Using the ecosystem classification available for the block, site index estimates from the SIBEC project were assigned for major commercial tree species. A crosswalk table between WFP's ecosystem classification and MOF site series was developed to facilitate this assignment. Where site index values were not available for certain species a derived value was assigned based on a conversion factor. Area summaries and assigned site indices by ecosystem are outlined in Table 39 and were sorted based on the ecologically appropriate species site index (highlighted). Based on this summary ecosystems were then divided into productivity groups to allow for analysis unit grouping. Table 40 shows the weighted average site index by productivity group.

Table 39 – Ecosystem and Estimated Site Index – Block 2

Ecosystem	THLB (ha)	SI F	SI H	SI B	SI C/Yc	SI S
S5	12.0	30.9	23.8	23.2	19.6	34.0
ST5	40.0	30.9	23.8	23.2	19.6	34.0
S3	148.1	35.0	31.3	26.2	21.2	32.8
S3B	2.6	35.0	31.3	26.2	21.2	32.8
S13F	73.3	35.0	31.3	26.2	21.2	32.8
S13	331.5	37.0	30.4	29.8	24.3	29.2
ST13	1159.3	37.0	30.4	29.8	24.3	29.2
S1HA	1499.2	34.8	29.0	26.7	22.4	28.9
ST1	2916.9	34.8	29.0	26.7	22.4	28.9
M1	1455.0	35.0	28.9	26.8	17.7	28.2
M1C	298.8	35.0	28.9	26.8	17.7	28.2
MT1	3187.3	35.0	28.9	26.8	17.7	28.2
MT1C	377.3	35.0	28.9	26.8	17.7	28.2
MT1S	3.2	35.0	28.9	26.8	17.7	28.2
M5	13.5	34.1	28.0	29.4	22.9	29.6
MT5	236.0	34.1	28.0	29.4	22.9	29.6
ST3	569.1	24.4	17.3	16.0	22.7	25.2
ST4	189.0	24.4	17.3	16.0	22.7	25.2
S15	17.3	33.5	26.4	21.4	22.0	23.7
ST15	97.0	33.5	26.4	21.4	22.0	23.7
MT15	0.7	32.4	26.3	26.3	15.1	25.6
S6	75.7	30.9	23.8	23.2	19.6	34.0
ST6	8.4	30.9	23.8	23.2	19.6	34.0
S1CH	43.7	20.0	20.0	19.4	22.4	18.3
M2	195.2	31.0	18.4	23.8	16.8	17.7
MT2	458.0	31.0	18.4	23.8	16.8	17.7
S2	150.0	31.1	17.2	23.8	16.8	17.1
S2F	48.4	31.1	17.2	23.8	16.8	17.1
ST2	481.6	31.1	17.2	23.8	16.8	17.1
MH1	661.9		16.0	12.0		
MH1C	206.6		16.0	12.0		
M4	34.2		29.8		18.6	
MT4	11.9		29.8		18.6	

Table 40 – Site Index Estimates– Block 2

Productivity Group	Ecosystems	F	H	B	C/Yc	S
A	S5, ST5, S3, S3B, S13F, S13, ST13	36.6	30.3	29.1	23.8	29.8
B	S1HA, ST1, M1, M1C, MT1, MT1C, MT1S, M5, MT5, ST3, ST4, S15, ST15, MT15	34.2	28.1	26.0	20.1	28.3
C	S6, ST6, S1CH, M2, MT2, S2, S2F, ST2, MH1, MH1C, M4, MT4	30.7	17.6	19.3	17.2	18.4

Block 3

Site index estimates for existing managed, existing unmanaged and future stands were derived based on valves provided in *Site Index Estimates by Site Series for Coniferous Tree Species in British Columbia* – 1997. Using the ecosystem classification available for the block, site index estimates from the SIBEC project were assigned for major commercial tree species. A crosswalk table between WFP's ecosystem classification and MOF site series was developed to facilitate this assignment. Where site index values were not available for certain species a derived value was assigned based on a conversion factor. Area summaries and assigned site indices by ecosystem are outlined in Table 41 and were sorted based on the ecologically appropriate species site index (highlighted). Based on this summary ecosystems were then divided into productivity groups to allow for analysis unit grouping. Table 42 shows the weighted average site index by productivity group.

Table 41 – Ecosystem and Estimated Site Index – Block 3

Ecosystem	THLB (ha)	SI F	SI H	SI B	SI C/Yc	SI S
S3B	4.0	35.0	31.3	26.2	21.2	32.8
S3	103.0	35.0	31.3	26.2	21.2	32.8
S13	52.8	35.0	30.4	26.2	21.2	29.2
M3C	10.8	37.0	30.0	28.8	18.8	29.3
M3	109.9	37.0	30.0	28.8	18.8	29.3
S1HA	2493.6	34.8	29.0	26.7	22.4	28.9
M1C	27.4	35.0	28.9	26.8	17.7	28.2
M1	4590.0	35.0	28.9	26.8	17.7	28.2
S15	39.5	33.5	26.4	21.4	22.0	23.7
S6	8.5	30.9	23.8	23.2	19.6	34.0
S1CH	182.1	20.0	20.0	19.4	22.4	18.3
M2	669.2	31.0	18.4	23.8	16.8	17.7
S2F	341.3	31.1	17.2	23.8	16.8	17.1
S2	147.1	31.1	17.2	23.8	16.8	17.1
M4	310.5		29.8		18.6	
MH1	353.8		16.0	12.0		

Table 42 –Site Index Estimates– Block 3

Productivity Group	Ecosystems	F	H	B	C/Yc	S
A	S3B, S3, S13, M3C, M3	35.9	30.6	27.3	20.2	30.6
B	S1HA, M1C, M1	35.0	28.9	26.8	19.3	28.4
C	S15, S6, S1CH, M2, S2F, S2, MH1, M4	29.7	19.7	20.9	17.9	17.8

Block 5

In the original inventory, site classes (GMPL) were assigned to all forested polygons. Site Class L is considered unproductive and inoperable. To determine the site index for stands in Block 5 second growth permanent sample information is used and supplemented with information from a coastal site class table (source: Site Index – A Primer, MOF 1999).

In the mid 1990s, about 50 growth and yield permanent sample plots (PSP) were established in second growth of Block 5. Most of the second growth had been classified site class "M" in the original inventory so the top heights were computed for each of the "M" site PSPs and used to derive an average SI_{50} for common species occurring in second growth site class "M". This data is summarized below.

Table 43 – Average SI_{50} for PSP – Block 5

Leading Species	Site Class M
Ba	27.7
Cw	20.2
Hw	27.2
Ss	32.4
Yc	20.2
Dr	25.4

These plots also were BEC classified in the field. As an additional check the CWHvm1-01 or mesic site series, which might be considered representative of the "M" site class was summarized (N=8) for Hw and Ba for comparative purposes. Resultant SI_{50} for Hw and Ba were 26.1m (24.7 to 28.0) and 26.2m (21.8 to 33.4) respectively.

Using height shifts (Table 44) suggested by the site class table the mean site index values calculated for the "M" site are adjusted to create site index estimates for Good and Poor site types. The resulting site index estimates used for modelling are outline in Table 45.

Table 44 – SI_{50} Coastal Site Class and shifts from Medium

Leading Species	Site Class			Adjustment		
	G	M	P	G	M	P
Ba	29	23	14	6	0	-9
Cw	29	23	15	6	0	-8
Hw	28	22	14	6	0	-8
Ss	28	21	11	7	0	-10
Yc	29	23	15	6	0	-8

Table 45 – Site Index Estimates – Block 5

Productivity Group	Site Class	H	B	C	Yc	S	D
A	Good	33.2	33.7	26.2	26.2	39.4	
B	Medium[10]	27.2	27.7	20.2	20.2	32.4	25.4
C	Poor	19.2	18.7	12.2	12.2	22.4	

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[10] Table 43

Block 6

Site index estimates for existing immature natural stands were calculated from the inventory database based on the primary tree layer leading species.

Site index estimates for existing managed stands and future stands were estimated by calculating a site index value for all major species for each existing immature natural stand in the inventory. Where the site index couldn't be calculated directly from forest attributes a site index conversion equation was used. Area summaries and weighted average site indices by ecosystem were calculated and sorted based on the ecologically appropriate species site index. Based on this summary ecosystems were divided into productivity groups. Table 46 outlines the ecosystem and estimated site index by species, where Table 47 shows the weighted average site index by productivity group.

Table 46 – Ecosystem and Estimated Site Index – Block 6

	F		H		B		C/Yc		S		D	
Ecosystem	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**	**SI**	**Area**
Q5	34.8	1048.6	30.6	1151.9	28.2	783.7	25.5	771.5	33.4	1045.2	29.8	564.5
Q6	32.8	35.1	28.8	40.2	26.8	25.8	24.2	25.8	30.8	35.1	27.5	26.5
Q1	32.3	3160.2	28.8	3119.6	26.8	2915.8	24.2	2763.8	30.1	3123.3	28.7	369.4
Q1C	31.5	615.4	28.1	632.5	26.3	558.0	23.8	537.8	29.6	611.3	29.3	156.2
Q12	31.2	73.4	27.6	74.0	25.9	70.8	23.7	57.8	29.3	71.2	24.9	9.5
Q2	29.4	107.0	26.1	108.5	24.9	106.0	22.6	87.4	27.8	107.0	27.1	10.3
M1C	30.0	1.3	26.6	1.3	25.2	1.3	22.9	1.3	33.1	1.3		
M7	27.6	3.6	24.5	3.6	23.7	3.6	21.7	3.6	25.5	3.6	24.9	3.1
M3	25.1	0.0	22.1	0.0	22.1	0.0	20.4	0.0	22.7	0.0		
M1	23.2	155.5	20.5	155.5	20.9	155.2	19.5	149.8	21.6	153.0	26.9	0.3
H5	21.4	4.3	22.2	9.9	19.4	2.4	18.4	3.1	20.1	4.1	28.2	8.0
H1	21.4	7.2	18.9	7.2	20.2	6.8	18.0	6.0	19.8	6.9	38.1	0.2
MH1	9.1	4.0	18.4	0.6	19.5	0.6	18.2	0.6	4.8	4.0		

Table 47 –Site Index Estimates– Block 6

Productivity Group	Ecosystems	F	H	B	C/Yc	S	D
A	Q5	34.8	30.6	28.2	25.5	33.4	29.8
B	Q1, Q1C, Q12, Q6	32.1	28.7	26.7	24.2	30.0	28.7
C	Q2, M1, M1C, M3, M7, H1, H5, MH1	25.4	22.7	22.5	20.6	23.8	27.3

8.3 Utilization Levels

The utilization level is 12.5 cm for all existing stands less than 41 years old and for future stands. Stump height for these stands is 30 cm and top diameter inside bark (DIB) is 10 cm. Utilization level for immature and mature conifer stands is 17.5 cm, with stump height of 30 cm and top DIB of 15 cm (Table 48).

Table 48 – Utilization levels

Species Group	Utilization			Firmwood Standard
	Minimum DBH (cm)	Stump Height (cm)	Top DIB (cm)	
Managed Conifers (0 - 40 yrs, future)	12.5	30.0	10.0	50%
Immature (41 – 140 yrs)	17.5	30.0	15.0	50%
Mature (141+ yrs)	17.5	30.0	15.0	50%

8.4 Decay, Waste, and Breakage

The default decay, waste, and breakage factors for TFL 25 within VDYP 6.6d were used for existing natural stands.

8.5 Operational Adjustment Factors

Where no better information was available an OAF1 of 15% and OAF2 of 5% were used for yield tables generated with TIPSY.

In Blocks 1 and 6 VRI data for land cover classification (%) was analyzed. This analysis suggested that in existing stands net downs for unmapped non-treed areas such as ponds, swamps, rock outcrops, brush patches, and slides that were visible in aerial photographs - but for practical purposes too small to delineate - accounted for less than 1% in both Blocks 1 and 6. Based on the assumption that gaps in tree cover of this nature account for 5-10 points out of the 15% default value, the analysis suggests that the default % could be reduced by 4-9% for these blocks. Hence OAF1 was set conservatively at 11%.

Based on instructions from the Ministry of Forests an OAF2 of 12.7% was applied to CWHxm2 ecosystems with a leading Fd component, to account for *Phellinus* root rot. As this variant was part of larger productivity groups, an area-weighted OAF2 adjustment of 5.6%, 9.8% and 5.7% was calculated and applied to analysis units F-A-2M, F-B-2M and F-C-2M in Block 1.

8.6 Volume Deductions

Volume deductions will be used to model the retention of Wildlife Tree Patches in the THLB, to allow for evolving riparian management and retention practices, incorporate CMT that are not included in WTP, and to include a precautionary buffer. These reductions are summarized in Table 49 and will occur during modelling when individual stands are harvested. Yield curves are unmodified.

Table 49 – Volume Deductions

Block	WTP	Riparian Management/ Dispersed retention	Buffer	Total
1	3.25	1.0	0.75	5.0
2	3.25	1.0	0.75	5.0
3	3.25	1.0	0.75	5.0
5	3.25	3.0[11]	2.25[1]	8.5
6	3.25	1.0	0.75	5.0

In the event of area-based determinations, a post-simulation adjustment for these volume net downs will be necessary. Assuming the volume net downs remain <10% in total, the area harvest can be reduced by the same percentage as the total volume net down percentage without significant distortion of the annual area harvest calculation.

Deciduous volumes existing in pure or mixed stands have not been removed from the volume calculations. Standing volumes are generally a small proportion of total volume. In any case, alder saw logs are commonly utilized in Block 1, and interest in alder harvest elsewhere is on the rise suggesting increased utilization elsewhere in the TFL is likely.

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[11] Tripled to reflect uncertainty as discussed in Section 6.8

8.7 Yield Tables For Unmanaged Stands

8.7.1 Natural Immature Stand Volumes

For existing natural immature stands, an analysis unit was assigned to every forest cover polygon based on criteria defined in Section 7.3. For Blocks 1 and 6 the inventory site index was used to generate the yield tables. For Blocks 2, 3 and 5 the ecosystem based site index determined in Section 8.2 was used. Yield tables were first calculated for each individual polygon using VDYP 6.6d4. An area weighted average yield table was then calculated for the analysis unit. The average yield curves for each Block are shown below.

Table 50 – Unmanaged Stands Analysis Units by Area

Block 1

AUnit	THLB Area
B-A-2U	11.2
B-C-2U	12.3
C-A-2U	87.9
C-B-2U	90.2
C-C-2U	243.4
D-A-2U	285.0
D-B-2U	335.0
D-C-2U	26.6
F-A-2U	1157.7
F-B-2U	2099.9
F-C-2U	808.3
H-A-2U	1923.9
H-B-2U	794.5
H-C-2U	747.2
P-B-2U	75.6
P-C-2U	151.0
S-A-2U	33.7
S-B-2U	3.9

Block 2

AUnit	THLB Area
B-A-2U	37.0
B-B-2U	785.2
B-C-2U	7.8
C-A-2U	48.9
C-B-2U	176.0
C-C-2U	320.9
D-A-2U	434.8
D-B-2U	609.0
D-C-2U	19.4
F-A-2U	640.5
F-B-2U	769.2
F-C-2U	159.1
H-A-2U	1645.8
H-B-2U	13650.4
H-C-2U	1875.5
S-B-2U	37.4

Block 3

AUnit	THLB Area
B-A-2U	13.1
B-B-2U	452.8
B-C-2U	58.9
C-B-2U	8.8
C-C-2U	28.2
D-A-2U	23.1
D-B-2U	88.2
F-B-2U	16.5
F-C-2U	1.5
H-A-2U	14.9
H-B-2U	1769.8
H-C-2U	801.2

Block 5

AUnit	THLB Area
B-B-2U	71.1
C-B-2U	16.2
C-C-2U	2.7
D-A-2U	64.7
D-B-2U	774.6
D-C-2U	7.1
H-A-2U	29.0
H-B-2U	1521.6
H-C-2U	95.3
S-A-2U	4.5
S-B-2U	8.7
S-C-2U	12.8

Block 6

AUnit	THLB Area
C-A-2U	6.6
C-B-2U	11.1
C-C-2U	3.3
D-A-2U	519.9
D-B-2U	481.8
D-C-2U	12.5
H-A-2U	244.3
H-B-2U	2035.3
H-C-2U	206.7
S-A-2U	374.3
S-B-2U	1661.9
S-C-2U	66.6
Y-B-2U	0.3
Y-C-2U	0.5

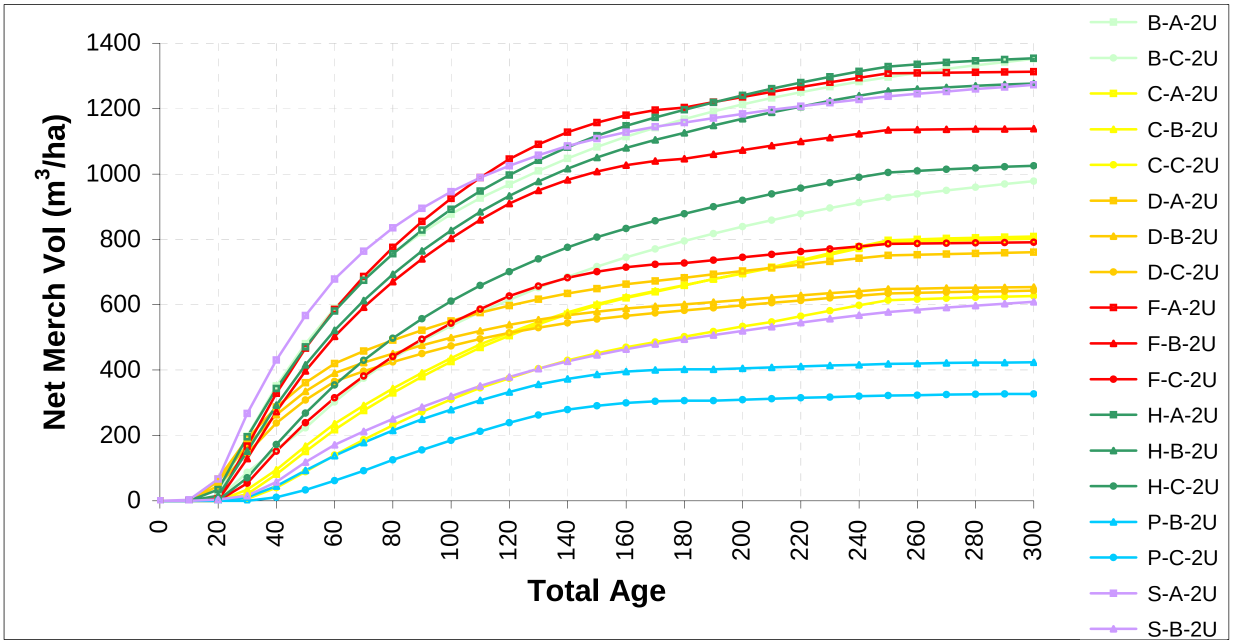

Figure 2 – Yield curves for existing analysis units, >40 and <141 years – Block 1

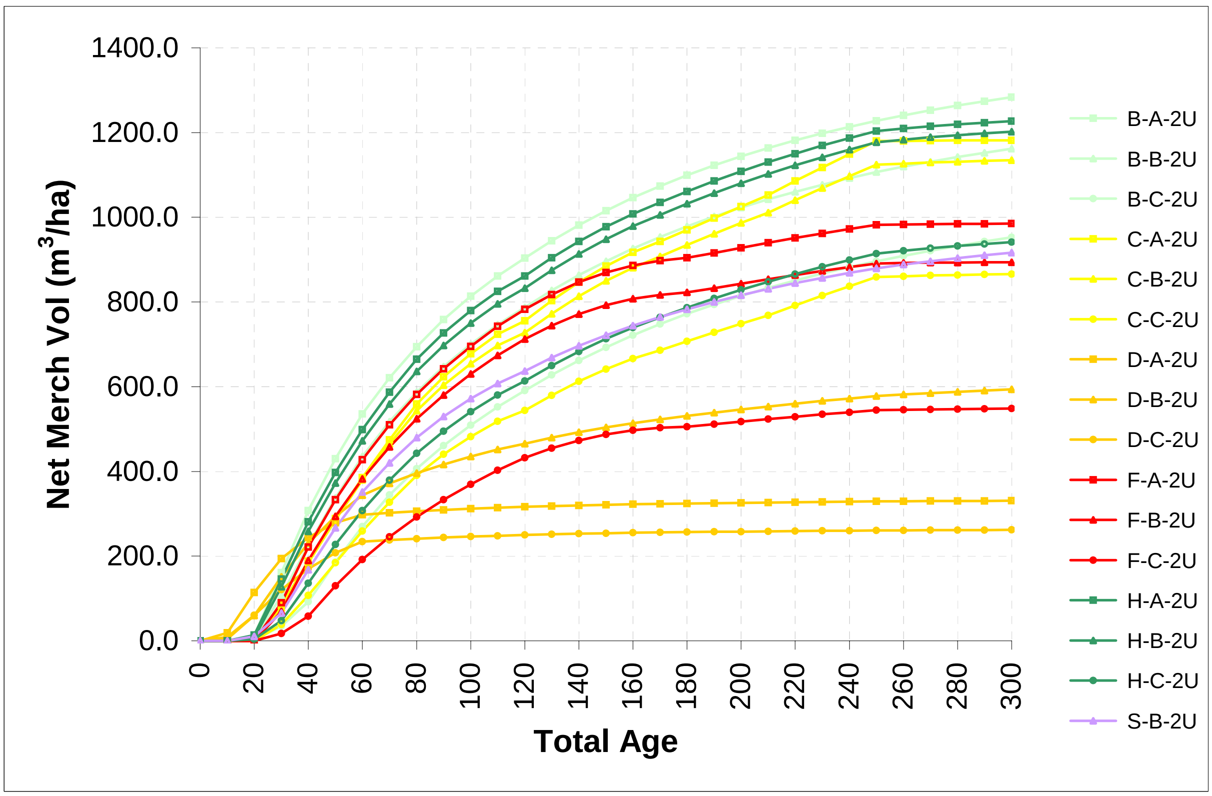

Figure 3 – Yield curves for existing analysis units, >40 and <141years – Block 2

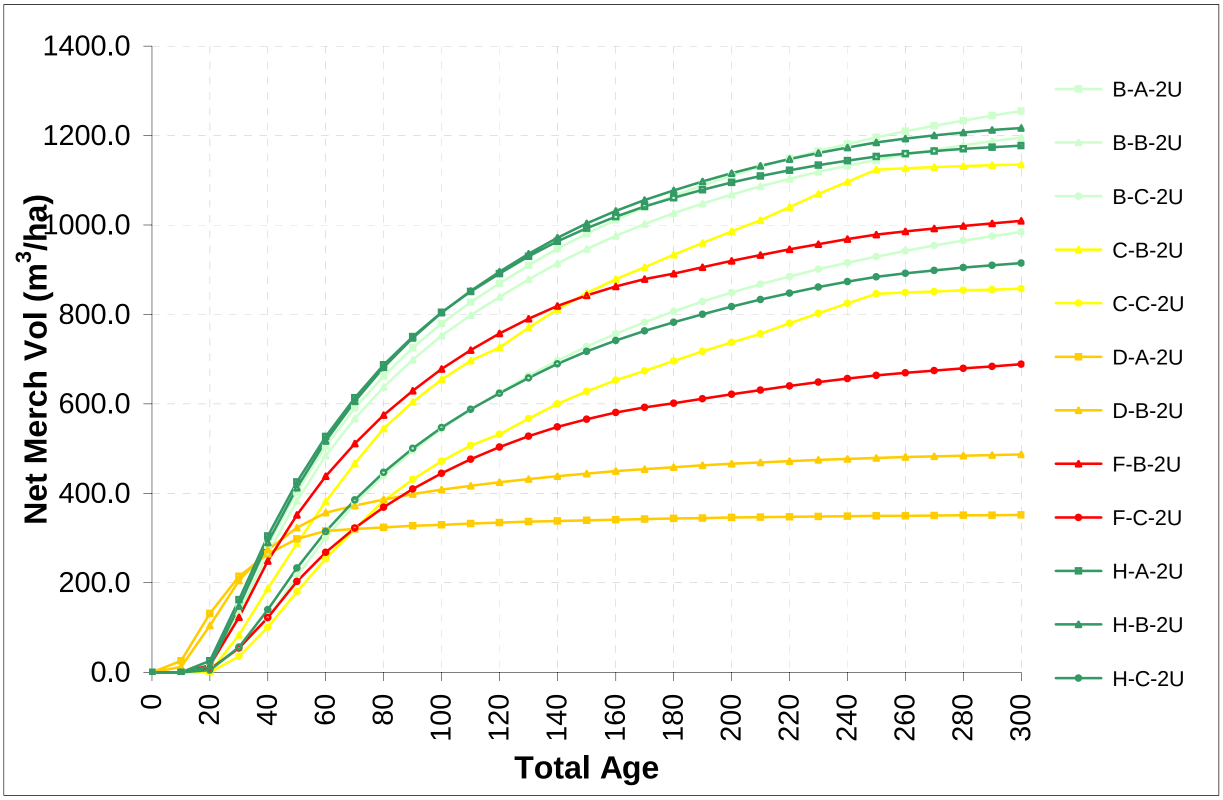

Figure 4 – Yield curves for existing analysis units, >40 and <141years – Block 3

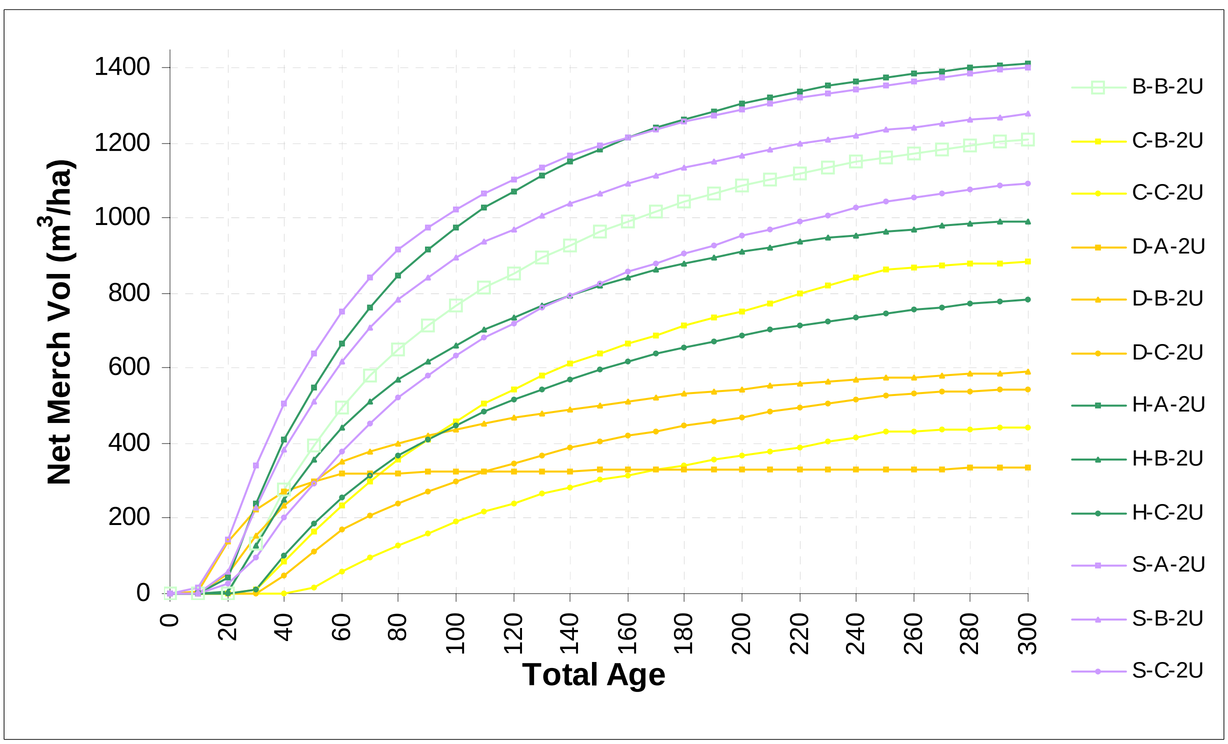

Figure 5 – Yield curves for existing analysis units, >40 and <141 years – Block 5

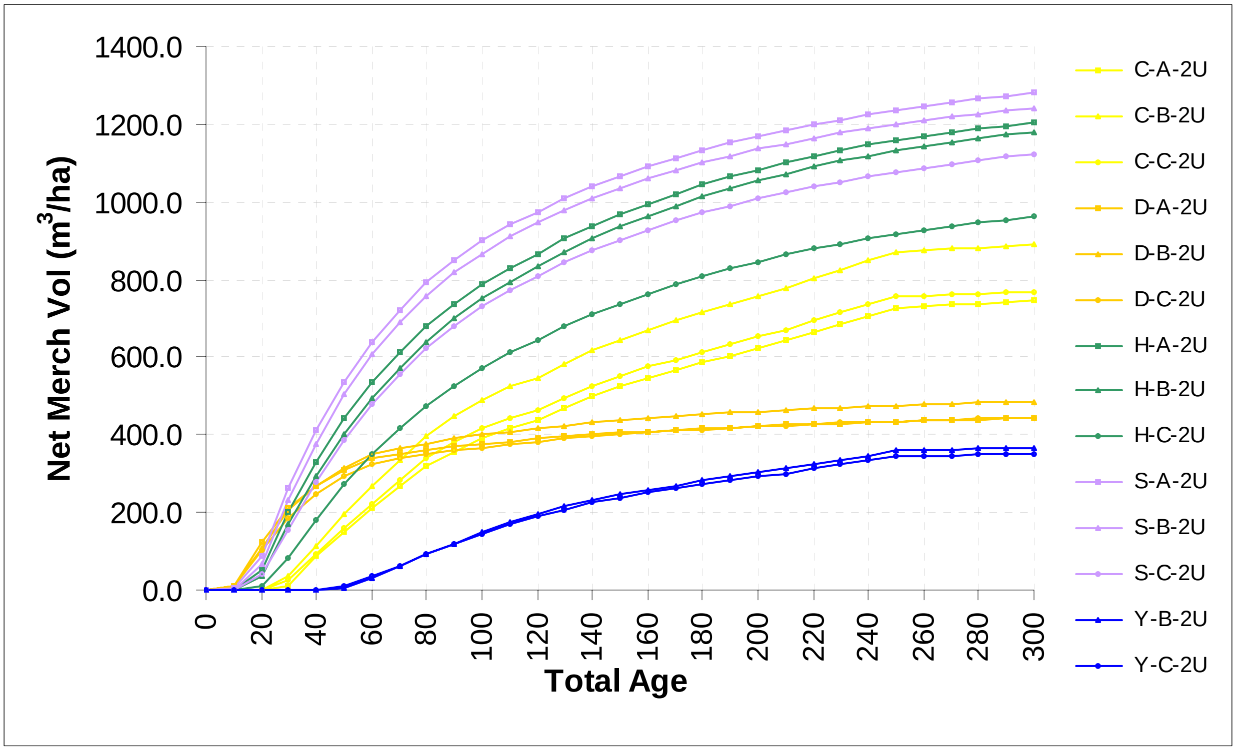

Figure 6 – Yield curves for existing analysis units, >40 and <141 years – Block 6

8.7.2 Existing Mature Stand Volumes

For Blocks 1 and 6 the timber volume in existing mature stands (those ≥ 140 years) was determined for each analysis unit by using area weighted average volumes as calculated from VDYP for these stands. For Blocks 2, 3 and 5 volumes were assigned based on area weighted average volume line (AVL) derived from inventory plots located in these stands.

Table 51 – Existing mature volume. – Block 1

Analysis Unit	THLB Area	Weighted Avg Volume/ha	Analysis Unit Volume
B-A-OG	71.0	838.0	59,456.8
B-B-OG	3.4	637.2	2,134.6
B-C-OG	57.8	696.8	40,270.2
C-A-OG	455.1	803.1	365,511.4
C-B-OG	57.1	651.4	37,197.6
C-C-OG	844.3	562.6	474,968.6
F-A-OG	8.4	370.8	3,107.5
F-B-OG	45.3	478.9	21,670.4
F-C-OG	47.0	407.0	19,130.6
H-A-OG	724.8	829.0	600,873.3
H-B-OG	112.2	645.8	72,461.4
H-C-OG	1949.7	552.7	1,077,552.9
S-A-OG	2.8	1062.0	2,973.6
Y-A-OG	2.0	413.8	815.1
Y-B-OG	6.0	516.4	3,083.2
Y-C-OG	2010.1	372.5	748,705.8

Table 52 – Existing mature volume. – Block 2

Analysis Unit	THLB Area	Weighted Avg Volume/ha	Analysis Unit Volume
B-A-OG	145.2	741.2	107,652.0
B-B-OG	1187.7	730.6	867,647.9
B-C-OG	216.0	662.2	143,042.9
C-A-OG	396.0	873.1	345,737.5
C-B-OG	1956.5	800.2	1,565,612.0
C-C-OG	816.8	695.3	567,941.8
F-A-OG	11.0	1055.1	11,627.1
F-B-OG	30.6	1209.7	37,004.9
F-C-OG	10.9	1147.5	12,450.0
H-A-OG	130.9	783.1	102,474.2
H-B-OG	976.9	784.9	766,780.9
H-C-OG	221.1	740.3	163,694.8
S-A-OG	5.4	1062.2	5,704.0
S-B-OG	51.0	947.9	48,348.5
Y-A-OG	4.2	513.6	2,131.5
Y-B-OG	104.1	609.4	63,422.7
Y-C-OG	175.4	519.3	91,101.9

Table 53 – Existing mature volume. – Block 3

Analysis Unit	THLB Area	Weighted Avg Volume/ha	Analysis Unit Volume
B-A-OG	12.2	917.5	11,166.2
B-B-OG	120.4	908.2	109,330.8
B-C-OG	21.9	904.7	19,795.8
C-A-OG	25.8	874.9	22,592.9
C-B-OG	984.8	887.2	873,762.1
C-C-OG	575.7	772.7	444,821.0
F-B-OG	4.1	1117.5	4,525.8
F-C-OG	5.5	710.5	3,886.3
H-A-OG	79.4	908.7	72,184.1
H-B-OG	2577.8	873.9	2,252,678.5
H-C-OG	558.1	784.4	437,732.6
Y-A-OG	5.7	568.5	3,263.0
Y-B-OG	478.3	632.7	302,597.9
Y-C-OG	403.9	565.2	228,292.5

Table 54 – Existing mature volume. – Block 5

Analysis Unit	THLB Area	Weighted Avg Volume/ha	Analysis Unit Volume
B-A-OG	3685.7	796.3	2,935,056.2
B-B-OG	6971.9	630.8	4,397,924.9
B-C-OG	25.3	399.3	10,102.3
C-A-OG	144.7	777.7	112,543.3
C-B-OG	14058.5	702.4	9,874,246.9
C-C-OG	11038.1	458.1	5,056,971.3
H-A-OG	1484.1	729.1	1,082,016.4
H-B-OG	15714.3	615.8	9,676,888.0
H-C-OG	887.9	438.2	389,068.7
S-A-OG	1228.8	909.0	1,116,997.5
S-B-OG	53.2	678.1	36,088.5
S-C-OG	1.7	399.3	682.8
Y-B-OG	140.1	678.3	95,023.0
Y-C-OG	414.8	423.1	175,506.1

Table 55 – Existing mature volume. – Block 6

Analysis Unit	THLB Area	Weighted Avg Volume/ha	Analysis Unit Volume
C-A-OG	242.9	629.7	152,946.6
C-B-OG	1501.3	566.8	850,991.2
C-C-OG	1272.3	473.6	602,623.8
D-B-OG	1.0	134.2	135.5
H-A-OG	292.6	730.4	213,697.3
H-B-OG	1779.0	652.4	1,160,602.7
H-C-OG	884.4	589.8	521,608.0
P-C-OG	9.0	220.3	1,991.3
S-A-OG	157.1	920.2	144,558.8
S-B-OG	167.2	923.4	154,395.0
S-C-OG	147.4	779.9	114,950.3
Y-A-OG	1.7	390.0	647.4
Y-B-OG	68.1	394.7	26,863.7
Y-C-OG	252.0	407.6	102,728.9

Table 56 – Existing mature volume. – All Blocks

Block	THLB Area	Weighted Avg Volume/ha	Analysis Unit Volume
1	6,396.8	551.8	3,529,754.2
2	6,439.6	761.3	4,902,467.5
3	5,853.5	817.7	4,786,407.0
5	55,849.2	626.0	34,961,599.2
6	6,776.0	597.5	4,048,660.0
Total	81,315.1	642.3	52,228,887.9

8.8 Yield Tables for Managed Stands

8.8.1 Existing Managed Stand Volumes

For existing managed stands, all stands were assumed to be plantations, species composition was taken from the inventory database, establishment density was assumed to be 1000 stems per hectare, which is typical planting density and 10% higher than free growing standards. The site index derived in Section 8.2 was used. Yield tables were first calculated for each individual polygon using Batch Tipsy 3.0. An area weighted average yield table was then calculated for each analysis unit. No other treatment was used in existing managed stands. Although juvenile spacing has been carried out in most Blocks, it is assumed that such treatments have been primarily a cleaning of natural infill and modelling based on planting density is appropriate. Fertilization has been sporadic in some blocks but the volume gain has not been explicitly modelled for past treatments. Some pruning has been done but growth impacts are assumed insignificant.

Table 57 – Managed Stand Analysis Units by Area[12]

Block 1

AUnit	THLB Area
B-A-2M	151.2
B-B-2M	9.9
B-C-2M	250.2
C-A-2M	249.5
C-B-2M	5.5
C-C-2M	692.8
D-A-2M	98.5
D-B-2M	32.7
D-C-2M	16.0
F-A-2M	1748.0
F-B-2M	1173.7
F-C-2M	2237.4
H-A-2M	652.8
H-B-2M	147.4
H-C-2M	1420.2
P-B-2M	1.3
P-C-2M	2.5
S-A-2M	18.8
S-C-2M	4.3
Y-A-2M	26.8
Y-B-2M	2.9
Y-C-2M	779.1

Block 2

AUnit	THLB Area
B-A-2M	15.5
B-B-2M	360.9
B-C-2M	21.0
C-A-2M	46.7
C-B-2M	422.5
C-C-2M	94.5
D-A-2M	54.1
D-B-2M	99.3
D-C-2M	1.6
F-A-2M	85.1
F-B-2M	325.8
F-C-2M	44.1
H-A-2M	382.3
H-B-2M	2438.7
H-C-2M	239.6
S-A-2M	6.2
S-B-2M	6.4
Y-A-2M	10.4
Y-B-2M	199.4
Y-C-2M	91.1

Block 3

AUnit	THLB Area
B-A-2M	12.3
B-B-2M	410.2
B-C-2M	15.7
C-A-2M	4.3
C-B-2M	322.2
C-C-2M	108.2
F-A-2M	7.5
F-B-2M	98.6
F-C-2M	30.2
H-A-2M	123.3
H-B-2M	1633.0
H-C-2M	150.4
Y-B-2M	108.1
Y-C-2M	38.8

Block 5

AUnit	THLB Area
B-A-2M	61.5
B-B-2M	276.6
B-C-2M	22.6
C-A-2M	146.1
C-B-2M	742.2
C-C-2M	12.0
D-B-2M	128.1
H-A-2M	41.8
H-B-2M	3272.7
H-C-2M	110.5
S-A-2M	127.0
S-B-2M	351.0
S-C-2M	8.0
Y-B-2M	23.6
Y-C-2M	9.4

Block 6

AUnit	THLB Area
C-A-2M	0.6
C-B-2M	12.4
C-C-2M	66.4
D-A-2M	208.2
D-B-2M	631.4
D-C-2M	59.9
H-A-2M	307.4
H-B-2M	4357.6
H-C-2M	1045.3
S-A-2M	508.5
S-B-2M	4535.6
S-C-2M	750.6
Y-C-2M	24.5

1.1

[12] Yield curves that exceed TASS/Tipsy data ranges at older ages have had older data extrapolated from the last acceptable value according to the following formula: $Vol_{Age+10} = Vol_{Age}+(Vol_{Age}-Vol_{Age-10})/2$

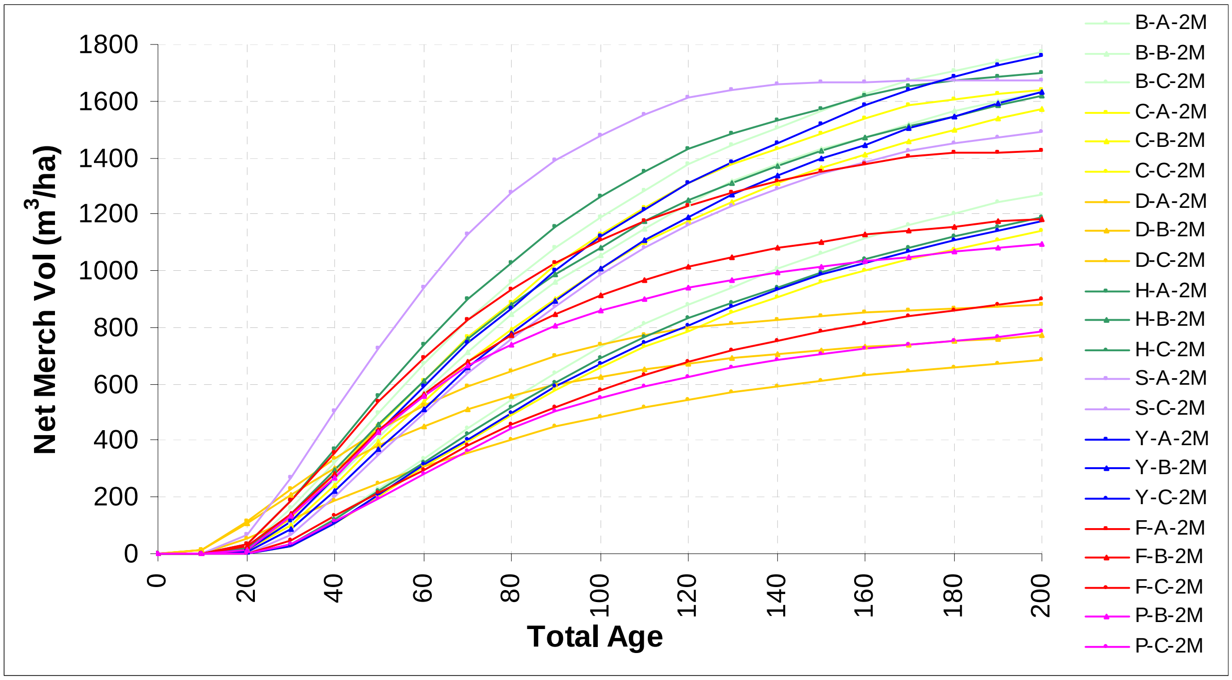

Figure 7 – Yield curves for existing analysis units, <41 years – Block 1

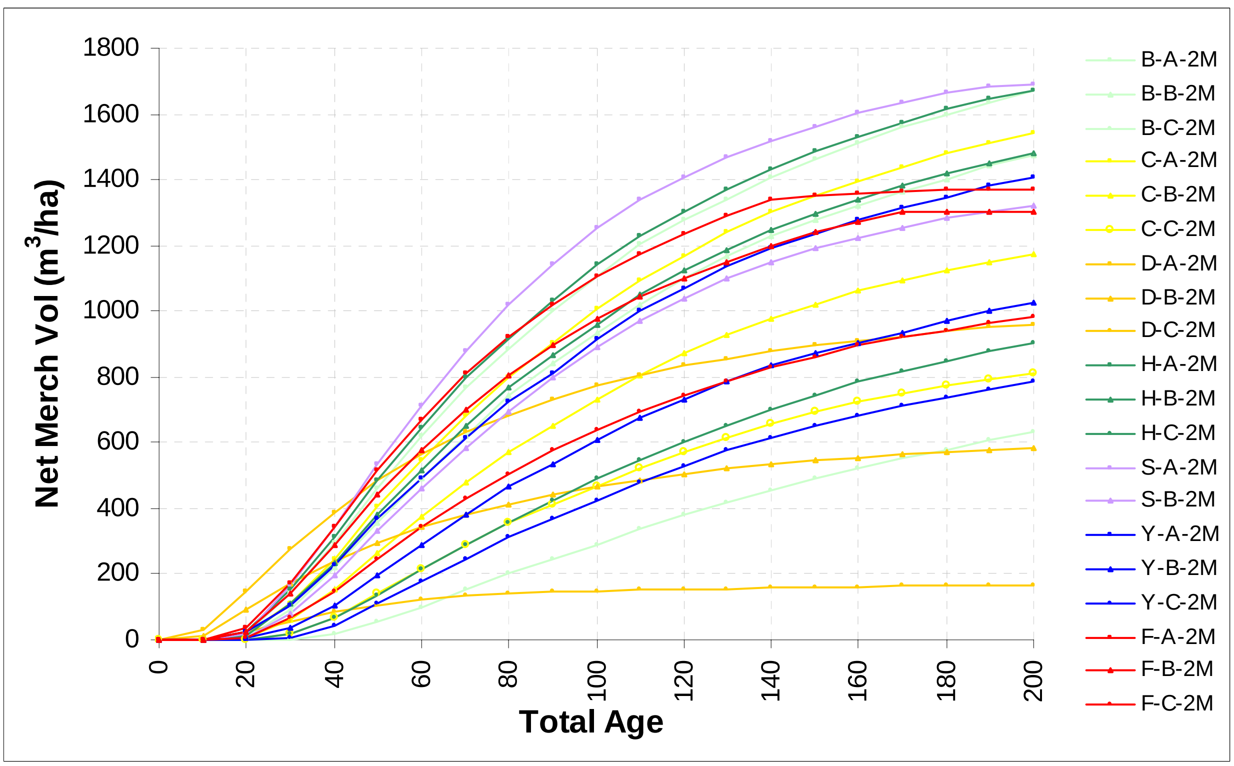

Figure 8 – Yield curves for existing analysis units, <41 years – Block 2

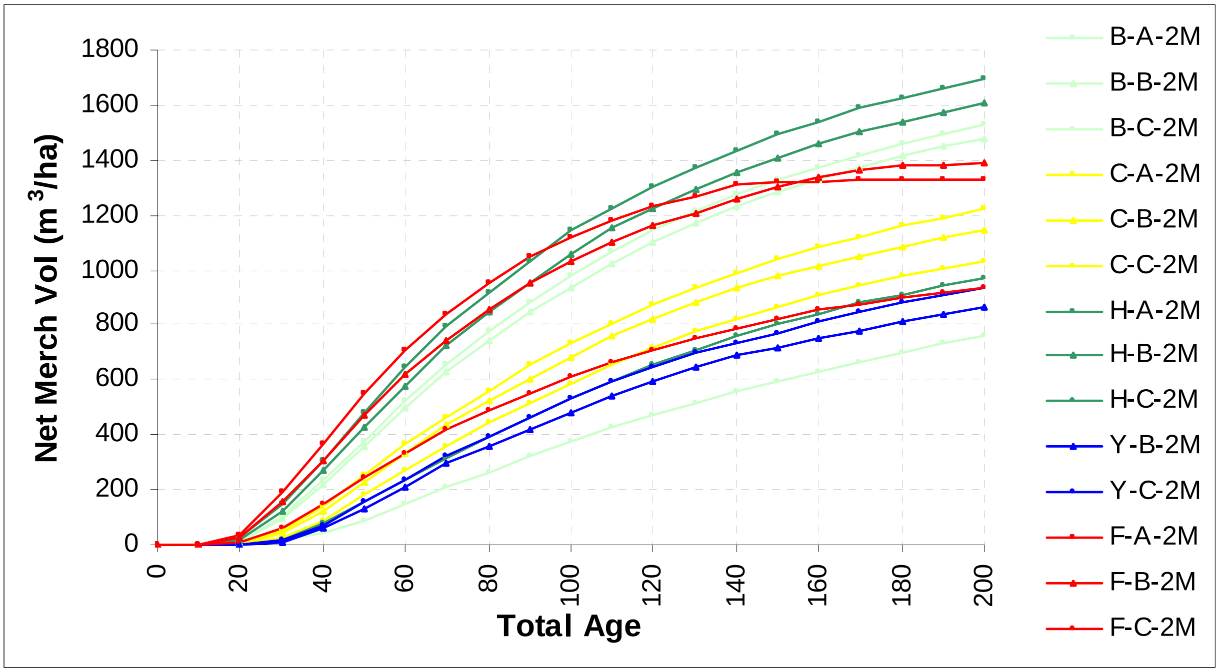

Figure 9 – Yield curves for existing analysis units, <41 years – Block 3

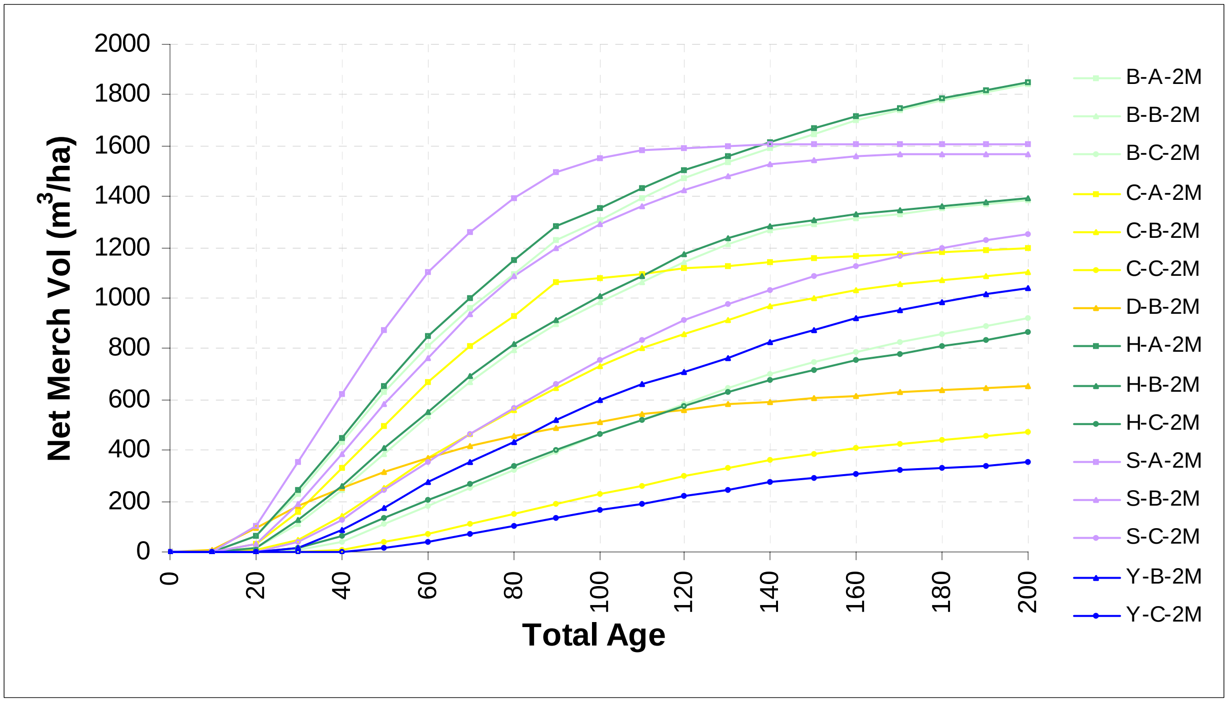

Figure 10 – Yield curves for existing analysis units, <41 years – Block 5

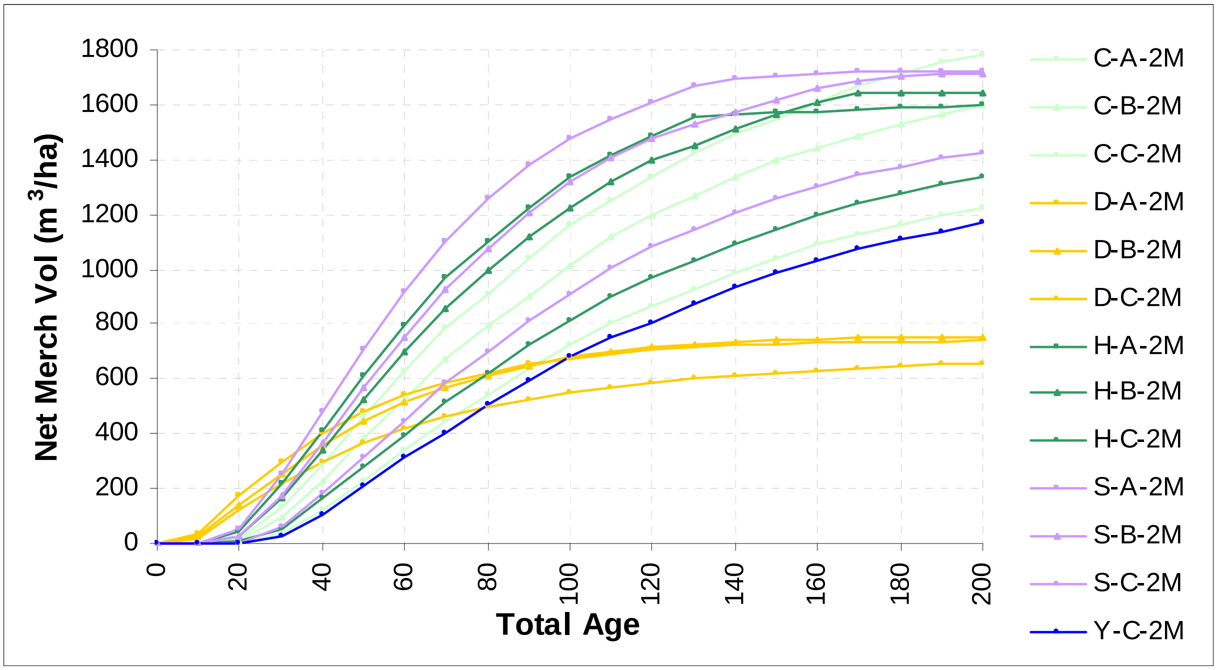

Figure 11 – Yield curves for existing analysis units, <41 years – Block 6

8.8.2 Future Stand Volumes

For future stands, a series of silviculture strategies were derived based on what is currently being done on the TFL and what Western Forest Products intends to do in the future. These silviculture strategies were based on ecological units. Input information is given in Table 58Table 58. Utilization limit was 12.5 cm and regeneration delay is to be applied within the timber supply model. OAF 2 in Block 1 Fir leading analysis units have been adjusted to reflect estimates of Phellinus root rot (see Section 8.5)

Fertilization is modelled for Block 1 only. A late rotation (55 year old) fertilization curve for Douglas fir mixed stands on productivity group B sites was developed by first running a pure Douglas Fir stand in Tipsy using the default fertilization gain of 30m^3/ha, calculating the net gain by comparing it to a unfertilized pure fir stand and using this net gain to adjust the untreated fir mixed stand defined for analysis unit F-B-P. Fertilization of Cedar leading stands on productivity group C sites is modelled by assuming a shift in the productivity to the next highest group.

Table 58 – Silviculture strategies for future stands[13]

Block	Aunit	Ecosystem	Sp 1	%	SI	Sp 2	%	SI	Sp 3	%	SI	Sp 4	%	SI	Initial Density	Regn	OAF 1	OAF 2	Fert
1	F-A-P	A5	Fd	75	34.9	Cw	20	26.0	Ba	5	28.8				1000	P	11	5.6	
1	S-A-P	S3, S13	Ss	40	34.4	Ba	30	28.8	Cw	20	26.0	Hw	10	31.3	1000	P	11	5	
1	H-A-P	S1HA, M3, S15	Hw	60	31.3	Ba	30	28.8	Cw	5	26.0	Fd	5	34.9	1000	P	11	5	
1	F-B-P_F	A1, A2, L3, L1	Fd	80	32.3	Cw	10	25.0	Hw	10	28.8				1000	P	11	9.8	Yes
1	F-B-P	A1, A2, L3, L1	Fd	80	32.3	Cw	10	25.0	Hw	10	28.8				1000	P	11	9.8	
1	F-C-P	N1, L2, N2, A3	Fd	90	24.1	Cw	10	20.6							1000	P	11	5.7	
1	C-C-P_F	A6, S1CH, S6, M4	Cw	90	25.0	Hw	10	28.8							1300	P	11	5	Yes
1	C-C-P	A6, S1CH, S6, M4	Cw	90	20.6	Hw	10	21.4							1300	P	11	5	
1	H-C-P	S2, M1, M2, MH1	Hw	50	21.4	Cw	25	20.6	Ba	25	23.0				1000	P	11	5	
2	S-A-P	S3, S13	Ss	40	29.8	Ba	30	29.1	Cw	20	23.8	Hw	10	30.3	1000	P	15	5	
2	C-A-P	S5, ST5, ST13	Cw	30	23.8	Ba	30	29.1	HW	30	30.3	Fd	10	36.6	1000	P	15	5	
2	H-B-P	S1HA, ST1, M1, MT5	Hw	50	28.1	Ba	40	26.0	Cw	10	20.1				1000	P	15	5	
2	H-B-N	MT1, MT15, M5	Hw	40	28.1	Ba	40	26.0	Yc	20	20.1				4000	N	15	5	
2	H-C-P	M2, S2, ST2	Hw	50	17.6	Cw	20	17.2	Yc	20	17.2	Fd	10	30.7	1000	P	15	5	
2	H-C-N	MH1, MT2	Hw	40	17.6	Ba	30	19.3	Cw	30	17.2				4000	N	15	5	
3	S-A-P	S3, S13, M3	Ss	40	30.6	Ba	30	27.3	Cw	20	20.2	Hw	10	30.6	1000	P	15	5	
3	H-B-P	S1HA, M1	Hw	50	28.9	Ba	30	26.8	Yc	20	19.3				1000	P	15	5	
3	C-C-P	S15, S6, S1CH	Cw	80	17.9	Hw	20	19.7							1000	P	15	5	
3	Y-C-N	M4, MH1	Yc	60	17.9	Hw	20	19.7	Ba	20	20.9				4000	N	15	5	
3	H-C-P	M2, S2	Hw	60	19.7	Yc	40	17.9							1000	P	15	5	
5	S-A-P	CWH vm1, vh2	Ss	70	39.4	Cw	20	26.2	Ba	10	33.7				1000	P	15	5	
5	H-A-P	CWH vm2	Hw	50	33.2	Yc	40	26.2	Ba	10	33.7				1000	P	15	5	
5	H-B-P	CWH vm1	Hw	70	27.2	Ba	20	27.7	Cw	10	20.2				1000	P	15	5	
5	Y-B-P	CWH vm2	Yc	40	20.2	Hw	40	27.2	Ba	20	27.7				1000	P	15	5	
5	C-B-P	CWH vh2	Cw	50	20.2	Yc	30	20.2	Hw	20	27.2				1000	P	15	5	
5	H-B-X	MH mm1, wh1	Hw	60	27.2	Yc	20	20.2	Ba	20	27.7				1000	P	15	5	
5	H-C-P	CWH vm1	Hw	50	19.2	Cw	40	12.2	Ba	10	18.7				1000	P	15	5	
5	Y-C-P	CWH vm2	Yc	50	12.2	Cw	30	12.2	Hw	20	19.2				1000	P	15	5	
5	C-C-P	CWH vh2	Cw	50	12.2	Yc	50	12.2							1000	P	15	5	
5	H-C-N	MH mm1, wh1	Hw	60	19.2	Yc	40	12.2							4000	N	15	5	
6	S-A-P	Q5	Ss	80	33.4	Hw	10	30.6	Cw	10	25.5				1000	P	11	5	
6	S-B-P	Q1, Q1C, Q6, Q12	Ss	80	30.0	Cw	10	24.2	Hw	10	28.7				1000	P	11	5	
6	S-C-P	Q2, Q3, Q15, H5, M3	Ss	80	23.8	Hw	10	22.7	Cw	10	20.6				1000	P	11	5	
6	H-C-P	M1, M1C, M7, H13, H1	Hw	80	23.8	Yc	20	20.6							1000	P	11	5	

1.1

[13] Yield curves that exceed TASS/Tipsy data ranges at older ages have had older data extrapolated from the last acceptable value according to the following formula: $Vol_{Age+10} = Vol_{Age}+(Vol_{Age}-Vol_{Age-10})/2$

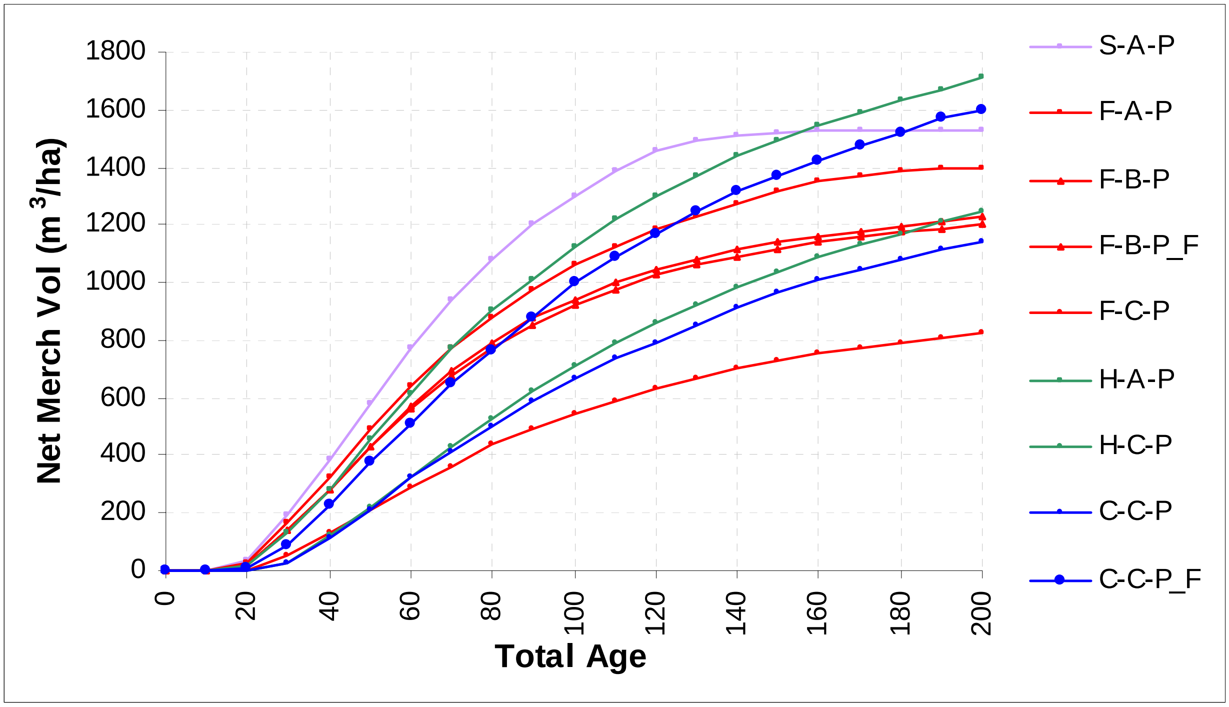

Figure 12 – Yield curves for future stands – Block 1

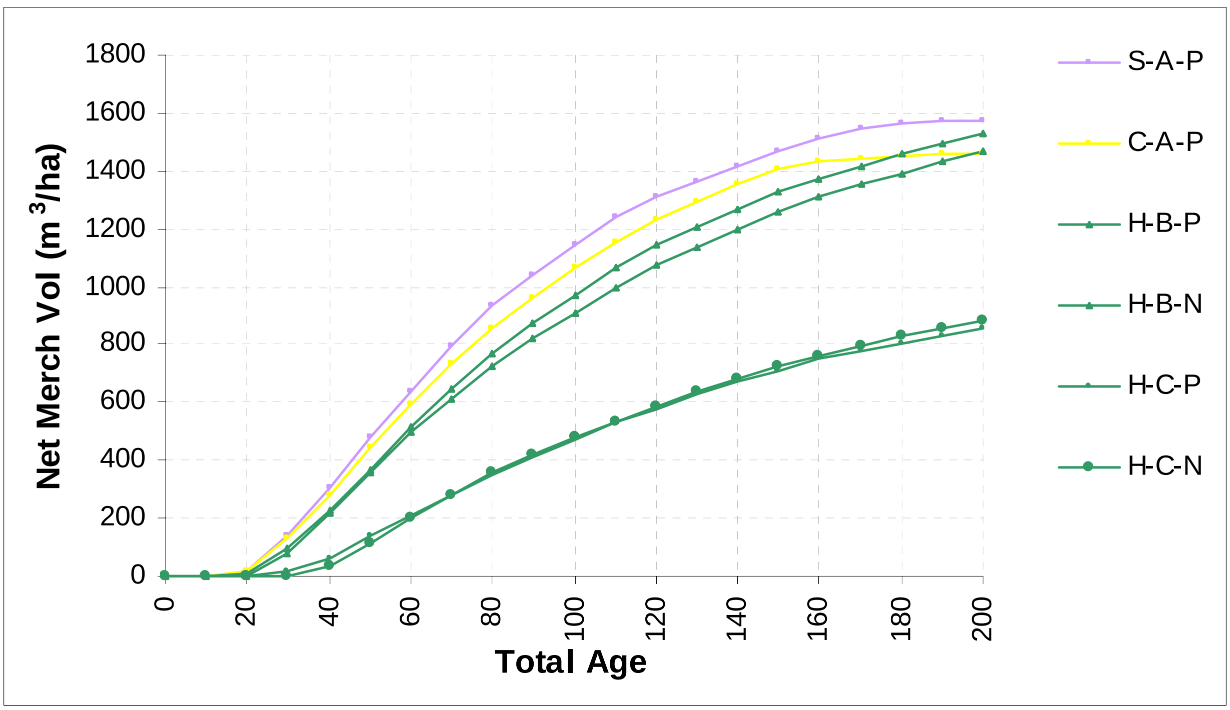

Figure 13 – Yield curves for future stands – Block 2

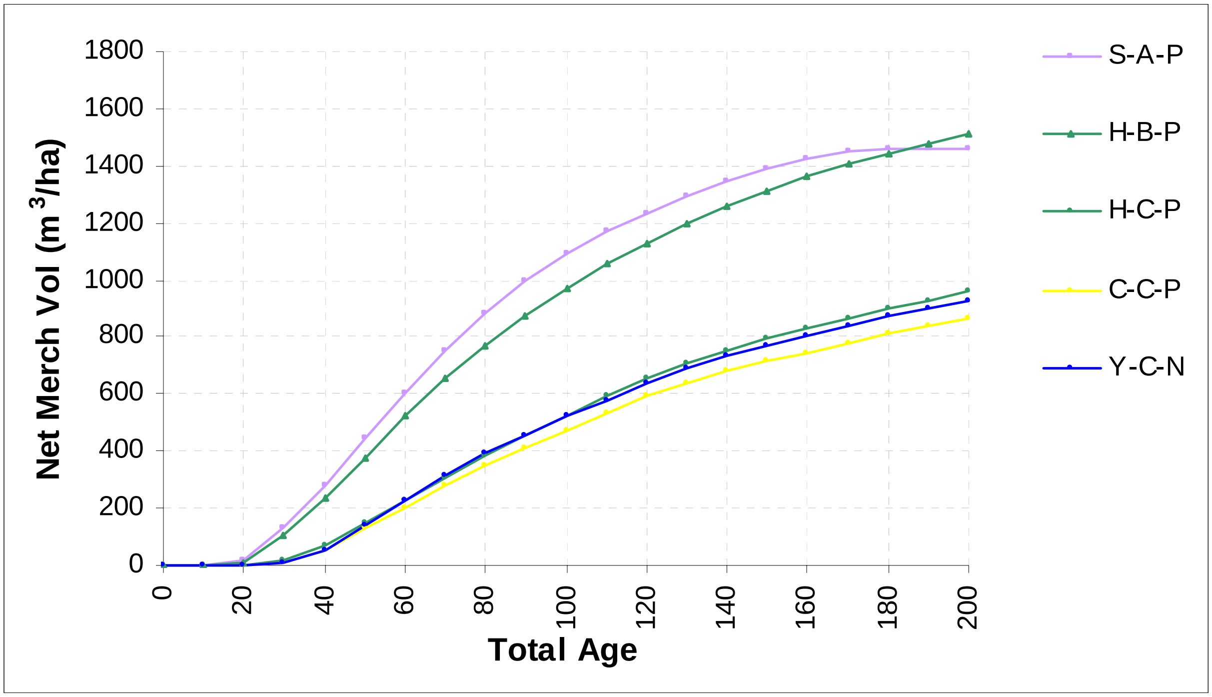

Figure 14 – Yield curves for future stands – Block 3

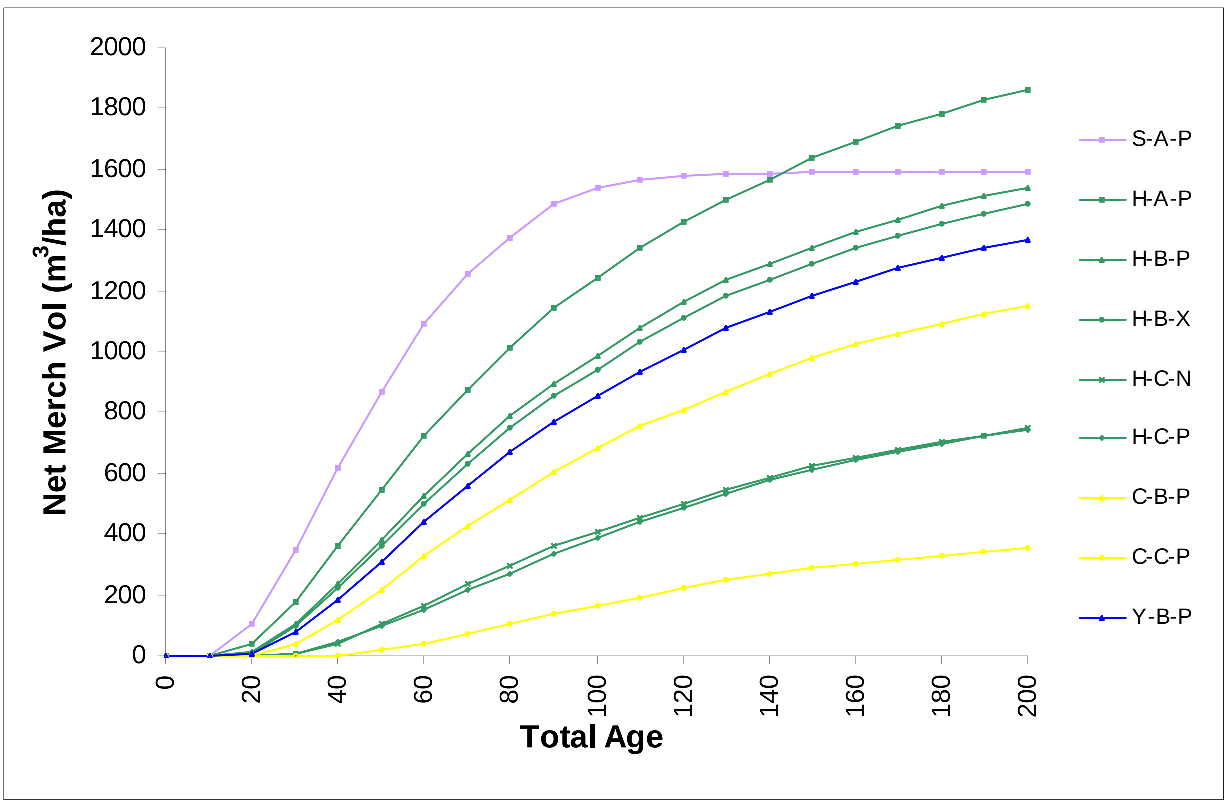

Figure 15 – Yield curves for future stands – Block 5

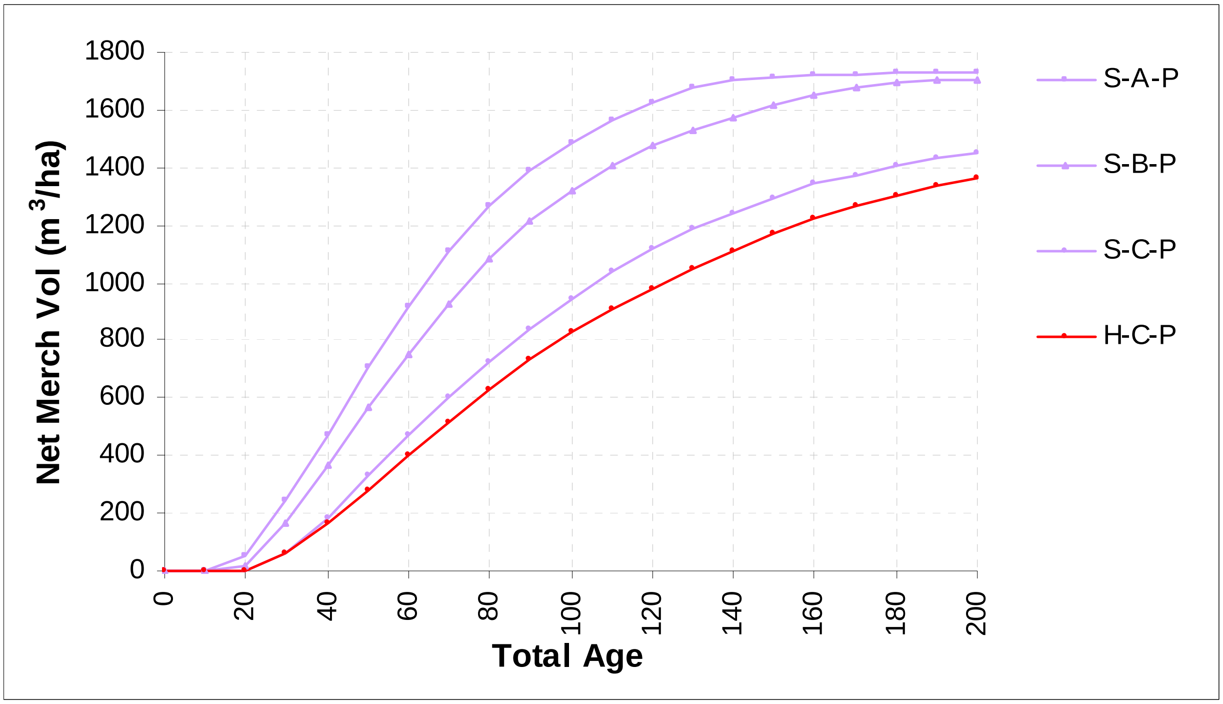

Figure 16 – Yield curves for future stands – Block 6

8.8.3 Genetic gains for future stands

Genetic gains for future stands will be modelled by applying the gains specified in Table 59.

Table 59 – Genetic gain by regeneration era

Species	Elevation (m)	Block 1		Block 2		Block 3		Block 5		Block 6	
		2001-06	2007+	2001-06	2007+	2001-06	2007+	2001-06	2007+	2001-06	2007+
Cw	0 – 600	2%	8%	2%	8%	2%	8%	2%	8%	2%	5%
Fd	0 – 600	10%	12%	10%	12%	10%	12%				
Fd	600 – 1200	6%	6%	6%	6%						
Hw	0 – 600	12%	14%	12%	14%	12%	14%			2%	5%
Hw	600 – 1200	2%	7%	2%	7%	2%	7%				
Ss	0 – 600	2%	5%	2%	5%	2%	5%	2%	5%	2%	7%
Yc	All	8%	18%	8%	18%	8%	18%	8%	18%	8%	18%

8.8.4 Regeneration Delay

The regeneration delay refers to the average time elapsed between harvesting and establishment of new plantations on the TFL. For most sites in the TFL actual regeneration delay is around 2.0 years or better. However, with time-of-planting fertilization, which is current management practice on most sites, an “effective” one-year reduction of regeneration delay is appropriate and conservative. For modelling proposes a 1 year regeneration delay will be used for all planted stands and a 3 year regeneration delay will be assigned to naturally established stands. Regeneration delay will be applied in the timber supply model, not in the TIPSY yield model.

8.8.5 Regeneration Assumptions

The assignment of future regeneration analysis units is based on the ecosystem classification grouping for Blocks 1, 2, 3 and 6. As ecosystem mapping is still unavailable for Block 5, future stand analysis units are assigned based on productivity class and biogeoclimatic mapping. The timber supply analysis for the TFL will use the regeneration assumptions outlined in Table 60.

Table 60 – Regeneration assumptions

Block	Future Analysis Unit	Ecosystem
1	F-A-P	A5
1	S-A-P	S3, S13
1	H-A-P	S1HA, M3, S15
1	F-B-P_F	A1, A2, L3, L1
1	F-B-P	A1, A2, L3, L1
1	F-C-P	N1, L2, N2, A3
1	C-C-P_F	A6, S1CH, S6, M4
1	C-C-P	A6, S1CH, S6, M4
1	H-C-P	S2, M1, M2, MH1
2	S-A-P	S3, S13
2	C-A-P	S5, ST5, ST13
2	H-B-P	S1HA, ST1, M1, MT5
2	H-B-N	MT1, MT15, M5
2	H-C-P	M2, S2, ST2
2	H-C-N	MH1, MT2
3	S-A-P	S3, S13, M3
3	H-B-P	S1HA, M1
3	C-C-P	S15, S6, S1CH
3	Y-C-N	M4, MH1
3	H-C-P	M2, S2
5	S-A-P	CWH vm1, vh2
5	H-A-P	CWH vm2
5	H-B-P	CWH vm1
5	Y-B-P	CWH vm2
5	C-B-P	CWH vh2
5	H-B-X	MH mm1, wh1
5	H-C-P	CWH vm1
5	Y-C-P	CWH vm2
5	C-C-P	CWH vh2
5	H-C-N	MH mm1, wh1
6	S-A-P	Q5
6	S-B-P	Q1, Q1C, Q6, Q12
6	S-C-P	Q2, Q3, Q15, H5, M3
6	H-C-P	M1, M1C, M7, H13, H1

8.8.6 Species Conversion

A small amount of non-productive brush type (NP BR) is converted on a yearly basis within the TFL. This type occurs in small patches and is usually contiguous to or surrounded by productive forest land. These areas are site prepared in conjunction with the harvested area and planted. As the area converted on a yearly basis is difficult to quantify but thought insignificant, it will not be explicitly modelled but a slight positive impact on future timber supply may be realized operationally.

8.9 Silviculture History

8.9.1 Existing Managed Immature

The silviculture program in TFL 25 has been fairly aggressive since the 1960s with 78% of all stands harvested being planted. Brush control is regularly used to ensure time to free growing is minimized. A fair sized fertilization program has been ongoing in Blocks 1 and 6 throughout the 1990s with a small pruning program in Blocks 1, 2 and 6.

8.9.2 Backlog and Current Not Sufficiently Restocked (NSR) Areas

As of January 1, 2001 the total area of NSR in TFL 25 amounted to 2,979.8 ha. Of the NSR area within the TFL, 2,625.0 ha are in the timber harvesting land base with the remainder in constrained areas. Currently, 51.4 ha of backlog areas are reported in the GIS; however, operational staff estimates indicate that most of these area are incorrectly classified and are in fact SR or NP. Natural NSR areas, blow-down and old slash fire escapes, are also reported in the GIS (194.1 ha). In Blocks other than 1 and 6, these areas are also believed to be incorrectly classified and are most likely fully stocked stands. Western Forest Products' target is to re-stock denudated areas within two years of harvest.

Table 61 – NSR area

Block	THLB	Non-THLB	Total Area (ha)
1	610.6	24.0	634.6
2	572.1	22.5	594.6
3	113.6	12.4	126.0
5	1099.2	147.3	1,246.5
6	229.5	148.6	378.1
Total	***2,625.0***	***354.8***	***2,979.8***

Timber supply analysis assumption for dealing with reported NSR is as follows:

- Backlog NSR and Natural NSR areas are assumed fully stocked and will be assigned to an existing managed stand and given an age of 10 years.
- Current NSR will be regenerated to the appropriate future Analysis Unit within the specified regeneration delay period.

9.0 NON-RECOVERABLE LOSSES

9.1 Overview

The intent of this section is to describe the non-recoverable losses that will be deducted from the calculated annual harvest. These losses include epidemic losses from insects, disease, wind-throw, fire, or other factors not otherwise accounted for in the analysis.

9.2 Insects and Disease

The forests of TFL 25 have been relatively free of major insect or disease infestations and therefore no losses are defined. There have been no recent catastrophic outbreaks causing significant unsalvaged mortality or volume losses.

Hemlock dwarf mistletoe is widespread throughout merchantable sized stands. Sanitation treatments of advanced regeneration are sometimes required to prevent the spread in newly regenerated western hemlock stands. Usually regenerated stands are not impacted significantly by hemlock dwarf mistletoe. Root diseases sometimes result in small pockets of mortality. These endemic losses are assumed accounted for in yield curves via the calibration plots or adjustment factors.

Blackheaded budworm and hemlock sawfly outbreaks have been documented in second growth, most recently in Block 6. However there is no evidence that growth losses have been significant, that they are unaccounted for in PSP re-measurements, or that they warrant additional adjustment factors. Studies currently underway in Block 6 may improve knowledge of long-term budworm impacts.

9.3 Wind-Throw

Recently, wind-throw has been isolated in relatively small areas within TFL 25. WFP has maintained an aggressive program of salvaging wind-thrown stands that are relatively accessible. Any large windthrown areas that have occurred historically are accounted for in updates to the forest inventory. A ledger system has been developed to monitor ongoing damage and salvage occurring within the TFL.

9.4 Fire

The risk of loss of timber due to fire is moderate to low within the TFL. The bulk of the TFL has a wet climate characterized by cool, wet summers and fire suppression has been efficient; hence the likelihood of losses to forest fire is small. Any large fires that have occurred historically are accounted for in updates to the forest inventory.

9.5 Other

Other potential risks of loss of timber could include landslides, snow avalanches, theft, or wilful damage. Landslides are added to the forest cover as NSR or NP as they occur and are therefore reflected in the inventory. Timber losses in any Management Plan period are typically small and are included in the timber loss ledger system. We are unaware of any significant losses to theft.

9.6 Summary

Table 62 – Annualized Timber Loss Summary

Block	Total (m3/yr)	Inoperable (m3/yr)	Operable (m3/yr)	Ledger length (yrs)	NRL adjustment (m3/yr)
1	800	40	760	6	800
2	633	0	633	3	700
3	1,063	475	588	8	600
5	63	63	0	3	400[14]
6	1,500	357	1,143	7	1,200

For the purposes of converting non-recoverable loss volumes for reducing area harvest calculations, the volume suggested will be divided by average mature volume/ha to estimate associated non-recoverable loss area.

1.1

[14] The ledger record for Block 5 only samples current operating areas. All losses away from current operations would be non-recoverable. Assuming that the current operating areas represent roughly 20% of total area, the total loss figure was multiplied by a factor of 5 and rounded upward as was the case for the other blocks

10.0 INTEGRATED RESOURCE MANAGEMENT

10.1 Overview

The intent of this section is to give an overview of the resource inventories available and being used for the timber supply review. The section also describes other resource management information that is being utilized for planning within TFL 25.

10.2 Forest Resource Inventory

Table 63 summarizes the forest resource inventories currently being maintained for the TFL.

Table 63 – Forest resource inventory status

Item	Block	Status	MOF Acceptance	Plan
Forest Cover (Timber Inventory)	1	Completed 1999 to Vegetative Resource Inventory (VRI) Standards. Updated annually, currently to January 1, 2001.	Yes, RIB accepted 1999	VRI ratio adjustments and NVAF information still under review.
	2, 3	Completed 1971. Updated annually, currently to January 1, 2001.	Yes	New inventory started in 2001.
	5	Completed 1985. Updated annually, currently to January 1, 2001.	Yes	New inventory to begin once land use issues are resolved.
	6	Completed 2000 to Vegetative Resource Inventory (VRI) Standards. Updated annually, currently to January 1, 2001.	Yes, RIB accepted 2000	VRI ratio adjustments and NVAF information still under review.
Ecosystems	1	Completed 1988 by T. Lewis. Inventory completed to WFP standards. Minor updates and revisions completed in 1999.	Yes	
	2	Completed 1994 and 1995 by T. Lewis. Inventory completed to WFP standards. Minor updates and revisions completed in 1999.	Yes	
	3	Completed 1988 by T. Lewis. Inventory completed to WFP standards. Minor updates and revisions completed in 1999.	Yes	
	5	In progress. Inventory started in 1999 and is expected to be complete early 2002.		
	6	Completed 1981 by T. Lewis. Inventory completed to WFP standards.	Yes	Revision mapping scheduled for 2001/02
Terrain Stability	1	Completed 1992 by T. Lewis. Reclassified to MOF standards 1996	Yes	
	2	Completed 1994 (Stafford), 1995 (Apple) and 1996 (Heydon) by T. Lewis. Reclassified to MOF standards.	Yes	
	3	Completed 1992 by T. Lewis. Reclassified to MOF standards 1996.	Yes	
	5	Partial completion 1995 by Maynard (Yeo, Rodrick, Pooley), 1995 by T. Lewis (Neekas, Coldwell Penn.).		Remaining areas (except PRI) being completed as part of the ecosystem classification.
	6	Completed 1981 by T. Lewis. Reclassified to MOF standards 1996.	Yes	

Item	Block	Status	MOF Acceptance	Plan
ESA (Wildlife) (Recreation)	1	Completed 1992 by T. Lewis		ESA mapping has been replaced with detailed inventories. Use of ESA mapping will be minimal in MP10.
	2	Not done		
	3	Completed 1992 by T. Lewis		
	5	Completed 1985 by T. Lewis		
	6	Not done		
Wildlife	1 – 6	See Wildlife Studies – Section 3.1.11 of TFL 25 Management Plan		Inventory and research are intertwined.
Recreation Features Inventory	1	Completed 1992 by Recreation Resources Limited	Yes 09/14/95	Revision of all blocks is being carried out over the next two years to reflect changes to standards.
	2	Completed 1992 by Recreation Resources Limited	Yes 07/04/95	
	3	Completed Dec 01 by Recreation Resources Limited	Submitted Jan 2002	
	5	Completed 1996 by Recreation Resources Limited	Yes	
	6	Completed 1995 by Recreation Resources Limited	Yes	
Recreation Opportunity Spectrum Analysis	1	Completed 1995 by Recreation Resources Limited	Yes 09/14/95	Revision of all blocks is being carried out over the next two years to reflect changes to standards.
	2	Completed 1994 by Recreation Resources Limited	Yes 07/04/95	
	3	Completed Dec 01 by Recreation Resources Limited	Submitted Jan 2002	
	5	Completed 1996 by Recreation Resources Limited	Yes	
	6	Completed 1995 by Recreation Resources Limited	Yes	
Visual Landscape Inventory	1	Completed 1994 by Recreation Resources Limited	Yes 03/01/95	Designation of recommended VQOs (rVQO) were established under a Visual Mitigation Strategy conducted in 1998. Revision of all blocks is being carried out over the next two years to reflect changes to standards.
	2	Completed 1994 by LA West Landscape Architects	Yes 07/04/95	
	3	Completed Dec 2001 by Recreation Resources Limited	Submitted Jan 2002	
	5	Partial completed 1994 by LA West (Yeo, Coldell, Neekas, Susan, Roderick, Pooley). Remaining area completed 1995 by Recreation Resources Limited	Yes	
	6	Completed 1995 by Recreation Resources Limited	Yes	
Stream Classification	1 – 6	Ongoing – Operational classification is being integrated into overview inventory for all blocks. Conversion from old A,B,C classification to FPC "S" class has been completed or is approximated.	MP 10 uses existing information supplemented with GIS slope analysis to derive overview stream classifications.	Continue to update inventory as new operational data becomes available. RIC 1:20 overview mapping will be incorporated as it becomes available.
Archaeological Overview Assessment (AOA)	1	Not done		
	2	Not done		
	3	Not done		
	5	Completed 2000 by Golders Associates. Funded by FRBC	Yes 2000	
	6	Ongoing FRBC project in place for QCI.		Expected completion date 2002.
Operability	1	Completed 2000 by WFP. Inventory contains classification for operability by harvest system and economic conditions.	Submitted to Districts in May 2001	
	2			
	3			
	5			
	6			

10.3 Forest Cover Requirements

10.3.1 Forest Cover Objectives - Rationale

The rationale for each forest cover objective reported in the timber analysis is described below. The rationales are based on the unique attributes of each TFL Block.

10.3.1.1 Visual Quality

For all Blocks other than Block 3, visual quality is currently being managed to the recommended visual quality class (rVQC) as established during the Visual Mitigation Strategy conducted in 1998. A revised inventory for Block 3 was completed in December 2001, which identifies revised rVQC based on existing landscape conditions and management goals. Recommended Visual Quality Classes to be modelled in the timber supply analysis are Preservation (P), Retention (R), Partial Retention (PR) and Modification (M). The amount of area that can be disturbed (i.e. has not achieved visually effective green-up) is 1%, 5%, 15% and 25% for each rVQC respectively. These levels are set at the upper end of the % denudation range for use in timber supply analyses to reflect the successful implementation of visual landscape design during cutblock layout in sensitive viewscapes.

A 6 m visually effective green-up (VEG) height is proposed for Blocks 5 and 6, 5 m is proposed for other blocks.

Table 64 to Table 68 outlines the management assumptions for dealing with visual quality within each block of the TFL. The areas reported are based on the results of the visual mitigation strategy completed in 1998.

Block 1

As part of the visual mitigation strategy conducted in 1998, Block 1 was divided into three Scenic Classes that defined the level of management for individual rVQCs. Scenic Class 1 rVQCs are to be managed to traditional timber supply assumptions, Scenic Class 2 rVQCs are to be managed to the upper limit of VQC % denudation range, and Scenic Class 3 rVQCs are considered non-visible and are not managed for scenic values. For simplicity, the small amount of area falling in Scenic Class 1 will be assumed Scenic Class 2 for timber supply modelling.

Table 64 – Visual Quality Management Assumptions – Block 1

Scenic Class	rVQC	Productive Forest	THLB Area	Denudation %
1	R	2.6	2.2	5%
	PR	0.0	0.0	15%
	M	0.0	0.0	25%
2	R	67.1	63.5	5%
	PR	17.7	17.2	15%
	M	5,677.8	5,509.9	25%
3	R	23.8	22.7	N/A
	PR	0.0	0.0	N/A
	M	0.0	0.0	N/A

Block 2

As part of the visual mitigation strategy conducted in 1998, rVQC polygons were defined in the lower reaches of the Stafford and Apple valleys and around Stafford Lake. The Heydon Bay unit as well as the upper ends of the Stafford and Apple valleys were identified as not requiring objectives for the maintenance of scenic values.

Table 65 – Visual Quality Management Assumptions – Block 2

rVQC	Productive Forest	THLB Area	Denudation %
R	0.0	2.2	5%
PR	861.8	728.3	15%
M	4,103.2	2,343.0	25%

Block 3

A revised inventory was completed in December of 2001, which re-examined the existing visual condition of Block 3 and re-classified the landscape to ensure the maintenance of scenic values. This inventory was completed using the methodology outlined in the Ministry of Forests – Visual Landscape Inventory, Procedures and Standards dated May 1997.

Table 66 – Visual Quality Management Assumptions – Block 3

rVQC	Productive Forest	THLB Area	Denudation %
PR	4,519.9	3,338.8	15%
M	1,121.8	747.9	25%

Block 5

As part of the visual mitigation strategy conducted in 1998, the requirement for visual management around inland lakes in the Mid Coast Forest District was eliminated. In the North Coast Forest District revisions to scenic management included the relaxation of visual constraints in areas away from the main marine travel corridor between Princess Royal Island and the Mainland.

Table 67 – Visual Quality Management Assumptions – Block 5

rVQC	Productive Forest	THLB Area	Denudation %
P	133.4	74.2	1%
R	6,499.4	3,227.6	5%
PR	33,161.8	14,299.7	15%
M	21,290.4	8,999.5	25%

Block 6

As part of the Visual mitigation strategy conducted in 1998, minor revisions to the visual landscape inventory for Block 6 were completed whereby areas away from major marine travel corridors were assigned a less restrictive rVQC.

Table 68 – Visual Quality Management Assumptions – Block 6

rVQC	Productive Forest	THLB Area	Denudation %
R	665.4	350.9	5%
PR	15,110.8	7,778.7	15%
M	10,284.7	4,660.3	25%

10.3.1.2 Wildlife

10.3.1.2.1 Ungulate winter range

To date there has been no formal designation of ungulate winter ranges within TFL 25. There has been some modelling work carried out in Blocks 1, 2 and 3, which predicts suitable winter range, as well as a number of field deer winter range assessments in Block 2. These modelled results and field assessments are being used at the Landscape Unit planning level in guiding suitable locations for Old Growth Management Areas.

10.3.1.2.2 Identified wildlife

To date there have been no Wildlife Habitat Areas delineated in TFL 25.

10.3.1.3 Adjacent Cutblock Green-up

For Blocks 1 and 3, the Vancouver Island Land Use Plan and associated Higher Level Plan provide for a 3 metre green-up height in General and Special Resource Management Zones and a 1.3 metre green-up height in Enhanced Resource Management Zones. These green-up heights are proposed for areas without visual quality objectives.

For Blocks 2, 5 and 6, a green-up height of 3 metres is proposed for areas without visual quality objectives.

As described in Section 10.3.1.1, an age surrogate for each analysis unit will be used within the model to represent height.

10.3.1.4 Landscape Level Biodiversity

Due to ongoing land use planning in the Central Coast the current management option for Block 2 and 5 will have forest cover constraints imposed based on guidance provided in the *Provincial Guide for the Submission of Timber Supply Analysis Information Packages for Tree Farm Licences Version 4 – March 2001*. According to the policy, approximately 45 percent of the TFL will be in the lower BEO, 45 percent in the intermediate BEO and 10 percent in the high BEO. As a result, in the current management option the area-weighted average (i.e. 45/45/10) biodiversity constraints (old seral only) for the three BEOs will be applied for each variant in each Landscape Unit.
Sensitivity analyses will evaluate the impacts of managing for biodiversity as specified by the interim BEO ratings assigned to each Landscape Unit. Modelling of the management of

Landscape Units assigned Low, Intermediate and High BEO ratings will be guided by the Landscape Unit Planning Guidebook and, as indicated to date by government policy, only old seral targets will be modelled during the sensitivity.

For all other Blocks within TFL 25, landscape level biodiversity will be modelled by applying the old seral target specified by the interim BEO rating assigned to each Landscape Unit.

Table 69 – Landscape biodiversity assumptions

Current Management Option

NDT 1	Early seral stage	Off	*Draw down acceptable in Low BEO Lunits*	
	Mature + old	Off	*Only if timber supply impact is noted*	
	Old seral stage	On	*All other Lunits are to be assigned the full constraint*	
			Implement old seral cover %	
			0 years	guidebook *0.33
			70 years	guidebook *0.67
			140 years	guidebook*1.0

Block 2 and 5

CWH					***MH***				
Time 0	H	19%*0.10	1.9	**9.7**	Time 0	H	28%*0.10	2.8	**14.2**
(OLD)	I	13%*0.45	5.9		*(OLD)*	I	19%*0.45	8.6	
	L	(13%*0.33)*0.45	1.9			L	(19%*0.33)*0.45	2.8	
Time 70	H	19%*0.10	1.9	**11.6**	Time 70	H	28%*0.10	2.8	**17.0**
(OLD)	I	13%*0.45	5.9		*(OLD)*	I	19%*0.45	8.6	
	L	(13%*0.66)*0.45	3.9			L	(19%*0.66)*0.45	5.6	
Time 140	H	19%*0.10	1.9	**13.6**	Time 140	H	28%*0.10	2.8	**19.9**
(OLD)	I	13%*0.45	5.9		*(OLD)*	I	19%*0.45	8.6	
	L	(13%*1.00)*0.45	5.9			L	(19%*1.00)*0.45	8.6	

Blocks 1, 3, and 6

Old seral biodiversity targets

	Low	Intermediate	High
CWH	>13%	>13%	>19%
MH	>19%	>19%	>28%

10.3.1.5 Reductions to Reflect Volume Retention in Cutblocks

Where feasible and wildlife objectives can be met, wildlife tree patches (WTPs) are located in constrained areas such as riparian reserves, unmerchantable stands or unstable slopes. Existing WTPs are captured in the inventory. In order to capture future WTPs to be located in harvestable areas a volume reduction will be implemented in the timber supply model for all future harvesting. Management direction for WTP targets are available in the Biodiversity Guidebook and range from 0 to 18% depending on how much of the landscape is available for harvest. A preliminary analysis indicates that a WTP retention target of 13% represents a conservative estimate of what is being realized in the TFL. Assuming 75% of the WTP retention is in constrained areas (based on the *Forest Practices Code Timber Supply Impact Analysis*) a volume reduction of 3.25% (0.25x13%) is recommended for use to account for operable area in WTPs.

10.3.1.6 Community Watersheds

There are four community watersheds that overlap areas of TFL 25 Block 1. The largest of these watersheds are comprised primarily of private land outside of the TFL. Application of timber supply constraints in the model to emulate on the ground management is not a meaningful analysis, as activities outside the TFL are the primary hydrological driver. The smaller watersheds will also be managed sensitively on the ground, but modelling specific cover constraints for timber supply is expected to be inconsequential and therefore not worthwhile in this context.

Table 70 – Community Watersheds

CWS Code	CWS Name	CWS Gross Area (ha)	Productive Forest	THLB Area
930.008	Goudie Community Watershed	66.8	39.3	31.9
930.037	Charters Community Watershed	1,926.5	97.1	82.2
930.040	Leech Community Watershed	9,357.0	325.5	250.4
930.041	Mary Vine Community Watershed	307.8	182.5	151.6

10.3.1.7 Higher Level Plans

For Blocks 1 and 3, the order establishing Resource Management Zones and Resource Management Zone objectives within the area covered by the Summary Vancouver Island Land Use Plan came into effect as of December 1, 2000. All plans filed after April 1, 2001 are to conform to this order. WFP is conducting operations within the Resource Management Zones within these two blocks to meet the intent of the stated management objectives as outlined in Table 27. For modelling purposes, current management constraints such as visual quality, green-up (as per Section 10.3.1.3) and old seral stage targets for Landscape Units will adequately address RMZ objectives for General and Enhanced zones, hence no additional forest cover constraints are being modelled specifically for these RMZ objectives. In Block 1, the primary objective for Special Management Zone 22 is the maintenance of recreational and scenic values along the Kludahk Trail. As a detailed inventory has yet to be completed along the trail, modelling of the SMZ objectives will be met by applying a cover constraint that retains at least 50% of the forested landbase within the SMZ in ages >140 years throughout the planning horizon.

For Block 2 and 5, which are part of the Central Coast Land and Coastal Resource Management Plan (CCLCRMP), an interim agreement was reached in April of 2001 where government announced its acceptance of the recommendations of the CCLCRMP. These recommendations related to candidate protection areas, special management zones and “Options areas” on which land-use decisions remain to be taken. As the CCLCRMP has not been established as a Higher Level Plan, and is therefore not yet conclusive, its tentative management recommendations are not reflected in current management assumption. Instead, sensitivity analyses will be used to evaluate the implication for timber supply of 1) removing the candidate protection areas from the THLB, and 2) removing both the candidate protection areas and “option areas” from the THLB. The following table outlines the CCLCRMP recommendations as they pertain to TFL 25.

Table 71 – CCLCRMP Recommendations – Block 2 and 5

Block	Candidate Protection Areas		Option Areas		Total THLB
	Productive Forest	THLB Area	Productive Forest	THLB Area	
2	383.5	203.2	0.0	0.0	203.2
5	39,030.4	15,235.2	44,846.5	19,685.1	34,920.3

10.4 Timber Harvesting

10.4.1 Minimum Harvestable Age

Minimum harvestable ages are simply minimum criteria. While harvesting may occur in stands at the minimum requirements in order to meet forest level objectives (i.e. maintaining overall timber flows) many stands will not be harvested until well past the minimum timber production ages because consideration of other resource values takes precedence, or timber may be in ample supply elsewhere.

In the previous timber supply analysis, target quadratic mean diameters (DBHq) were used for good, medium, and poor sites (45, 40, 35 cm respectively) to set conservative minimum harvest ages. For model set-up purposes we propose to relax this constraint for each yield curve to the younger of (1) the age 95% of maximum MAI is attained or (2) the age 30cm DBHq is attained. However, rather than maximize harvest levels by forcing harvest at yield curve minimums and to facilitate development of area-based harvest regulation (where feasible), we intend to analyze overall average harvest DBHq through time for various area or volume-based harvest scenarios and choose a base case where average DBHq through the mid and long terms remains in the range of 30-40cm.

10.4.2 Operability

The criteria used to determine operability for use in the timber supply analysis are defined in the terms of reference submitted and approved by the Regional Manager, MOF – Vancouver Region May 2000. The Terms of Reference document can be found in the TFL 25 Management Plan and contains detailed information regarding the assumptions and criteria used.

Table 72 – Operability Summary

Block	Operability	THLB Area (ha)
1	Oc – Operable Conventional	25,142.3 (98%)
	Oh – Operable Helicopter	419.7 (2%)
	Total	***25,562.0***
2	Oc – Operable Conventional	11,995.1 (80%)
	Oh – Operable Helicopter	3,007.3 (20%)
	Total	***15,002.4***
3	Oc – Operable Conventional	8,600.0 (91%)
	Oh – Operable Helicopter	843.6 (9%)
	Total	***9,443.6***
5	Oc – Operable Conventional	51,577.6 (82%)
	Oh – Operable Helicopter	11,323.5 (18%)
	Total	***62,901.1***
6	Oc – Operable Conventional	22,446.6 (89%)
	Oh – Operable Helicopter	2,721.9 (11%)
	Total	***25,168.5***
Total	***Oc – Operable Conventional***	***119,761.6 (87%)***
	Oh – Operable Helicopter	***18,316.0 (13%)***
	Total	***138,077.6***

10.4.3 Initial Harvest Rate

Initially, the timber supply analysis will be set at a harvest level similar to that of the last approved AAC determination. Harvest rates will be set by individual blocks and will incorporate partitions associated with operable helicopter areas where appropriate. Partitions defined for commercial thinning volume, specifically in Block 1, will not be modelled in the current management analysis. Rates will be varied to meet the objectives stated in Section 10.4.7. Once a suitable flow is established sensitivity analyses will be performed. Should these analyses suggest an alternative flow pattern is warranted, additional runs may be initiated.

For area regulation, initial volume requests will be set 50% higher than indicated and a maximum annual area constraint imposed to restrict area harvest to typical existing annual area harvests as indicated in annual reports.

Table 73 – Initial Harvest Rates - Volume

Block	Conventional	Helicopter	Total
1	159,000	6,000	165,000
2	70,000	22,000	92,000
3	53,000	2,000	55,000
5	185,000	70,000	255,000
6	115,000	0	115,000
Total	*582,000*	*100,000*	*682,000*

10.4.4 Harvest Rules

Harvest rules priorize forest stands for harvest based on specified criteria. Since the timber supply model is spatially based, a couple of options are available to implement harvest rules. Like aspatial timber supply models, harvesting stands on an oldest first basis or by minimizing growth loss is available as harvest rules. However, an additional rule of closest to the log dump can be used. This rule allows the model to harvest in a pattern typical of actual operations. Additional rules can be placed on the model to control the harvest levels by operating area. A number of options may be run to test sensitivity to changes of harvest rules.

10.4.5 Harvest Profile

Harvesting to the inventory profile in TFL 25 has been achieved and will continue. For volume regulation, no constraints will be imposed in the model to target certain species or product grades.

In the case of area regulation, balancing of harvest from analysis unit groups of varying productivity, or other methods, may be used to try to smooth volume flows associated with flat-line area regulation.

10.4.6 Silviculture Systems

The majority of the TFL is currently harvested using clearcut with reserve or group retention harvest methods. There is no significant selection or partial cutting with dispersed retention, with the exception of certain riparian management situations, occurring at this time.

In Block 5, the Licensee has committed to implementing ecosystem based management (EBM) strategies (to be determined by the CCLRMP with assistance of the Joint Solutions Project) to test the appropriateness of such strategies to ensure economic, social, and environmental sustainability. However implementation is in an early stage and it is largely impossible to forecast the nature of the landscape- and stand-level changes that will be forthcoming and evolving as negotiations progress.

For the purposes of modelling clumped retention, volume reductions as discussed in Section 10.3.1.5 in combination with even-aged growth and yield projections for the remaining harvested area are assumed adequate, albeit imperfect.

To date the Licensee has focussed management strategies for conservation of biodiversity at the landscape level. Riparian reserves, larger wildlife tree patches and other exclusions from the timber harvesting land base are examples of areas being managed for conservation. Strategies for stand level retention within the TFL are now being investigated to augment higher-level conservation plans with the most significant changes now expected in Block 5

As pressures to adopt non-traditional cutting methods and uneven-aged silviculture systems mount, growth and yield models need to be developed and calibrated for predicting the long term outcome of partial cutting in coastal old-growth and second-growth stands. As there is little experience on the coast and few, if any, stands to sample for partial cutting response, models will have to deviate significantly from the usual strategy of permanent sample plot analyses. Due to the lack of growth and yield data and predictive tools, the licensee will not attempt to model partial cutting for this timber supply analysis. However the Licensee is, and will be, supportive of any initiatives of the Ministry of Forests or others to meet the challenge of developing uneven-aged or partial cutting models for the Coastal Western Hemlock Zone.

10.4.7 Harvest Flow Objectives

Under a volume regulation scenario, the current AAC will be used as the starting volume request and be maintained only as long as the smooth transition to a lower mid or long term harvest level is not compromised. Should declines exceeding 10% per decade be required to complete the transition, starting volume request will be decreased until declines less than or equal to 10% are achieved, if possible. Where potential increases above the current AAC seem feasible, increases in initial harvest level will not be such that future percentage declines are in excess of those expected if the current AAC were the initial harvest level.

Under an area regulation scenario, the harvest area will remain constant through the planning horizon. The average area harvested under the current AAC will be the harvest area benchmark. Where a large immediate drop is required to maintain a stable plot of harvest area through time, area-regulation will be deemed socially and economically inappropriate and abandoned in favour of volume regulation with appropriate transitions. Where increases in area harvest per year seem feasible, output analyses will ensure that increases are constrained to prevent disruption of other indicators such as habitat availability, harvest DBHq, volume flow, seral stage distribution, etc.

APPENDIX I - DETAILED AREA AND VOLUME SUMMARIES

Table 74 – Area (ha) by leading species, and age class – Block 1

Leading Species	Age Class 0	1	2	3	4	5	6	7	8	9	Immature Area	Mature Area	Total Area	Immature Volume	Mature Volume	Total Volume
NSR	567										567		567			
Ba		388	23	17			6	1	44	88	434	133	567	9,267	107,857	117,124
Cw		509	439	313	74	14	20		17	1,340	1,369	1,357	2,726	56,164	895,779	951,943
Dr		15	133	205	406	33		2			791	2	794	228,531	41,528	270,059
Fd		1,009	4,151	2,519	1,098	240	142	55	19	81	9,158	156	9,314	1,776,915	163,981	1,940,896
Hm		17								22	17	22	39		1,880	1,880
Hw		1,092	1,112	2,346	897	152	64	6	43	2,722	5,663	2,771	8,434	1,586,384	1,894,894	3,481,277
Pl			1	30	85	35	65				214		215	9,631	26,594	36,225
Pw		3		13							16		16	3,305		3,305
Ss		13	10	36	1					3	61	3	63	21,287	2,974	24,261
Yc		809								2,018	809	2,018	2,827		752,604	752,604
Total	567	3,856	5,866	5,478	2,562	473	297	65	123	6,274	19,100	6,462	25,562	3,691,483	3,888,091	7,579,574

Table 75 – Area (ha) by leading species, and age class – Block 2

Leading Species	Age Class 0	1	2	3	4	5	6	7	8	9	Immature Area	Mature Area	Total Area	Immature Volume	Mature Volume	Total Volume
NSR	572										572		572			
Ba		247	150	14	35	16	10	44	0	1,549	472	1,593	2,065	86,906	1,118,343	1,205,248
Cw		453	111	49	1	15	0	18	4	3,165	630	3,187	3,818	32,061	2,479,526	2,511,587
Dr			155	80		69	4				307		307	43,586		43,586
Fd		292	163	2		129		93		52	586	146	732	155,256	61,082	216,338
Hw		1,088	1,972	1,992	225	170	2	72	6	1,323	5,449	1,400	6,850	809,725	1,033,390	1,843,114
Ss			13			1		4		56	14	60	74	2,860	54,053	56,912
Yc		299	2							284	301	284	585		160,689	160,689
Total	572	2,379	2,567	2,137	261	400	16	231	10	6,430	8,332	6,671	15,002	1,130,394	4,907,081	6,037,475

Table 76 – Area (ha) by leading species, and age class – Block 3

Leading Species	Age Class										Immature Area	Mature Area	Total Area	Immature Volume	Mature Volume	Total Volume
	0	1	2	3	4	5	6	7	8	9						
NSR	114										114		114			
Ba		438			7	49	9	1		154	503	156	659	49,368	140,293	189,661
Cw		426	9	4		1				1,586	439	1,586	2,025	1,877	1,341,176	1,343,053
Dr				4		9					14		14	7,493		7,493
Fd		137					2			10	139	10	148	1,329	8,412	9,741
Hw		1,489	417	7	27	144	109	40		3,215	2,193	3,255	5,448	245,869	2,762,946	3,008,815
Yc		147								888	147	888	1,035		534,153	534,153
Total	114	2,637	426	15	34	203	120	41		5,853	3,549	5,895	9,444	305,936	4,786,980	5,092,916

Table 77 – Area (ha) by leading species, and age class – Block 5

Leading Species	Age Class										Immature Area	Mature Area	Total Area	Immature Volume	Mature Volume	Total Volume
	0	1	2	3	4	5	6	7	8	9						
NSR	1,099										1,099		1,099			
Ba		166	30		9	21	26	15	20	10,663	253	10,697	10,950	55,344	7,343,083	7,398,427
Cw		391			5			14	18	25,223	396	25,255	25,651	8,973	15,043,762	15,052,734
Dr			128	500	271	76					975		975	302,640		302,640
Hw		1,165	1,195	944	620	57	7	18	64	18,022	3,988	18,104	22,092	644,165	11,147,973	11,792,138
Ss		236			20	1		4	16	1,267	258	1,288	1,546	15,815	1,153,769	1,169,583
Yc		33								555	33	555	588		270,529	270,529
Total	1,099	1,991	1,353	1,444	925	156	33	51	118	55,731	7,001	55,900	62,901	1,026,936	34,959,116	35,986,051

Table 78 – Area (ha) by leading species, and age class – Block 6

Leading Species	Age Class										Immature Area	Mature Area	Total Area	Immature Volume	Mature Volume	Total Volume
	0	1	2	3	4	5	6	7	8	9						
NSR	327										327		327			
Cw		79		1		3		16	45	2,971	84	3,033	3,117	5,578	1,611,475	1,617,053
Dr		214	686	784	196	11				1	1,891	1	1,892	262,696	148,179	410,876
Hm										12		12	12		3,923	3,923
Hw		1,357	4,353	1,827	431	20	74	112	59	2,886	8,063	3,056	11,119	895,634	2,242,793	3,138,427
Pl									9			9	9		1,991	1,991
Ss		3,110	2,677	1,954	86	20	7	21	39	433	7,854	492	8,347	991,311	492,886	1,484,197
Sw			7		5						12		12	2,111		2,111
Yc		12						1	13	309	12	322	335	170	130,240	130,410
Total	327	4,773	7,724	4,566	718	55	81	149	165	6,611	18,243	6,925	25,169	2,157,501	4,631,488	6,788,989

Appendix V

Timber Supply Analysis

Western Forest Products Limited

Tree Farm Licence 25

Timber Supply Analysis

MANAGEMENT PLAN 10

March 2003

R. Paul Bavis, *R.P.F*
Regional Forester
Western Forest Products Limited

Executive Summary

This analysis examines timber supply projections for Tree Farm Licence 25, which is comprised of five administrative units. Two are located on Vancouver Island at Jordan River (Block 1) and Naka Creek (Block 3). Two are on the Mainland coast at Loughborough Inlet (Block 2) and Swanson Bay (Block 5) and the fifth is on Moresby Island (Block 6) in Haida Gwaii.

Complan 3.0, a spatially-explicit harvest model, was used to simulate current management practices for protection and maintenance of ecological values and to estimate the residual timber potential through the year 2252.

After allowances for non-recoverable losses, the simulation of current management practice as agreed and set out in the associated information package suggests the following area-based AAC by block for the term of the proposed management plan:

Block	Location	AAC (hectares)
1	Jordan River	290
2	Loughborough Inlet	123
3	Naka Creek	87
5	Central Coast	491
6	Haida Gwaii	251
	Total	1,242

The proposed harvest levels should accommodate ecological concerns in the short and longer terms. The simulation suggests that a minimum of 124,600 ha (46% of productive forest) will be maintained in older forests (>140 yrs) and a minimum 64,000,000 m^3 of merchantable growing stock will be retained throughout the 250-year simulation horizon. These forests are expected to contribute significantly to biodiversity conservation and complement protected areas (~240,800 ha) adjacent to the Tree Farm Licence. The timber flowing from the proposed harvests would be sufficient to maintain existing people and communities dependent on harvesting and forest management in the short term, and may allow for an expansion in the future.

The analysis suggests that with time, timber volumes realized from this fixed harvest area will begin to increase as will stand ages, standing volume, and associated environmental values. Projections of cedar harvest and availability suggest that these species remain available for cultural and commercial uses throughout the simulation.

Sensitivity analyses suggest that the current management simulation is sensitive to land base and minimum harvest age changes. Policies that change either or both of these parameters may have significant impacts on area and volume harvest levels.

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Acknowledgements

David Byng, R.P.F. prepared yield tables, performed GIS analysis and inventory preparation, and set up model parameters. Mike Landers, R.P.F. assisted and established base case runs, performed many sensitivity analyses, and prepared dozens of output graphs. David and Mike also provided many valuable editorial comments and interpretations of model outputs. Jim Wilson of Timberline Forest Inventory Consultants analysed historic cruise data to estimate cedar diameter distributions.

1.0 Introduction

1.1 Purpose

Tree Farm Licence 25 is located in coastal British Columbia and consists of five independent blocks encompassing 480,149 hectares, of which 138,078 hectares are considered available for long term timber production. The TFL was established in 1958 with the intent of maintaining a sustainable harvest level indefinitely. Since that time the AAC has been re-determined periodically and more recently at five-year intervals. This report provides the technical basis for re-determination of the AAC.

1.2 Objectives

The primary objective of this report is to estimate achievable and sustainable annual area harvests and associated timber flows for the consideration of the Provincial Chief Forester in making his determination of Allowable Annual Cut for the term of Management Plan 10. More specifically the timber supply model is to be programmed to ensure the following primary objectives:

1. Non-timber values such as fish and wildlife habitat, biodiversity, recreation, visual quality, and terrain stability are to be given priority over timber. Protection of non-timber values will be satisfied by land base removals, yield net downs and/or by maintaining a percentage of polygons in older stands.
2. Annual harvest area is to be derived as a residual after non-timber values are accommodated. The proposed harvest level will consider harvestable inventory, growth potential of present and future stands, silvicultural treatments, potential timber losses, operational and legislative constraints.
3. Annual area harvested is held constant throughout the 250-year time horizon of the simulation.

Secondary objectives include:

4. Estimation of growing stock and age class changes through time as a coarse gauge of future habitat supply.
5. Evaluation of the impacts of and effectiveness of existing and alternative forest policies and land uses.
6. Identification of potential silvicultural or other interventions that may have social and/or ecological benefit.
7. Identification of data, inventory, or modelling uncertainties or shortcomings that may, if reduced or eliminated in future, significantly improve model predictions.

1.3 Timber Supply Model

Timber supply simulations were completed with Complan 3.2006 software developed by Olympic Resource Management and predecessors and currently owned by Timberline Forest Inventory consultants. Complan is a spatially-explicit supply model and is described in more detail in the associated information package (MP 10, Appendix IV, section 4.1)

The inventory database was current to January 1, 2001 and the simulation was set up to include a one-year initial harvest period to force actual 2001 harvesting to bring the effective inventory date ahead to 2002. This initialization year was included in all runs but is not presented in the tables or graphs herein. For each of the five blocks, a 20-year plan was prepared based on the first two decades of model output to depict the current management simulation. Total simulation horizon was set at 250 years.

Analysis units and associated yield curve parameters are described in more detail in the associated information package (MP 10, Appendix IV, sections 7 & 8).

To ensure optimization of harvest scenarios, harvest request levels were incrementally changed until a one-hectare change induced a small deficit, typically occurring in the vicinity of the transition to second growth. The reported harvest level is the last requested level where no deficit is evident.

2.0 Current Management or Base Case

The current management (CM) simulation includes the following assumptions and modelling parameters that are described in more detail in the associated information package (MP 10, Appendix IV, section 3.2):

- Future Wildlife Tree Patches are projected to occupy 13% of the land base, 3.25% of which is assumed to come from the otherwise harvestable land base[15,16]. Universal volume reductions ranging from 5.0% (Blocks 1, 2, 3, 6) to 8.5% (Block 5) were used to simulate the overall volume impacts of WTPs, partial cutting, and EBM. Old seral stage targets are maintained based on specific Biodiversity Emphasis Options where available, or the TSR II recommendations of 10% high, 45% intermediate, and 45% low biodiversity emphasis where landscape units have not been drafted or finalized. Green-up heights are assigned based on Resource Management Zoning established in the Vancouver Island Land Use Plan. Vancouver Island "Special" and "General" zones as well as Mainland blocks have a 3m green-up requirement, whereas "Enhanced" zones on Vancouver Island have a 1.3m limit.

1.1 ————————————

[15] As the locations of future WTPs and partial cutting are not known, the percentage is not area based. Therefore growing stock and age class distributions and summaries do not reflect this reserved area or volume.

As these volume deductions are not reflected in area calculations some options for determination of AAC and cut control are:

Option A – net down the area-based AAC Determination for WTPs (assumed 3.25%) in THLB and partial cutting (% as below). Then when determining area harvested for cut control, do not include partial cutting. This approach would require establishment of a threshold basal area removal, may invite partial cutting manipulations or abuses to avoid cut control, and assumes the WTP/THLB overlap is as estimated. (Cut control area = net block clearcut area + harvestable productive forest in PAS right-of-way outside cutblocks[2]).

Option B – net down the area-based Determination for partial cutting only (1.75% for Blocks 1,2,3,6 and 5.25% for Block 5). Then for cut control purposes include as area harvested any WTP area overlapping the THLB, but as per Option A ignore partial cutting areas. Including WTP on THLB as part of area harvested is a more direct approach to determining the percentage of THLB occupied by WTP and brings the concept of THLB closer to the operational level. The timber resource would be better utilized if field personnel observed an immediate cut control effect from unnecessary or excessive reservation of THLB. As well this approach would facilitate better tracking of WTP overlap with THLB to determine the validity of the currently assumed 3.25% and encourage updating of THLB mapping to reflect block level assessments of terrain, etc. (Cut control area = net block clearcut area + THLB in WTP + harvestable productive forest in PAS right-of-way outside cutblocks[2]).

Option C – do not adjust the area-based AAC Determination for WTPs or partial cutting but include as area harvested for cut control any WTP area overlapping the THLB and include partial cutting using a percentage-of-basal-area-removed adjustment to calculate a clearcut equivalency area. This direct-measurement-of-results approach reduces potential partial cutting abuses and makes percentage estimates of the WTP/THLB overlap and/or partial cutting irrelevant to the AAC Determination. (Cut control area = net block clearcut area + THLB in WTP + partial cut area stated as clearcut equivalent + harvestable productive forest in PAS right-of-way outside cutblocks[2]).

Note that if partially cut area were to be included as 100% clearcut, operational personnel would find this approach unfair and partial cutting could be unduly discouraged.

[16] If the "disturbed area" approach to determining area harvested for cut control is used, in theory it is also necessary to make an upward adjustment of the AAC Determination to make allowance for NP (e.g. non-forested area on access road) or unmerchantable stands (young, unharvestable second growth or lower site stands outside the THLB) that may be disturbed in developing cutblocks. A direct measurement of this at the cut control stage would be more transparent.

- The operable land base includes stands accessible to helicopter and conventional cable or ground-based harvesting systems.
- All harvested stands are planted promptly. Future plantations are assumed to use seed orchard stock. Yield reductions for stocking gaps and decay are 20% at one hundred years.
- Visual quality restrictions are based on the latest inventory revisions with upper range denudation assumed. Recreation constraints as described in the information package are generally of little impact.
- Minimum harvestable ages are based on attainment of profitable minimum mean stand diameters. Minimum acceptable stand diameters increased 10cm from poor to good growing sites and 7cm from low cost, south coast operations to higher cost operations to the north.
- Alder volumes contribute to the timber supply.
- Harvest priorities are generally to minimize growth loss and harvest oldest stands. In Block 1 the oldest first rule was not invoked to better reflect current operations that include significant second growth harvesting. Existing forest development plan blocks were harvested in the initial years as model constraints permitted.

The Current Management summary statistics for each block are presented in Table 1 below and harvest levels are presented in Figure 1 below. More detailed graphs of output parameters and sensitivity analyses are presented by TFL block in the sections following and in Appendix A (page 66).

In terms of annual area harvest, the order of importance of the blocks is: Block 5 (40%), Block 1 (23%), Block 6 (20%), Block 2 (10%), Block 3 (7%). This order remains even after Central Coast Candidate Protected Areas announced April 1, 2001 are removed, although the Block 5 area harvest is reduced by about a quarter (128 ha or 26%). In terms of projected annual volume flow, the short term block order is the same, but in the longer term Block 6 surpasses Block 1 as the age class imbalance induced by the 1988 withdrawal of the Gwaii Haanas reserve from the management unit is eventually overcome.

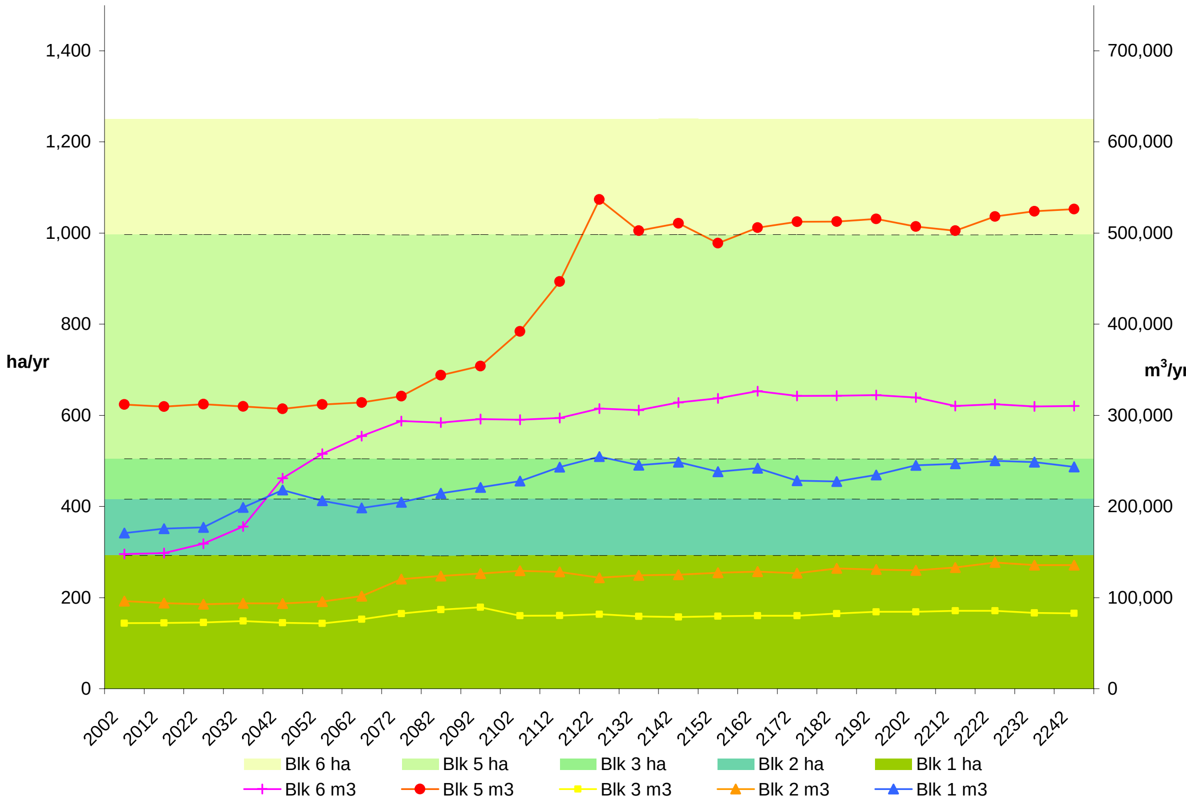

Figure 1. Area harvest (background bands) and predicted volume flow (lines) to 2252 for each block under current management

The indicated annual harvest area for the TFL of 1,250 ha is less than both the Long-Run Sustainable Area harvest calculation (LRSA) and the Long-Run Sustainable Area harvest calculation if all stands were harvested when marginally profitable (mLRSA). Future stands would on average be harvested beyond culmination of mean annual increment and be of sufficient size to ensure a reasonable economic return for future generations.

Table 1. Current management harvest summary

Block	mDBHq[17] (cm)	Indicated Annual Harvest (ha)	THLB[18] (ha)	Implied average rotation age[19] (yrs)	Predicted average annual volume to 2022[20] (m^3/yr)	Average culmination age[18] (yrs)	LRSA[21] (ha)	Average age mDBHq attained	mLRSA[22] (ha)	NRL[18] (ha)
1	40/35/30	292	25,562	88	164,534	95	269	85	301	2
2	43/38/34	124	15,002	121	90,234	96	156	115	130	1
3	43/38/34	88	9,444	107	68,342	105	90	108	87	1
5	47/42/37	492	62,901	128	284,258	103	611	126	499	1
5-PA	47/42/37	364	47,966[23]	132	210,134	104	461	128	375	1
6	47/42/37	254	25,169	99	140,873	83	303	85	296	3
All		1,250	138,078	110	748,241	100	1,429	109	1,313	8
All-PA		1,122	123,143	110	674,117	97	1,279	107	1,189	8

1.1

[17] Minimum harvestable quadratic mean stand diameter for Good, Medium, and Poor sites respectively.
[18] from the information package (MP 10, Appendix IV) for future stands.
[19] THLB divided by expected annual area harvest.
[20] Actual harvest volume will vary; this parameter is not suitable for conversion of area to volume for administrative or operational purposes.
[21] Theoretical Long Run Sustainable Area harvest calculated as THLB divided by area-weighted culmination age of future managed stands.
[22] Theoretical Long Run Sustainable Area if harvest occurs at mDBHq, calculated as THLB divided by area-weighted age that future managed stands attain mDBHq.
[23] Original THLB hectares less THLB in Order-in-Council designated Protected Areas.

3.0 Block 1 Analysis (Jordan River)

3.1 Current Management – 292 ha/year

Figure 2 below summarizes for the current management or “base case” simulation, the trends for harvest variables including timber volume, harvest age, mean stand diameter (DBHq), and proportion of helicopter harvesting.

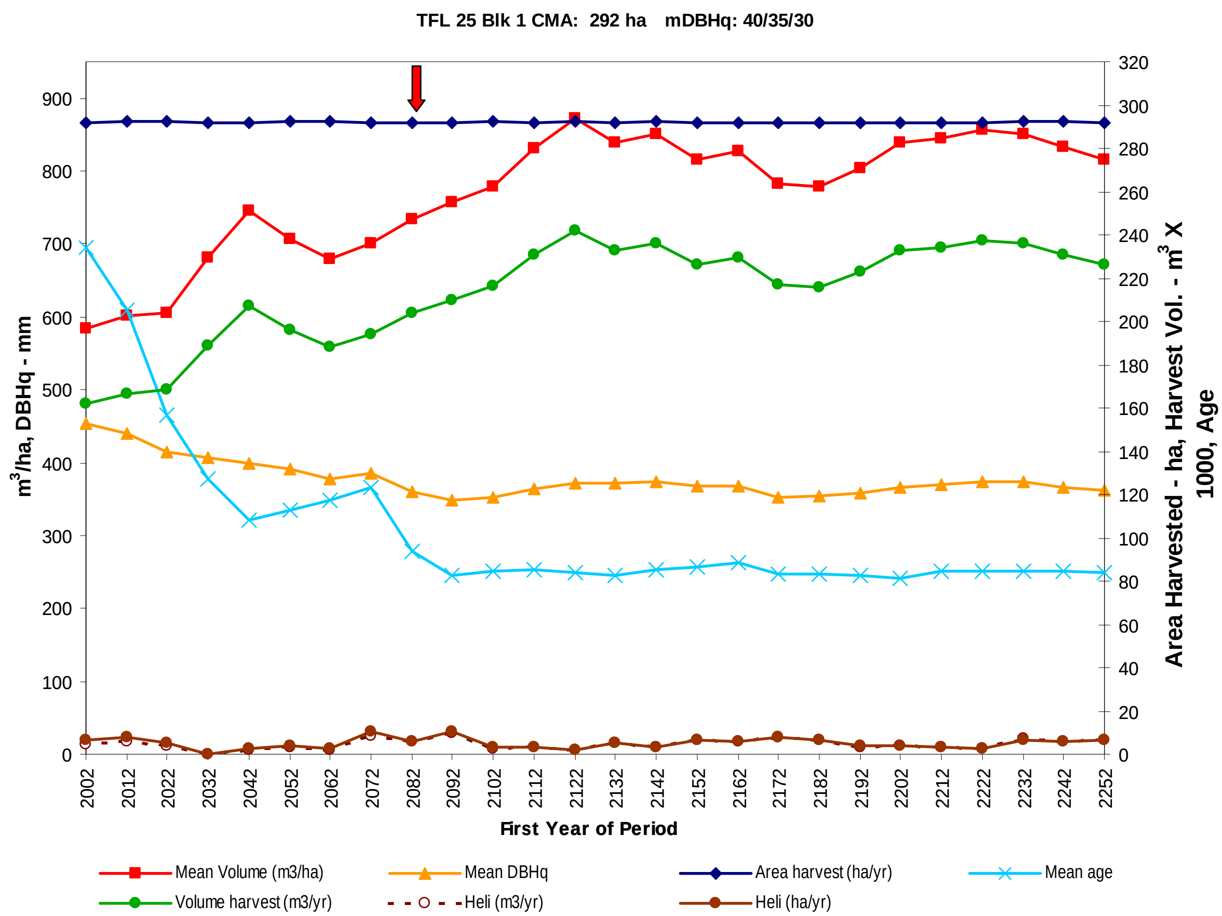

Figure 2. Block 1 Current Management harvest statistics through 250 years[24]

As the transition to second growth occurs, average age and diameter of harvested stands declines until the transition is complete. The transition will be largely complete within the next 40 years but nevertheless old forests would be a significant portion of the harvest profile until about 90 years into the future. As the transition progresses average merchantable stand volumes at harvest increase from under 600 m^3/ha initially to the 800-850 m^3/ha range in the long term. This effect is primarily related to expected gains from current silviculture practices. As the area harvest is constant, annual harvest

1.1 ———

[24] Red arrow indicates point where an area harvest deficit occurs if harvest request is increased by 1 ha.

volumes increase[25] in tandem with the increasing stand volumes. In the long term, ages at harvest average 82-88 years and average harvest diameters are around 35-37 cm (individual stands ranging 30-65+ cm).

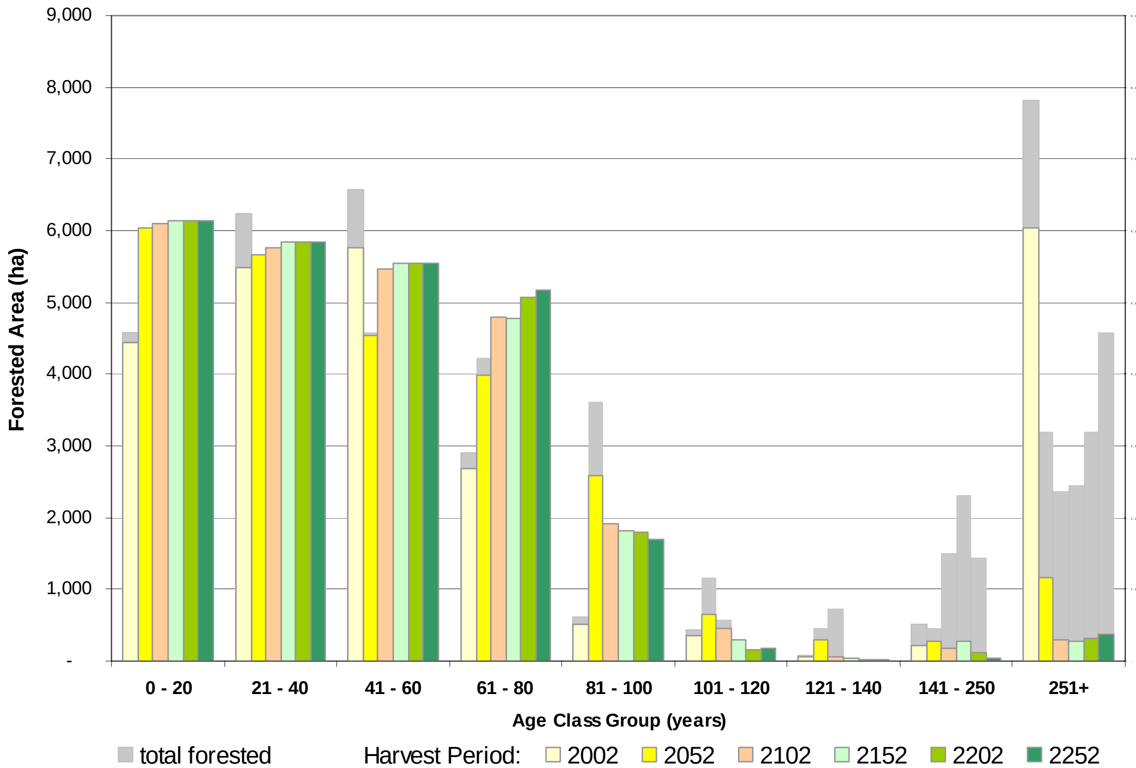

Figure 3. Age class progression on Block 1 THLB (+ total forested) for current management through 250 years

In this Block the indicated harvest level is midway between the LRSA and mLRSA calculations (Table 1), suggesting that near the pinch point (circa 2082) and beyond stands are on average harvested before culmination of mean annual increment but above the threshold minimum harvest age needed to ensure a profitable harvest.

Age class distributions are examined in Figure 3 above. On the THLB, with the exception of the 41-60 class, the age classes less than 101 years increase modestly from current levels initially and then stabilize through the remainder of the simulation. 101- to 250-year-old stands remain present in low abundance throughout the simulation. On the THLB the oldest stands decline dramatically through the first part of the simulation as the transition to second growth harvesting is completed.

1.1 ___

[25] This "fall-up" effect is the reverse of the oft-cited "falldown" effect observed in some stands (Douglas-fir for example). At the stand level the effect is commonly observed on coastal hemlock, balsam, or cedar sites where old forests are severely decayed and of low merchantable volume when compared to second growth growing on similar sites.

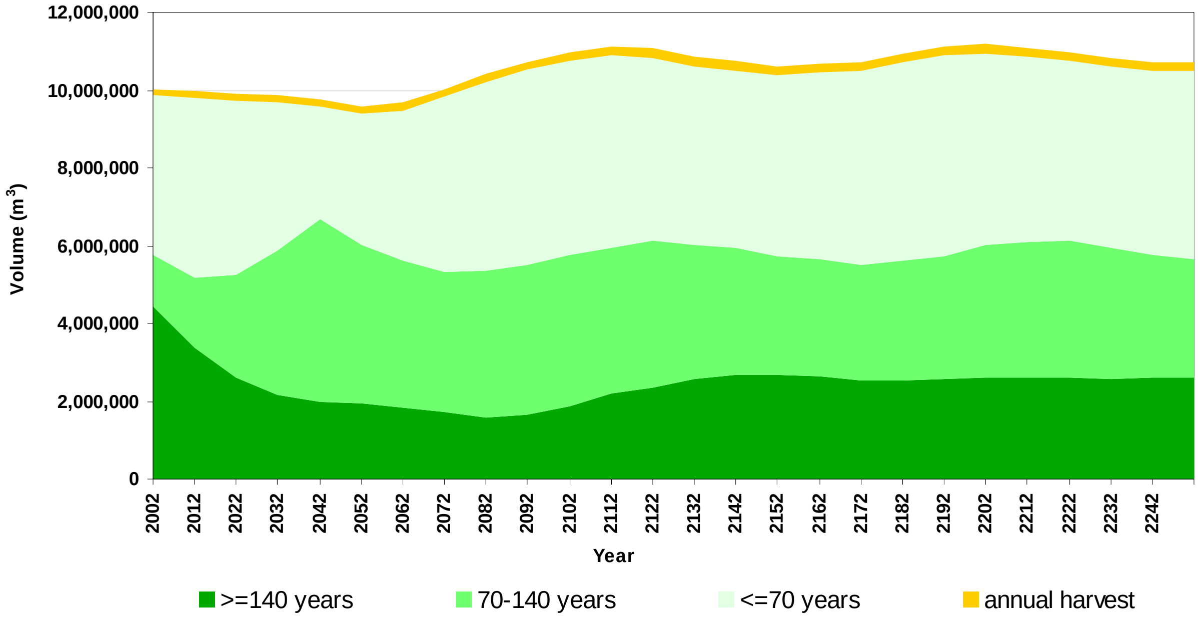

Figure 4. Merchantable growing stock on total Block 1 land base through 250 years

On the total forest land base, forest greater than 250 years old declines from the current level of about 7,800 ha to about 2,400 ha and then rebuilds to the 4,600 ha level. However during the deficit period stands in the 141- to 250-year-old class are increasing so that at least 3,900 ha of forest older than 140 years is forecasted to be present and contributing to the perpetuation of old-growth dependent processes or organisms.

Figure 4 above illustrates gross growing stock levels for the total land base. Initially levels are somewhat below 10 million m^3 but rise modestly to near 11 million m^3 in the longer term. The proportion of older forest drops initially from the current level of about 4.4 million m^3 to about 1.6 million m^3 and then stabilizes near 2.6 million m^3 in the long term. This 10-11 million m^3 standing inventory of wood permanently provides the basis for sustainable timber flow in the long term and provides substantial habitat and other environmental benefits to supplement values in adjacent park land (935 ha). The proportion of younger growing stock is initially 42% and in the long term stabilizes in the range of 43-47% of total growing stock. The 71- to 140-year-old growing stock provides the primary source of sustainable timber production through the simulation.

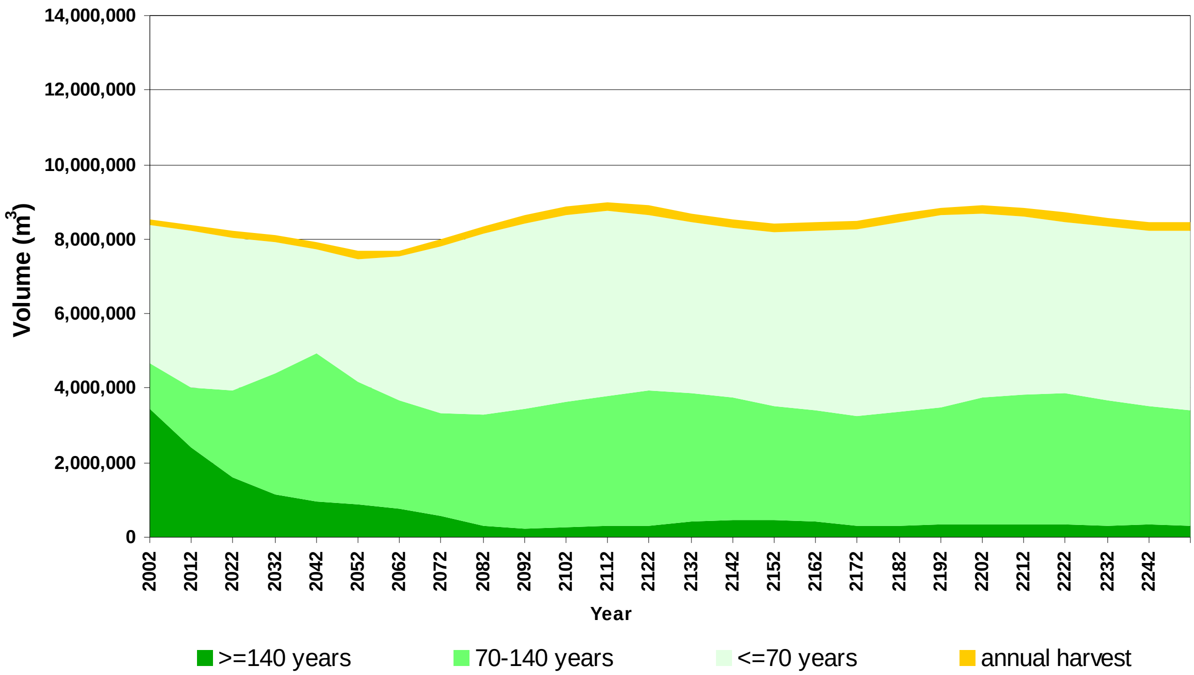

Figure 5. Merchantable growing stock on Block 1 THLB through 250 years

In the future the older growing stock is for the most part, but not entirely, in reserves or area projected to be unavailable for timber harvest. Figure 5 above displays growing stock through time for the THLB only. For non-timber reasons, some timber is held significantly beyond normal rotation ages and reaches ages in excess of 140 years before other stands become equally or more suitable for satisfying the non-timber objective(s). When this timber is released, its harvest could provide a small but ongoing supply of older stems possibly suitable for specialty manufacturing or cultural purposes.

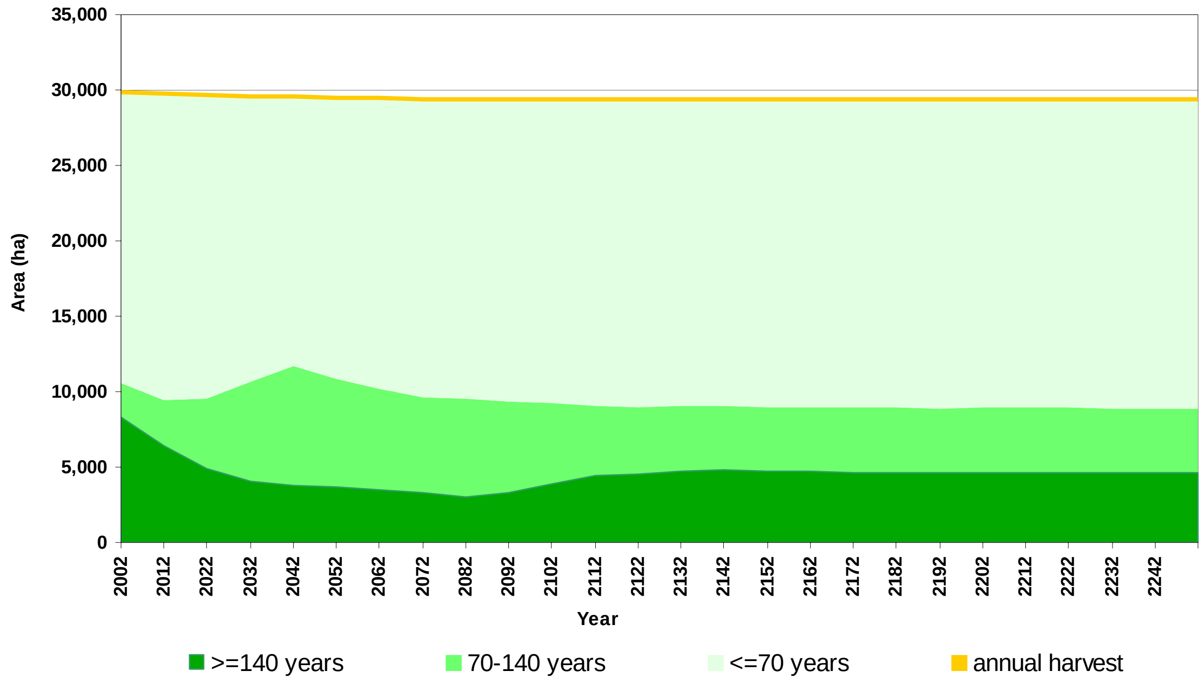

Figure 6. Age-group areas for Block 1 total land base through 250 years

Figure 6 above is as per Figure 4 except data is presented on an area basis rather than a volume basis and simplifies the age class data presented in Figure 3. There is a slight drop in the productive forest area from the initial level as new roads are built and withdrawn from the productive area.

Initially the area of old growth declines, the area of maturing stands increases, and the area of younger stands remains relatively stable. Contrary to popular opinion, as the transition from old growth progresses, at the landscape level old growth area is not replaced by clearcut area (young stands decrease from 64% to 63% through 2252), but rather by 71- to 140-year-old stands (increases from 8% to 25%). Under the current management regime, young stands will occur no more frequently after the completion of the transition to second growth than they do today.

Figure 6 also clearly demonstrates that the age class distribution is already much different than the natural disturbance type (NDT1) or recent historical range of natural variability for the area would dictate. Clearly any attempt to impose or return to an age class distribution representative of infrequent disturbances would be extremely difficult, as well as economically devastating and socially irresponsible.

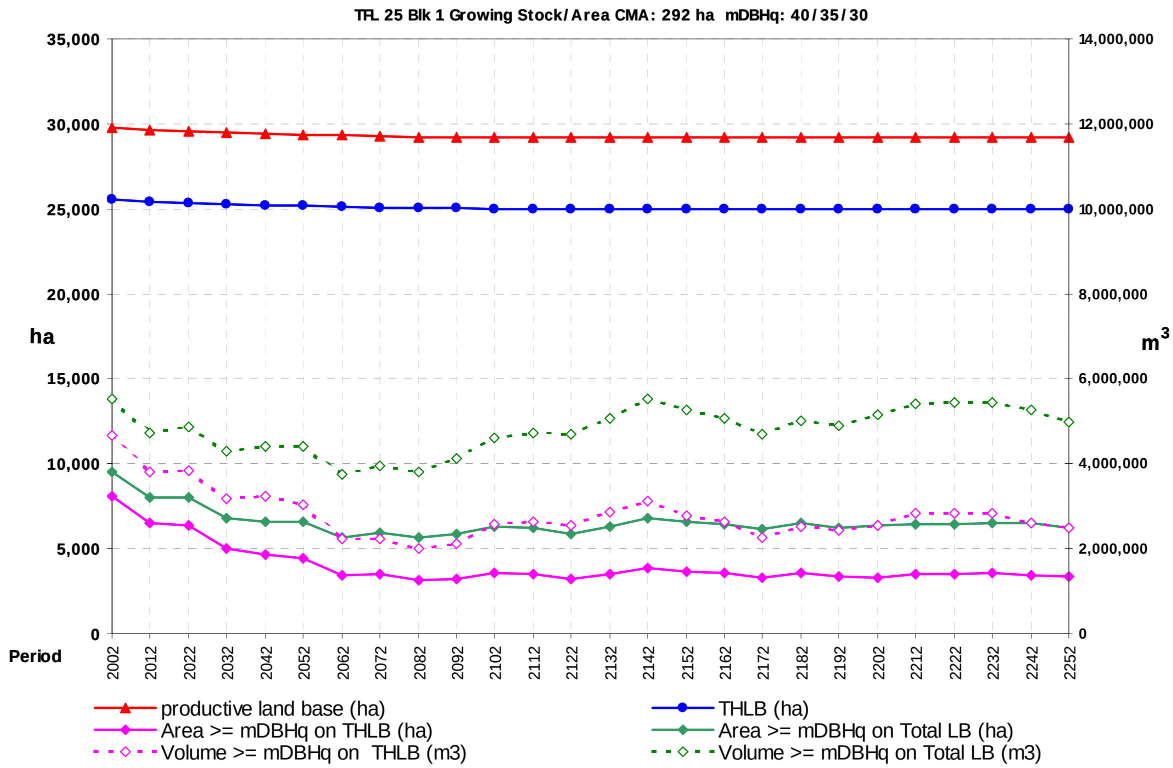

Figure 7. Merchantable growing stock in harvestable (>mDBHq) stands through 250 years for Block 1.

Figure 7 above presents growing stock in terms of merchantable volume and area that is larger than the minimum harvestable[26] DBHq.

Roughly 4,200 ha or 14% of the productive land base is unavailable for harvesting for the long term. Because the locations of future Wildlife Tree Patches and partial retention along streams or elsewhere could not be easily predicted, they were modelled as a yield curve volume net down. Consequently these net downs are not represented in any of the aforementioned Figures and the actual volume and/or hectares illustrated understate the old forest reserved from harvest by about 5% of THLB area or volume.

On the THLB, harvestable stands become less available until the transition to second growth is complete and are maintained thereafter between 3,100 and 3,500 ha, or roughly 11-14 years worth of harvesting at the indicated harvest level. The ratio of harvestable area to annual harvest is somewhat higher than for other blocks and reflects a higher influence of policy factors (adjacency, cover %) rather than a shortage of physically available stands (mDBHq, age class structure). This confirms that the annual harvest area recommendation after making provision for non-timber values, makes more or less optimal use of the land base's residual timber capacity. Operational flexibility in

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[26] The term "merchantable" is used to refer to the net volume as indicated by growth and yield models: typically less a 30 cm high stump, a 10 cm top diameter, trees less than 12.5 cm dbh, and decay, waste and breakage estimates. The term "harvestable" is used here to refer to stands that have grown to mDBHq. Although a particular stand may have some, or considerable, merchantable volume it is not considered harvestable until it has attained sufficient volume and stem sizes to be deemed profitable.

the selection of harvest locations can be expected to be most limited around pinch points at 2062, 2082 and 2122.

A strategic focus for silviculture treatments could be to increase the harvestability of stands through the 2052-2132 period where area available for harvesting is projected to be lowest. A second objective would be to increase volume/ha during the anticipated dip from 2052-2082 (Figure 2, p. 7). Generally though, the differences are subtle and silviculture treatments which increase the future volume, merchantability or quality of stands may be more or less equal in terms of strategic importance and could therefore be ranked using stand-level financial analysis.

3.2 Alternate Harvest Levels

3.2.1 10% Increase

Figure 8 below shows that a higher area harvest request induces area and volume shortfalls at the transition to second growth and the rotations beyond. Average harvest age and DBHq decline sooner and remain somewhat lower in the long term. Average volume per hectare is lower in the longer term as stands are harvested earlier than was the case in the current management run. Note that relative to the current management simulation, this run produces modestly more volume (625,348 m^3 or 2,500 m^3 annually on average) through 250 years (see Appendix B, Table 12, p.103).

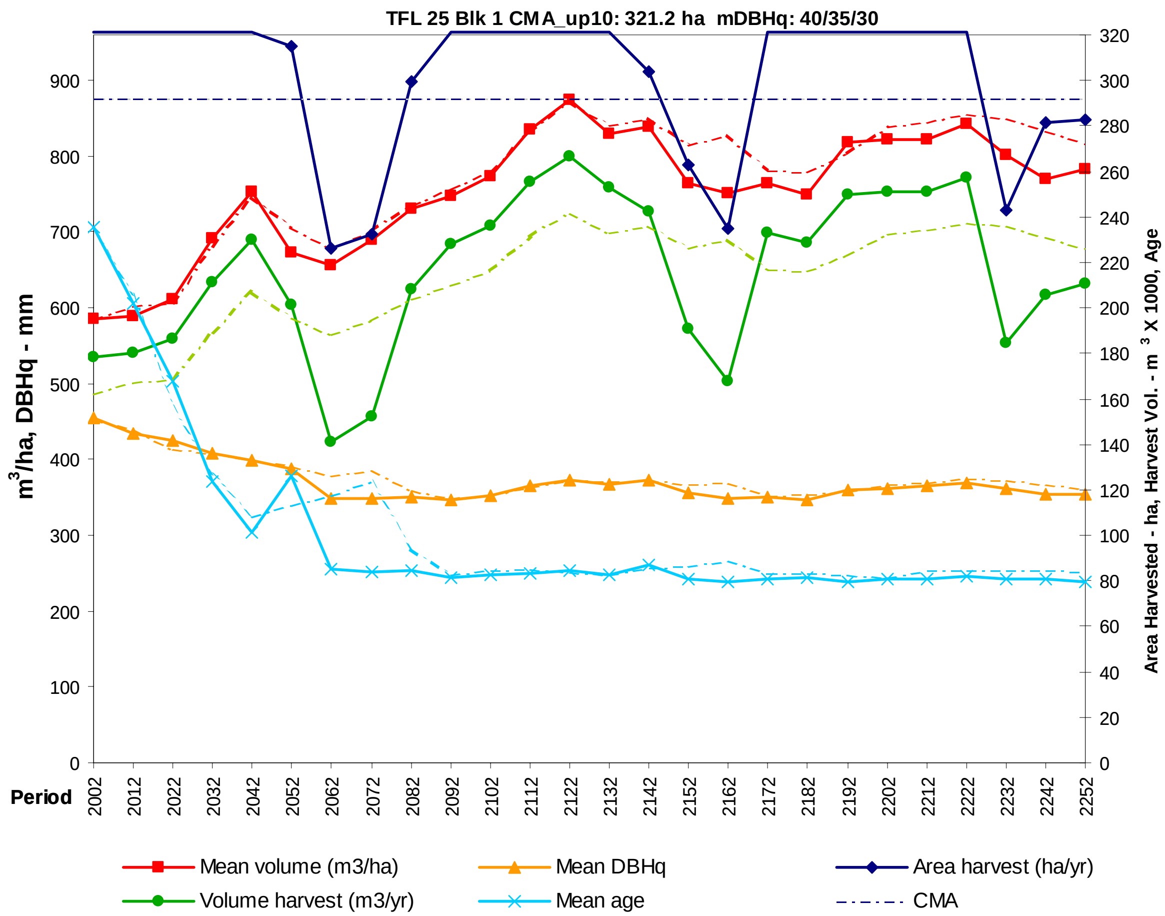

Figure 8. Block 1 harvest statistics[27] through 250 years for current management area harvest plus 10%

3.2.2 10% Decrease

Lowering the harvest request level by 10% (Figure 9 below) has the effect in the short term of lowering the harvest volume in proportion (-10.1%) to the area change. This is because existing old growth stands are assumed to be neither adding nor losing volume through time. Once second growth becomes an appreciable component of the harvest profile, harvest age and DBHq are significantly higher (longer rotation) with the result that stand volumes per hectare at harvest are higher as well. This tends to compensate for the loss of area harvested such that the overall volume harvest is less affected in the longer term (-5.6%) versus the short term (-10.1%) (Appendix B, Table 12, p.103).

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[27] Dashed lines in background represent current management statistics.

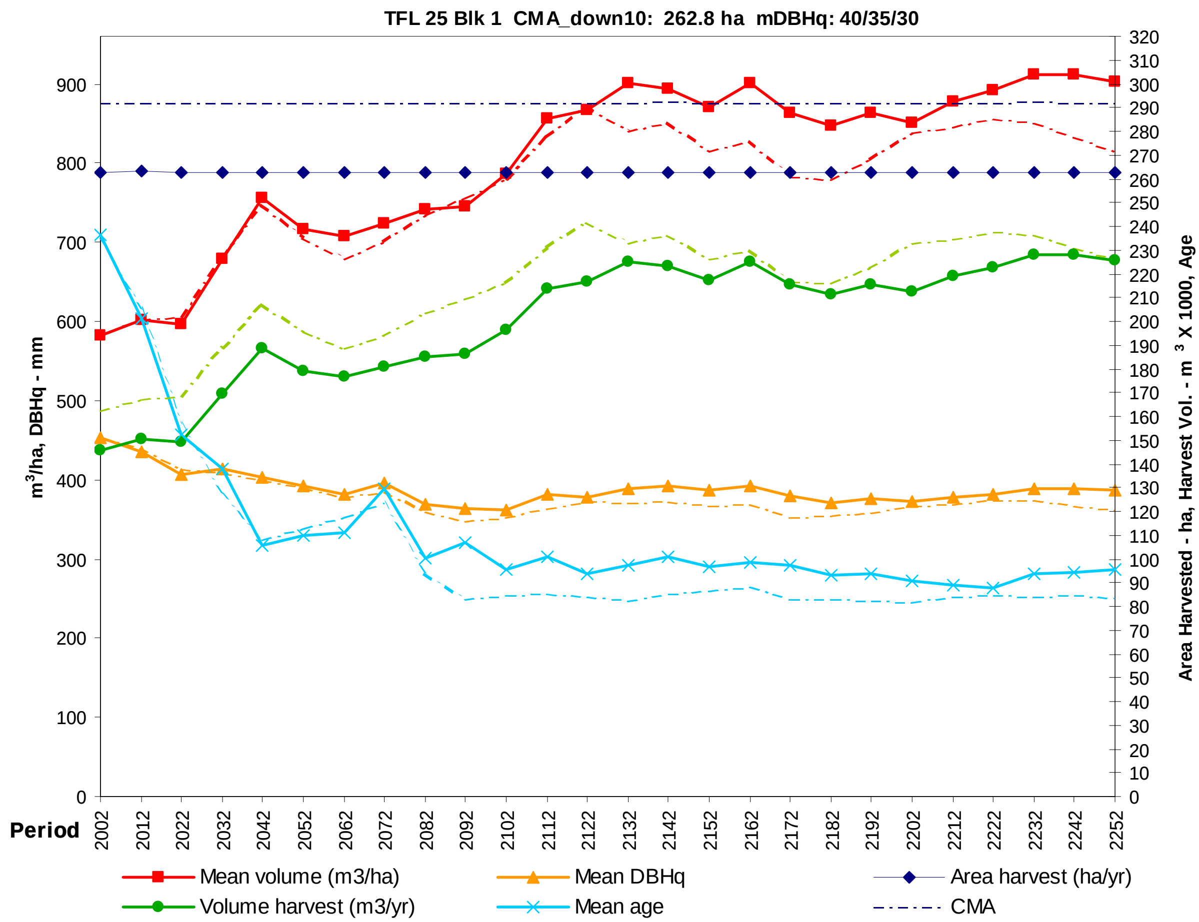

Figure 9. Block 1 harvest statistics through 250 years for current management area harvest less 10%

3.3 Sensitivity Analyses

Harvest output statistics for all sensitivity runs are presented in Appendix A (p. 66). In the harvest output graphs, decreases in area harvest relative to the base case are presented both unadjusted and as a new flat line. For increases in area harvest, a new, higher, flat-line harvest level was established. Flat-line flows were established by increasing area harvest requested until a deficit occurred, and then dropping back to the nearest whole number where the deficit disappears. Appendix B (p.100) summarizes changes in area (Table 10, Table 11) and near, mid, and long term volume (Table 12).

Table 2 presents the area results of sensitivity analyses for Block 1.

Block 1 is most sensitive to changes that alter the minimum harvest age (-SI3m, +age, +ageX2). The "+/-age" results are unbalanced and suggest that an increase in rotation age has a much stronger impact than a decrease in rotation age. This effect is most pronounced in Block 1 and is related to a pinch-point shift from harvestability limitations at the pinch point to increased adjacency or cover restrictions as rotation ages shorten (see +ageX2, +age, -age, and –ageX2 sensitivities).

Table 2. Block 1 Sensitivity results

Run ID	Harvest (ha)	Change (ha)	Change %	Description
CMA	292	-	-	Area-based current management option
+Oe	294	2.0	0.7	Include Oce and Ohe polygons in THLB (1.0% of THLB)
-Oh	286	-6.0	-2.1	Remove helicopter operable polygons (1.6% of THLB)
-SI3m	236	-56.0	-19.2	Reduce SI estimates for age class 1-2 and future stands by 3m
-age	309	17.0	5.8	Lower minimum harvest age by decreasing mDBHq by 3 cm
+age	239	-53.0	-18.2	Increase minimum harvest age by increasing mDBHq by 3 cm
-RndAge	283	-9.0	-3.1	Uses the mDBHq ages rounded up to the nearest 10th year (effectively adds 5 years to mDBHq)
-midVQ	289	-3.0	-1.0	Use mid range disturbance target
+ageX2	196	-96.0	-32.9	Increase minimum harvest age by increasing mDBHq by 3X2=6cm
-ageX2	318	26.0	8.9	Decrease minimum harvest age by decreasing mDBHq by 3X2=6cm

4.0 Block 2 Analysis (Stafford-Apple-Heydon)

4.1 Current Management - 124 ha/year

Figure 10 summarizes for the current management or "base case" simulation, the trends for harvest variables including timber volume, harvest age, mean stand diameter (DBHq), and proportion of helicopter harvesting.

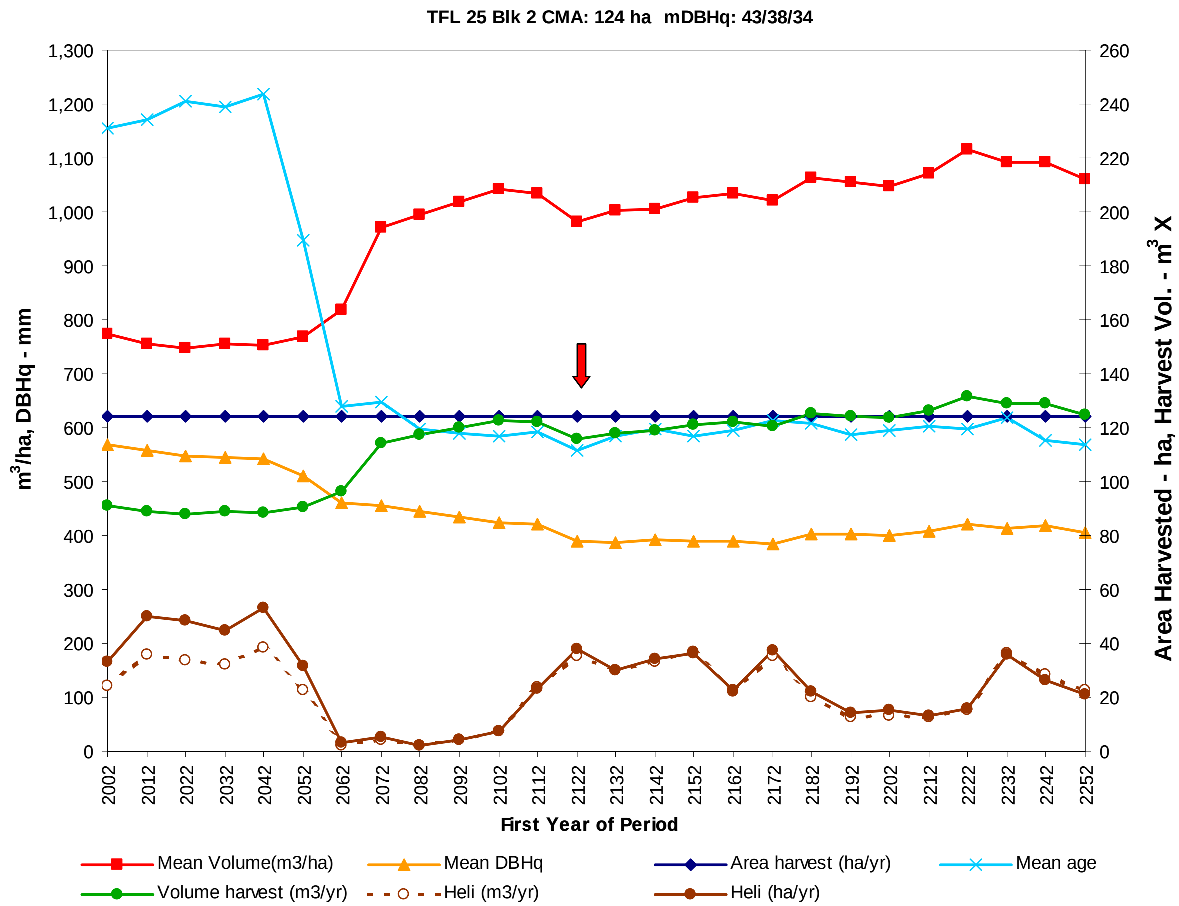

Figure 10. Block 2 Current Management harvest statistics through 250 years[28]

In this simulation the transition to second growth occurs quickly as average harvest age drops abruptly through the 2052 to 2062 periods and stabilizes around 113-124 years. Average stand diameter at harvest also drops abruptly at the transition and a gradual decline continues through the mid term before settling into the 39-42 cm range in the long term. As the second growth comes on stream average merchantable stand volumes at harvest "fall up"[25] from the old growth norm of about 750 m^3/ha to about 1000 m^3/ha and continue to trend upward to near 1100 m^3/ha in the long term. The volume harvest directly reflects the volume/ha trend as it holds steady at about 89,000 m^3/year,

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[28] Red arrow indicates point where area harvest deficit occurs if harvest request is increased by 1 ha.

jumps to 115,000 after the transition, and slowly climbs to near 127,000 m^3/year in the long term.

In this block, timber only accessible to heli-logging makes up a significant portion of the land base and the harvest profile. In the current model configuration there is no satisfactory method to regulate the helicopter portion within the overall area regulation. However, a simulation of the flat line harvest flow from the helicopter-accessible land base only (CMA-Oc, Table 3) and the difference between the base case (CMA) and conventional only (CMA-Oh) harvest levels suggest that the helicopter portion makes up about 23-24 ha of the 124 ha annual flow forecast.

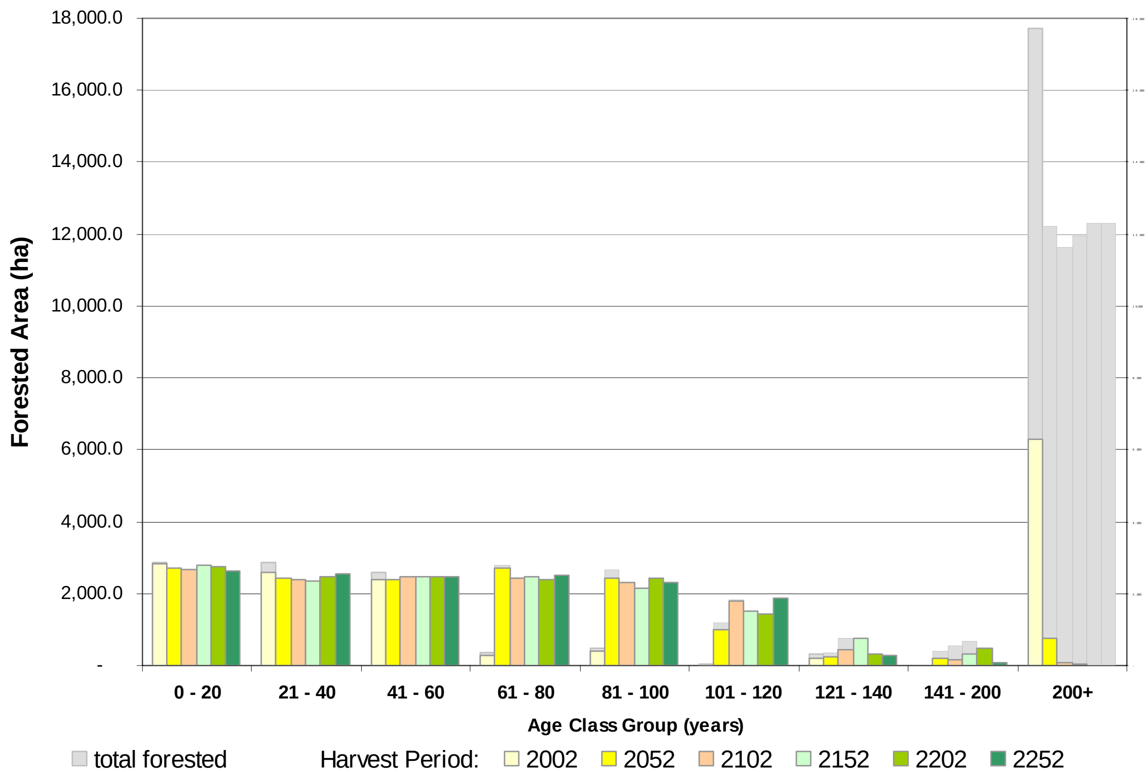

Figure 11. Age class progression on Block 2 THLB (+ total forested) for current management through 250 years

In this Block the indicated harvest level is less than both the LRSA and mLRSA calculations (Table 1). This illustrates that the pinch point or bottleneck at 2122 is preventing an optimal area harvest and in effect for most of the simulation stand harvests are delayed well beyond culmination age and beyond the mDBHq age. This pinch point is also noteworthy in that it is not associated with the old growth to second growth transition.

Age class distributions are examined in Figure 11. The younger age (≤ 60 years) classes remain relatively stable from the current state and occupy between 2,350 and 2,900 ha each indefinitely. Second growth age classes approaching harvestable ages increase significantly in the first 50-year period and then stabilize. 121- to 200-year-old stands are present in low abundance throughout the simulation and are actually increasing in abundance through the first century. On the THLB the oldest stands decline dramatically through the first part of the simulation as the transition to second growth harvesting is completed.

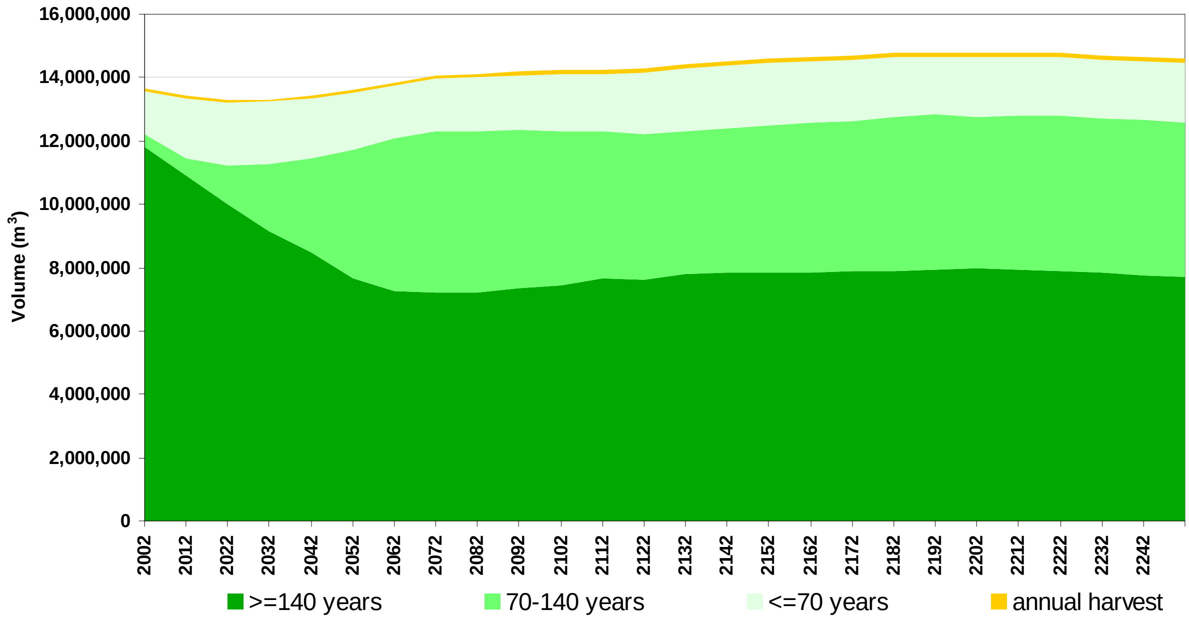

Figure 12. Merchantable growing stock on total Block 2 land base through 250 years

On the total forest land base, forest greater than 200 years old declines from the current level of just under eighteen thousand hectares to a stable long term level of about twelve thousand hectares. Old forest will continue to dominate this landscape under current management assumptions.

Figure 12 above illustrates gross growing stock levels for the total land base. Initially levels drop slightly and then slowly build to in excess of fourteen million cubic metres (m^3). The proportion of older forest drops initially from the current level of about twelve million m^3 and stabilizes at 7-8 million m^3. The older forest volume is replaced by middle-aged volumes (rising to 32-37%), whereas the younger stands remain more or less constant at around 11-15% of total merchantable growing stock. This fourteen million m^3 standing inventory of wood permanently provides substantial habitat and other environmental value while the smaller five million m^3 of 71- to 140-year-old stock therein provides the primary source of sustainable timber production (represented by the thickness of the orange "line" in Figure 12.

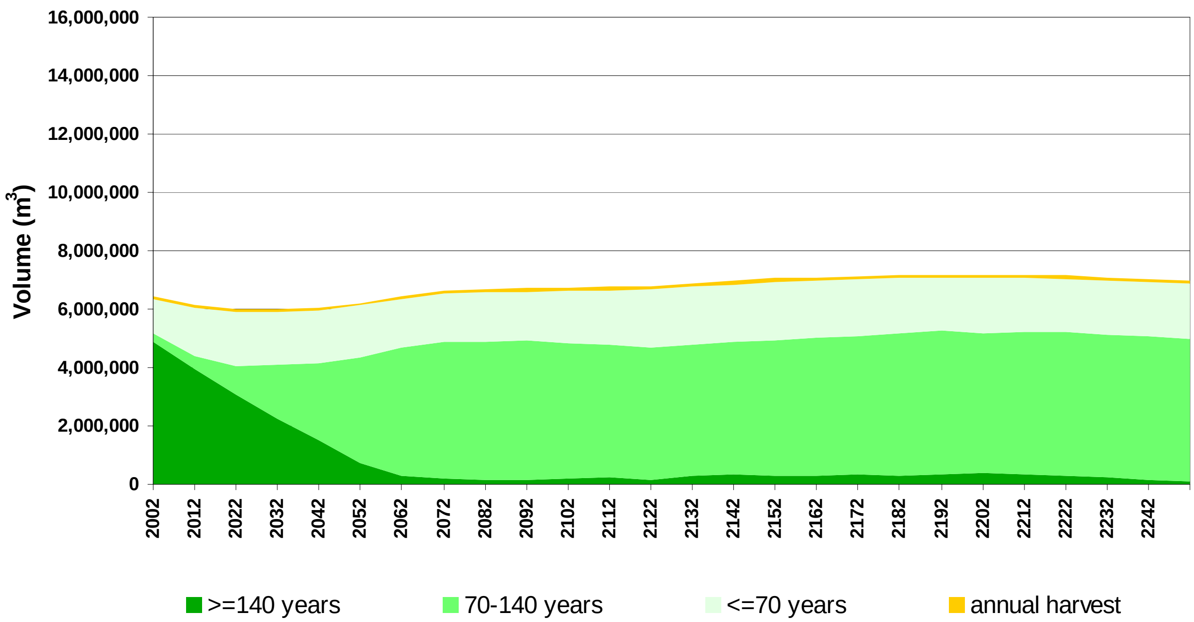

Figure 13. Merchantable growing stock on Block 2 THLB through 250 years

In future, the older growing stock volume is for the most part, but not entirely, in reserves or area projected to be unavailable for timber harvest. Figure 13 displays growing stock through time for the THLB only. For non-timber reasons, some harvestable timber is held significantly beyond normal rotation ages and reaches ages in excess of 140 years before other stands become equally or more suitable for satisfying the non-timber objective(s). When this timber is released, its harvest could provide a small but ongoing supply of older stems possibly suitable for specialty manufacturing or cultural purposes.

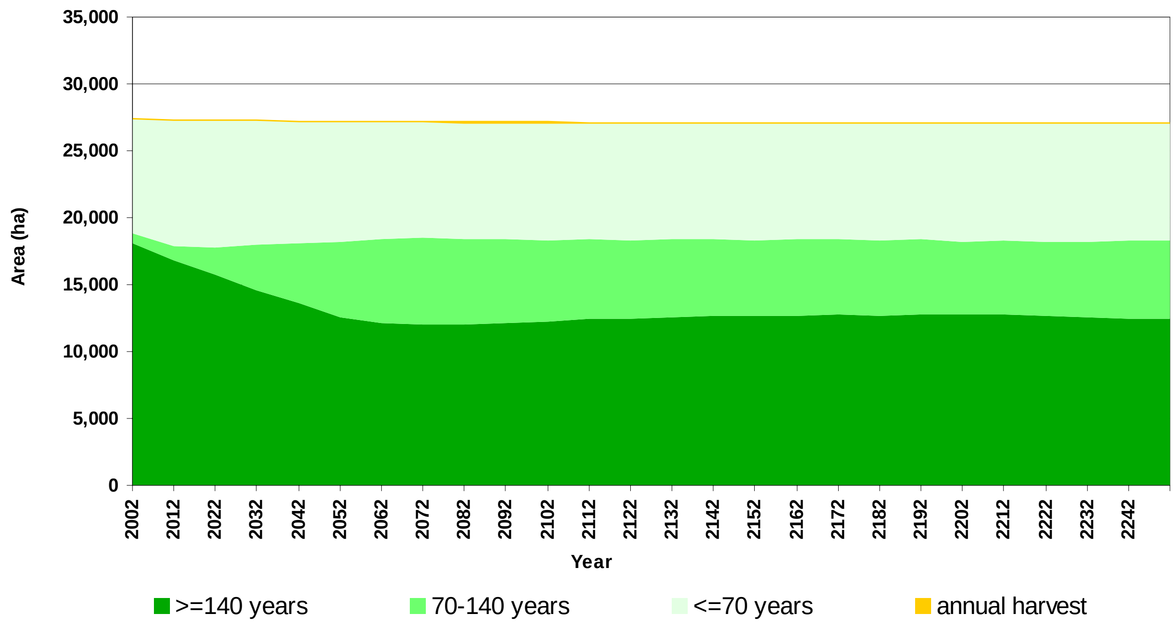

Figure 14. Age-group areas for Block 2 total land base through 250 years

Figure 14 is as per Figure 12 except data is presented on an area basis rather than a volume basis and simplifies the age class data presented in Figure 11.

Initially the area of old forest declines, the area of maturing stands increases, and the area of younger stands remains relatively stable. Contrary to popular opinion, as the transition from old forest progresses, at the landscape level old forest area is not replaced by clearcut area, but rather by 71- to 140-year-old stands. A century into the future under the current management regime, young stands will occur no more frequently than they do today and continue to occupy less than a third of the forested landscape throughout the simulation.

Figure 14 also demonstrates that the age class distribution is already different than the natural disturbance type (NDT1) or recent historical range of natural variability for the area would dictate. To impose or return to an age class distribution representative of infrequent disturbances would be very difficult as well as economically disruptive.

Figure 15 presents growing stock in terms of merchantable volume and area that is larger than the minimum harvestable DBHq.

Roughly 12,300 ha or 45% of the productive land base is unavailable for harvesting for the long term. Because the locations of future Wildlife Tree Patches and partial retention along streams could not be easily predicted, they were modelled as a yield curve volume net down. Consequently these net downs are not represented in any of the aforementioned Figures and the actual volume and/or hectares illustrated understate the old forest reserved from harvest by about 5% of THLB area or volume.

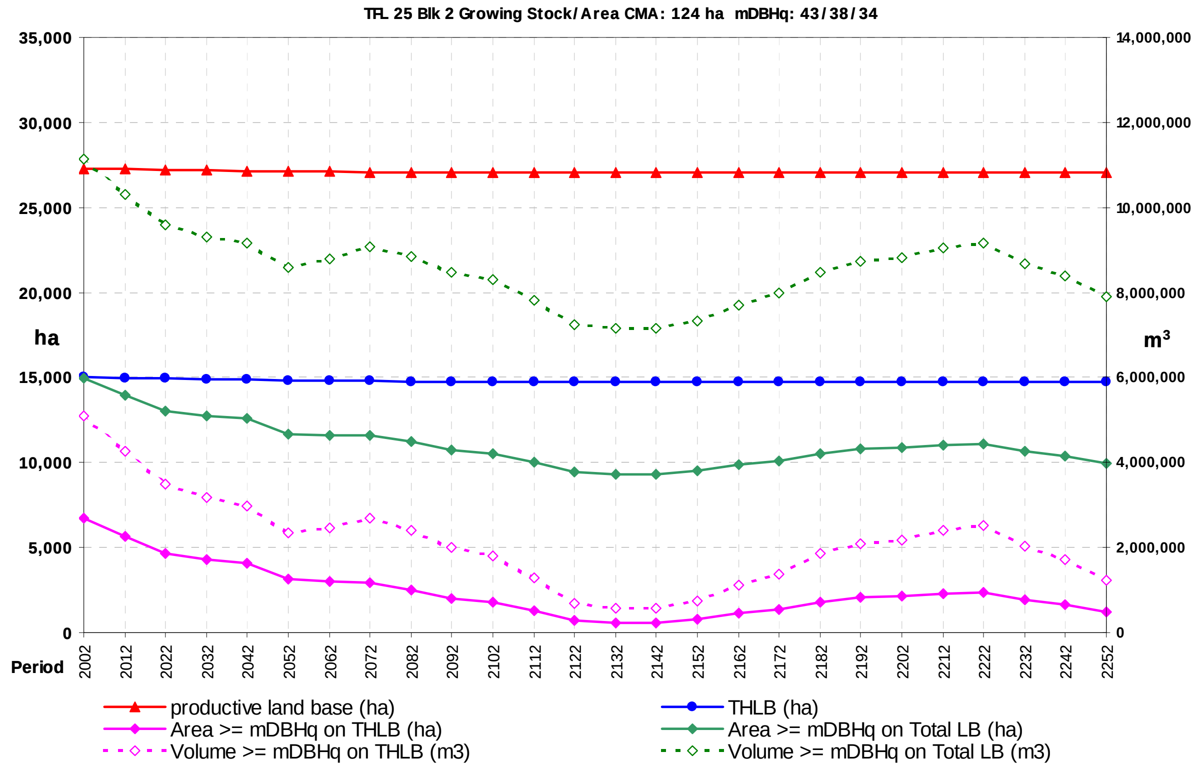

Figure 15. Merchantable growing stock in harvestable (>mDBHq) stands through 250 years for Block 2.

On the THLB, harvestable (>mDBHq) stands become less available until the pinch point is passed and then rebuid thereafter. At the low point harvestable stands amount to about 588 ha, or roughly 5 years worth of harvesting at the indicated harvest level. As the ratio of harvestable area to annual harvest is lower than in other blocks, policy factors such as adjacency are less important than the physical availablity of harvestable stands. The annual harvest area recommendation makes optimal use of the land base's residual timber capacity but operational flexibility could prove difficult through the 2122 to 2161 period. This pinch point rematerializes in the rotation beyond at the end of the simulation.

A strategic focus for silviculture treatments and density regimes could be to increase the number of harvestable stands through the 2122-2161 period where area available for harvesting is projected to be lowest. If the harvestability can be improved an Allowable Cut Effect could be realized. In terms of volume/ha and volume flow there is a slight decline associated with the pinch point so treatments that increase volume per hectare through this period would be of operational benefit.

Silviculture treatments which increase the future volume, merchantability or quality of stands outside the critical harvestability period would be more or less equal in terms of strategic importance and should therefore be ranked using stand-level financial analysis.

4.2 Alternate Harvest Levels

4.2.1 10% Increase

Figure 16 shows that a higher area harvest request induces large area and volume shortfalls starting seventy years into the future. Average harvest age and DBHq decline sooner, recover to base case levels and then decline again at the end of the simulation where a 130-year echo of the 2112 deficit occurs. Average volume per hectare becomes lower in association with area deficits as stands are harvested earlier than was the case in the current management run. Note however volume/ha is relatively unchanged elsewhere in the simulation so that relative to the current management simulation, this run produces 1.7% more volume (487,356 m^3 or 2,000 m^3 annually on average) through 250 years (see Appendix B, Table 12, page 103).

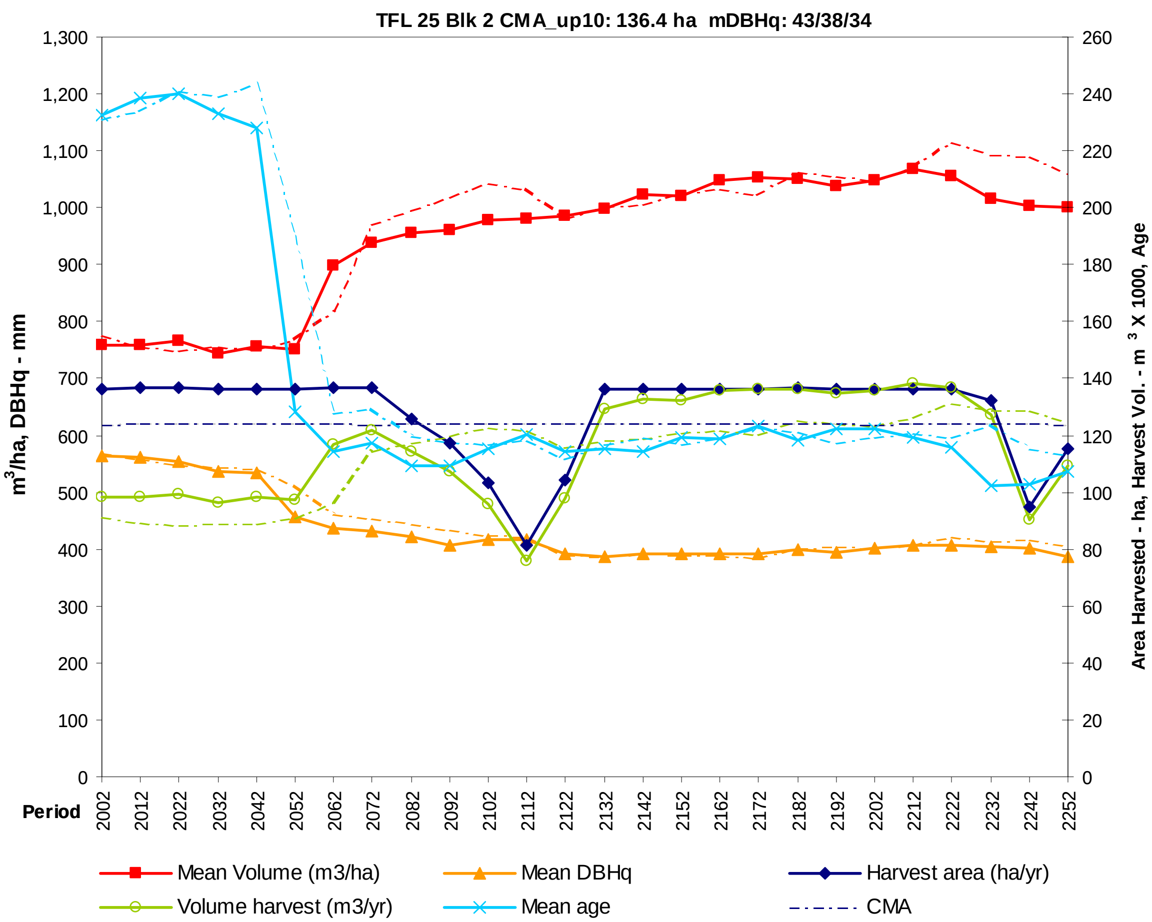

Figure 16. Block 2 harvest statistics[29] through 250 years for current management area harvest plus 10%

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[29] Dashed lines in background represent current management statistics.

4.2.2 10% Decrease

Lowering the harvest request level by 10% has the effect in the short term of lowering the harvest volume about in proportion (-10.3%) to the area change. This is because existing old growth stands harvested in the short term are assumed to be neither adding nor losing volume through time. The lower request delays the transition to second growth by a decade but once second growth becomes an appreciable component of the harvest profile, harvest age and DBHq are significantly higher (longer rotation) with the result that stand volumes per hectare at harvest are higher as well. This tends to compensate for the loss of area harvested such that the overall volume harvest is less affected in the longer term (-5.0%) versus the short term (-10.3%) (Appendix B, Table 12).

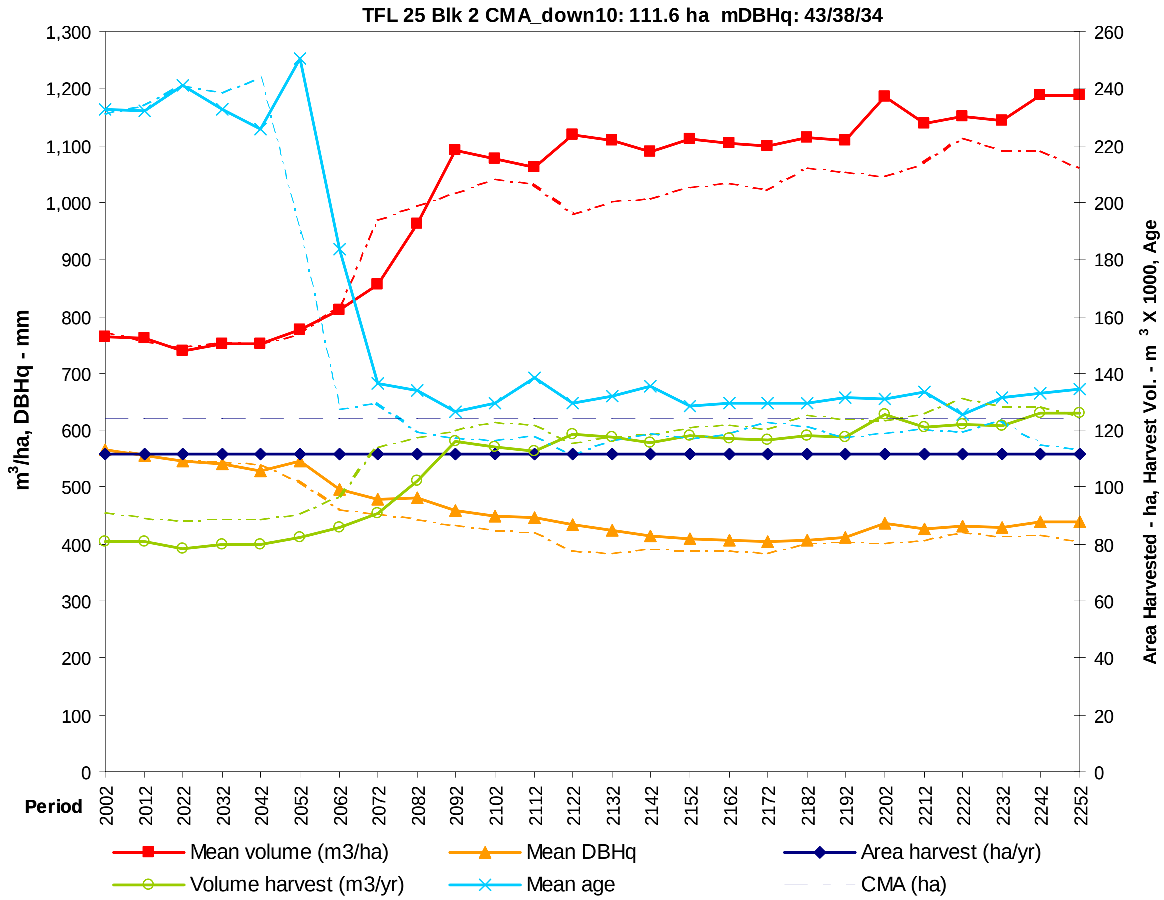

Figure 17. Block 2 harvest statistics[30] through 250 years for current management area harvest less 10%

4.3 Sensitivity Analyses

Harvest output statistics for all sensitivity runs are presented in Appendix A. In the harvest output graphs, decreases in area harvest relative to the base case are

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[30] Dashed lines in background represent current management statistics.

presented both unadjusted and as a new flat line. For increases in area harvest, a new, higher, flat-line harvest level was established. Flat-line flows were established by increasing area harvest requested until a deficit occurred, and then dropping back to the nearest whole number where the deficit disappears. Appendix B (p.100) summarizes changes in area (Table 10, Table 11) and near, mid, and long term volume (Table 12).

Table 3. Block 2 Sensitivity results

Run ID	Harvest (ha)	Change (ha)	Change %	Description
CMA	124	-	-	Area-based current management option
+Oe	126	2.0	1.6	Include Oce and Ohe polygons in THLB (3.7% of THLB)
-Oh	101	-23.0	-18.5	Remove helicopter operable polygons (20.0% of THLB)
-SI3m	106	-18.0	-14.5	Reduce SI estimates for age class 1-2 and future stands by 3m
-age	142	18.0	14.5	Lower minimum harvest age by decreasing mDBHq by 3 cm
+age	105	-19.0	-15.3	Increase minimum harvest age by increasing mDBHq by 3 cm
-RndAge	120	-4.0	-3.2	Uses the mDBHq ages rounded up to the nearest 10th year (effectively adds 5 years to mDBHq)
-midVQ	122	-2.0	-1.6	Use mid range disturbance target
+BEO	120	-4.0	-3.2	Apply specific BEOs to draft or legislated landscape units where not included in CM0
-Oc	24	-100.0	-80.6	Simulation on THLB accessible by helicopter only to estimate flat line portion of harvest attributable to helicopter harvesting.
-HRules	125	1.0	0.8	turn off oldest first and minimize growth loss harvest rules.

Table 3 presents the area results of sensitivity analyses for Block 2.

Block 2 is most sensitive to changes that alter the minimum harvest age (-SI3m, +/-age). Removing the area operable to helicopters only also has a large impact (-18.5%), but this area represents 20% of the THLB.

The –Oc run was done to test if the large fluctuation in the helicopter harvest component of the base case (Figure 10) was of management concern or merely a modelling artefact. As the flatline harvest indicated by –Oc is about the same as the deficit created by the –Oh run, the fluctuation is more likely a modelling artefact. Harvesting of helicopter operable polygons should target 100 to 120 ha for the next five years of cut control. If harvest average exceeds 17 ha/year (75% of –Oh area change) through the short term, disruptions of future harvest flows should be unlikely and later adjustments, if needed, would not have to be drastic.

5.0 Block 3 Analysis (Naka)

5.1 Current Management - 88 ha/year

Figure 18 summarizes for the Block 3 current management simulation, the trends for harvest variables including timber volume, harvest age, mean stand diameter (DBHq), and proportion of helicopter harvesting.

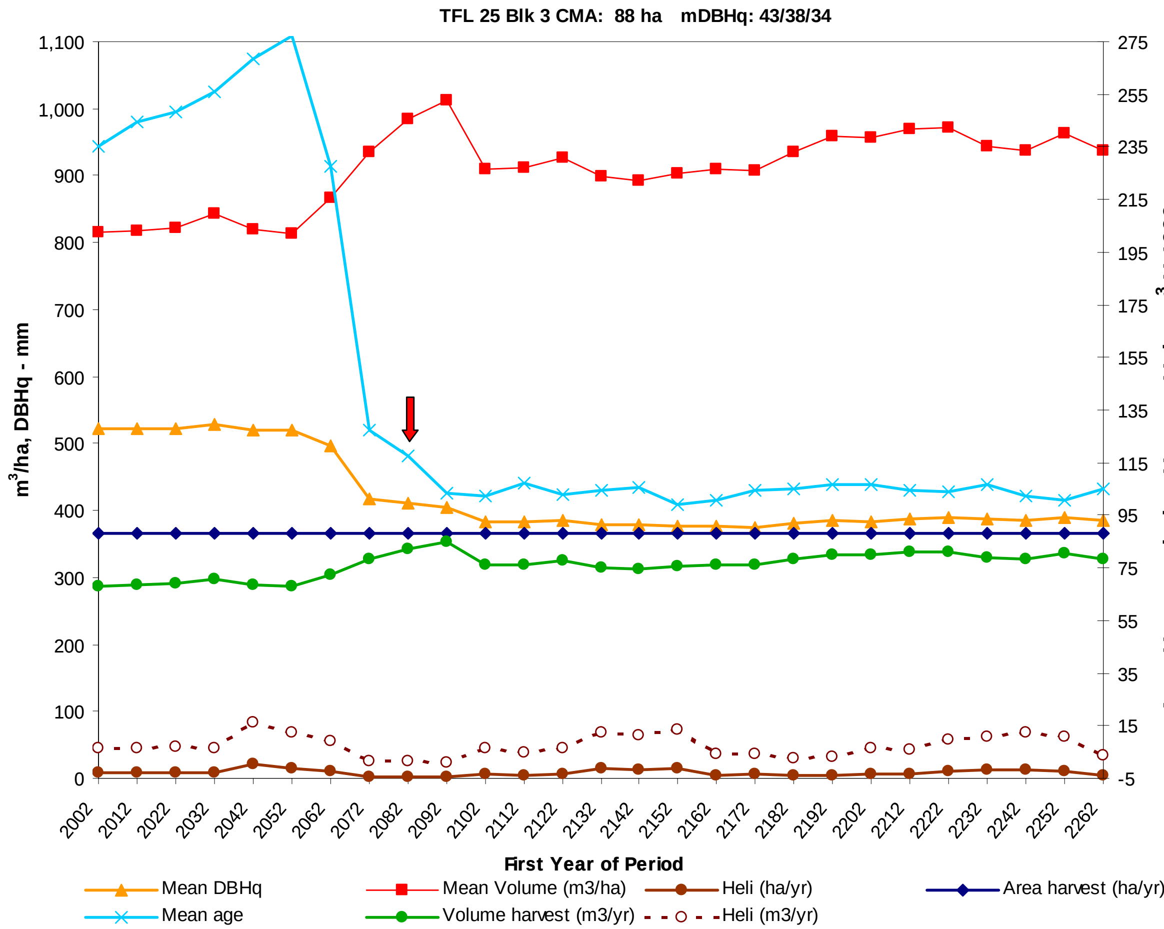

Figure 18. Block 3 Current Management harvest statistics through 250 years[31]

In this block the transition to second growth is abrupt. Average age and diameter of harvested stands declines rapidly within only two decades. Some older stands linger for another few decades and the pinch point occurs as the last of these are being harvested. The pinch point may be associated with an age class imbalance created by the sudden curtailment of harvesting in this block when Blocks 2, 3, and 5 were uncoupled for the purposes of AAC determination and cut control. Old forests make up the entire harvest profile until about 50 years into the future. As the transition progresses

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[31] Red arrow indicates point where an area harvest deficit occurs if harvest request is increased by 1 ha.

average merchantable stand volumes at harvest increase from just over 800 m^3/ha initially and with some fluctuation settle into the 940-970 m^3/ha range in the long term. This effect is primarily related to expected gains from current silviculture practices. As the area harvest is constant, annual harvest volumes increase[25] in tandem with the increasing stand volumes. In the long term, ages at harvest average 101-106 years and average harvest diameters are around 39 cm (individual stands ranging 30-47 cm).

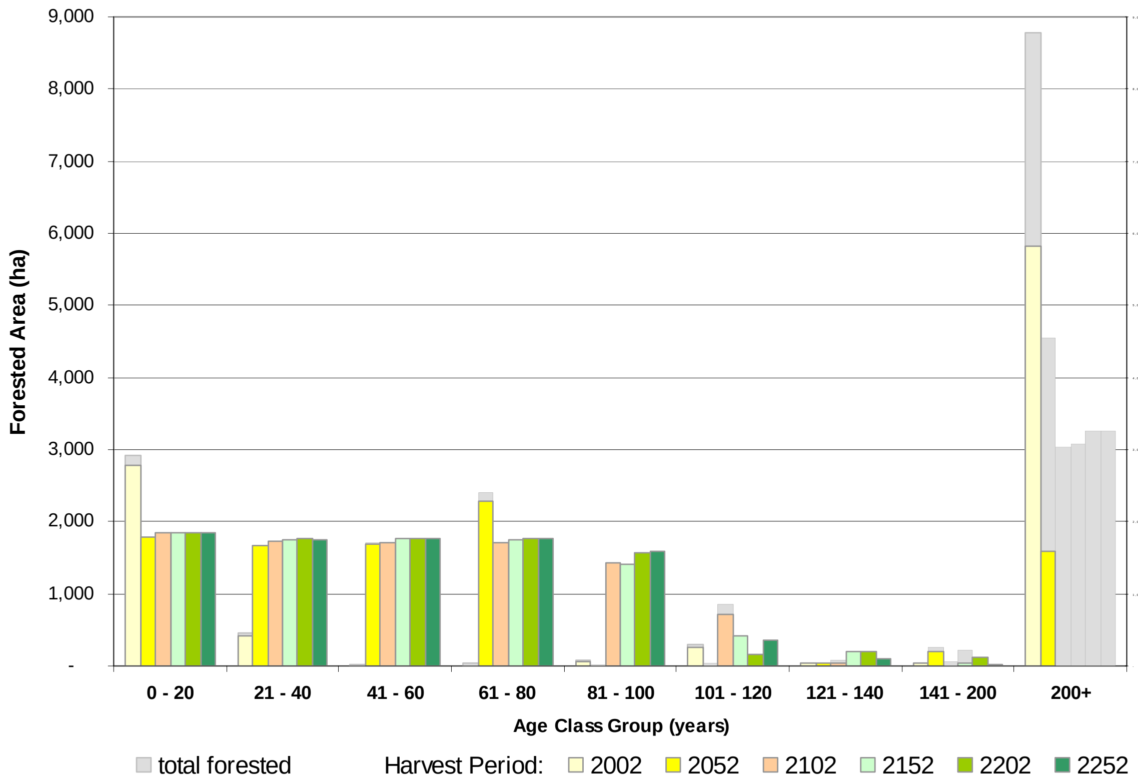

Figure 19. Age class progression on Block 3 THLB (+ total forested) for current management through 250 years

In this Block the LRSA and mLRSA calculations are very similar (Table 1) and the suggested harvest level falls between the two. On average in the long term, stands are harvested near culmination of mean annual increment and close to the threshold minimum harvest age needed to ensure profitability.

Age class distributions are examined in Figure 19. On the THLB, there is initially a disproportionate area in the youngest age class. Previously this block was the focus of harvesting for the combined Block 2, 3, 5 AAC and this regeneration pulse carries through from the 0-20 to the 61-80 age class by 2052. The 21-40 age class is low initially because harvesting began in this block only about 25 years ago. By the next century a more or less balanced age class distribution is attained. Harvestable second growth age classes increase dramatically by the next century and become the basis of the sustainable harvest. 101- to 200-year-old stands remain present in low abundance throughout the simulation. On the THLB the oldest stands decline dramatically through the first one hundred years of the simulation as the transition to second growth harvesting is completed.

On the total forest land base, forest greater than 200-years-old declines from the current level of about 8,800 ha to about 3,200 ha in the long term. This unharvested old forest should facilitate the perpetuation of most old-growth dependent processes or organisms and complement the 6,640 ha of adjacent ecological reserve and park in the Tsitika Valley.

Figure 20 illustrates gross growing stock levels for the total land base. Initially levels are about 7 million m^3 but decline to 5.6 million m^3 before recovering in the longer term to near 6 million m^3. The proportion of older forest drops from the current level of 6.7 million m^3 to about 2.3 million m^3 in the long term. The 6 million m^3 standing inventory of wood permanently provides the basis for sustainable timber flow in the long term and provides substantial habitat and other environmental benefits to supplement values in adjacent park land (6,640 ha). The proportion of younger growing stock increases initially and then stabilizes at about 22% of total growing stock. The 71- to 140-year-old growing stock provides the primary source of sustainable timber production (orange band) through the simulation.

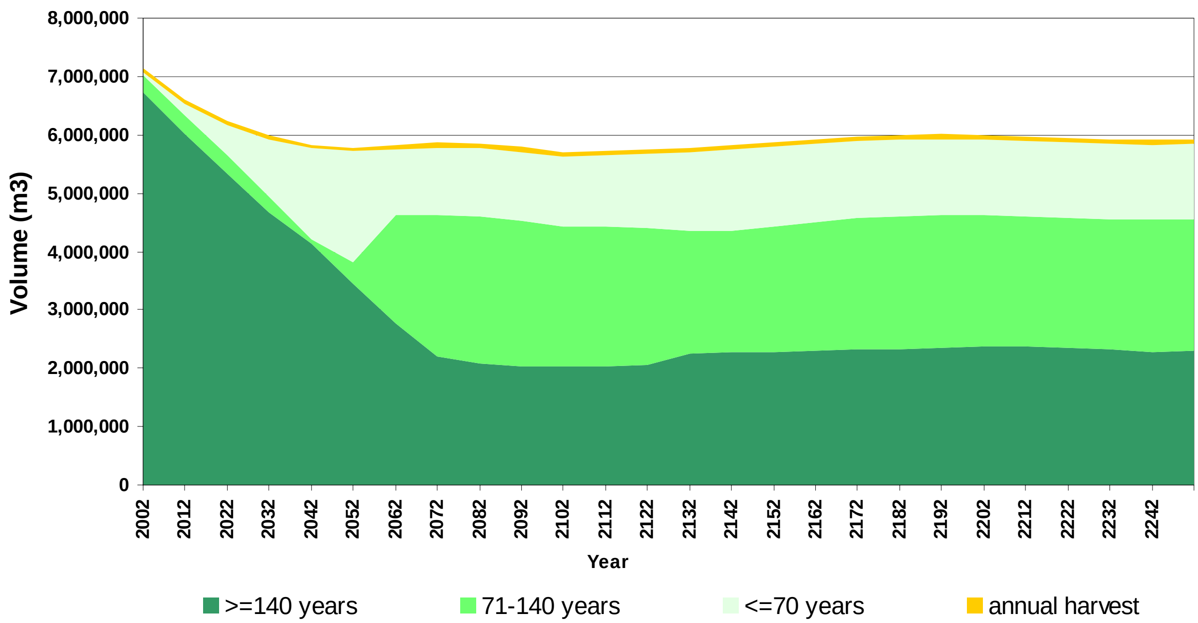

Figure 20. Merchantable growing stock on total Block 3 land base through 250 years

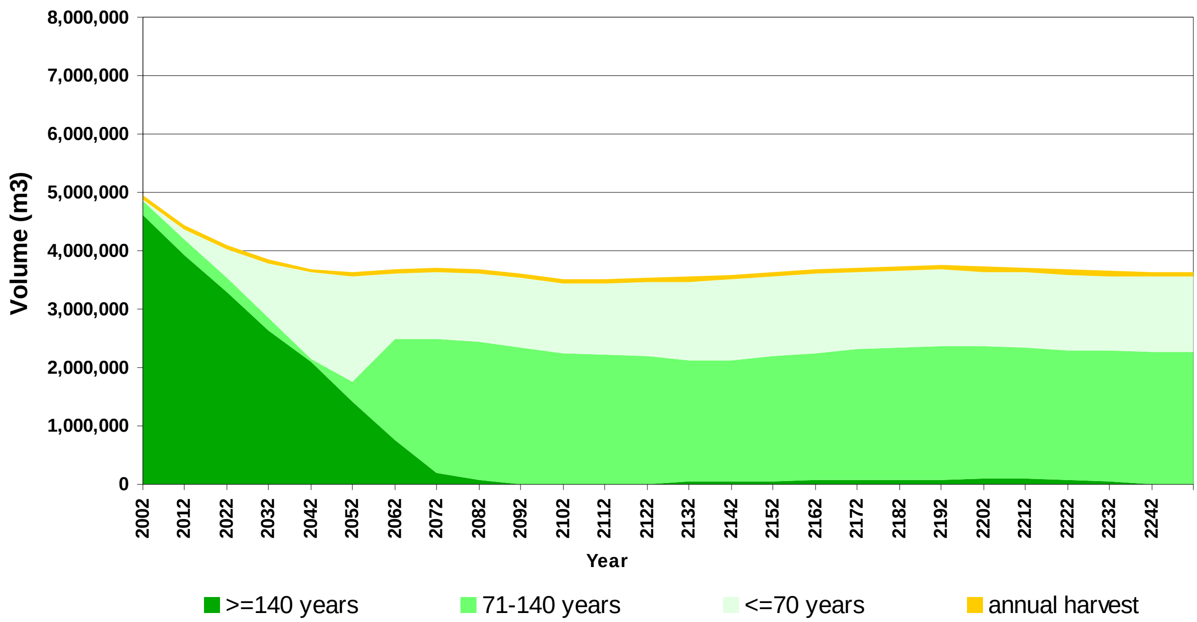

Figure 21. Merchantable growing stock on Block 3 THLB through 250 years

By the next century the older growing stock is for the most part, but not entirely, in reserves or area projected to be unavailable for timber harvest. Figure 21 displays growing stock through time for the THLB only. For non-timber or scheduling reasons, some timber is held significantly beyond normal rotation ages and reaches ages in excess of 140 years before being harvested. This harvest could provide a small but ongoing supply of older stems possibly suitable for specialty manufacturing or cultural purposes.

Figure 22 below is as per Figure 20 except data is presented on an area basis rather than a volume basis and simplifies the age class data presented in Figure 19.

Initially the area of old growth declines, the area of young stands increases and the area of maturing stands remains small. As the transition from old growth nears completion, at the landscape level old growth area is not replaced by clearcut area, but rather by maturing 71- to 140-year-old stands.

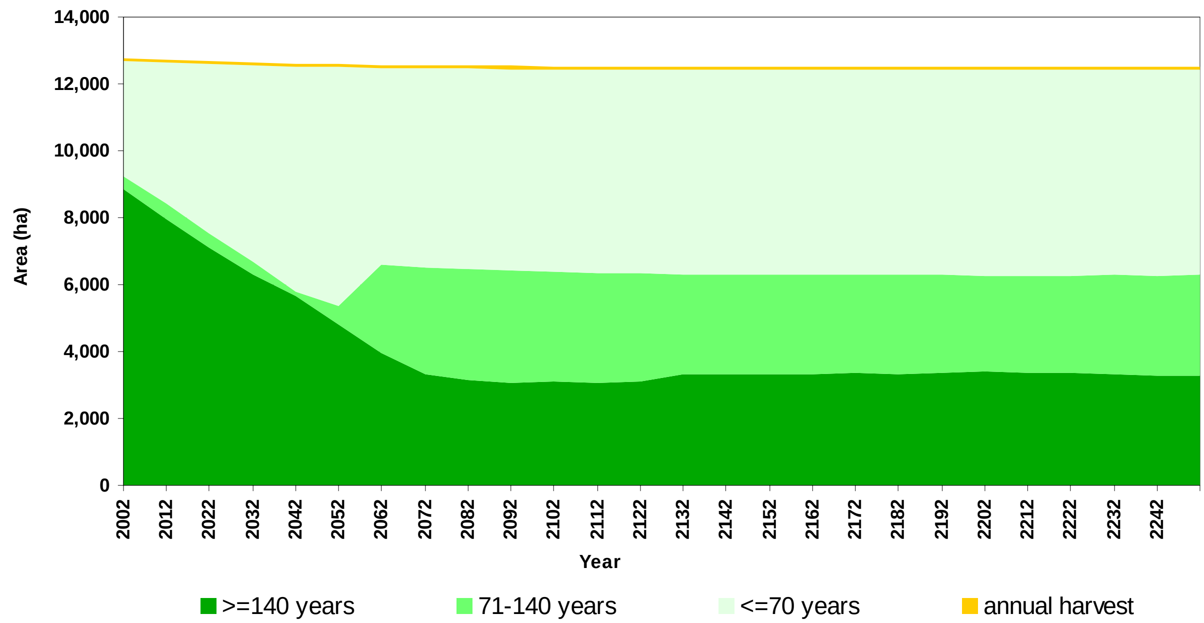

Figure 22. Age-group areas for Block 3 total land base through 250 years

Figure 22 also clearly demonstrates that the age class distribution is already different than the natural disturbance type (NDT1) or recent historical range of natural variability for the area would dictate. Clearly any attempt to impose or return to an age class distribution representative of infrequent disturbances would be very difficult and create timber shortages.

Figure 23 presents growing stock in terms of merchantable volume and area that is larger than the minimum harvestable[12] DBHq.

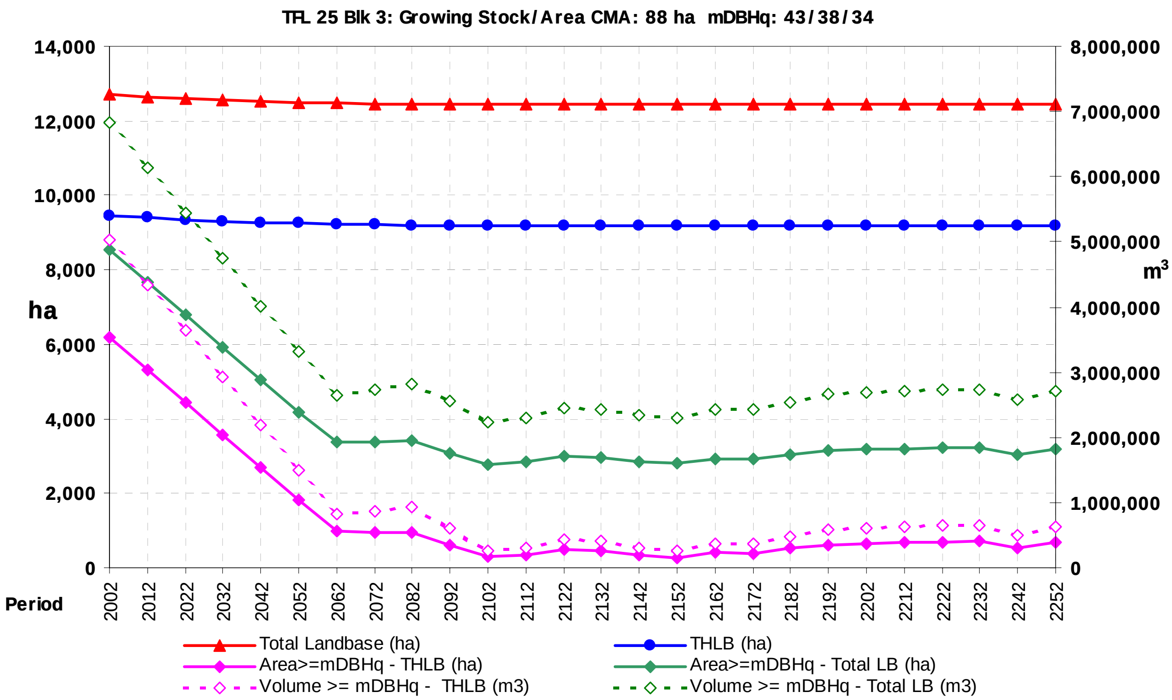

Figure 23. Merchantable growing stock in harvestable (>mDBHq) stands through 250 years for Block 3.

Roughly 3,250 ha or 26% of the productive land base is unavailable for harvesting for the long term. Because the locations of future Wildlife Tree Patches and partial retention along streams or elsewhere could not be easily predicted, they were modelled as a yield curve volume net down. Consequently these net downs are not represented in any of the aforementioned Figures and the actual volume and/or hectares illustrated understate the old forest reserved from harvest by about 5% of THLB area or volume.

On the THLB, harvestable stands become less available and at the pinch point 955 ha, or roughly 11 years worth of harvesting at the indicated harvest level, is of harvestable size. Two decades past the pinch point, this drops to 285 ha or only 3 years worth of harvesting suggesting that adjacency or cover factors are important at the pinch point but thereafter become less important as newly recruited stands are harvested soon after mDBHq is attained. By this point the annual harvest area recommendation makes near optimal use of the land base's residual timber capacity. Operational flexibility in the selection of harvest locations can be expected to be most limited around pinch points at 2102 and 2152.

A strategic focus for silviculture treatments could be to increase the harvestability of stands around the 2082 pinch point and through the 2092-2181 period where area available for harvesting is projected to be lowest. A second objective would be to increase volume/ha during the anticipated dips from 2042 to 2061 and 2102 through 2192 (Figure 18). Otherwise silviculture treatments which increase the future volume, merchantability or quality of stands maturing within the next century may be more or less equal in terms of strategic importance and should therefore be ranked using stand-level financial analysis.

5.2 Alternate Harvest Levels

5.2.1 10% Increase

Figure 24 shows that a higher area harvest request induces area and volume shortfalls at the transition to second growth and several points in the simulation thereafter. Average harvest age and DBHq dips sooner and remains somewhat lower in the long term. Average volume per hectare is lower and declining in the longer term as stands are harvested earlier than was the case in the current management run. Note that relative to the current management simulation, this run produces slightly more volume (267,522 m^3 or 1.4%) through 250 years (Appendix B, Table 12), most of which is realized in the nearer terms.

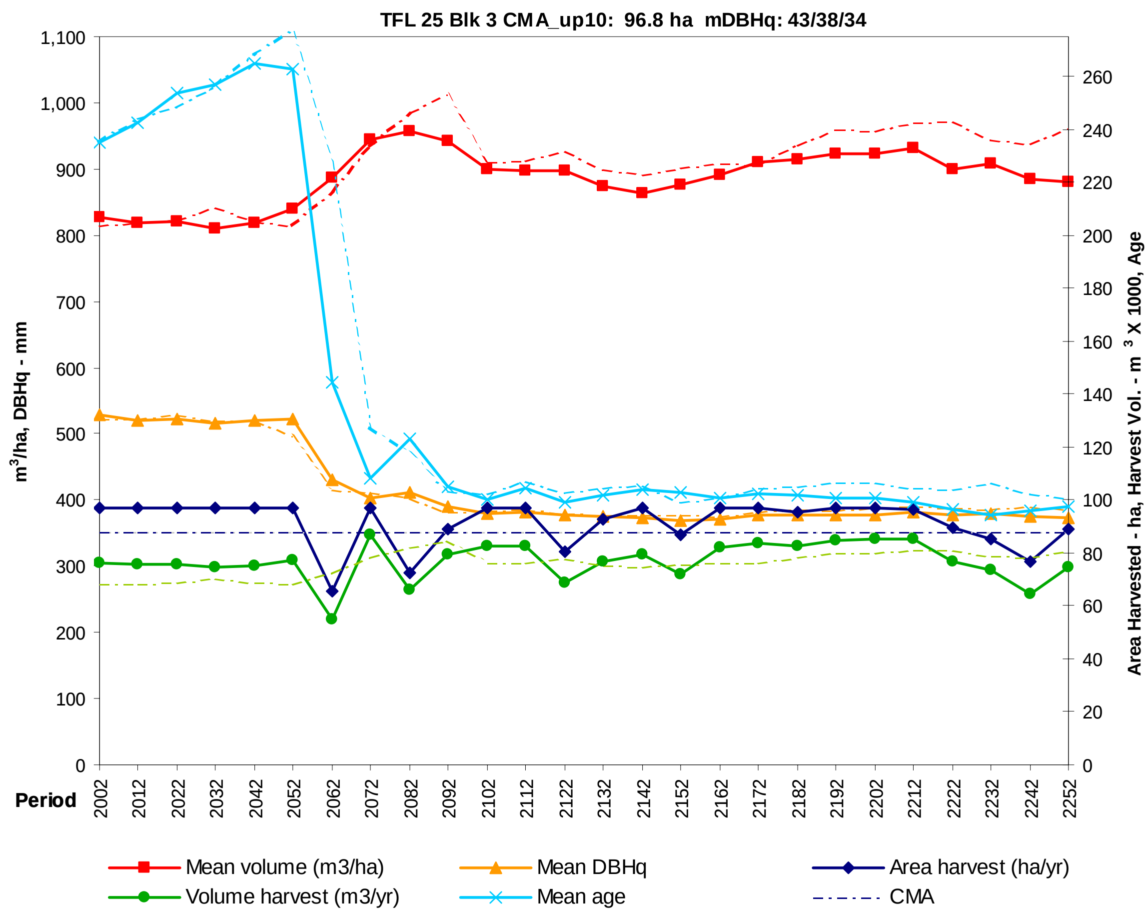

Figure 24. Block 3 harvest statistics[32] through 250 years for current management area harvest plus 10%

5.2.2 10% Decrease

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[32] Dashed lines in background represent current management statistics.

Lowering the harvest request level by 10% (Figure 25) has the effect in the short plus mid term of lowering the harvest volume in proportion (-10.4%) to the area change. This is because existing old growth stands are assumed to be neither adding nor losing volume through time. Once second growth becomes an appreciable component of the harvest profile, harvest age and DBHq are significantly higher (longer rotation) with the result that stand volumes per hectare at harvest are higher as well. This tends to compensate for the loss of area harvested such that the overall volume harvest is less affected in the longer term (-4.6%) (Appendix B, Table 12).

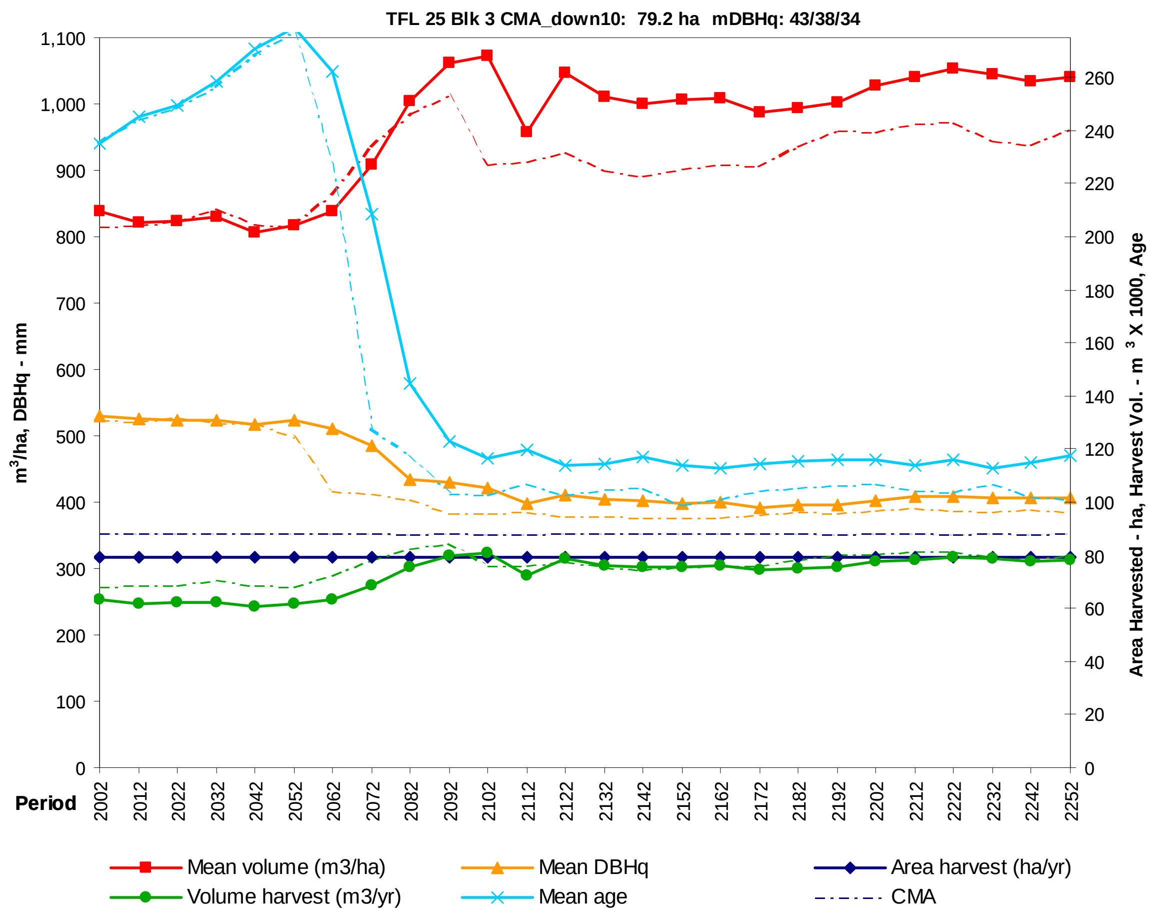

Figure 25. Block 3 harvest statistics through 250 years for current management area harvest less 10%

5.3 Sensitivity Analyses

Harvest output statistics for all sensitivity runs are presented in Appendix A. In the harvest output graphs, decreases in area harvest relative to the base case are presented both unadjusted and as a new flat line. For increases in harvest opportunity, a new, higher, flat-line harvest level was established. Flat-line flows were established by increasing area harvest requested until a deficit occurred, and then dropping back to the nearest whole number where the deficit disappears. Appendix B (p.100) summarizes changes in area (Table 10, Table 11) and near, mid, and long term volume (Table 12).

Table 4 presents the area results of sensitivity analyses for Block 3.

Block 3 is most sensitive to changes that alter the minimum harvest age (-SI3m, +/- age). Removing the area operable only by helicopter has an impact (-9.1%), about proportional to the 8.9% of the THLB excluded from the simulation.

Visual quality is an important issue along the shores of Johnstone Strait and further reducing the allowable disturbance in this area had an impact of –8.0%.

Table 4. Block 3 Sensitivity Results

Run ID	Harvest (ha)	Change (ha)	Change %	Description
CMA	88	-	-	Area-based current management option
+Oe	90	2.0	2.3	Include Oce and Ohe polygons in THLB (2.3% of THLB)
-Oh	80	-8.0	-9.1	Remove helicopter operable polygons (8.9% of THLB)
-SI3m	71	-17.0	-19.3	Reduce SI estimates for age class 1-2 and future stands by 3m
-age	101	13.0	14.8	Lower minimum harvest age by decreasing mDBHq by 3 cm
+age	74	-14.0	-15.9	Increase minimum harvest age by increasing mDBHq by 3 cm
-RndAge	84	-4.0	-4.5	Uses the mDBHq ages rounded up to the nearest 10th year (effectively adds 5 years to mDBHq)
-midVQ	81	-7.0	-8.0	Use mid range disturbance target

6.0 Block 5 Analysis (Central Coast)

6.1 Current Management

6.1.1 Protected Area Candidates Included – 492 ha/year

Figure 26 summarizes for the current management or "base case" simulation, the trends for harvest variables including timber volume, harvest age, mean stand diameter (DBHq), and proportion of helicopter harvesting.

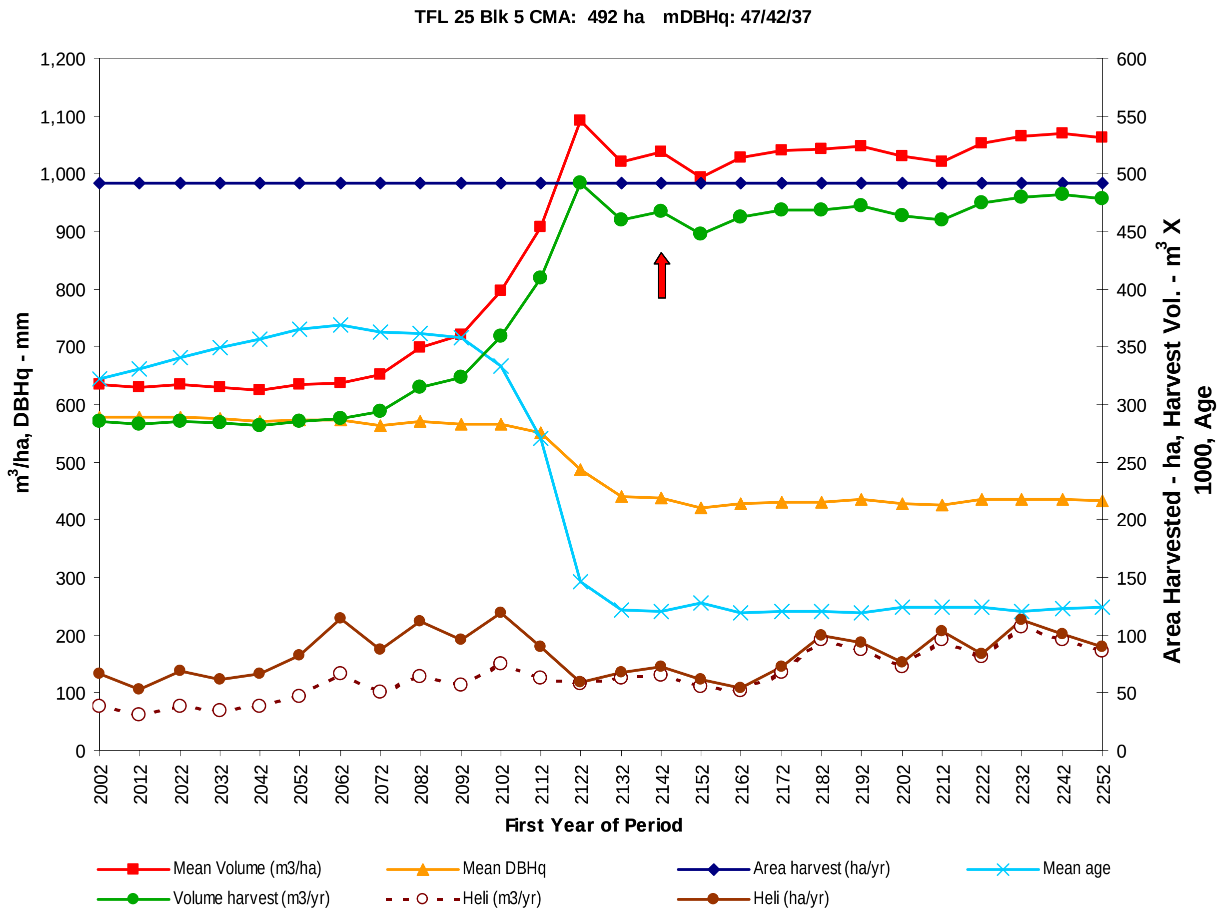

Figure 26. Block 5 Current Management harvest statistics through 250 years[33]

In this Block the primary transition to second growth is not forecast to occur until the start of the next century hence average stand age at harvest climbs until second growth harvesting becomes common. Mean diameters of harvested stands remain relatively constant as existing old stands are assumed to neither grow or decline. However a slight downward trend in DBHq, a flattening harvest age trend, and a slow increase in

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[33] Red arrow indicates point where an area harvest deficit occurs if harvest request is increased by 1 ha.

volume per hectare are evident after sixty years, indicating that a small proportion of second growth begins contributing to the harvest before the primary transition occurs. The bulk of the harvest will be from old forest for at least the next one hundred years.

The primary transition to second growth occurs rapidly within a 30-year period as harvest age and DBHq drop sharply. As the transition progresses average merchantable stand volumes at harvest increase from under 650 m^3/ha to the 1000-1070 m^3/ha range in the long term. This effect is primarily related to expected gains from current silviculture practices. As neither site series ecological mapping nor a Vegetation Resource Inventory have been completed for this Block, the second growth yield forecasts used are less certain than in other Blocks. It is conceivable that second growth yield is overstated, yet the volumes/ha indicated are comparable to Block 5 where both ecological mapping and VRI have been recently completed or updated. In any event, the harvest for the foreseeable future is not second growth dependent.

As the area harvest is constant, annual harvest volumes increase[25] in tandem with the increasing stand volumes. In the long term, ages at harvest average 120-124 years and average harvest diameters are around 42-44 cm (individual stands ranging up to 65+ cm).

In this Block the indicated harvest level is well below the LRSA and slightly below mLRSA calculations (Table 1, p.6), suggesting that near the pinch point (circa 2142) and beyond stands are on average harvested near the threshold minimum harvest age needed to ensure profitability and well beyond the culmination of mean annual increment.

Harvest from helicopter-operable polygons averages 83 ha per year through the simulation.

Age class distributions are examined in Figure 27. On the THLB, the younger age classes initially increase from current levels and then stabilize through the remainder of the simulation. Second growth stands in the 61-100 age classes do not increase significantly until the second century and then stabilize. 101- to 200-year-old stands build modestly through the simulation and 250 years into the simulation occupy more area than at present. On the THLB the oldest stands decline dramatically through the first half of the simulation as old forest is harvested but small amounts do remain indefinitely.

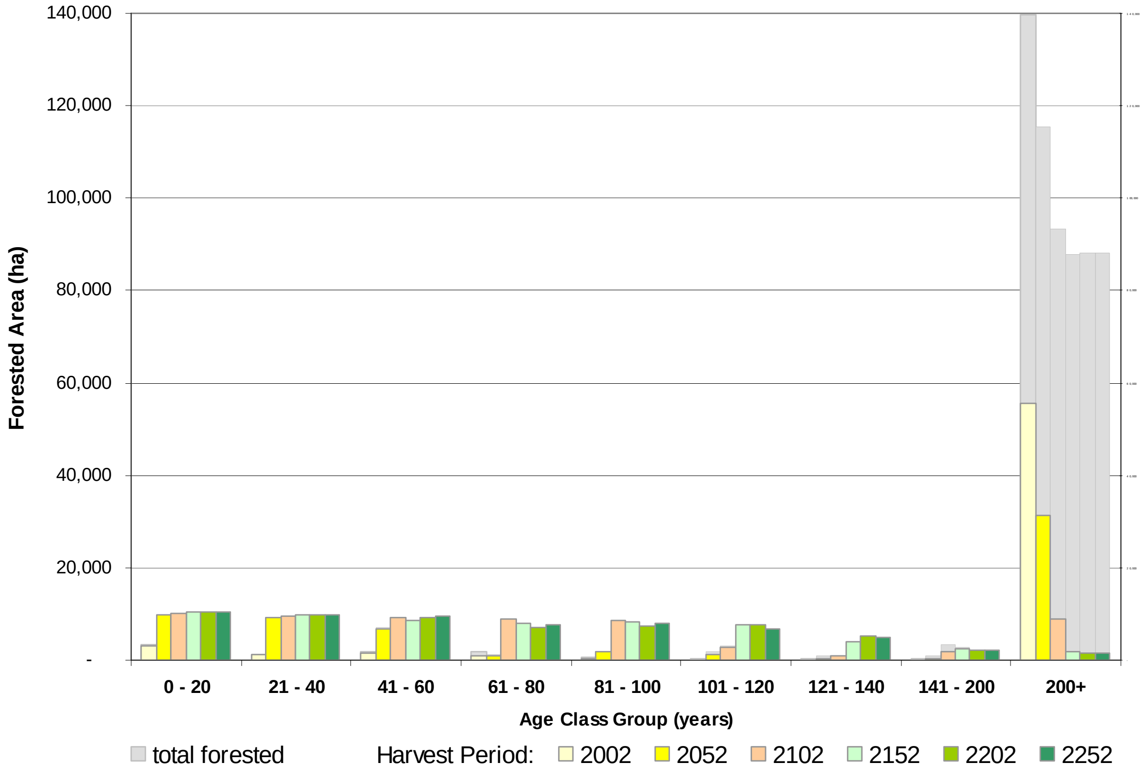

Figure 27. Age class progression on Block 5 THLB (+ total forested) for current management through 250 years

On the total forest land base, forest greater than 200 years old declines from the current level of just under 140,000 ha to about 63% of that level in the long term. At least 88,000 hectares of old forest is forecasted to be present and contributing to the perpetuation of old-growth dependent processes and organisms in the long term.

Figure 28 illustrates gross growing stock levels for the total land base. Initially levels are about 76 million m^3 and fall to about 66 million m^3 through the old forest harvesting phase before recovering to 70 million m^3 in the longer term. The proportion of older forest drops initially from the current level of 74 million m^3 to about 43 million m^3 and then stabilizes near 44 million m^3 in the long term. The 66-76 million m^3 standing inventory of wood permanently provides the basis for sustainable timber flow in the long term and provides substantial habitat and other environmental benefits supplementing values present in the adjacent Fiordland Recreation Area (84,750 ha).

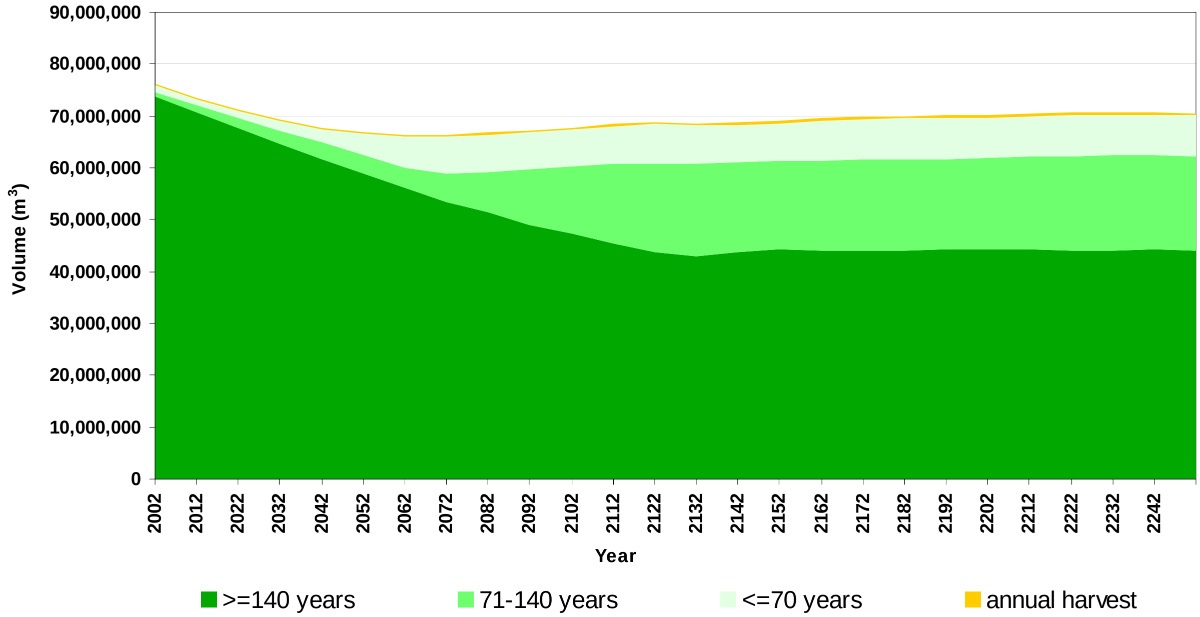

Figure 28. Merchantable growing stock on total Block 5 land base through 250 years

The proportion of younger growing stock increases gradually and then stabilizes at about 11% of total growing stock. The 71- to 140-year-old growing stock, amounting to 26% of total growing stock in the long term, provides the primary source of sustainable timber production through the simulation (represented by the thickness of the orange "line").

The older growing stock is for the most part, but not entirely, in reserves or area projected to be unavailable for timber harvest. Figure 29 displays growing stock through time for the THLB only. For non-timber reasons, 9-12% of growing stock is held significantly beyond normal rotation ages and reaches ages in excess of 140 years before other stands become equally or more suitable for satisfying the model's non-timber objective(s). When this timber is released, its harvest could provide a small but ongoing supply of older stems possibly suitable for specialty manufacturing or cultural purposes.

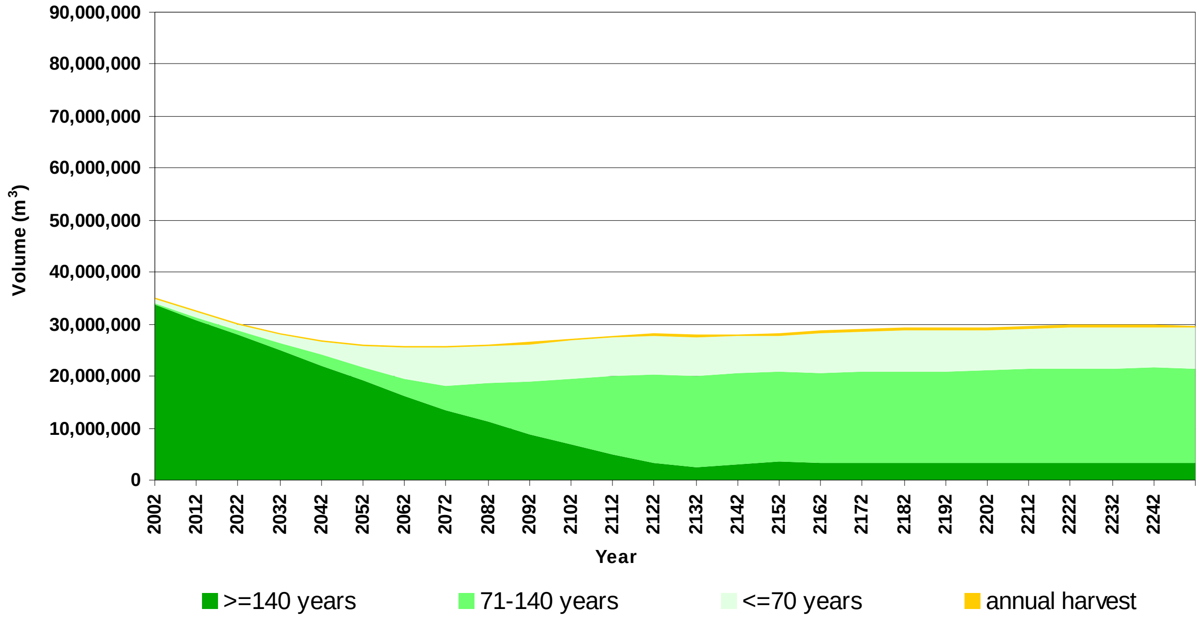

Figure 29. Merchantable growing stock on Block 5 THLB through 250 years

Figure 30 below is as per Figure 28 except data is presented on an area basis rather than a volume basis and simplifies the age class data presented in Figure 27.

The area of old forest declines gradually and the area of young forest increases in proportion through the first 70 years. As the transition to second growth harvesting approaches, the area of younger forest stabilizes and the area of maturing forest builds to provide the basis of a sustainable second growth harvest after the transition. Even in the long term, old forests would dominate this landscape.
Figure 31 presents growing stock in terms of merchantable volume and area that is larger than the minimum harvestable[26] DBHq.

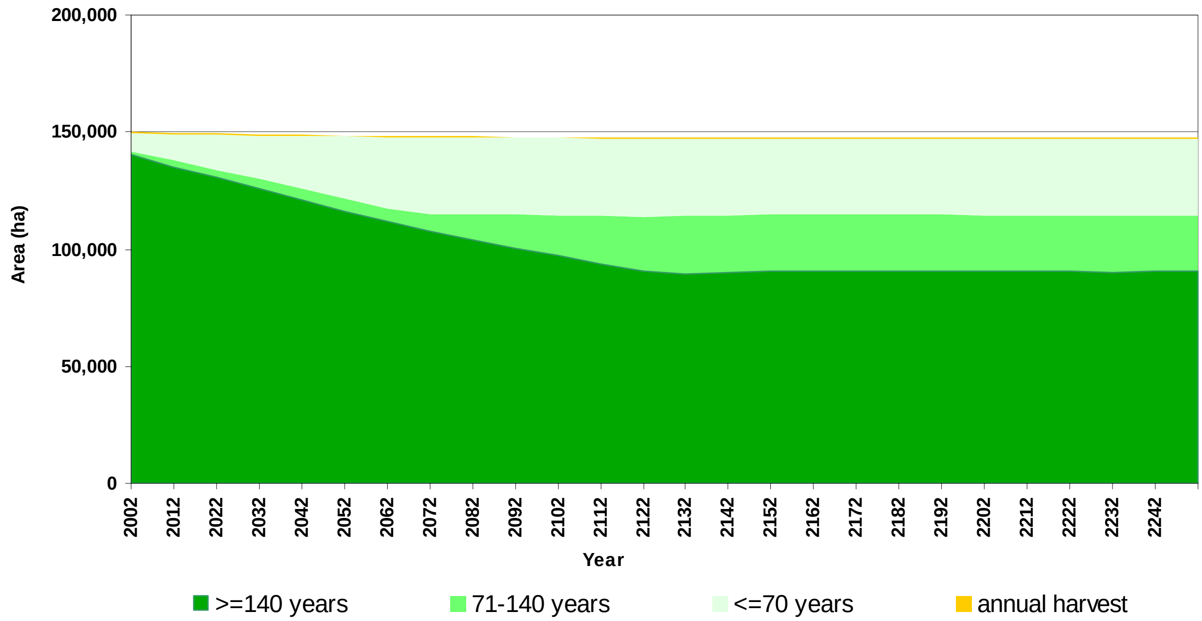

Figure 30. Age-group areas for Block 5 total land base through 250 years

Roughly 86,000 ha or 59% of the productive land base is unavailable for harvesting for the long term. Because the locations of future Wildlife Tree Patches, partial harvests along streams, or retention associated with ecosystem-based management could not be easily predicted, they were modelled as a yield curve volume net down. Consequently these net downs are not represented in any of the aforementioned Figures and the actual volume and/or hectares illustrated understate the old forest reserved from harvest by about 8.5% of THLB area or volume.

On the THLB, harvestable stands become less available until the pinch point and at 2152 amount to about 2,900 ha, or roughly 6 years worth of harvesting at the indicated harvest level. This confirms that the annual harvest area recommendation, after considering non-timber values, makes more or less optimal use of the land base's residual timber capacity while maintaining flexibility to locate harvest blocks. Operational flexibility in the selection of harvest locations can be expected to be most limited through the 2142 through 2181 period where that ration or harvestable area to annual harvest is lowest.

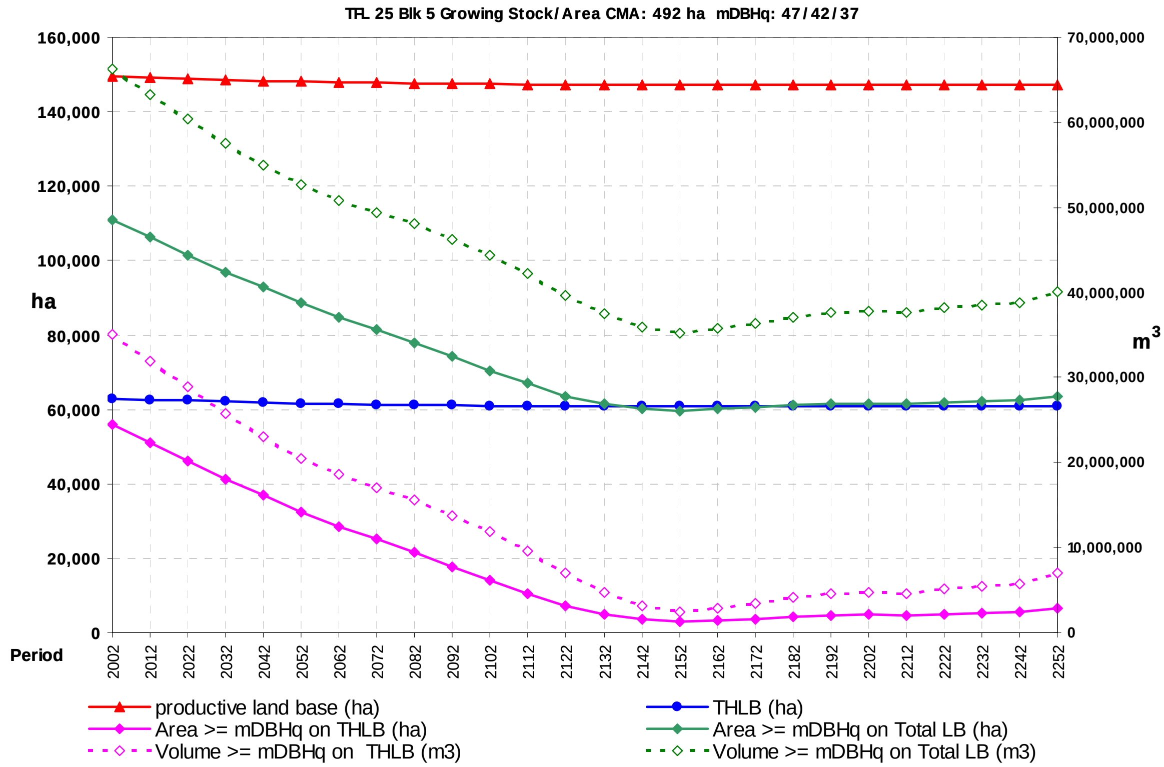

Figure 31. Merchantable growing stock in harvestable (>mDBHq) stands through 250 years for Block 5

Silviculture treatments to increase the harvestability or volumes of stands through the 2142-2181 period may prove worthwhile, but given the modelling and land use uncertainties involved, require more study before recommendation. Silviculture treatments which increase the future volume, merchantability or quality of stands may be more or less equal in terms of strategic importance and should therefore be ranked using stand-level financial analysis.

6.1.2 Protected Area Candidates Excluded – 364 ha/year

Figure 32 summarizes the current management simulation with Candidate Protected areas excluded. Trends for harvest variables including timber volume, harvest age, mean stand diameter (DBHq), and proportion of helicopter harvesting are presented.

In this simulation the output statistics and characteristics relative to the base case - with the large exceptions of area and volume harvested - are relatively unchanged. Annual area and short term volume harvest are reduced by 26% or 128 ha and 74,000 m^3/year. In the long term the impact is greater as annual volume harvest is reduced 128,000 m^3/year (27%) by the end of the simulation.

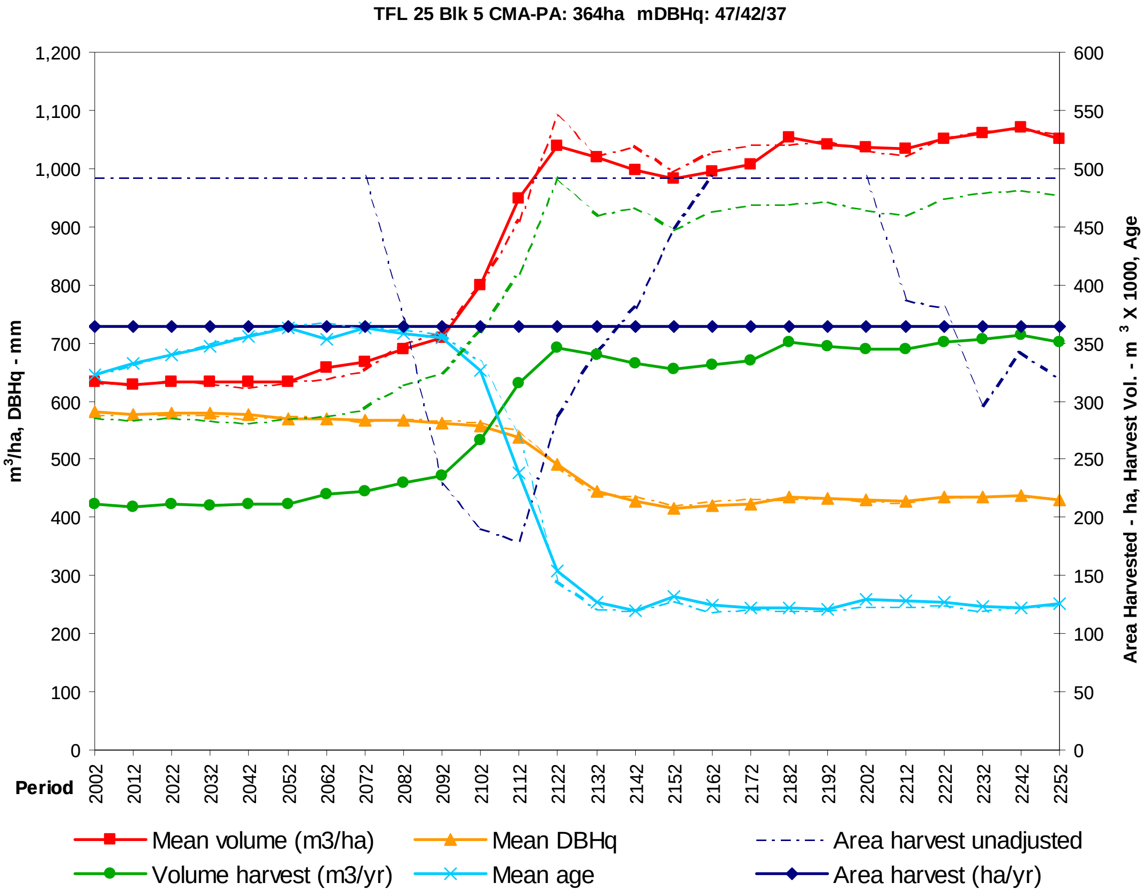

Figure 32. Block 5 Current Management with Candidate Protection Areas excluded - harvest statistics through 250 years[34]

6.2 Alternate Harvest Levels

6.2.1 10% Increase

Figure 33 shows that a higher area harvest request induces area and volume shortfalls at the transition to second growth and advances the transition by a decade. Note that the volume trough created at 2112 remains above volume estimates for the next 80 years. Average harvest age and DBHq dips sooner but is only slightly lower in the long term. Average volume per hectare trends somewhat lower in the long term. Note that relative to the current management simulation, this run produces more volume (5,789,110 m^3 or 23,200 m^3 annually on average) through 250 years (see Appendix B, Table 12).

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[34] Dashed lines in background represent current management statistics.

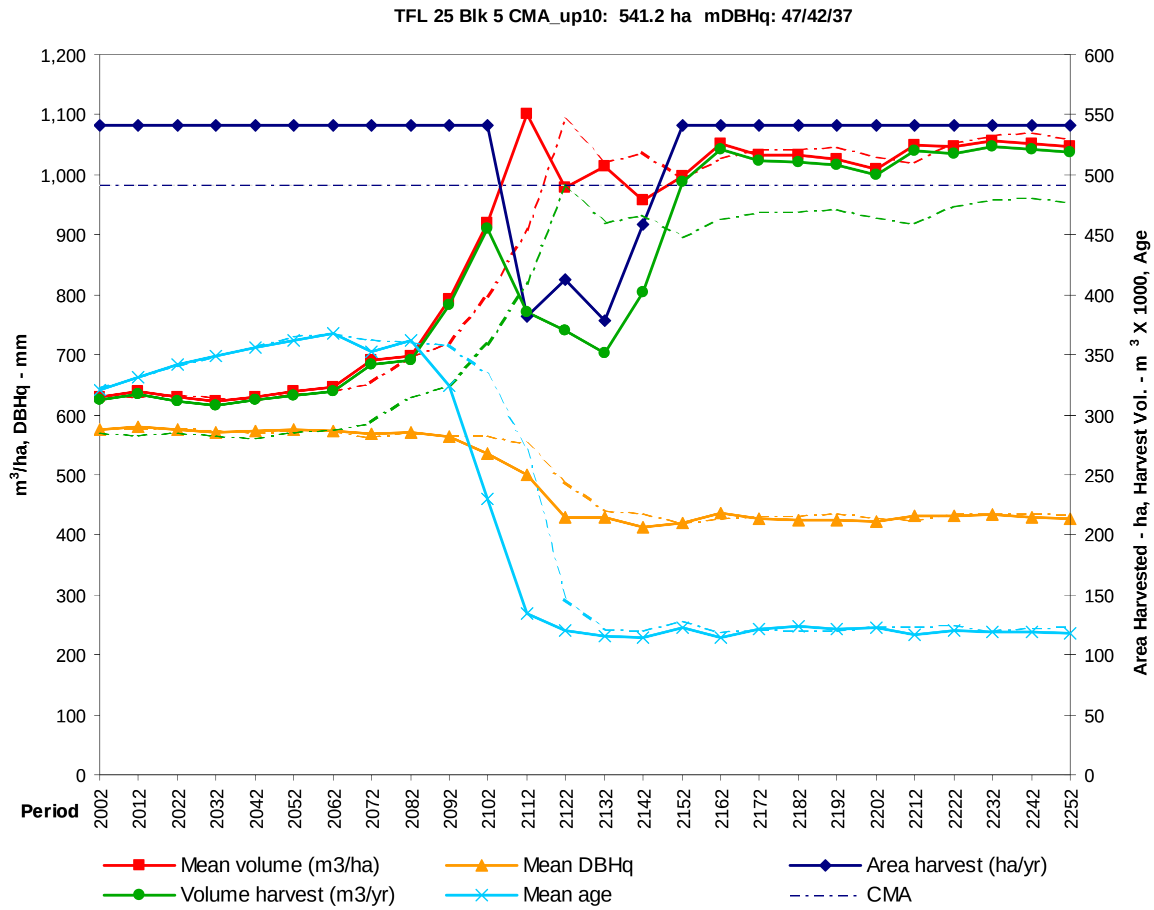

Figure 33. Block 5 harvest statistics through 250 years for current management area harvest plus 10%

6.2.2 10% Decrease

Lowering the harvest request level by 10% (Figure 34) has the effect in the short plus mid term of lowering the harvest volume in proportion (-10.0%) to the harvest area change. This is because existing old growth stands are assumed to be neither adding nor losing volume through time. Once second growth becomes an appreciable component of the harvest profile, harvest age and DBHq are higher (longer rotation) with the result that stand volumes per hectare at harvest are higher as well. This tends to compensate for the loss of area harvested such that the overall volume harvest is somewhat less affected in the longer term (-9.2%) (Appendix B, Table 12) and near the end of the simulation (-4 to -7%).

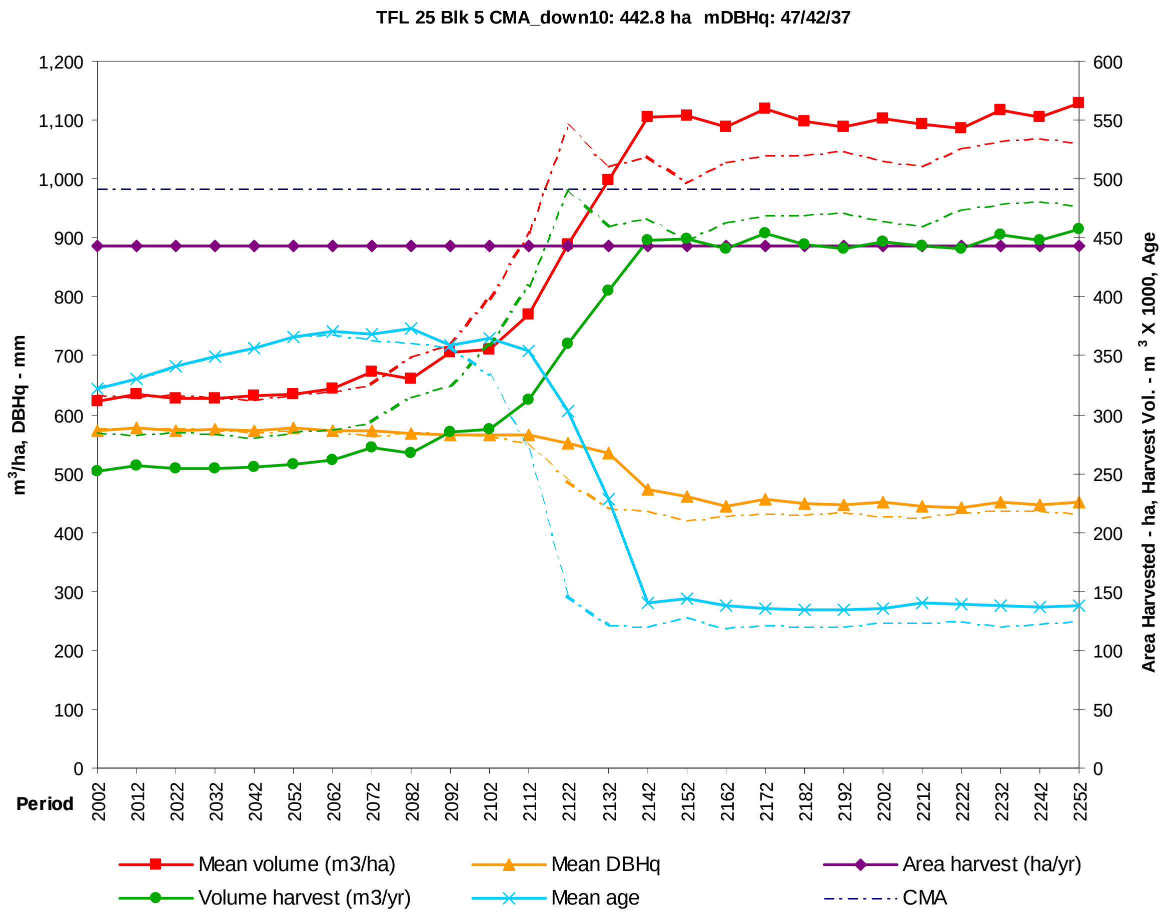

Figure 34. Block 5 harvest statistics[34] through 250 years for current management area harvest less 10%

6.3 Sensitivity Analyses

Harvest output statistics for all sensitivity runs are presented in Appendix A. In the harvest output graphs, decreases in area harvest relative to the base case are presented both unadjusted and as a new flat line. For increases in area harvest, a new, higher, flat-line harvest level was established. Flat-line flows were established by increasing area harvest requested until a deficit occurred, and then dropping back to the nearest whole number where the deficit disappears. Appendix B (p.100) summarizes changes in area (Table 10, Table 11) and near, mid, and long term volume (Table 12).

Table 5 presents the area results of sensitivity analyses for Block 5.

Table 5. Block 5 Sensitivity results

				CMA-PA			
	Harvest	Change		Harvest	Change		Description
Run ID	(ha)	(ha)	%	(ha)	(ha)	%	
CMA	492	-	-	364	-128	-26.0	Area-based current management option
+Oe	511	19	3.9	-			Include Oce and Ohe polygons in THLB (4.7 % of THLB)
-Oh	404	-88	-17.9	-			Remove helicopter operable polygons (18.0% of THLB)
-SI3m	434	-58	-11.8	323	-41	-11.3	Reduce SI estimates for age class 1-2 and future stands by 3m
-age	559	67	13.6	409	45	12.4	Lower minimum harvest age by decreasing mDBHq by 3 cm
+age	448	-44	-8.9	336	-28	-7.7	Increase minimum harvest age by increasing mDBHq by 3 cm
-RndAge	483	-9	-1.8	358	-6	-1.6	Uses the mDBHq ages rounded up to the nearest 10th year (effectively adds 5 years to mDBHq)
-PA	364	-128	-26.0	-			Remove protected area candidates as identified in April, 2001 announcement
-PA-OA	206	-286	-58.1	-			As above and also remove Option Areas identified in April, 2001 announcement
-midVQ	477	-15	-3.0	349	-15	-4.1	Use mid range disturbance target
+BEO	492	0	0.0	364	0	0.0	Apply specific BEOs to draft or legislated landscape units where not included in CM0
-SsSIest	469	-23	-4.7	347	-17	-4.7	Adjust SI so that Good site Spruce SI=34m instead of 39m - Piece size remains 47-42-37

Removal of the Candidate Protected Areas identified in the April, 2001 agreement will result in a 26% reduction of area harvest. Additional removal of the Option Areas identified at that time would result in a total area harvest reduction of 58% or 286 ha.

Land base reductions aside, Block 5 is most sensitive to changes that alter the minimum harvest age (-SI3m, +/- age). Removing the area operable only by helicopter has an impact proportional to the THLB excluded from the simulation.

Visual quality is an important issue along the Inside Passage and further reducing the allowable disturbance in this area had an impact of –3.0%.

7.0 Block 6 Analysis (Haida Gwaii)

7.1 Current Management - 254 ha/year

Figure 35 summarizes for the current management or "base case" simulation, the trends for harvest variables including timber volume, harvest age, mean stand diameter (DBHq), and proportion of helicopter harvesting.

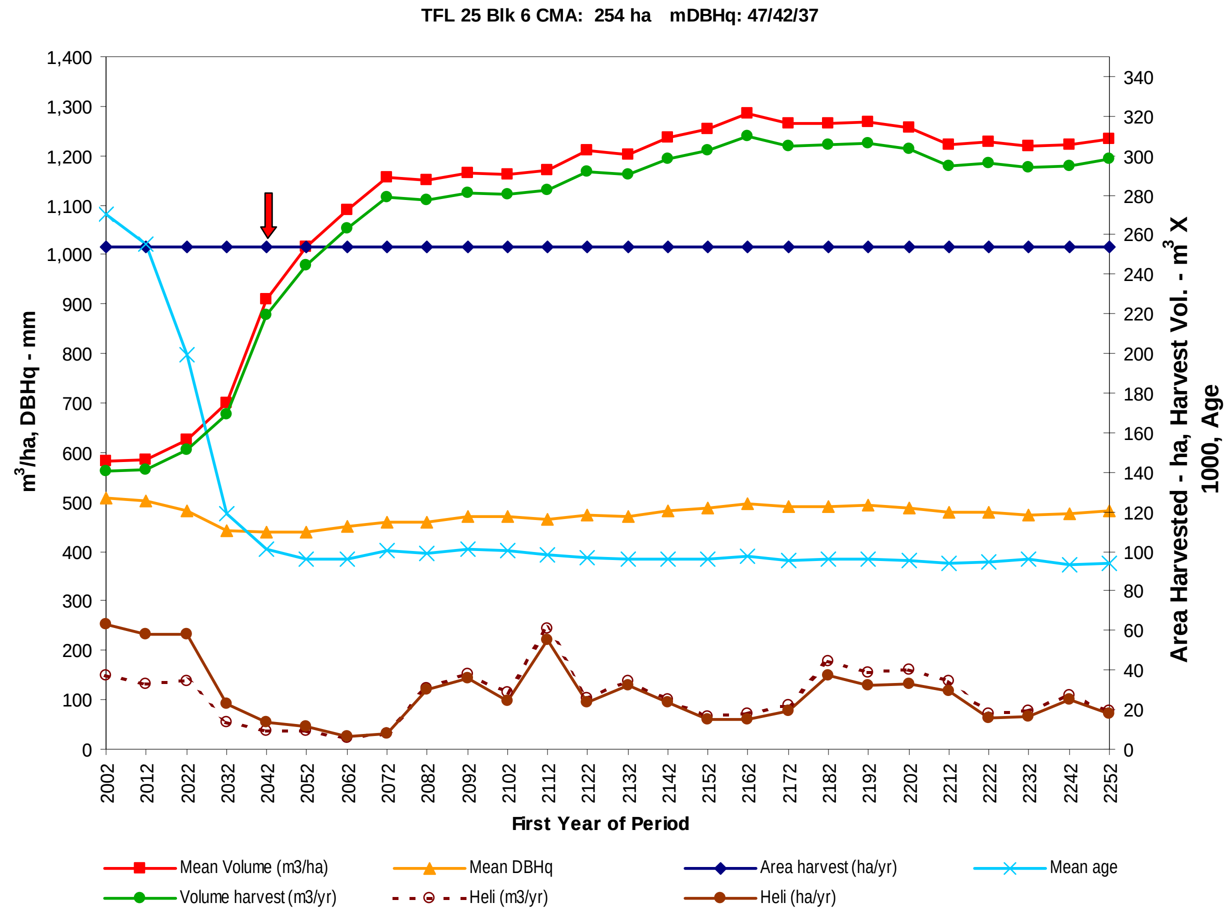

Figure 35. Block 6 Current Management harvest statistics through 250 years[35]

In this Block the transition to second growth is expected within the next few decades. As this occurs, average age of harvested stands declines abruptly until the transition is complete. Average DBHq at harvest declines from around 51 cm at present to 44 cm after 30 years and rebuilds to 47-50 cm in the long term. Within twenty years average merchantable stand volumes at harvest start to increase from current levels of under 600 m^3/ha and rapidly rise to in excess of 1,100 m^3/ha within 70 years. This effect is related to maturing second growth becoming available for harvest. Current AAC has been

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[35] Red arrow indicates point where an area harvest deficit occurs if harvest request is increased by 1 ha.

significantly depressed due to the age class imbalance created by the 1988 withdrawal of Gwaii Haanas reserve from forest management. Expected gains from current silviculture practices add to the second growth fall up[25] later in the simulation. As the area harvest is constant, annual harvest volumes increase in tandem with the increasing stand volumes. In the long term, ages at harvest average 93-98 years and average harvest diameters are around 47-50 cm (individual stands ranging 37-70+ cm).

In this Block the indicated harvest level is less than the LRSA and mLRSA calculations (Table 1, p.6), suggesting that throughout the simulation and even at the pinch point circa 2042 stands are on average harvested well beyond culmination of mean annual increment and the threshold minimum harvest age needed to ensure profitability.

Harvesting in helicopter-operable polygons makes up about 60 ha annually in the short term, but on average 11% or 28 ha per year of the annual harvest is from helicopter polygons. In the current model set-up there is no satisfactory method to regulate the helicopter portion within the overall area regulation so the short term heli-portion may be overstated. The appropriate level of harvesting from helicopter-operable polygons is discussed further in section 7.3.

Age class distributions are examined in Figure 38. On the THLB, the 21-60 age classes initially decline from current levels (which reflect a larger pre-1988 AAC and the concentration of early harvesting on the northern portion of Moresby Island) and then stabilize through the remainder of the simulation. Older (61- to 120-year-old) second growth age classes increase significantly in the first 50-year period and then stabilize. 121- to 250-year-old stands remain present in low abundance throughout the simulation. On the THLB the oldest stands decline in the first 50 years from 6,000 ha to 200 ha as the transition to second growth harvesting is completed.

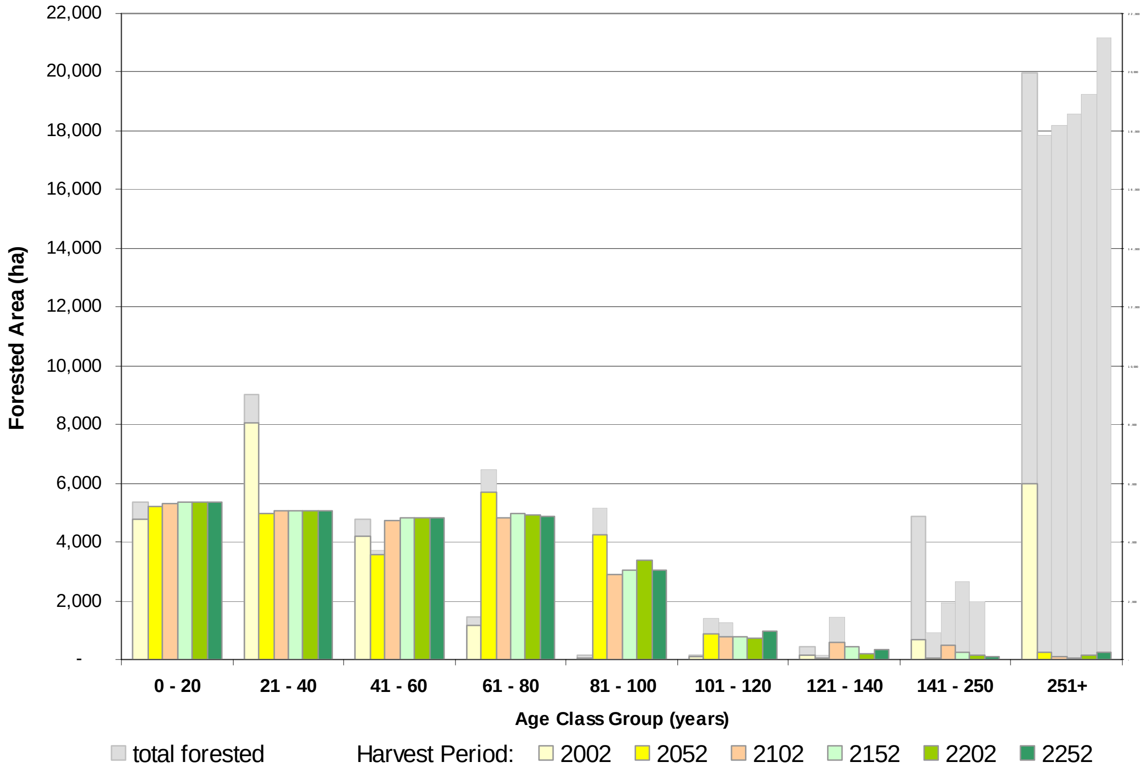

Figure 36. Age class progression on Block 6 THLB (+ total forested) for current management through 250 years

On the total forest land base, forest greater than 250 years old declines from the current level of just under 20,000 ha to about 18,000 ha and then rebuilds to above the 21,000 ha level as 141- to 250-year-old stands are recruited into the oldest age class. In this landscape, the future proportion of old forest remains essentially unaltered from current conditions.

Figure 37 illustrates gross growing stock levels for the total land base. Initially levels are about 17.5 million m^3 and rise above 25 million m^3 in the longer term. The proportion of older forest drops initially from the current level of about 12.5 million m^3 to about 9 million m^3 and then stabilizes near 12 million m^3 in the long term. This building standing inventory of wood permanently provides the basis for sustainable timber flow in the long term and provides substantial habitat and other environmental benefits to supplement values in the adjacent Gwaii Haanas reserve (148,500 ha). The proportion of younger growing stock increases initially and then stabilizes at about 24% of total growing stock. The 71- to 140-year-old growing stock provides the primary source of sustainable timber production through the simulation and increases from near nil initially to 28% in the long term.

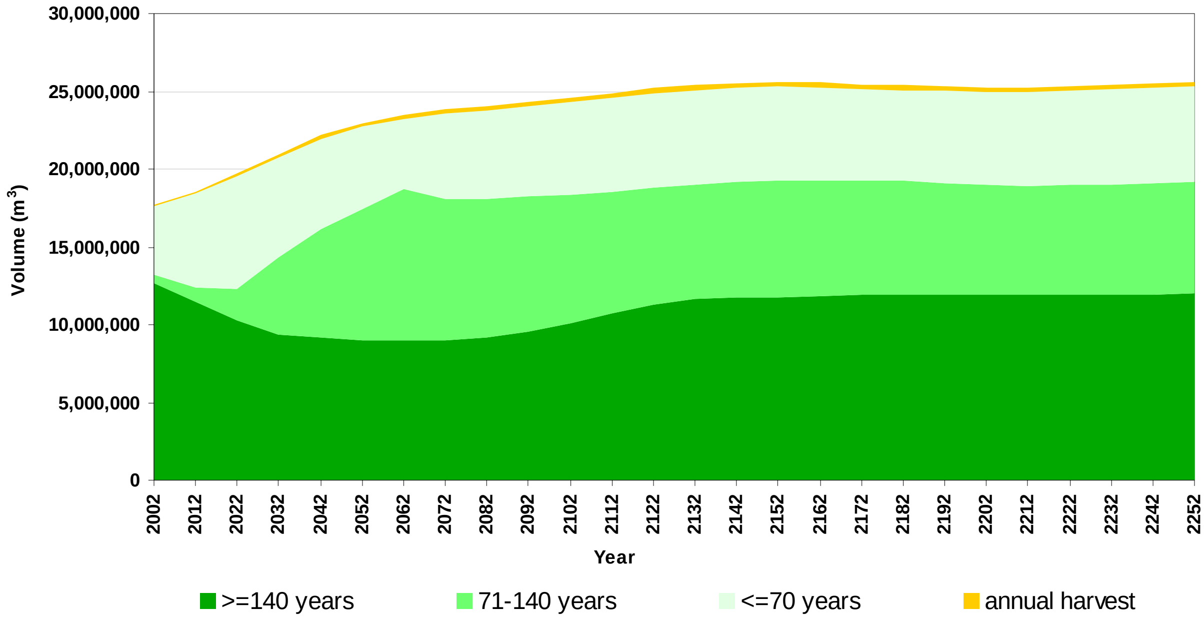

Figure 37. Merchantable growing stock on total Block 6 land base through 250 years

The older growing stock is for the most part, but not entirely, in reserves or area projected to be unavailable for timber harvest. Figure 38 displays growing stock through time for the THLB only. For non-timber or scheduling reasons, some timber is held significantly beyond normal rotation ages and reaches ages in excess of 140 years before other stands become equally or more suitable for satisfying non-timber objective(s). When this timber is released, its harvest could provide a small but ongoing supply of older stems possibly suitable for specialty manufacturing or cultural purposes.

Figure 39 is as per Figure 37 except data is presented on an area basis rather than a volume basis and simplifies the age class data presented in Figure 36.

Initially the area of old growth declines, the area of maturing stands increases, and the area of younger stands expands and then contracts. Contrary to popular opinion, as the transition from old growth progresses, at the landscape level old growth area is replaced less by clearcut area and more by 71- to 140-year-old stands. A century into the future under the current management regime, young stands will occur less frequently than they do today.

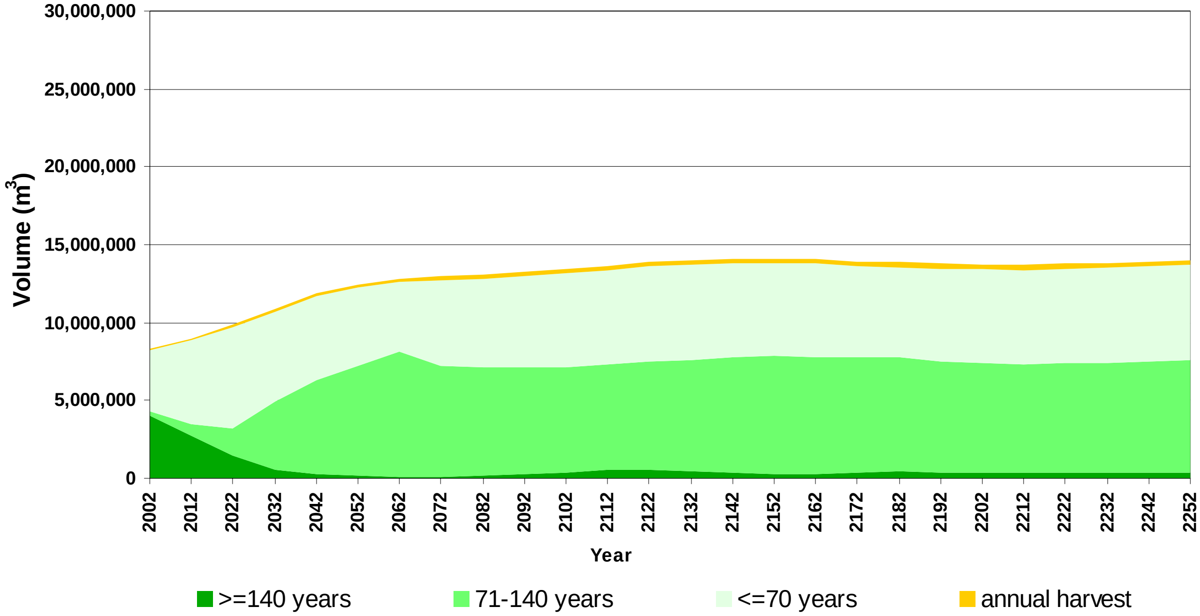

Figure 38. Merchantable growing stock on Block 6 THLB through 250 years

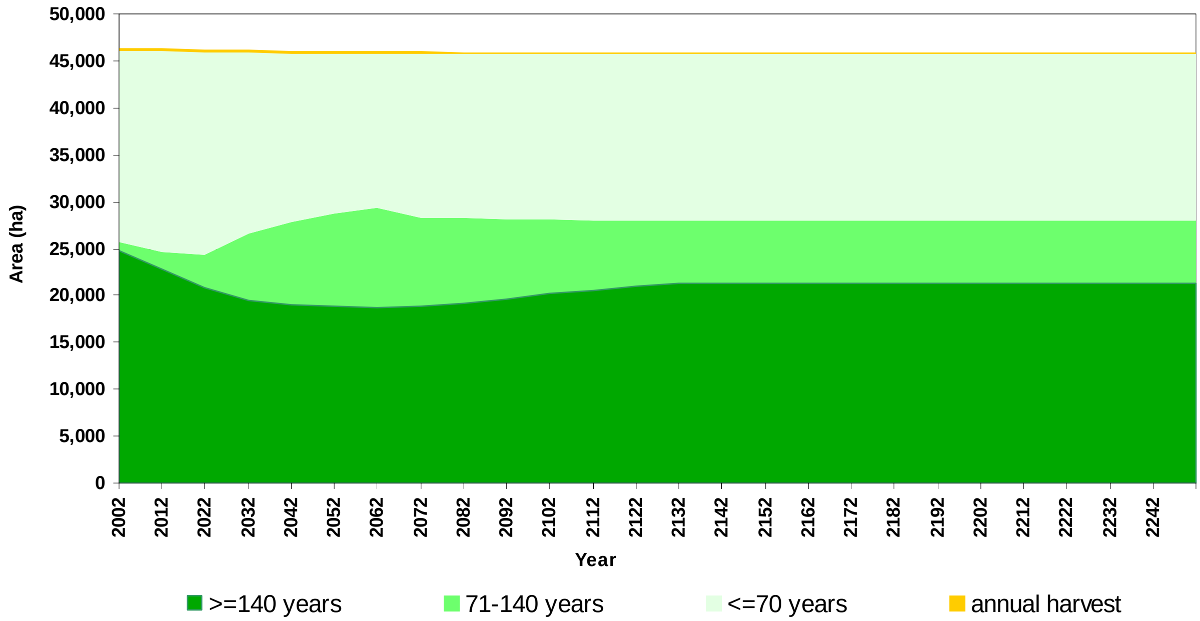

Figure 39. Age-group areas for Block 6 total land base through 250 years

Figure 39 also clearly demonstrates that the age class distribution is already much different than the natural disturbance type (NDT1) or recent historical range of natural variability for the area would dictate. Clearly any attempt to impose or return to an age class distribution representative of infrequent disturbances would be difficult, as well as economically devastating.

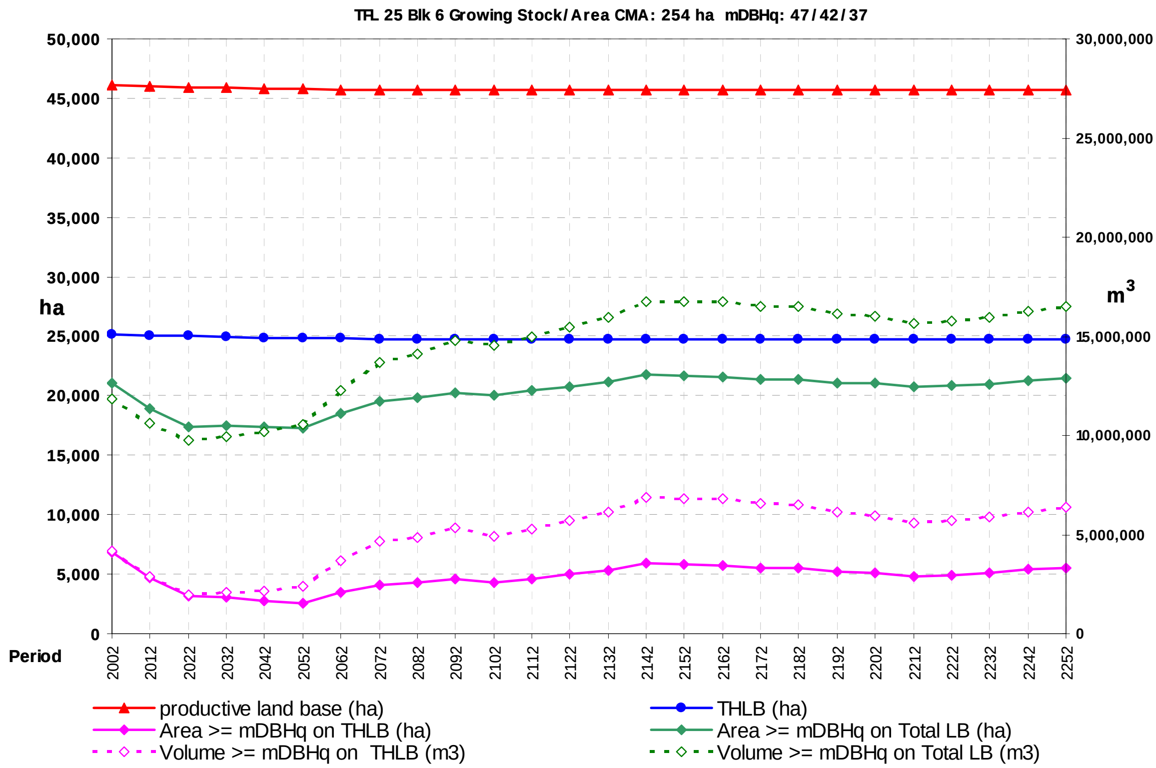

Figure 40. Merchantable growing stock in harvestable (>mDBHq) stands through 250 years for Block 6.

Figure 40 presents growing stock in terms of merchantable volume and area that is larger than the minimum harvestable[26] DBHq.

Roughly 20,900 ha or 46% of the productive land base is unavailable for harvesting for the long term. Because the locations of future Wildlife Tree Patches and partial retention along streams could not be easily predicted, they were modelled as a yield curve volume net down. Consequently these net downs are not represented in any of the aforementioned Figures and the actual volume and/or hectares illustrated understate the old forest reserved from harvest by about 5% of THLB area or volume.

On the THLB, harvestable stands become less available until the transition to second growth is complete and at the lowest point 2,557 ha are of harvestable size. This represents ten years worth of harvesting at the indicated harvest level. Operational flexibility in the selection of harvest locations can be expected to be most limited during the coming decades from 2012 through 2071.

A strategic focus for silviculture treatments could be to increase the harvestability of stands through the 2012-2071 period where area available for harvesting is projected to be lowest. However, there is expected to be ample volume available through the latter half of this period. Silviculture treatments which increase the future volume, merchantability or quality of stands beyond 2072 may be more or less equal in terms of strategic importance and should therefore be ranked using stand-level financial analysis.

7.2 Alternate Harvest Levels

7.2.1 10% Increase

Figure 41 shows that a higher area harvest request induces area and volume shortfalls at the transition to second growth. Note that the volume trough created at 2032 is about equal to the volume harvest levels from 2002-2031. Average harvest age and DBHq decline somewhat sooner but are notably lower in the long term. Average volume per hectare is lower in the long term as stands are harvested earlier than in the CMA simulation. Relative to the current management simulation, this run produces more volume (2,104,640 m^3 or 8,400 m^3 annually on average) through 250 years (see Appendix B). In the short term volume harvest is 9.9% higher but in the long term the volume harvest increases only 3.0%.

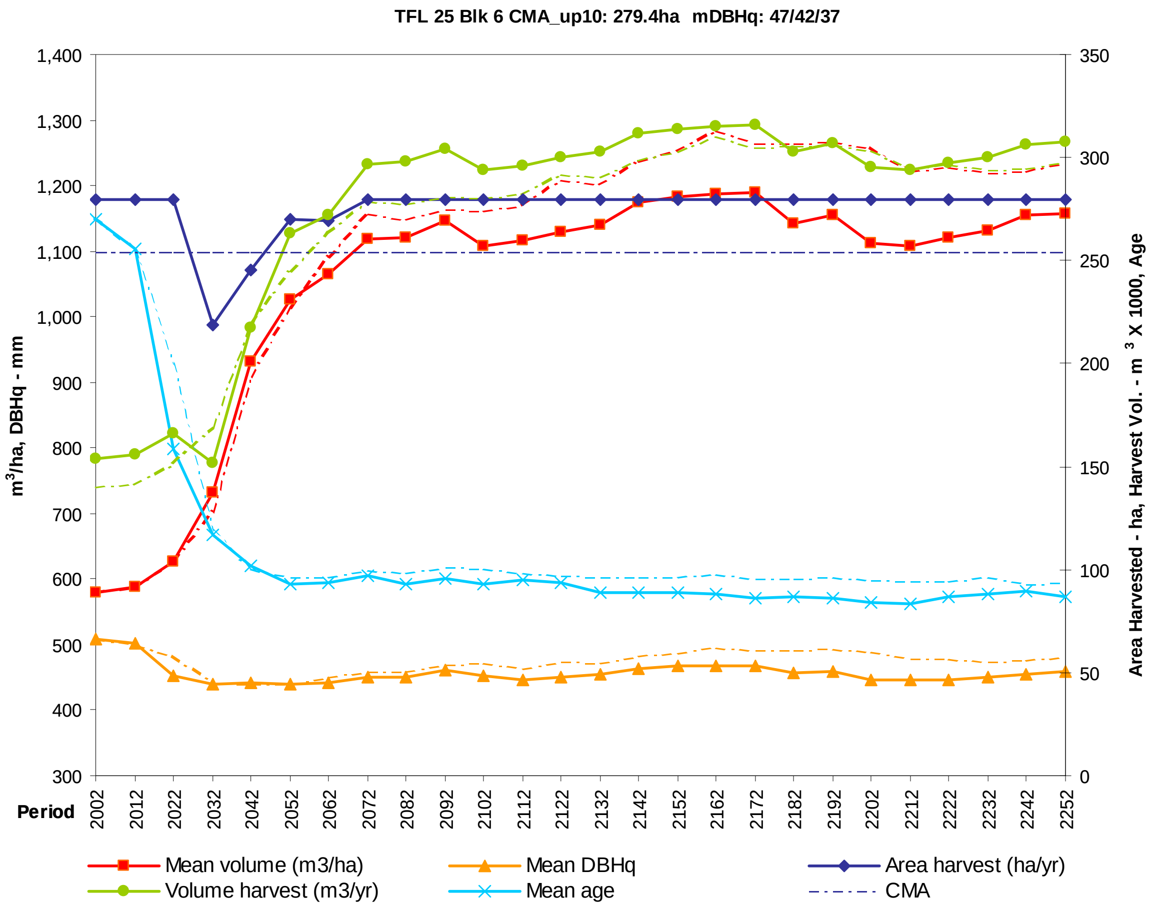

Figure 41. Block 6 harvest statistics[36] through 250 years for current management area harvest plus 10%

7.2.2 10% Decrease

Lowering the harvest request level by 10% (Figure 42) has the effect in the short term of lowering the harvest volume in proportion (-10.3%) to the harvest area change. This is because existing old growth stands are assumed to be neither adding nor losing volume through time. Once second growth becomes an appreciable component of the harvest profile, harvest age and DBHq are higher (longer rotation) with the result that stand volumes per hectare at harvest become higher as well. The higher volume per hectare tends to compensate for the loss of area harvested such that the overall volume harvest is less affected in the longer term (-4.6%) (Appendix B).

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[36] Dashed lines in background represent current management statistics.

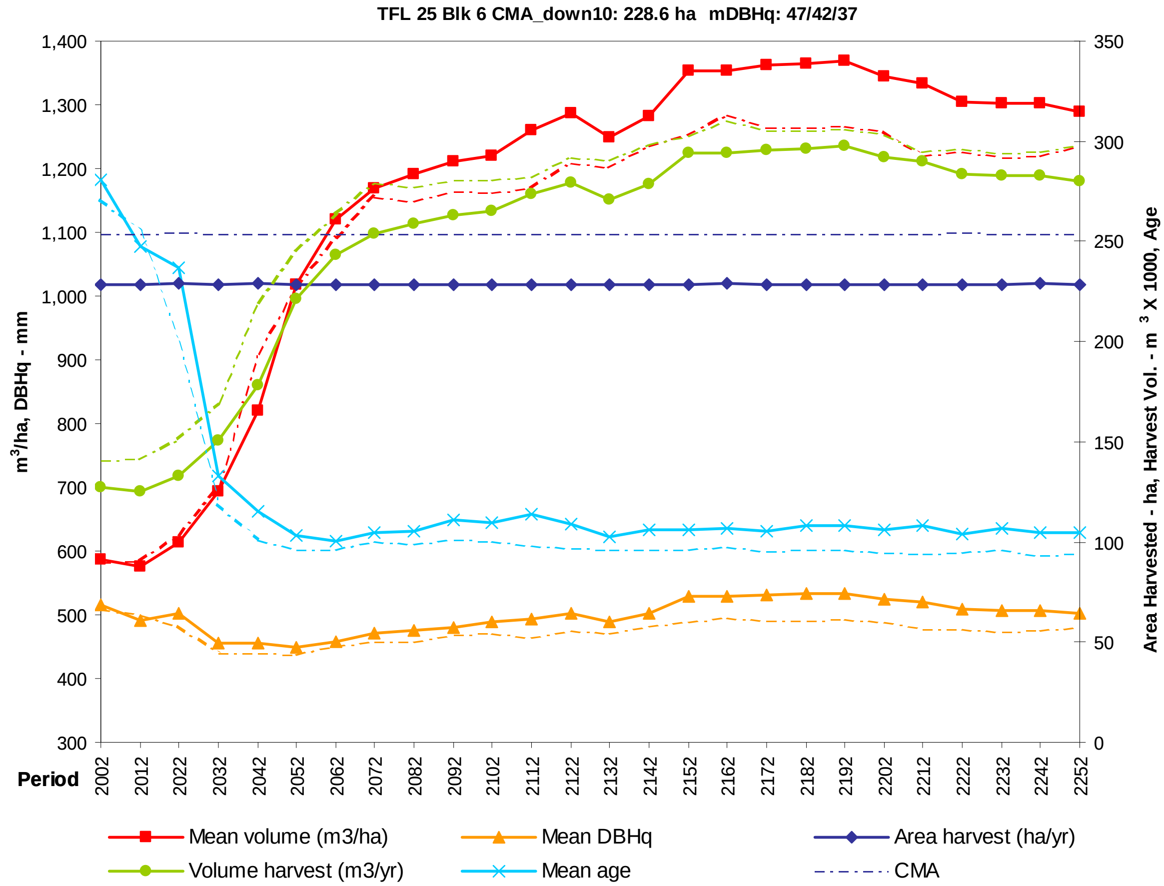

Figure 42. Block 6 harvest statistics[37] through 250 years for current management area harvest less 10%

7.3 Sensitivity Analyses

Harvest output statistics for all sensitivity runs are presented in Appendix A. In the harvest output graphs, decreases in area harvest relative to the base case are presented both unadjusted and as a new flat line. For increases in area harvest, a new, higher, flat-line harvest level was established. Flat-line flows were established by increasing area harvest requested until a deficit occurred, and then dropping back to the nearest whole number where the deficit disappears. Appendix B (p.100) summarizes changes in area (Table 10, Table 11) and near, mid, and long term volume (Table 12).

Table 6 presents the area results of sensitivity analyses for Block 6.

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[37] Dashed lines in background represent current management statistics.

Table 6. Block 6 Sensitivity results

Run ID	Harvest (ha)	Change (ha)	Change %	Description
CMA	254	-	-	Area-based current management option
+Oe	262	8.0	3.1	Include Oce and Ohe polygons in THLB (2.9% of THLB)
-Oh	215	-39.0	-15.4	Remove helicopter operable polygons (10.8% of THLB)
-SI3m	176	-78.0	-30.7	Reduce SI estimates for age class 1-2 and future stands by 3m
-age	283	29.0	11.4	Lower minimum harvest age by decreasing mDBHq by 3 cm
+age	200	-54.0	-21.3	Increase minimum harvest age by increasing mDBHq by 3 cm
-RndAge	229	-25.0	-9.8	Uses the mDBHq ages rounded up to the nearest 10th year (effectively adds 5 years to mDBHq)
-midVQ	239	-15.0	-5.9	Use mid range disturbance target
-Oc	30	-224.0	-88.2	Simulation on THLB accessible by helicopter only to estimate flat line portion of harvest attributable to helicopter harvesting.
UnCon	297	43.0	16.9	Remove all non-timber land base and volume constraints to simulate timber potential.
-Dr	234	-20.0	-7.9	Remove alder leading stands from the harvest flow permanently (no long term succession to conifers).

Block 6 is most sensitive to changes that increase the minimum harvest age (-SI3m, +age) or reduce THLB (-Oh).

As was the case in Block 1, the +/-age sensitivities are not proportional to one and other.

Reducing the THLB by 11% by removing helicopter-operable area has a disproportionate negative impact that may be an artefact caused by the unregulated peak of helicopter activity inherent in the CMA simulation (Figure 35) immediately prior to the pinch point. However the volume/year vs area/year for the first three decades indicates that the short term helicopter harvest is old growth dependent and a higher short term helicopter harvest is important. Simulations of the harvesting on the conventional land base only (-Oh) indicate a harvest level of 215 ha, suggesting that no more than 39 ha of helicopter harvesting is needed annually in the short term to sustain the current management harvest level. Adding the –Oc and –Oh runs suggests a harvest level of 245 ha, or 9 ha less than the base case. Therefore the combination of conventional and helicopter harvesting is synergistic. Cumulative harvesting from helicopter-operable polygons should exceed 150 ha within the forthcoming five years (at least 75% of –Oh change and equal to –Oc result) to ensure future harvest flow is not disrupted and adjustments, if needed as suggested by the next TSR, will not be severe.

The flow of red alder volume from the base case simulation and the –Dr simulation indicate that alder needs to be a significant proportion of the harvest profile in the short term. The annual volume harvest from stands with an alder component should be at least 15,000 m^3/year[38] in the short term and build to higher levels thereafter as the transition to second growth proceeds.

1.1

[38] For operational implementation the minimum is stated in terms of volume, rather than area, because alder generally comes from mixed stands that cannot be easily stated on an area basis.

8.0 Analysis of Combined Blocks

All blocks were combined into one management unit to test the effect of age class or other synergies among blocks. Combining the blocks resulted in a 24 ha or 2% increase[39] in annual harvest area, suggesting that some synergies between blocks may be present.

From an operational perspective, a logical block combination could be Blocks 2 and 3 which are in the same geographic vicinity, have relatively small AACs, and are at remote locations both serviced from east Vancouver Island. However, a run combining these blocks actually resulted in a harvest level somewhat below the combined harvest levels suggested earlier. The model seems to harvest exclusively in each block for extended periods thus creating adjacency and other bottlenecks. Further investigation is needed to reconfigure the model to prevent this artefact and properly investigate any potential synergy among Blocks 2 and 3.

9.0 Marginally Economic Opportunity

As part of operability mapping, a significant area of timber was identified as being “marginally economic”. In other words, it is not economically viable to harvest these stands during average market conditions as cost estimates exceed expected revenues. This area is assumed inoperable for the purposes of this timber supply analysis.

However, during market cycle peaks, stand values would exceed costs so that such stands could be harvested at a profit. The AAC Determination generally does not consider this opportunity wood. Even when markets peak and such stands become profitable, they are seldom the focus of harvesting as other stands within the regular AAC indicate a higher profit margin.

To realize this opportunity, a regulation mechanism needs to allow a periodic harvest of marginally economic stands over and above regular AAC. While a partitioned harvest could accomplish this, harvesting would not be expected for perhaps many years in succession. If a partition were stated in terms of an annual allowable harvest there could be a perceived underharvest of the partition for many years, and then an apparent over harvest once every five to ten years. A periodic allowable harvest more in sync with market cycles would be the preferred approach.

For example, the +Oe sensitivity run suggests that the following (Table 7) periodic harvests could be acceptable.

1.1 ————————————

[39] These results were based on preliminary modelling. Subsequently input files were corrected for a minor input error but were not recompiled for this combined run as creation of the combined file was onerous. Results would not be expected to change significantly.

Table 7. Potential Periodic Harvests of Marginally-Inoperable Polygons

TFL Block	+Oe result (ha/yr)	Periodic Harvest (m^3/period)	
		within 5 year period	within 10 year period
1	2	10	20
2	2	10	20
3	2	10	20
5	19	95	190
6	8	40	80

10.0 Cultural Cedar Supply

The normal harvest profiles will contain significant amounts of cedar suitable for cultural purposes such as bark stripping, small dugouts, poles, carving, or root collection. Figure 43 presents the projected cedar volume harvest for each block of the TFL through the next 250 years.

Figure 44 shows the cedar growing stock present through the simulation. Although there is a modest decline, at no point does the growing stock fall below 82% of current levels.

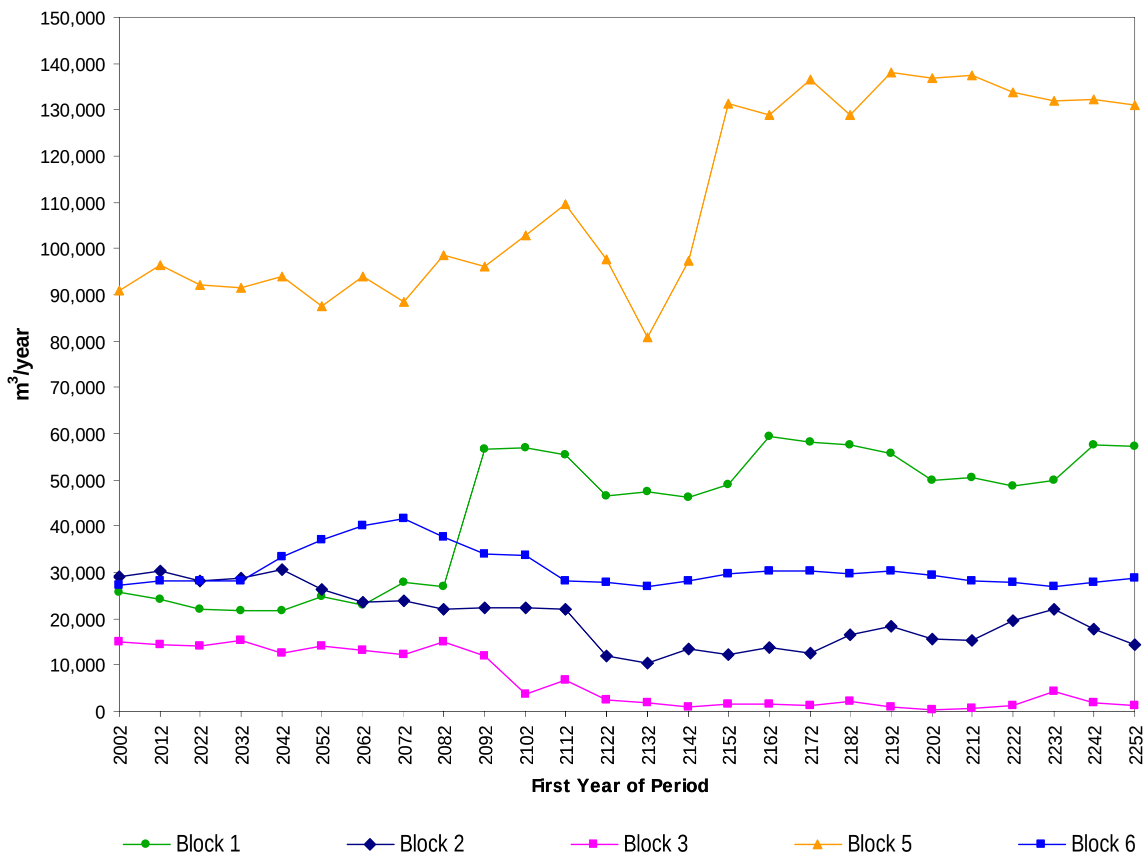

Figure 43. Projected cedar harvest by block through 250 years.

A small but continuous supply of monumental cedar (suitable for large dugouts, very large poles, split beams and planks) can be expected to be available from reserved areas including riparian reserves, old-growth management areas, and other inoperable forests. Wildlife tree patches and other trees retained within blocks were not included in this analysis and hence cedar retention estimates herein are underestimated by up to 5-8%.

A crude model was developed to estimate the availability through time of larger or “monumental” cedar trees suitable for special cultural purposes such as pole carving and dugout canoe construction. The model is described and discussed in more detail in Appendix D. Table 8 indicates the minimum and average number of larger diameter (≥70cm) trees predicted through the simulation for each Block. Although there is variation throughout the simulation, considerable numbers of larger cedar trees are forecast and contrary to some speculations such trees do not disappear.

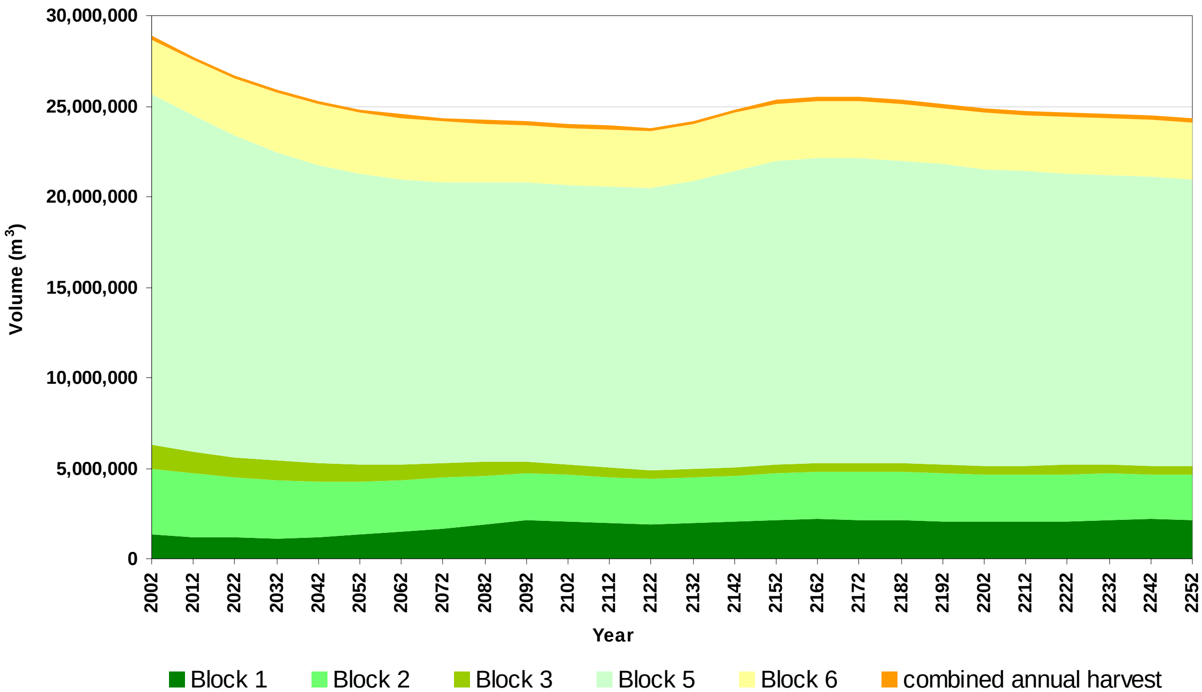

Figure 44. Cedar growing stock and annual harvest volumes through 250 years.

Table 8. Estimated larger diameter (≥ 70 cm) cedar trees available through 2252

Block	Minimum	Average
1	64,819	86,878
2	210,281	231,430
3	46,817	63,946
5	1,296,297	1,567,810
6	339,366	375,696
Total	1,957,580	2,325,760

11.0 Uncertainties

In the course of preparing for, and developing this analysis, a number of uncertainties in the underlying data and assumptions have become evident. These are listed below in order of perceived potential impact on timber supply and the direction (area harvest increase/decrease) of the potential change.

+/- The 3.25% volume allowance for future Wildlife Tree Patches needs to be verified against actual area withdrawals from the timber harvesting land base for WTP designations. Under area-based regulation, including WTP/THLB overlap area as part of the cut[15] should allow accurate tracking of the proportion of WTPs that would otherwise be THLB. This should facilitate simulation of WTPs as THLB area withdrawals (rather than as volume net downs) for future analyses.

-/-- Ecosystem Based Management is an evolving concept that WFP has agreed to test and where feasible implement in parts of the TFL. It is expected to include increased reserve areas and use of partial retention silviculture systems[42] and at the same time it is to maintain or enhance the economic feasibility of forestry. Modelling forest re-growth in response to dispersed, stand-level partial retention/harvesting remains problematic and has not been attempted for this analysis. Intuitively, shading, scarring, and mistletoe effects on regeneration and productivity seem likely, yet some proponents of selection and other partial harvest systems suggest productivity is actually improved by advanced regeneration and efficient capture of photosynthetic energy. Field studies, calibration of uneven-aged growth models for coastal use, and development of ecological process models are needed to forecast the outcomes of heretofore-unknown silvicultural practices. However, to determine an area-based harvesting level in an increasingly uneven-aged modelling environment, mDBHq lessens in modelling importance. Perhaps then, such modelling is only important for those interested in volume flows and is of little consequence to determining an area-based harvest level[40].

-/(+)	For Blocks 2, 3, and 5 site indices for managed and unmanaged second growth stands were based on Provincial SIBEC averages. These estimates have been recently updated but the updates were not used in this analysis. Site indices for these blocks need to be field checked and re-determined based on local field sampling. Sensitivity analysis results suggest that changes in site indices may profoundly influence area harvest levels through their influence on mDBHq at critical second growth pinch points.
+/-	For Blocks 2 and 3, and less so for Block 5, estimates of remaining old growth inventory volumes need to be confirmed in light of recent harvesting and withdrawals from the timber harvesting land base. A Vegetation Resource Inventory is in progress for Block 2 and 3. Re-inventory is not planned for Block 5 given current land use uncertainties. The existing Block 5 inventory is less than 20 years old. In Blocks 1 and 6 VRI has been completed and adjustments to timber volumes have been positive in both cases.
+/(-)	In Block 5, the procedure used to estimate site index tended to underestimate site indices for poor sites and overestimate site index for better sites. As poorer sites are more common, this may have lead to underestimation of overall yields. Completion of ecosystem mapping and VRI sampling would improve site index estimates substantially. However the harvest profile in this block is dominated by old forests for the next century or more, so second growth yields are relatively less important for setting current harvest level.

1.1

[40] In a pure, selection system landscape, harvest regulation becomes neither area- or volume-based; instead a stand level BA regulation of growing stock is the preferred approach.

+/- Operational adjustment factors for managed stands were TIPSY defaults. Field estimates for the more common stand types would improve estimates of mid to long term yield. Anecdotally OAF1 net downs may be underestimated for Block 5 where brush problems abound and herbicide use is restricted and may be overestimated in Blocks 1, 3, and 6 where stocking tends to be very good.

\+ Historic spacing and fertilization treatments need to be digitized, entered into the GIS, and appropriately modeled. As the mDBHq criterion is critical to this analysis, these treatments may have an important positive impact at the area-based pinch point by effectively reducing rotation age.

\- As retention and partial harvesting systems become more common both in riparian management and more widely, yield adjustments to reflect increased shading of crop trees and harvest damage of residual crop trees will be needed. Long term estimates of retention and its nature are as yet unreliable due to the short period of application and variability of implementation strategies to date.

\+ Commercial thinning[41,42] is proven in Douglas-fir stands in the drier variants of the Coastal Western Hemlock Zone and may be used in future to alleviate timber supply shortfalls. Further analyses are warranted for Block 1, although recently CT has

1.1 ________________

[41] For cut control of commercial thinning we suggest that an equivalent clearcut area (ECCA) be calculated to go against area AAC. ECCA would be calculated based on the expected volume opportunity lost at final harvest as follows:

$ECCA_{CT}$ (ha) = CT (ha) X (BAiptc – BA_{Ct}aiptc) / BAi where,

BAi = initial BA
BAiptc = initial BA projected to culmination (or for 20 years if culmination is less than 20 years away.)
BA_{CT}aiptc = post-CT BA projected to age of BAiptc

[42] For cut control of partial cutting in older, less responsive stands we suggest that ECCA be simply harvest area X (BA removed / BAi)

proven uneconomic where hemlock is a significant stand component.

+	The capability to model future cultural cedar tree availability would be improved by improving growth and yield data and modelling of 2nd growth cedar. Samples of older second growth cedar are uncommon and diameter distributions projected from current models may be unreliable at older ages. Timber supply modelling assumptions for regeneration strategies need to be refined to better reflect current species-specific reforestation practices for western red cedar and yellow cypress.
-/+	Land base reductions and/or volume net downs for future riparian management need to be confirmed in light of evolving practices, shifting expectations, and the relatively short implementation experience so far. Although no-harvest zones had dominated earlier management thinking, more recently there has been a move to more active intervention and flexibility around streams. If a "disturbed area" model is to be used for cut control, there will be a need to model partial cut area and basal area removal.
+	Future tree improvement gains are expected to be larger than modelled herein. Where the gains are not realized until beyond pinch points they are expected to have little influence under a flat line area-regulation scenario.
+/-	Higher elevation site index estimates are less certain than for lower elevation ecosystems where older second growth is common and site index estimates are more reliable.
+/-	These simulations are not optimized for harvest sequencing (model follows inherent stand database or model priority order) although variations in harvest sequence may yield higher harvest levels. This would however be a time consuming

exercise in the current modelling environment. In any case operational forest development is not inherently optimized either.

12.0 Recommendations

- Area-regulated harvest level for TFL 25 should be set at 1,250 ha less 8 ha of non-recoverable losses. This level will ensure that both the timber harvested for human use and the growing stock performing environmental services increases for future generations.
- Should economic conditions become favourable, efforts to prove the feasibility of harvesting in forest types deemed marginally uneconomic (not included in base case analyses) are to be encouraged. Such harvests should not be charged against AAC and should be permitted to occur periodically when conditions allow. We recommend that a marginally economic area allocation[43] be allowed to accumulate for a rolling or "evergreen" 10-year period and be harvestable at the Licensee's discretion when economic conditions permit. Based on "+Oe" runs, recommended annual accumulations for Blocks 1, 2, 3, 5, and 6 respectively are: 2, 2, 2, 19, and 8 ha. Therefore within the upcoming 5-year cut control period, harvests by Block could not exceed 10, 10, 10, 95, and 40 ha respectively.
- A strategic silviculture analysis, if funded, would identify future timber and habitat shortfalls and devise strategies to alleviate these. As well the analysis should investigate opportunities for fertilization, thinning, or other interventions that may lower minimum profitable harvest ages at critical pinch points, and analyse the outcome of such strategies in terms of habitat availability, timber volume and quality, and return-on-investment.
- The Licensee should ensure that for the next 5-year cut control period the area harvested from polygons accessible only by helicopter exceeds the following (~75% of "-Oh" area change times 5 years) for each Block:
    - Block 1: 23 ha
    - Block 2: 86 ha
    - Block 3: 30 ha
    - Block 5: 330 ha
    - Block 6: 150 ha
- Government to Licensee discussions should be continued to explore administrative and policy changes associated with area-regulation that may reduce costs to government and increase Licensee profitability. Reforms may be possible with respect to, but not limited to, the following:
    - elimination of waste and residue sampling and billing programs.

1.1

[43] Small incidental harvests of marginally uneconomic area would go against AAC, and the exemption would be activated for area sums greater than 2 ha by TFL Block.

- area-based cut control and SBFEP allocations.
- area-based stumpage ($/ha harvested) or an "all found" annual tenure rental.

Appendix A
Harvest Statistics for Simulation Runs

In the graphs following, The solid coloured trend lines presented are the output variables for the sensitivity's flat line flow. Dashed lines of the same colour represent the current management (CMA) or base case statistics for comparison purposes. A flat dashed line represents the CMA flat line flow and the unadjusted deficit flow, where it occurs, is presented as a dashed line below CMA.

Run naming conventions and descriptions of each run are presented in Appendix C.

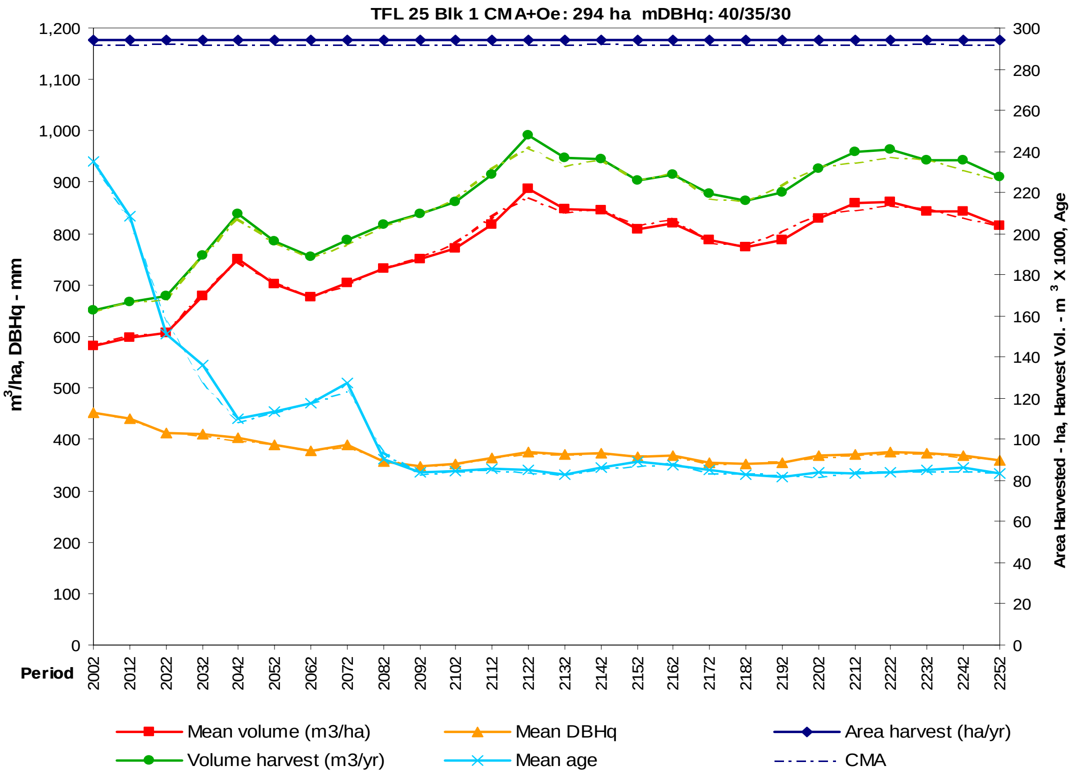

Figure 45. Block 1 CMA +Oe

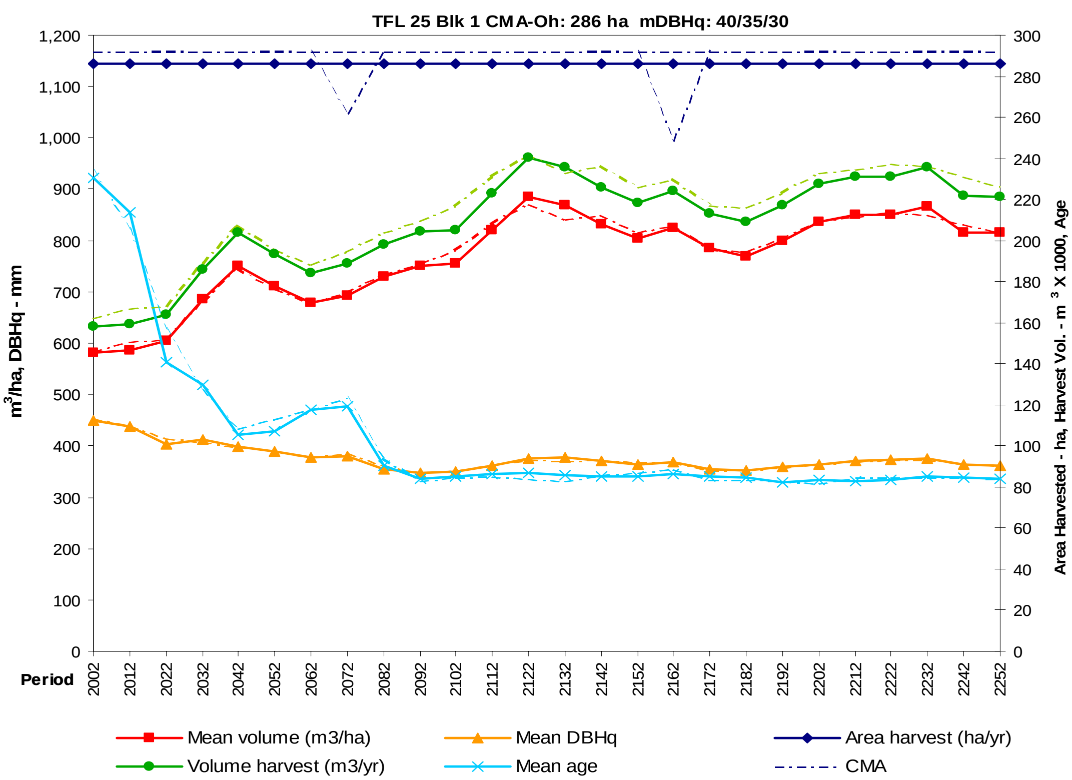

Figure 46. Block 1 CMA –Oh

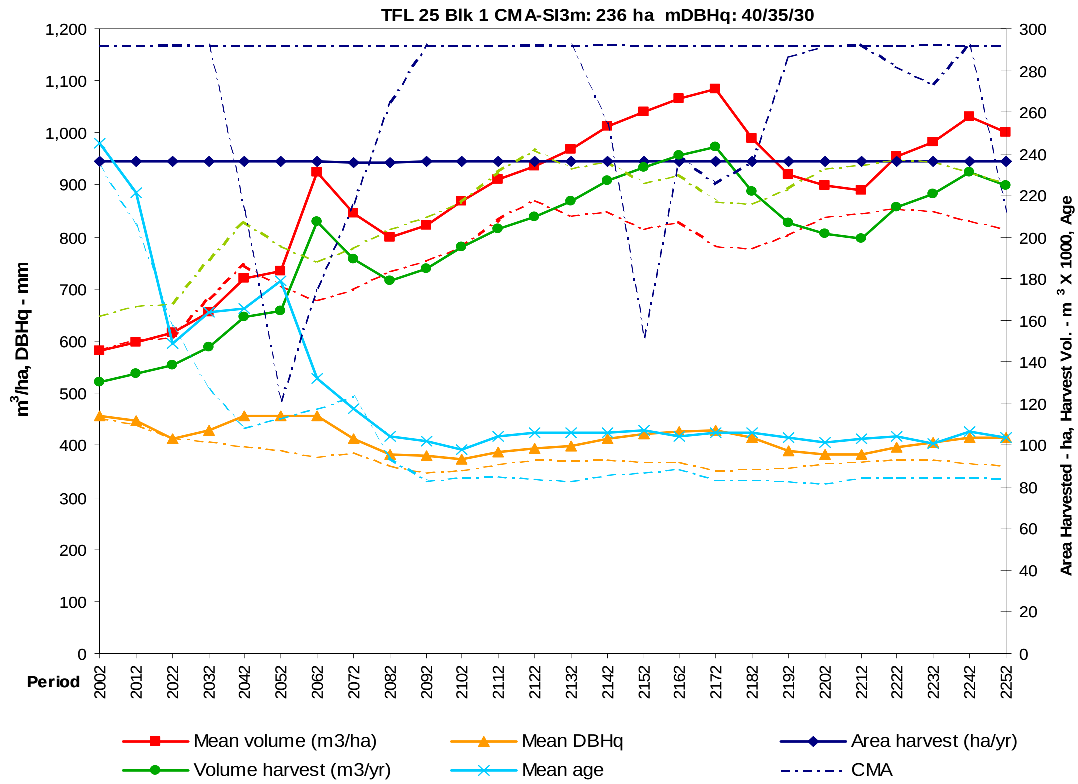

Figure 47. Block 1 CMA –SI3m

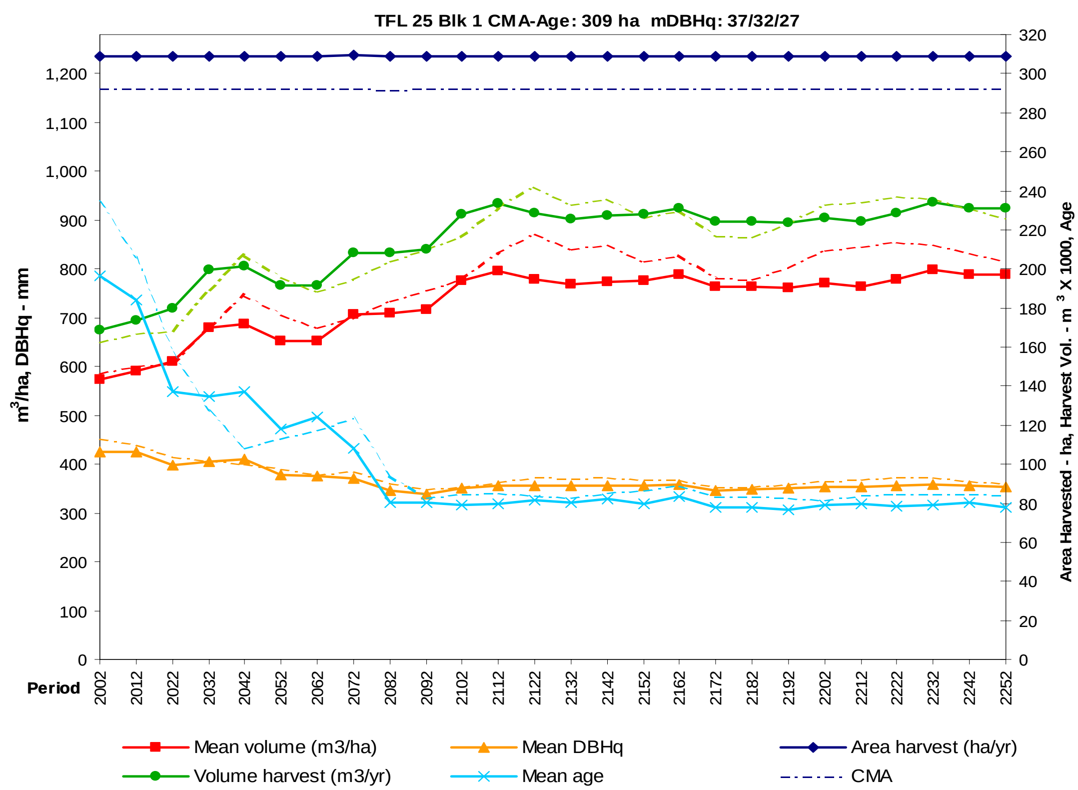

Figure 48. Block 1 CMA -age

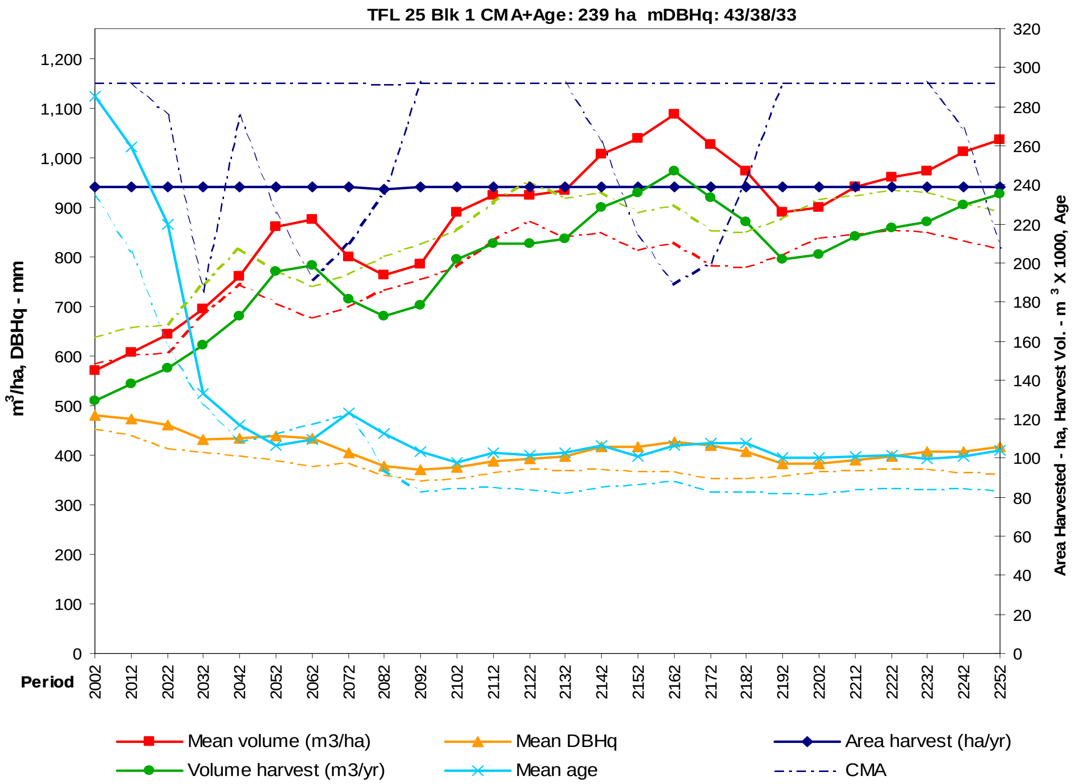

Figure 49. Block 1 CMA +age

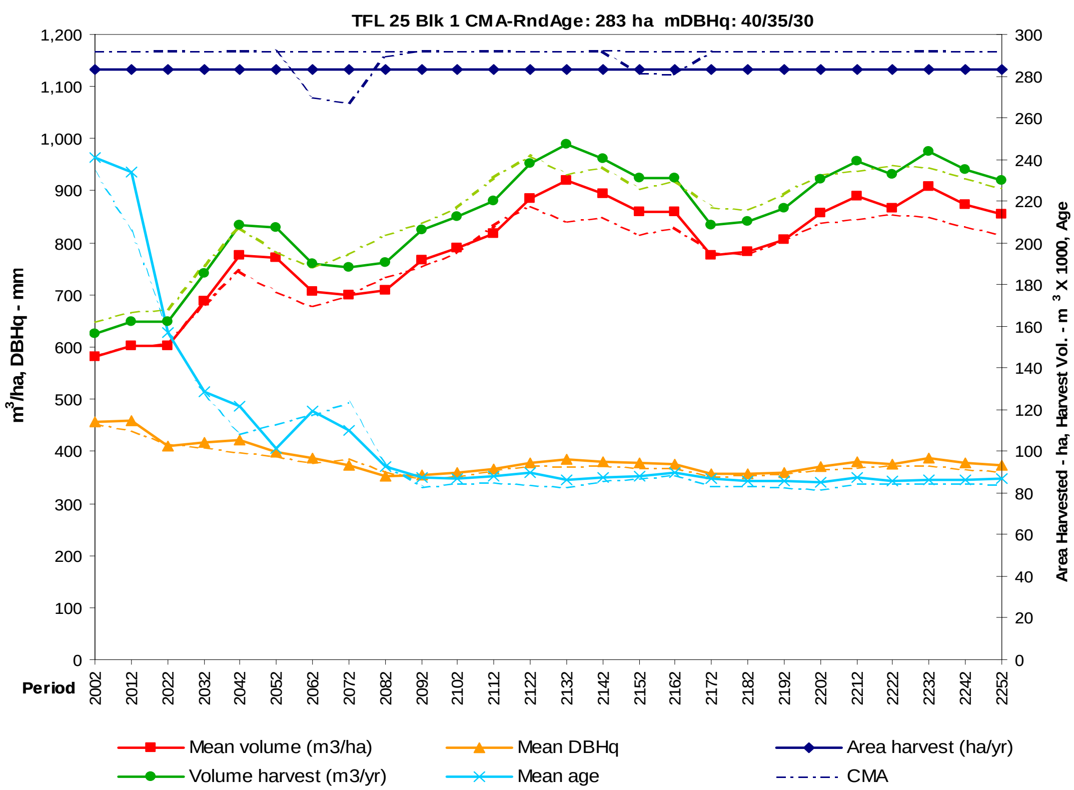

Figure 50. Block 1 CMA –RndAge

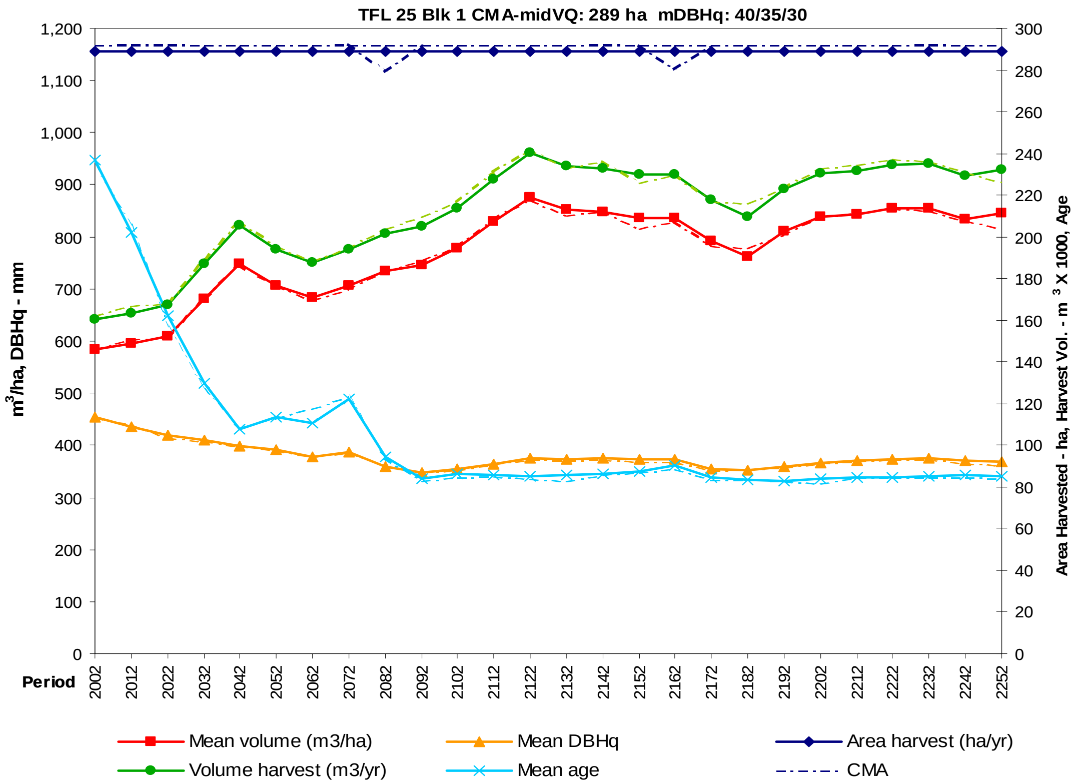

Figure 51. Block 1 CMA-midVQ

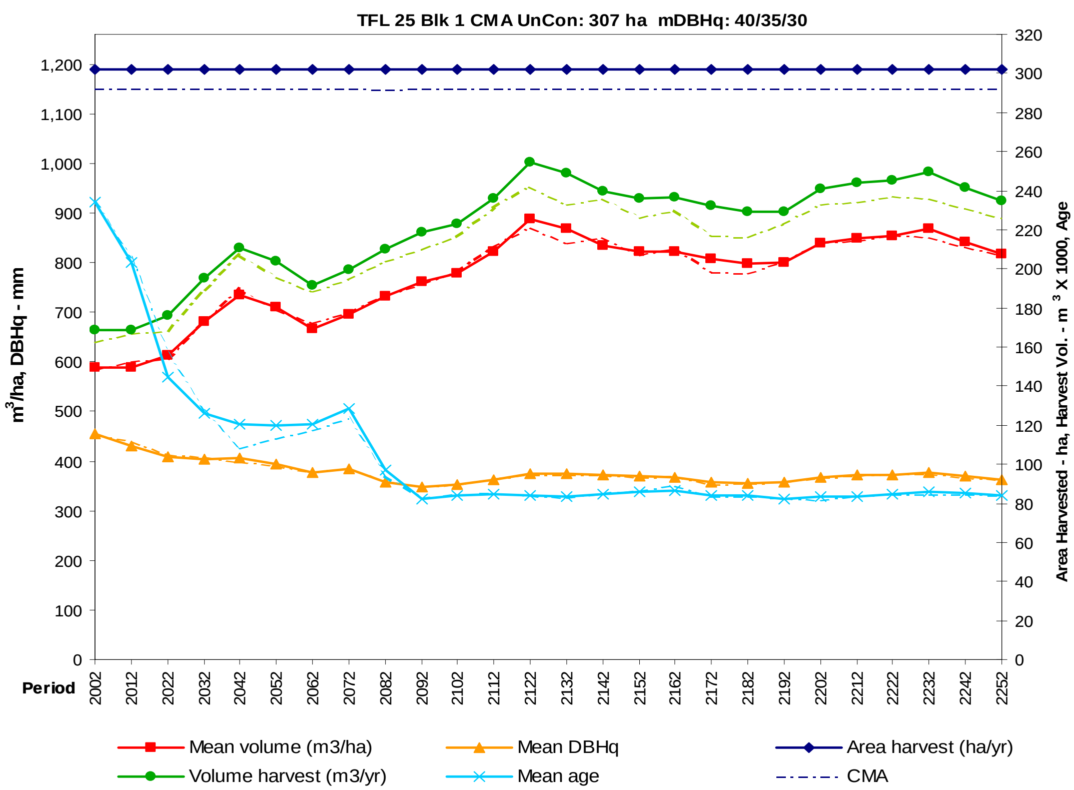

Figure 52. Block 1 CMA UnCon

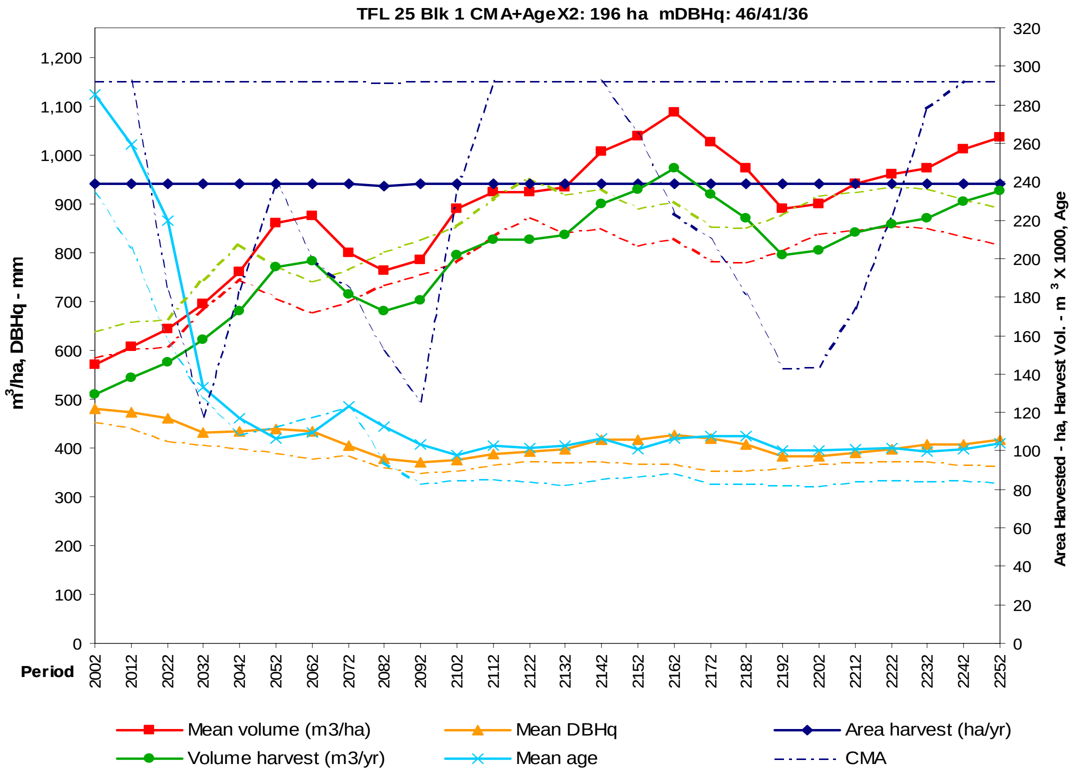

Figure 53. Block 1 CMA +ageX2

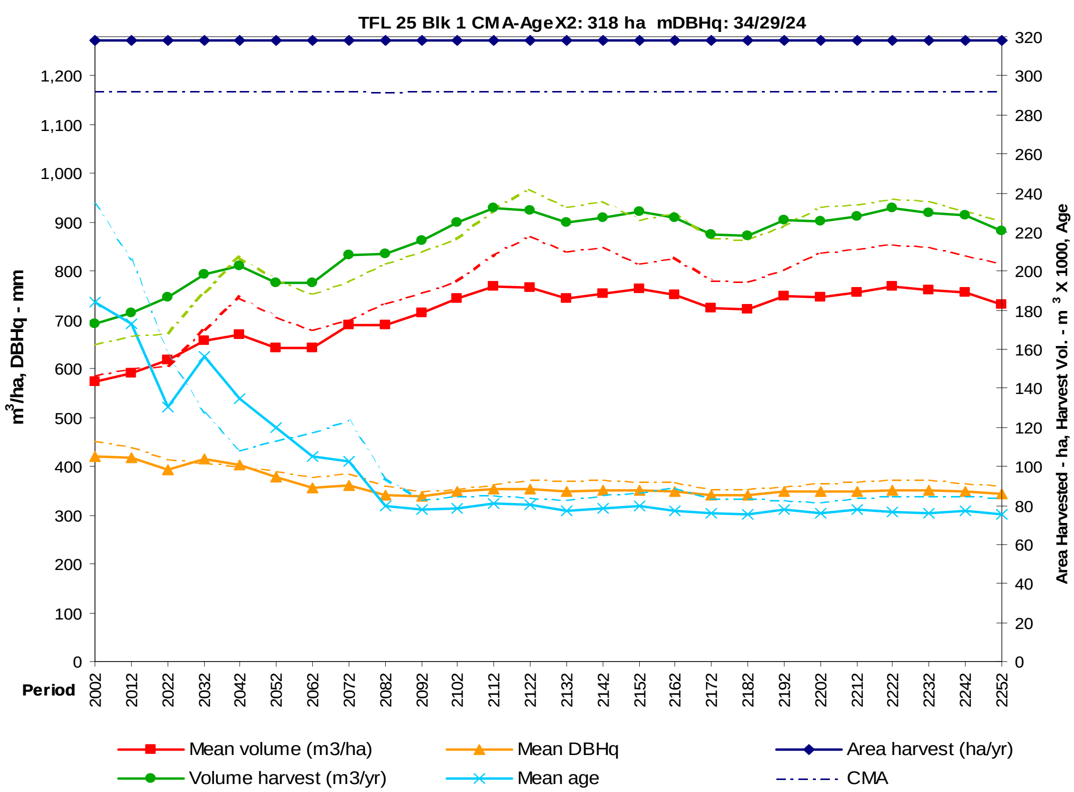

Figure 54. Block 1 CMA –ageX2

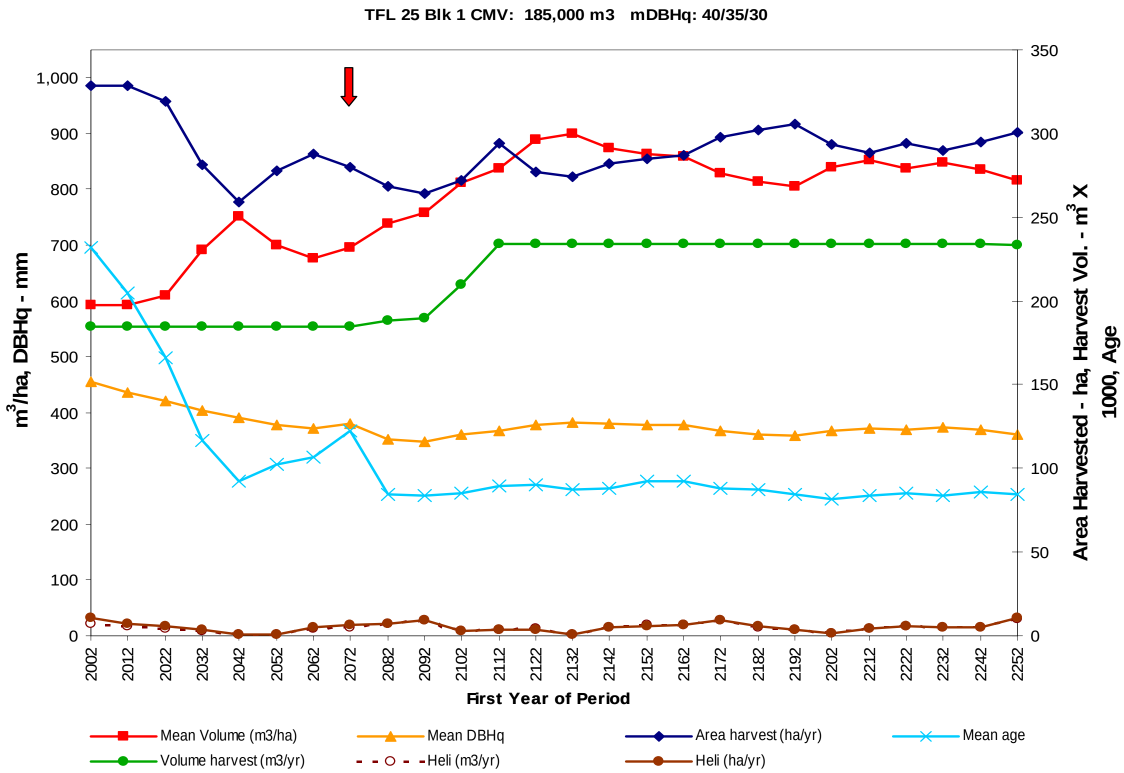

Figure 55. Block 1 CMV (Volume Regulated)

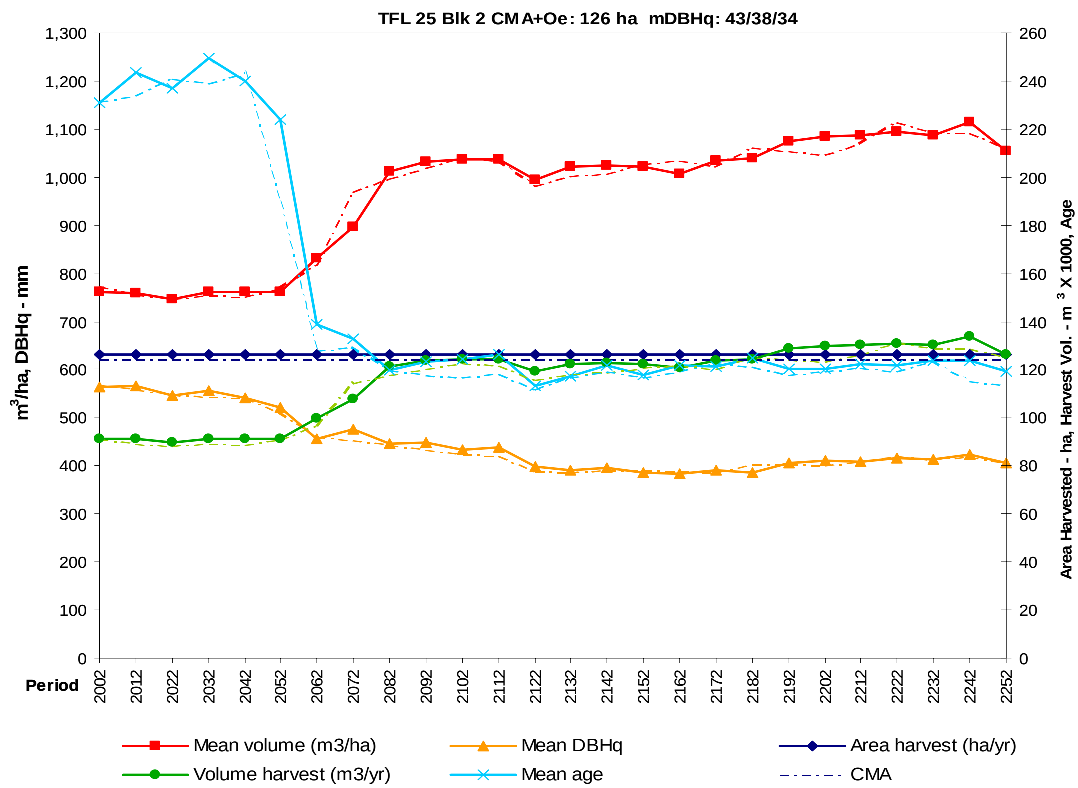

Figure 56. Block 2 CMA +Oe

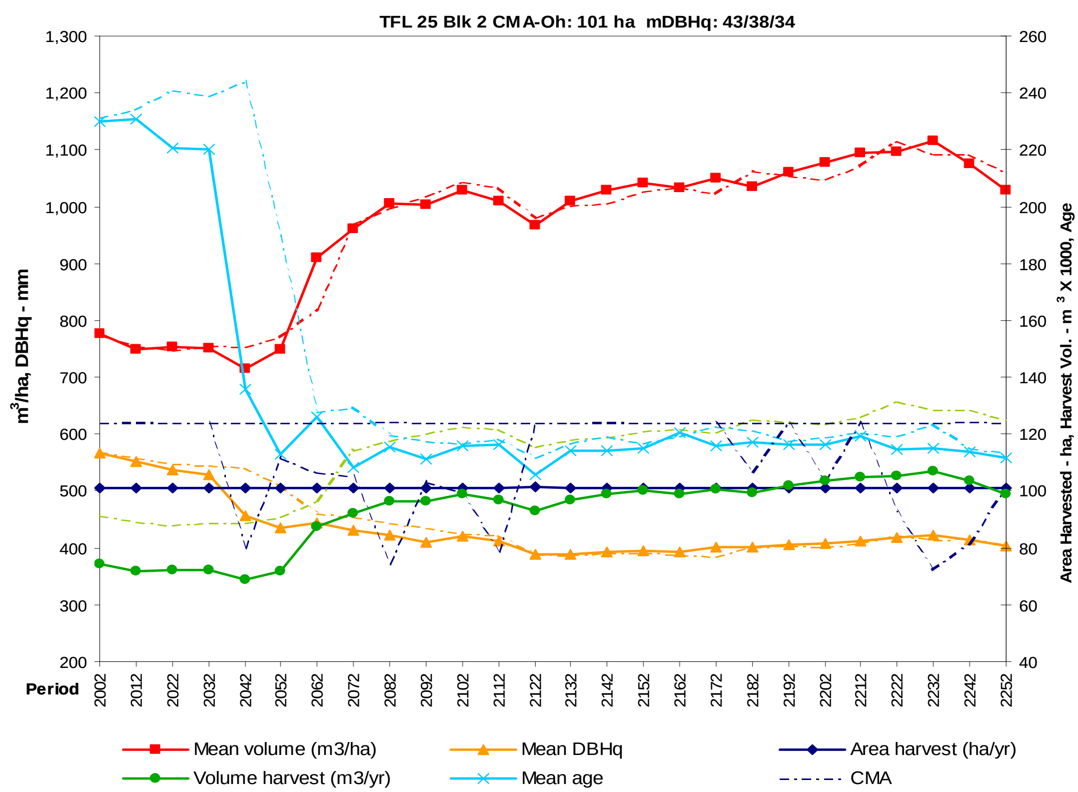

Figure 57. Block 2 CMA -Oh

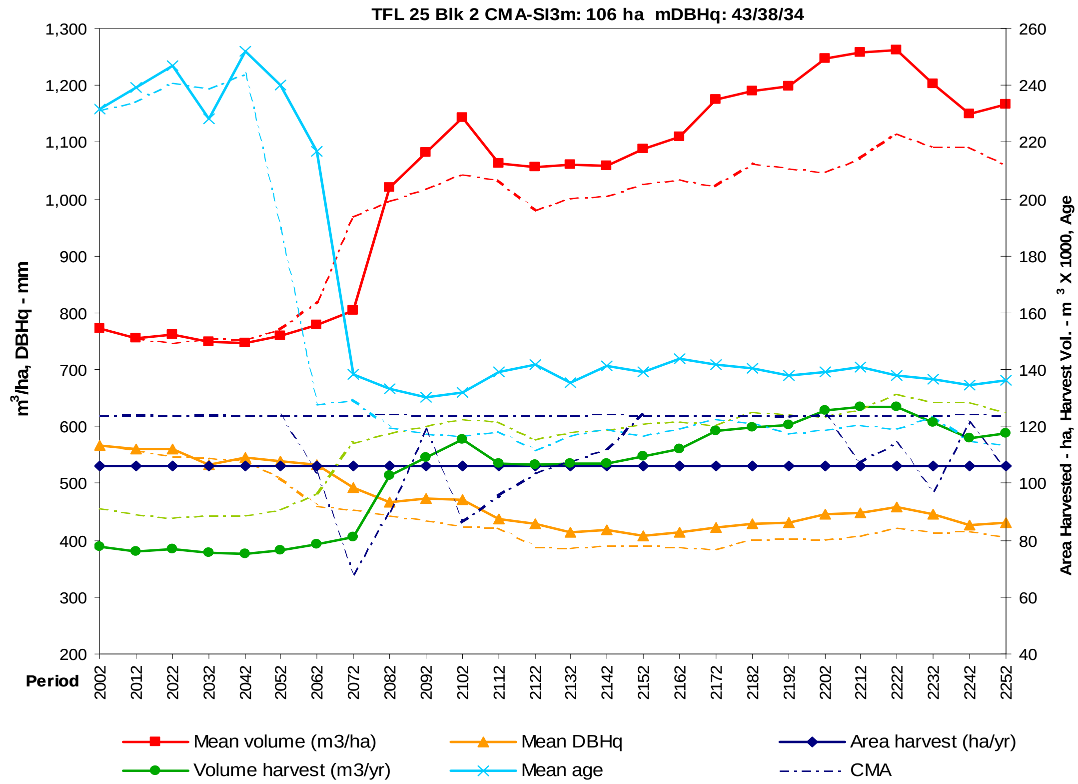

Figure 58. Block 2 CMA –SI3m

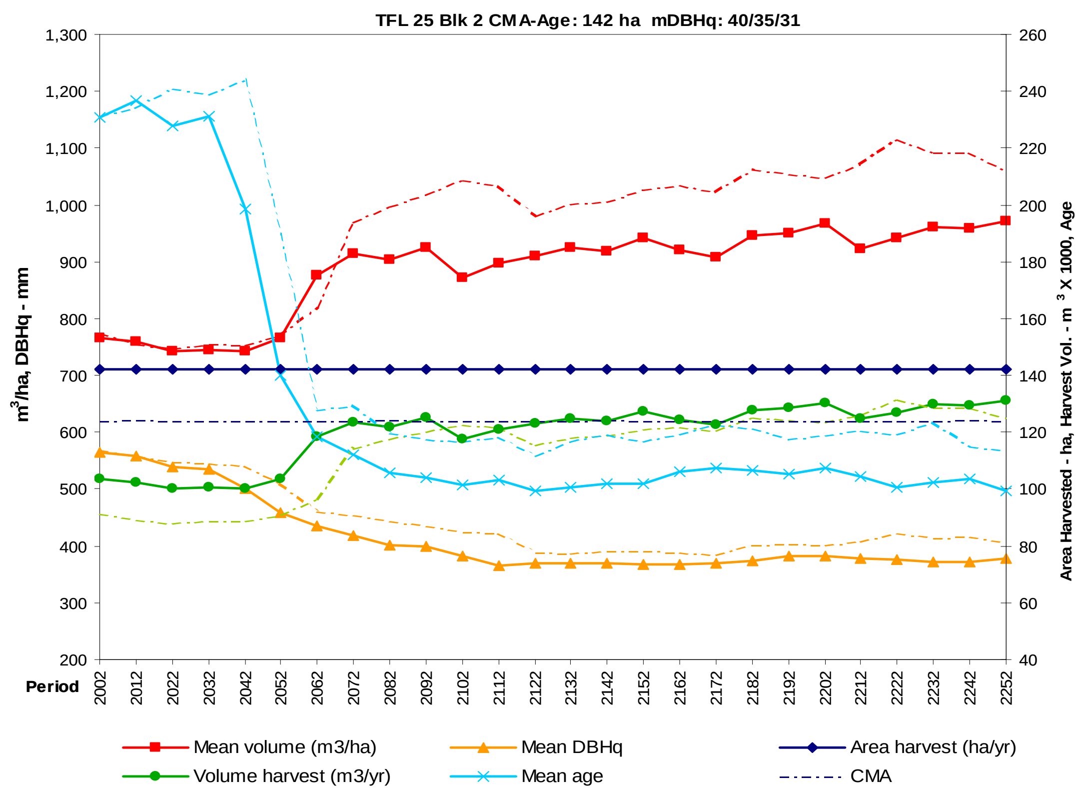

Figure 59. Block 2 CMA -age

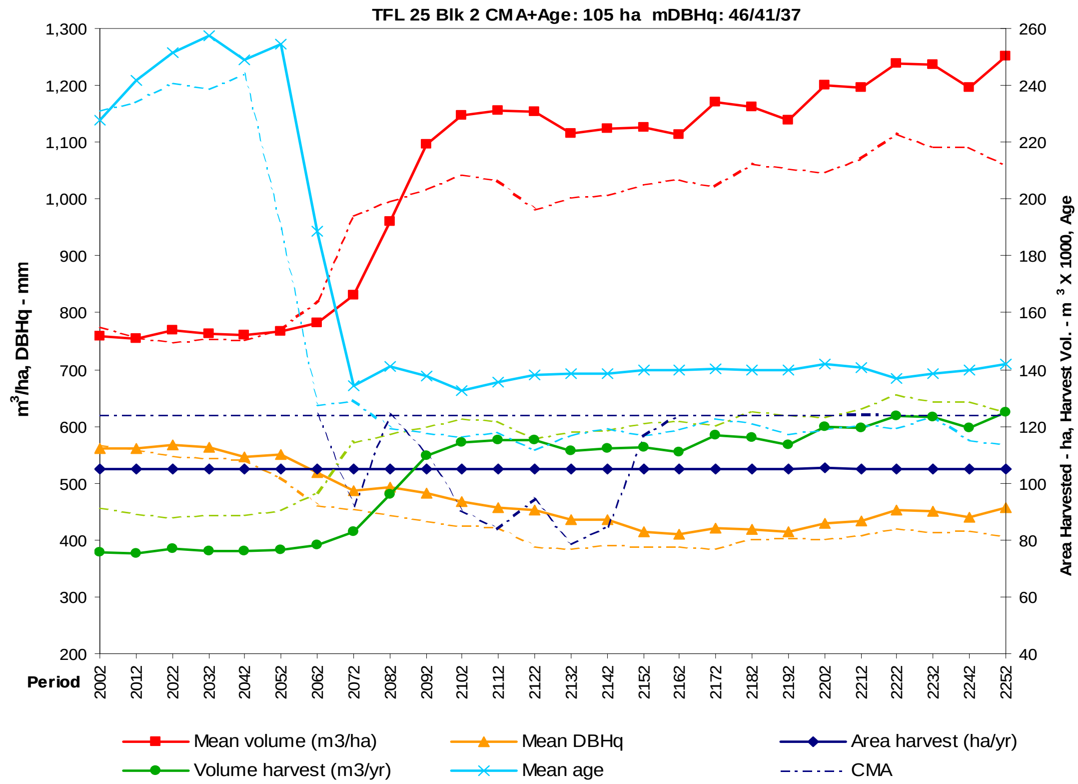

Figure 60. Block 2 CMA +age

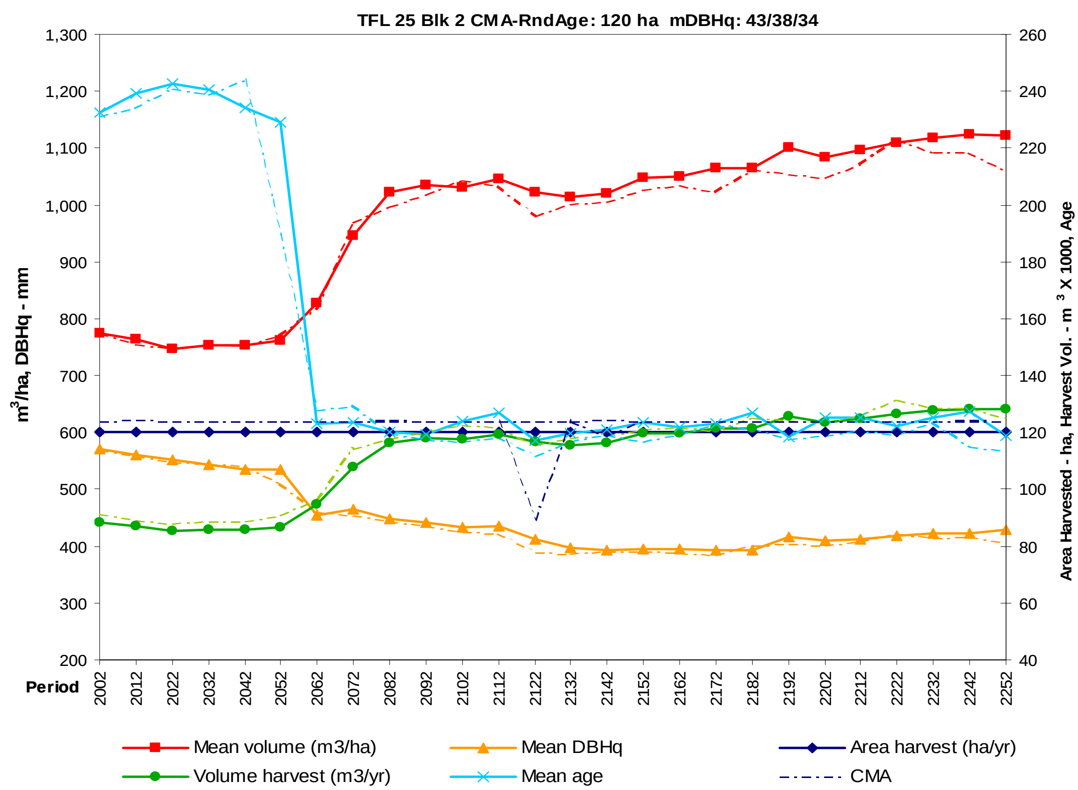

Figure 61. Block 2 CMA -RndAge

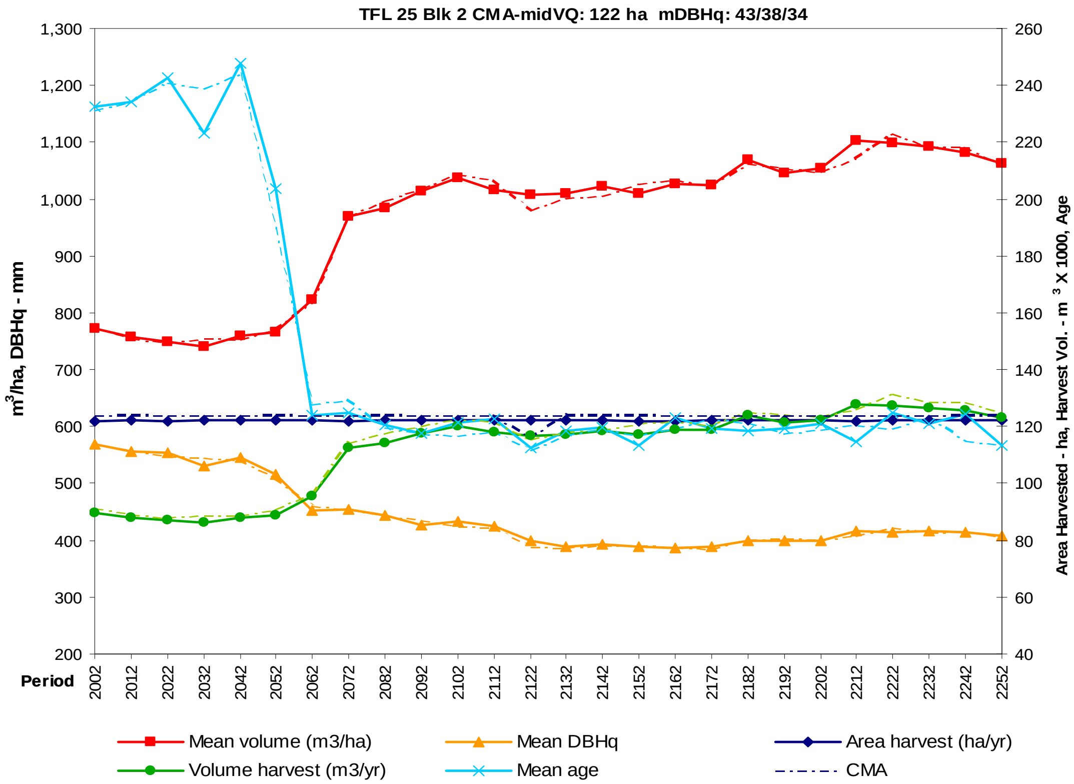

Figure 62. Block 2 CMA -midVQ

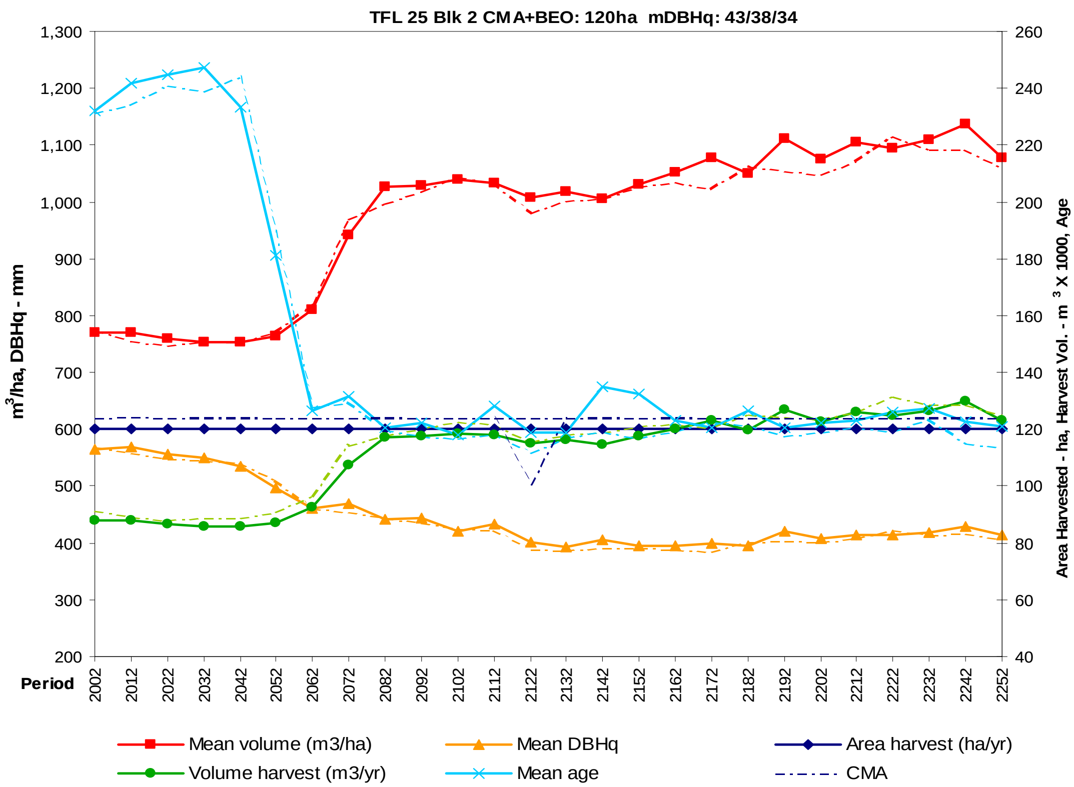

Figure 63. Block 2 CMA +BEO

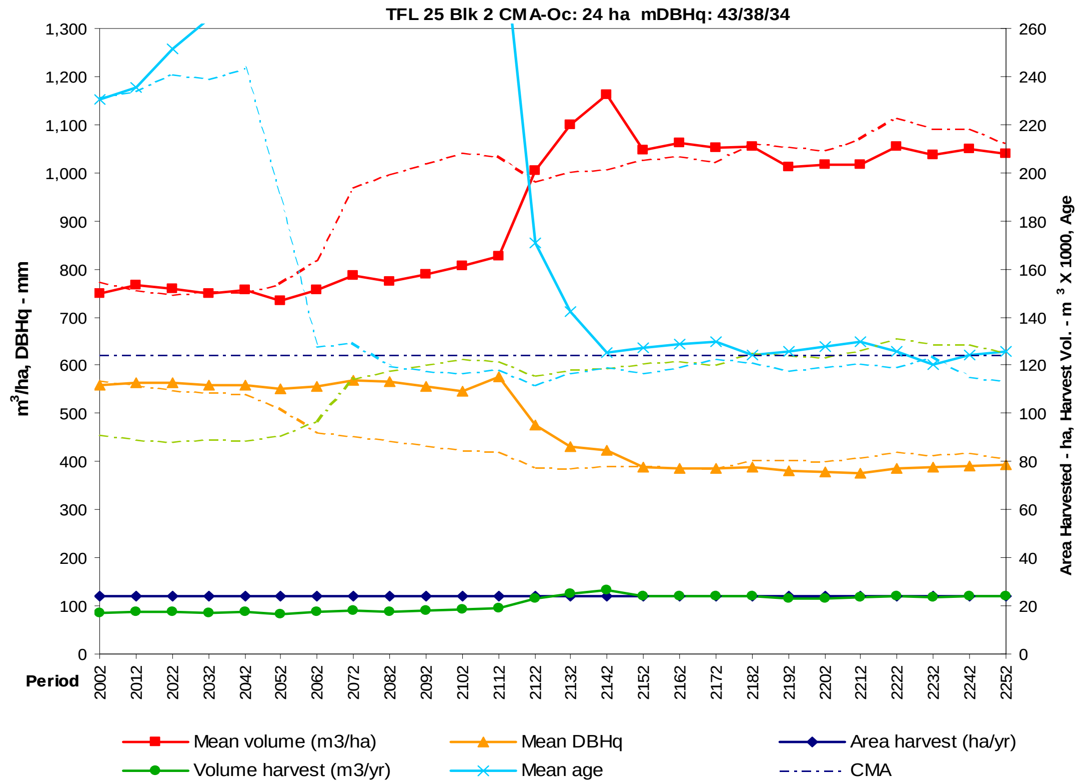

Figure 64. Block 2 CMA -Oc

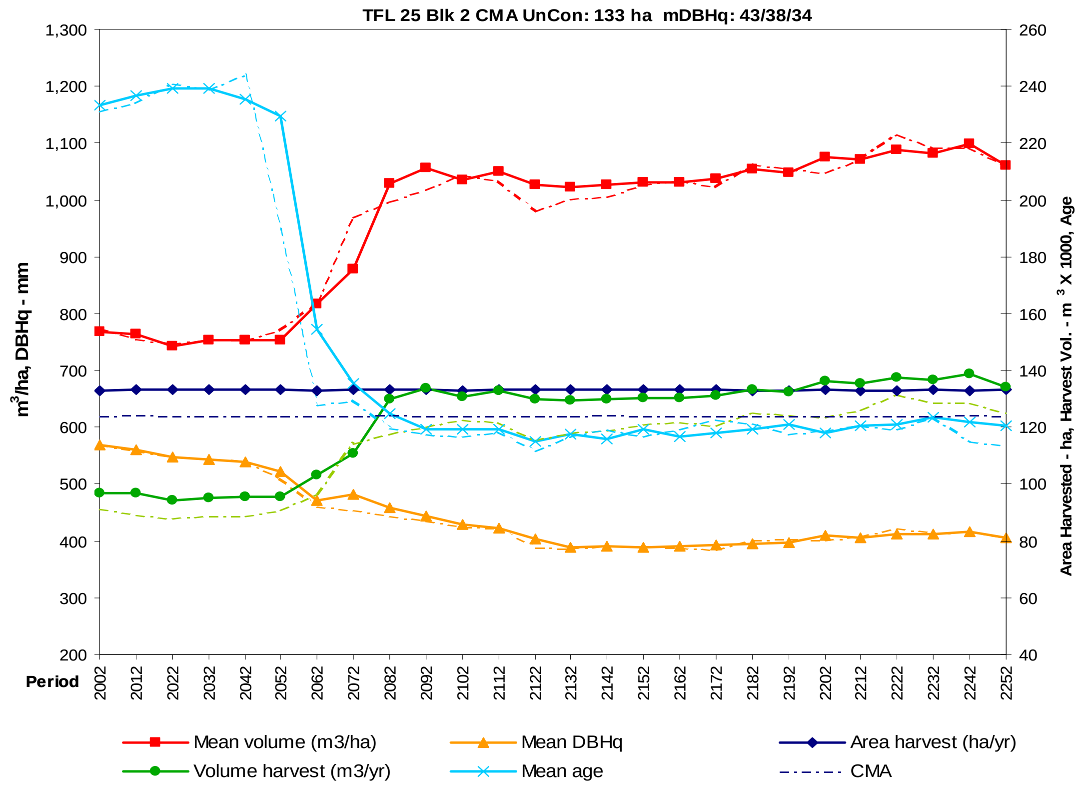

Figure 65. Block 2 CMA UnCon

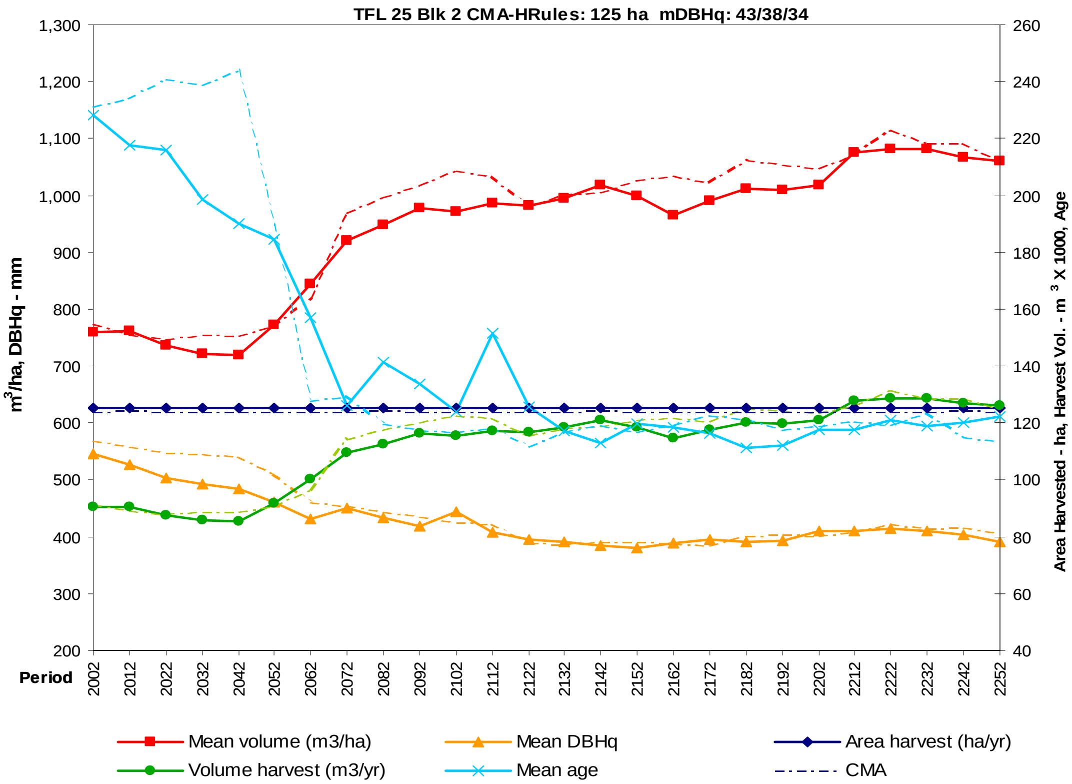

Figure 66. Block 2 CMA -HRules

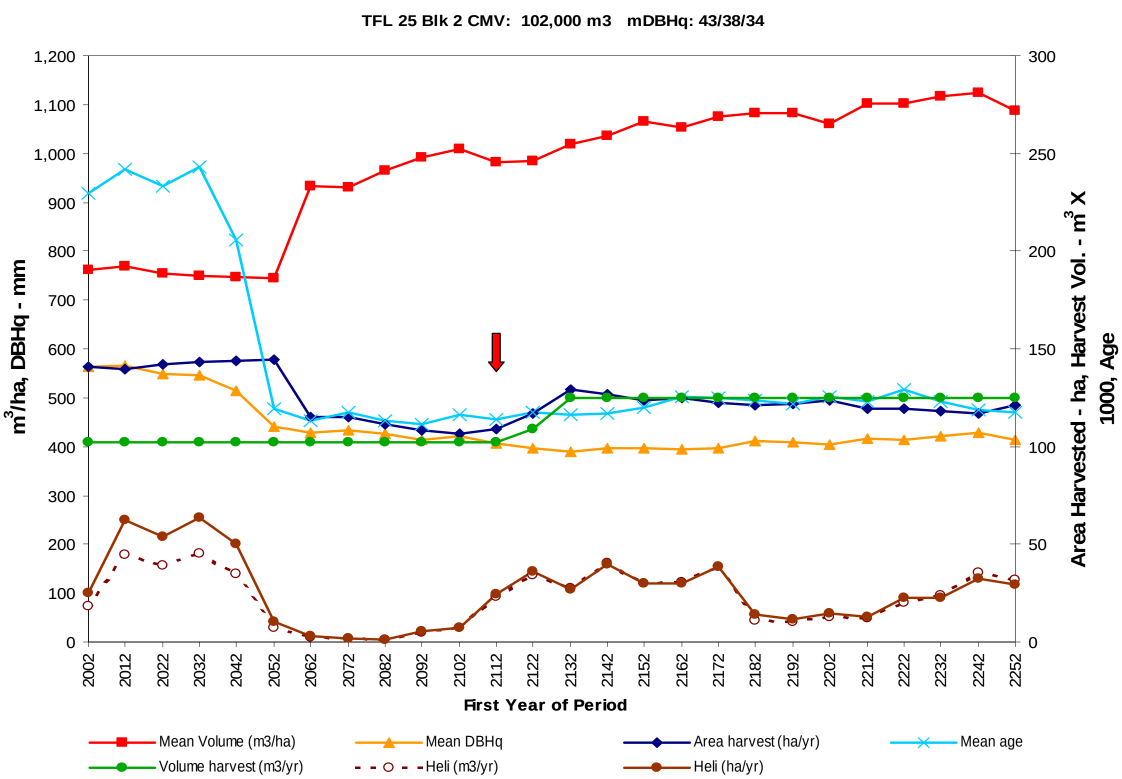

Figure 67. Block 2 CMV (Volume Regulated)

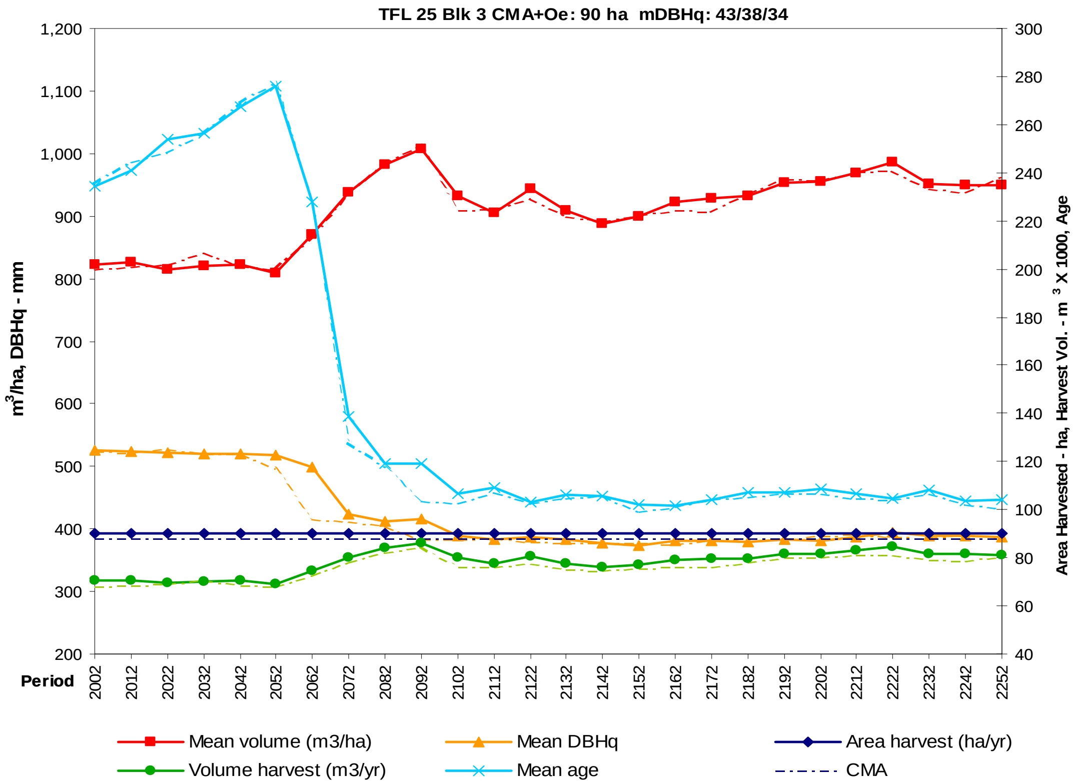

Figure 68. Block 3 CMA +Oe

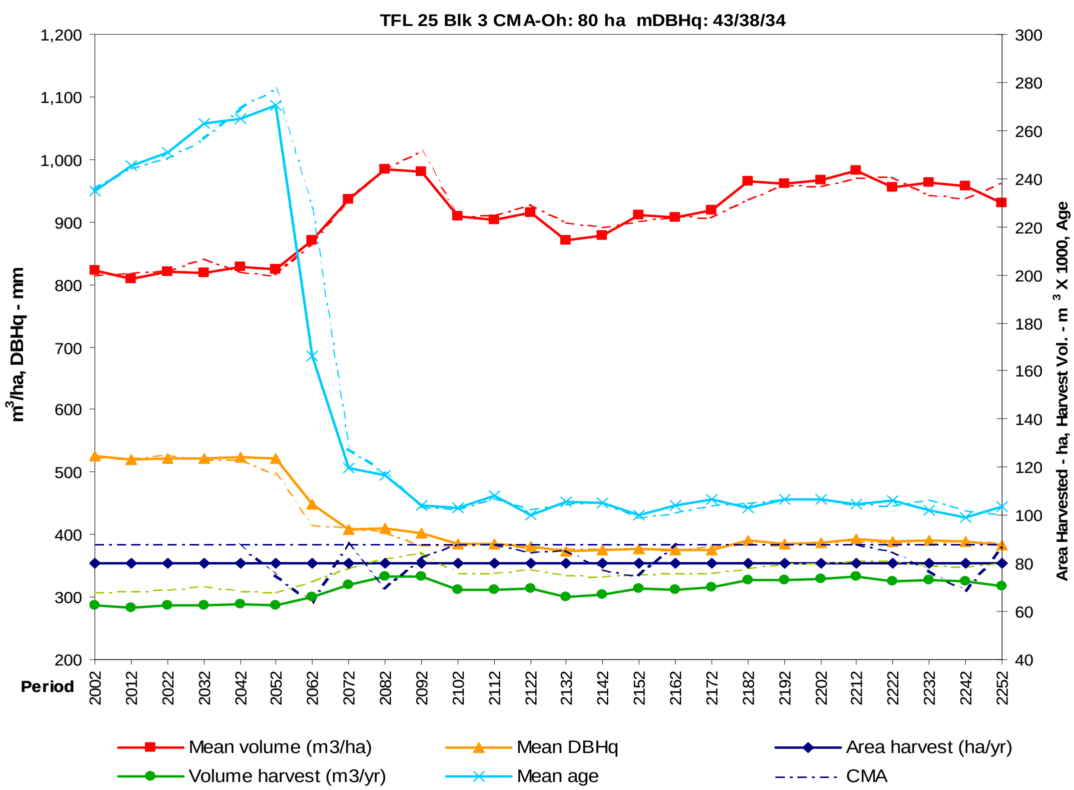

Figure 69. Block 3 CMA -Oh

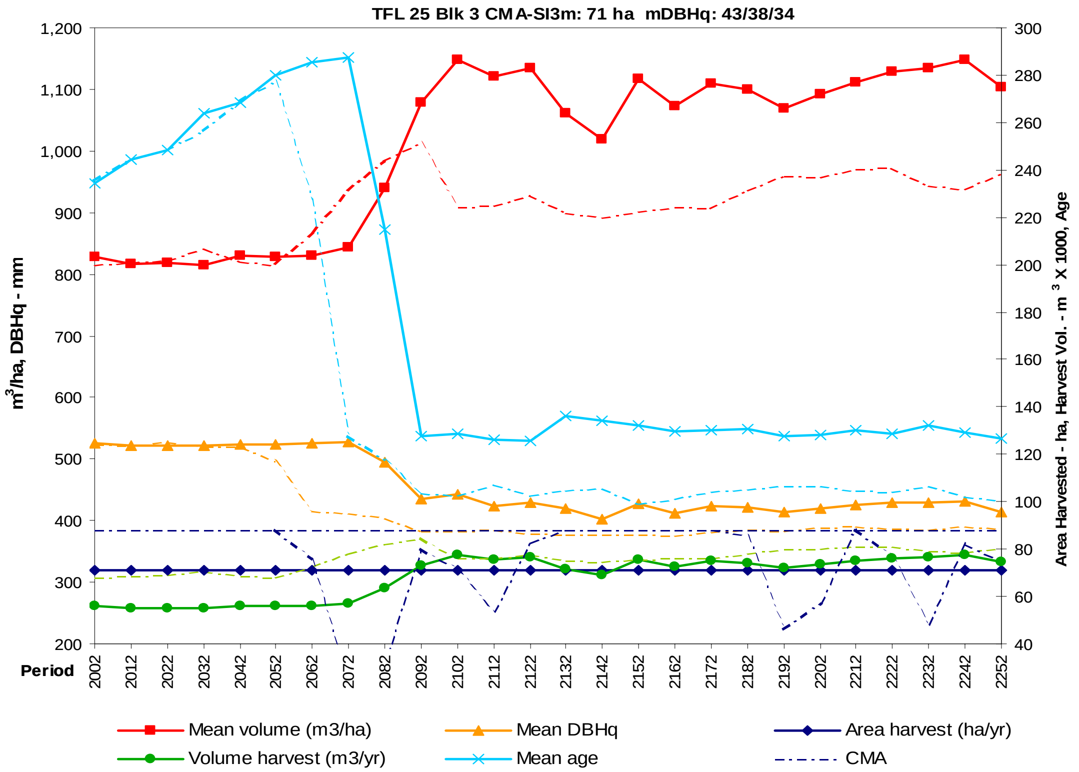

Figure 70. Block 3 CMA –SI3m

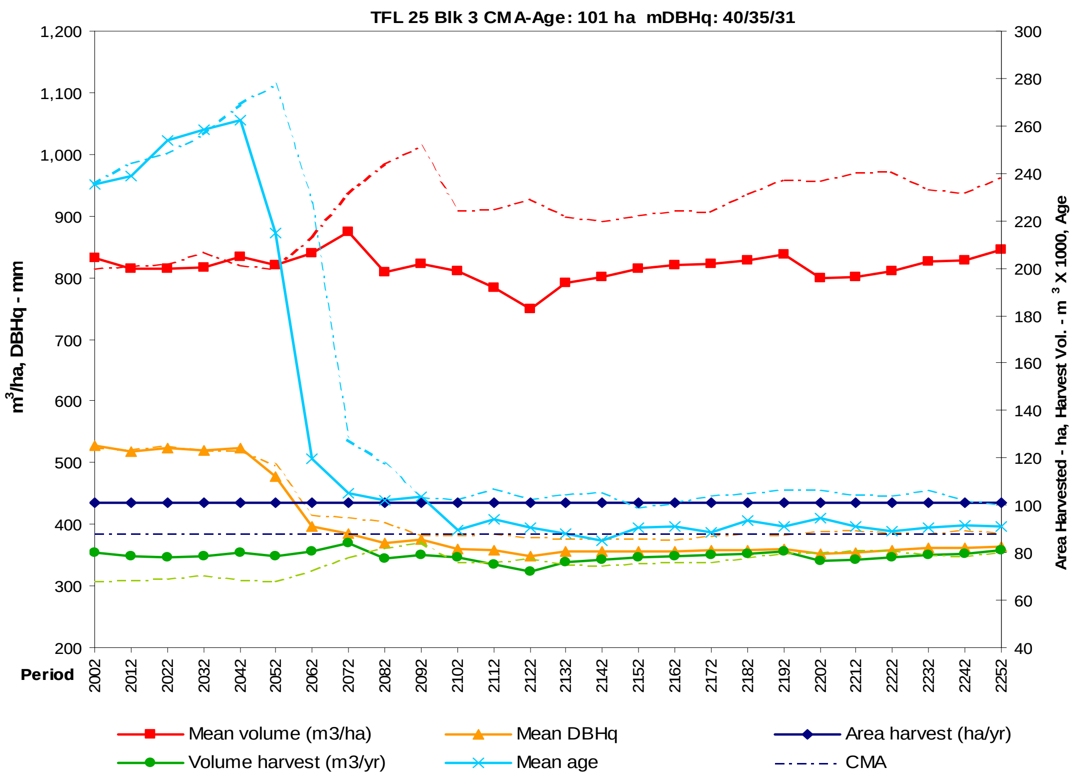

Figure 71. Block 3 CMA -age

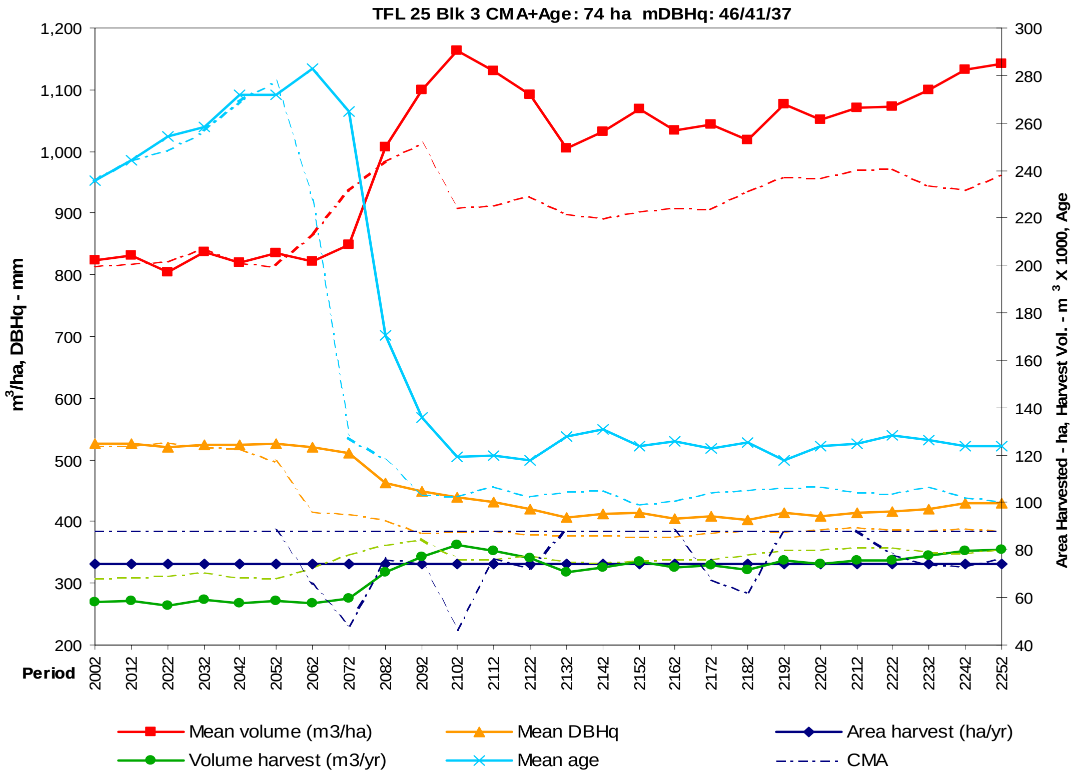

Figure 72. Block 3 CMA +age

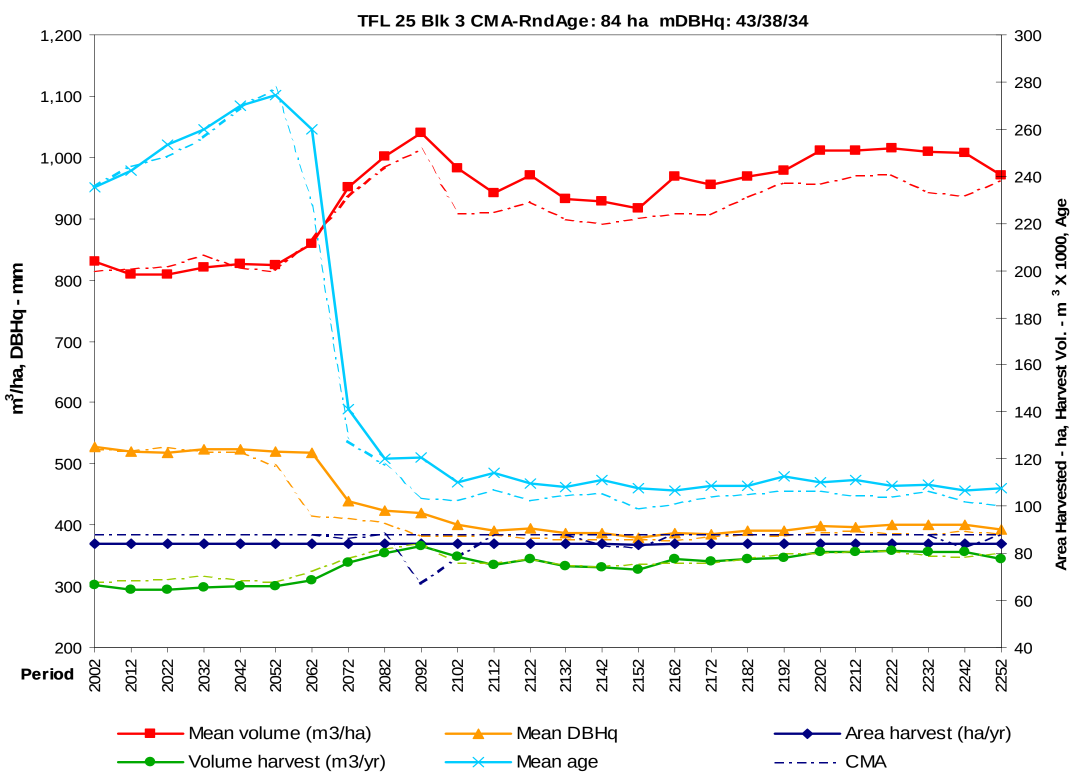

Figure 73. Block 3 CMA -RndAge

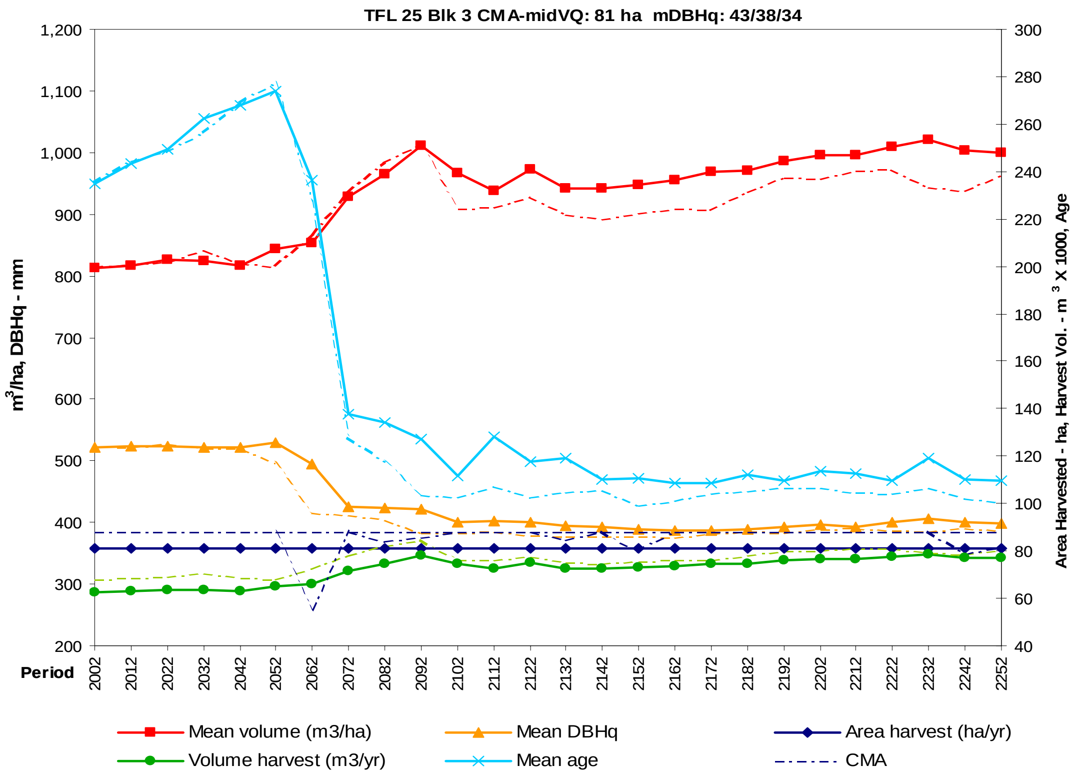

Figure 74. Block 3 CMA -midVQ

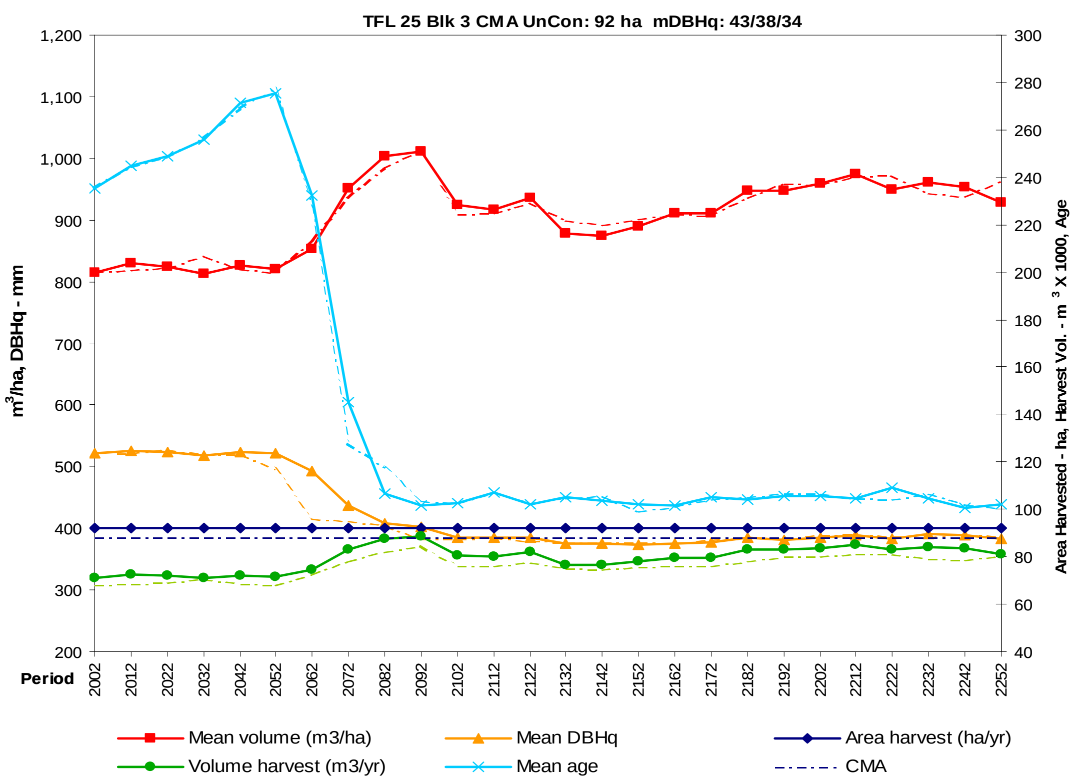

Figure 75. Block 3 CMA UnCon

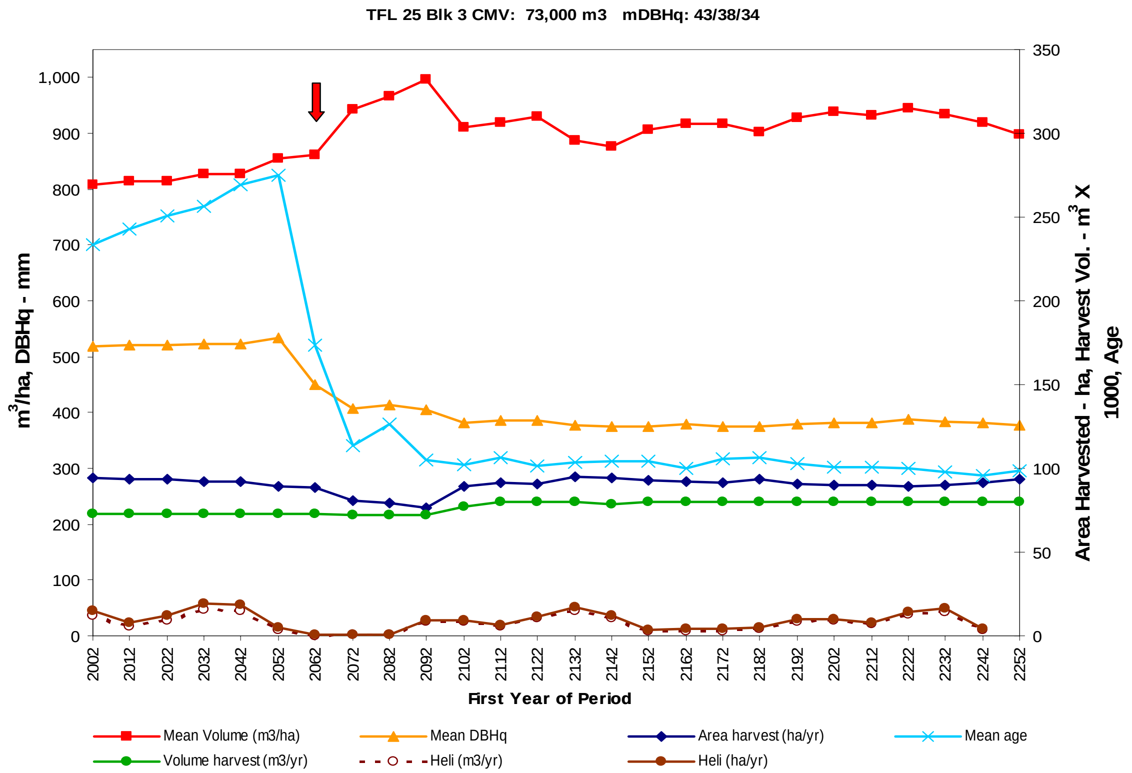

Figure 76. Block 3 CMV (Volume Regulated)

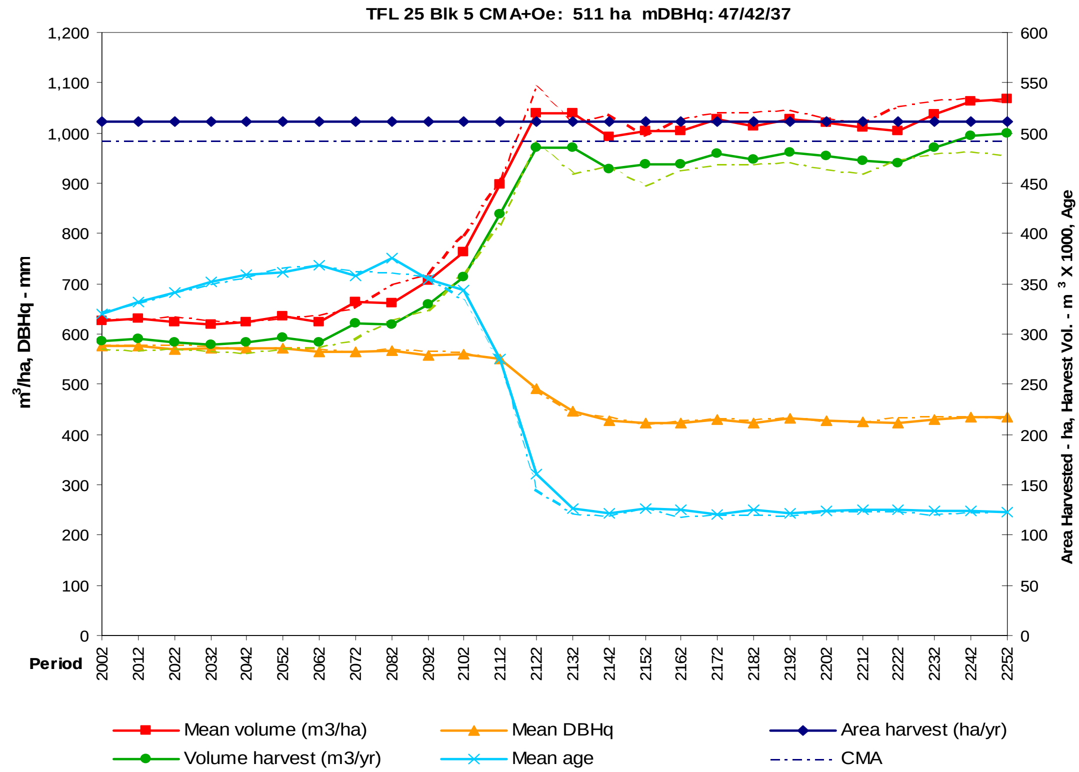

Figure 77. Block 5 CMA +Oe

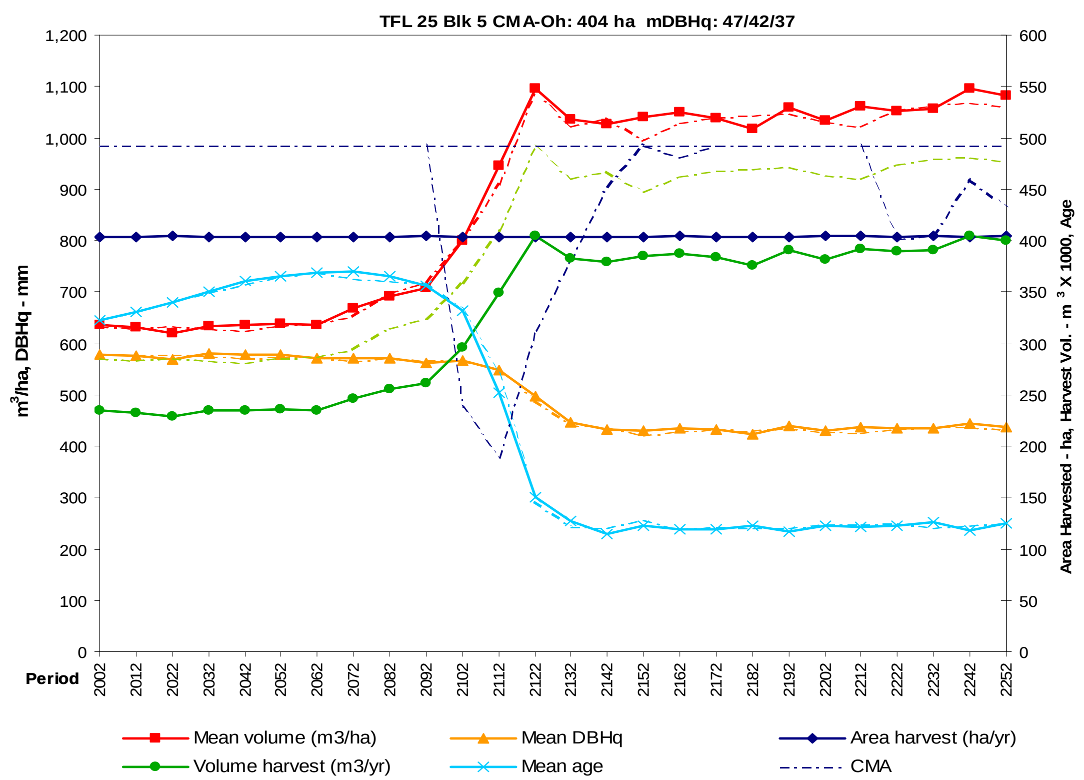

Figure 78. Block 5 CMA -Oh

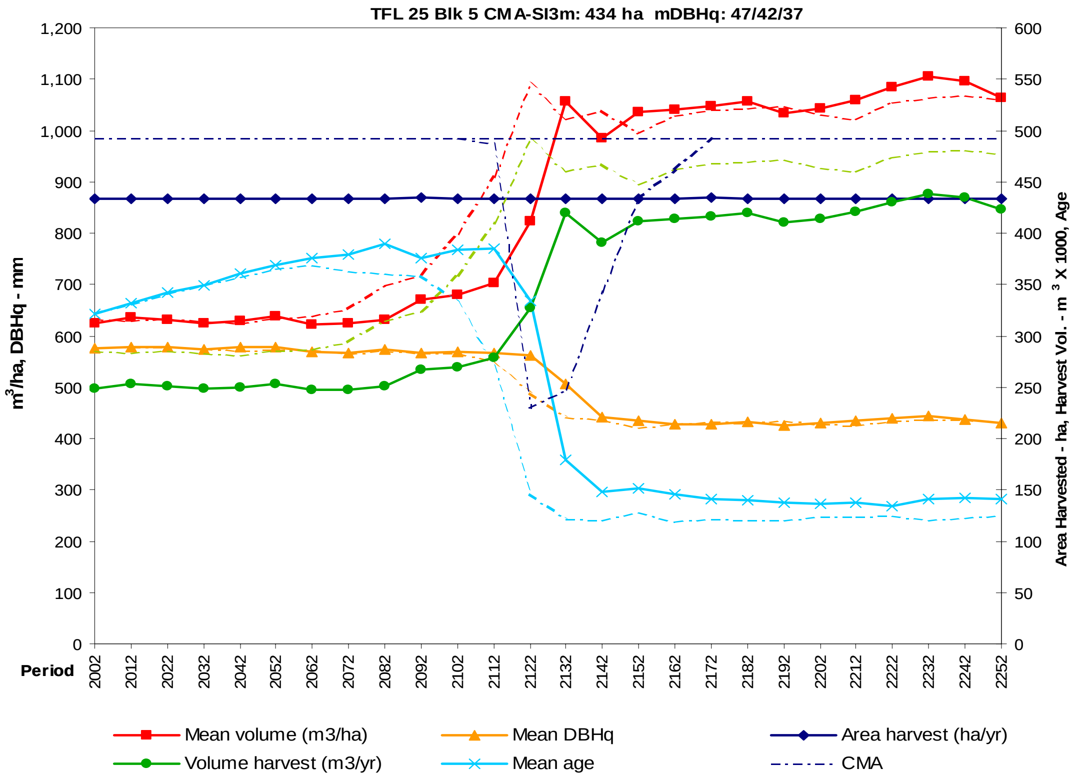

Figure 79. Block 5 CMA –SI3m

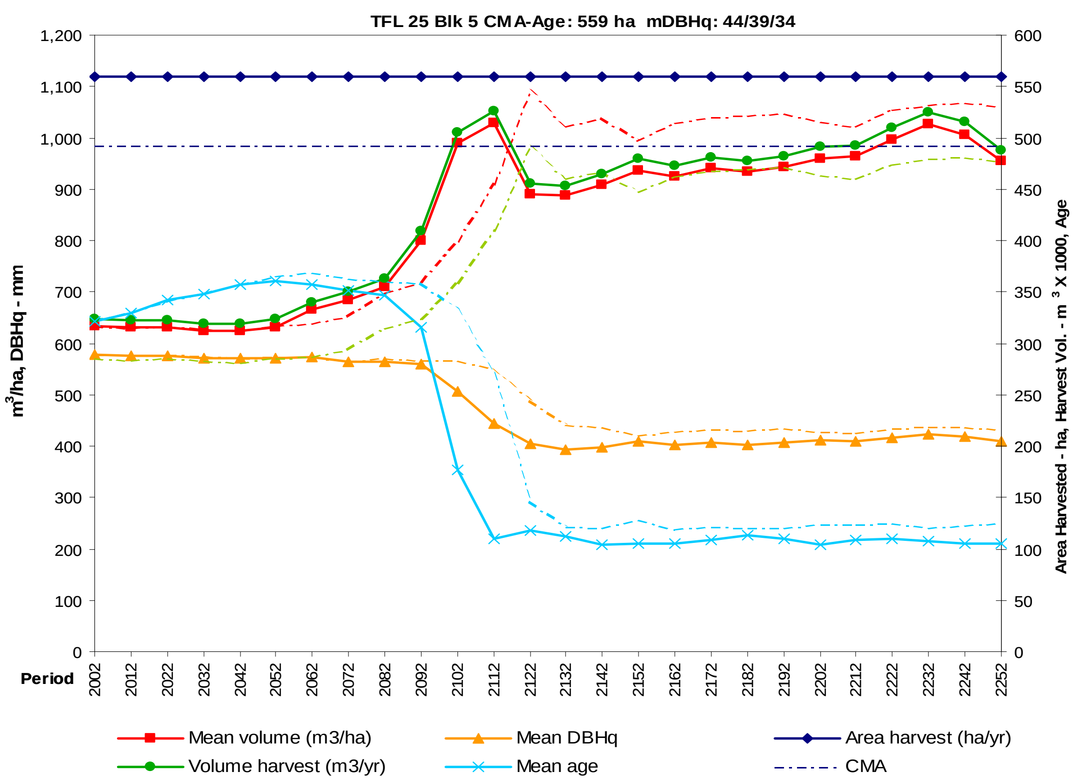

Figure 80. Block 5 CMA -age

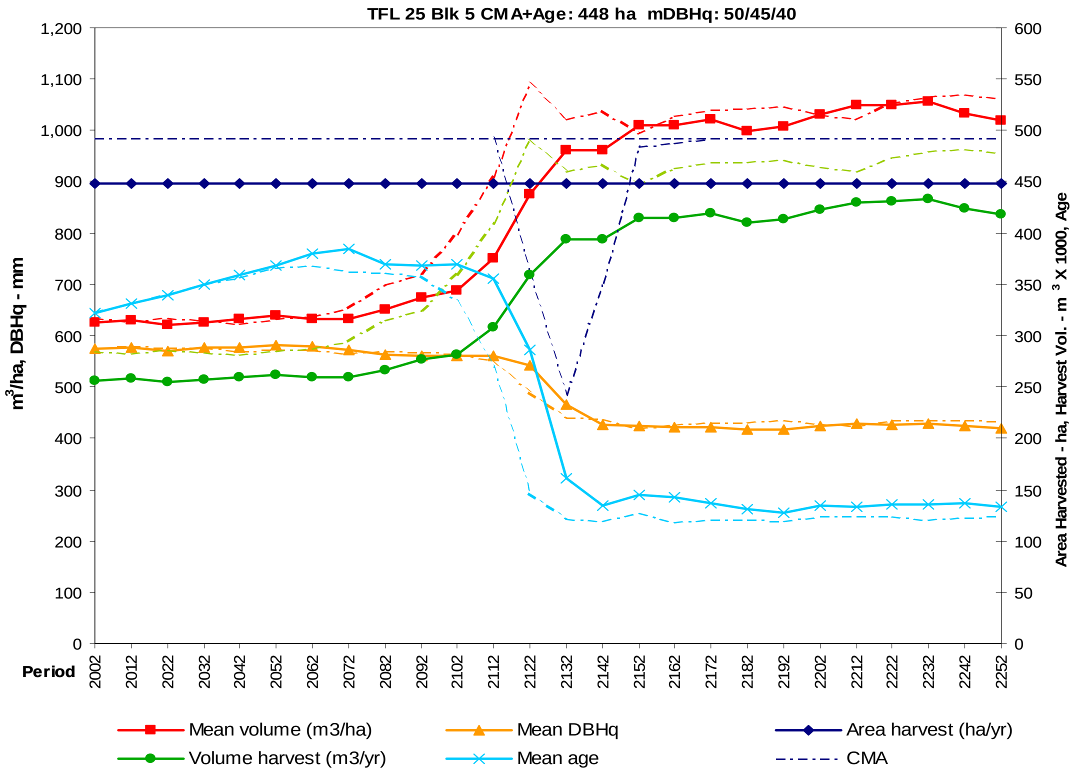

Figure 81. Block 5 CMA +age

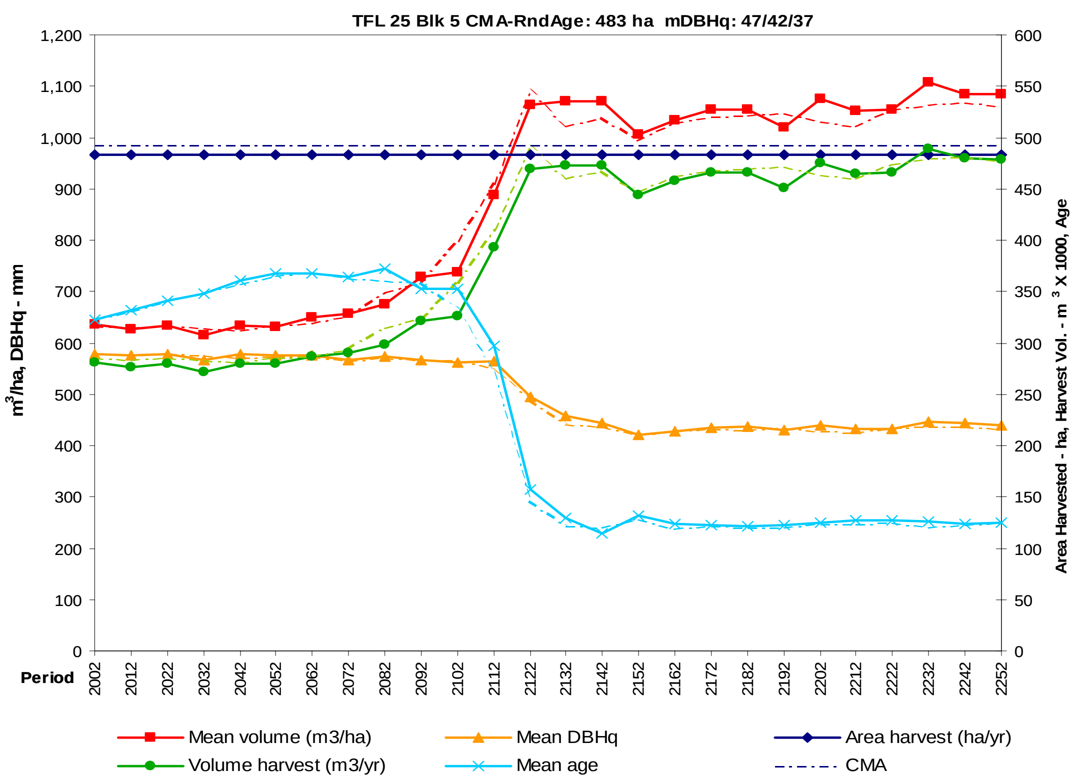

Figure 82. Block 5 CMA -RndAge

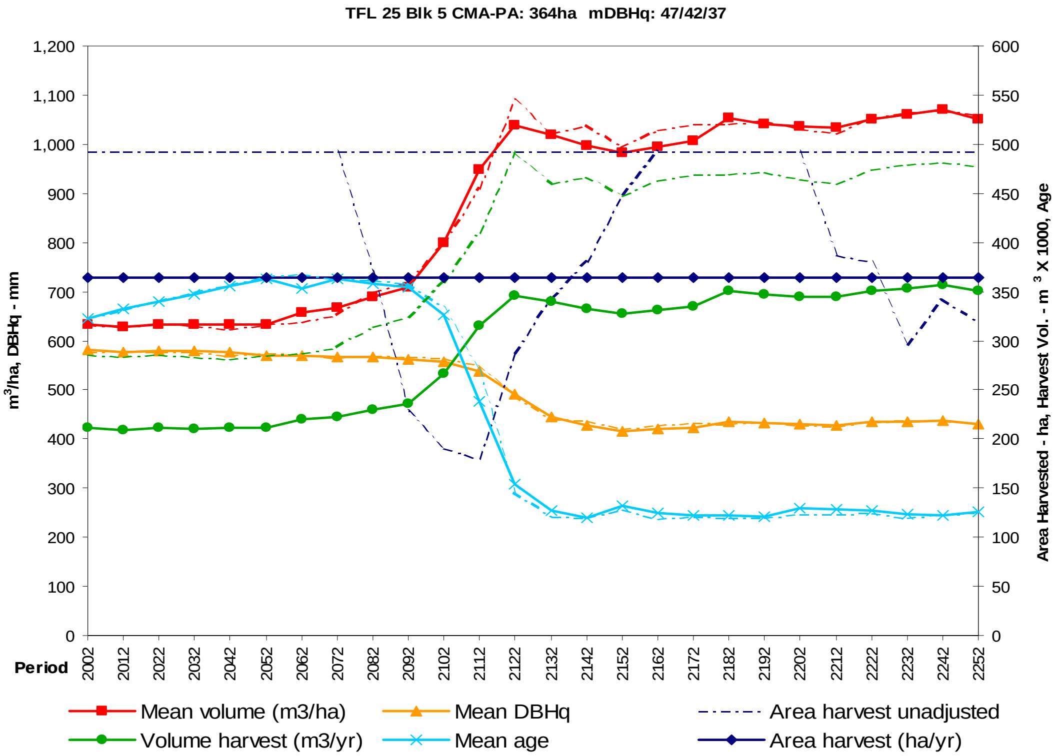

Figure 83. Block 5 CMA -PA

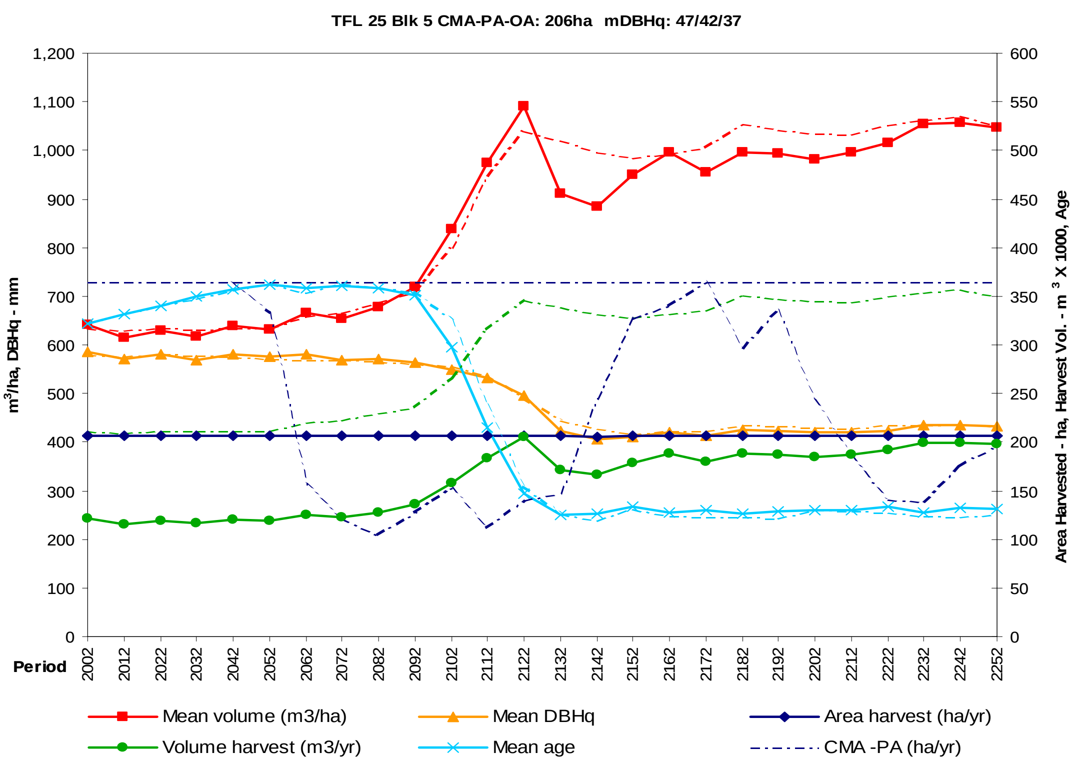

Figure 84. Block 5 CMA -PA -OA

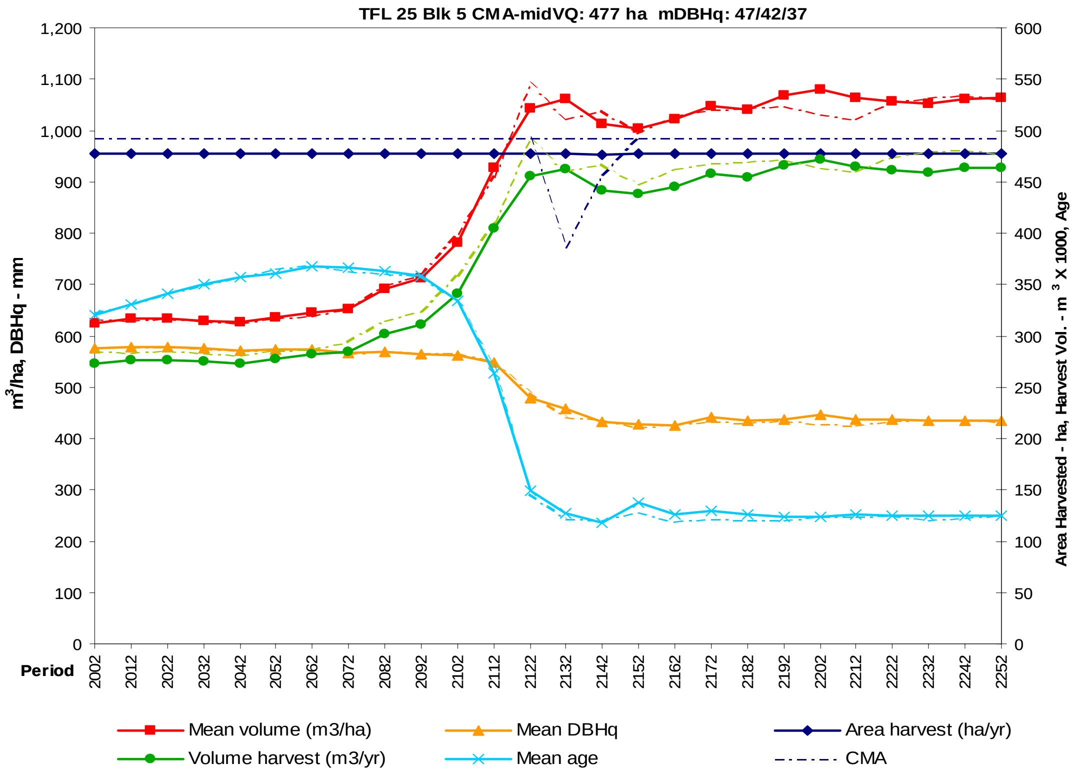

Figure 85. Block 5 CMA -midVQ

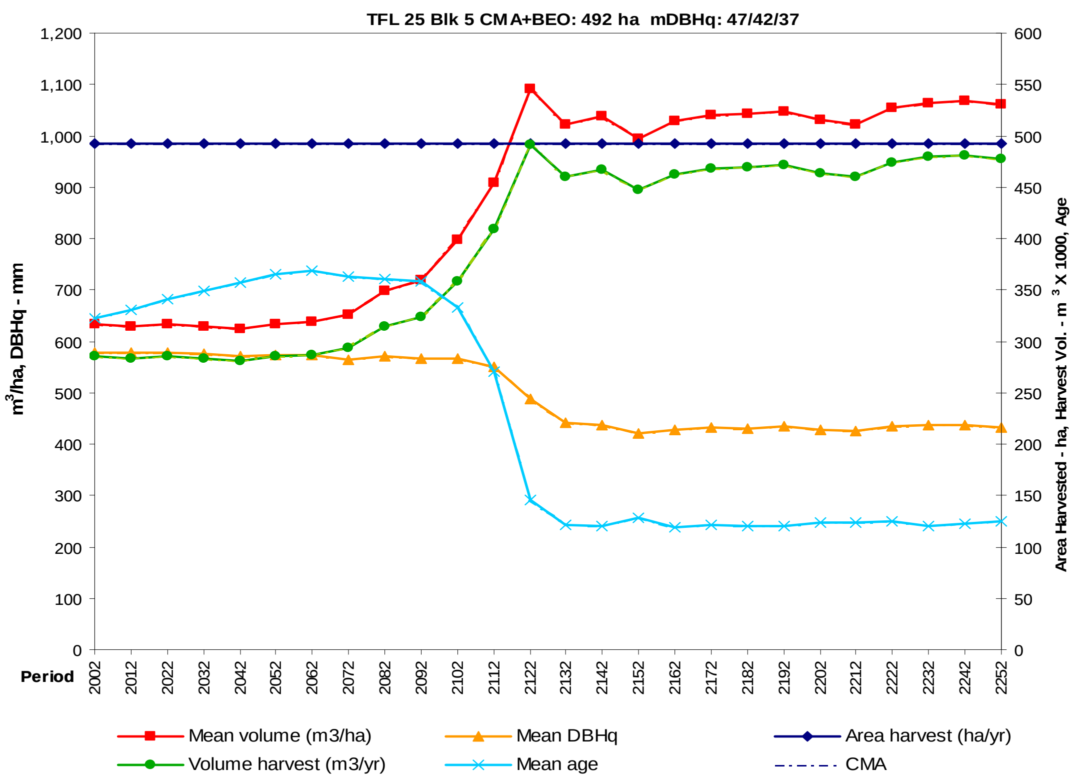

Figure 86. Block 5 CMA +BEO

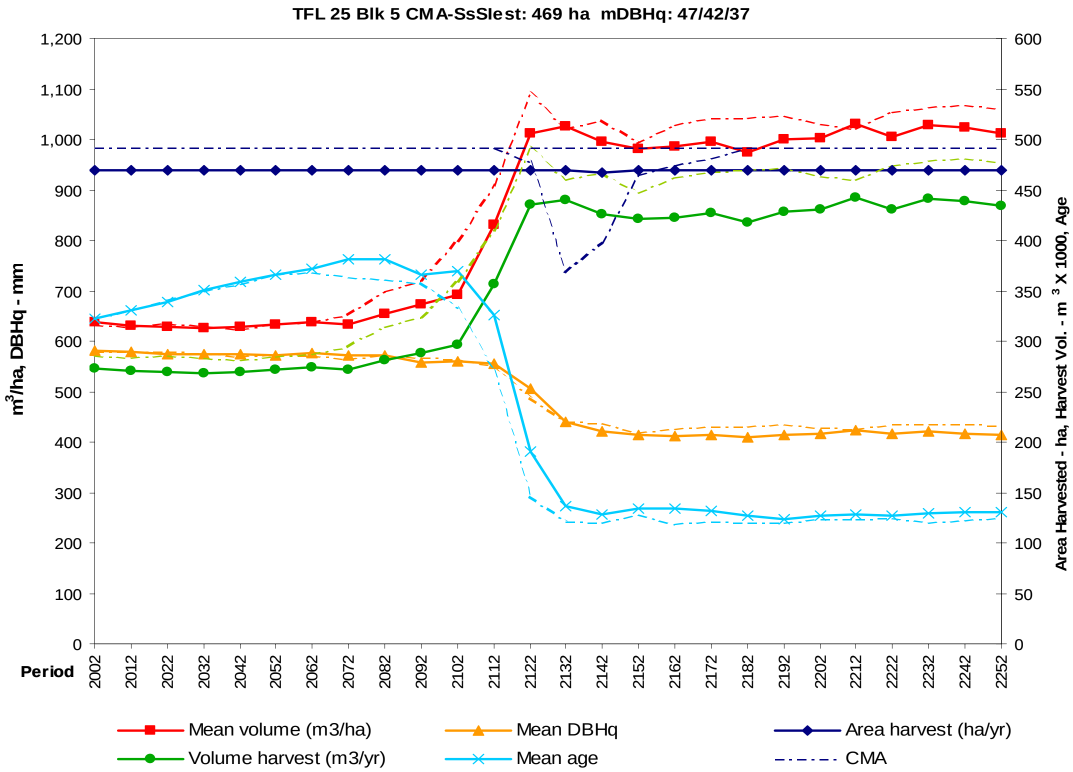

Figure 87. Block 5 CMA –SsSlest

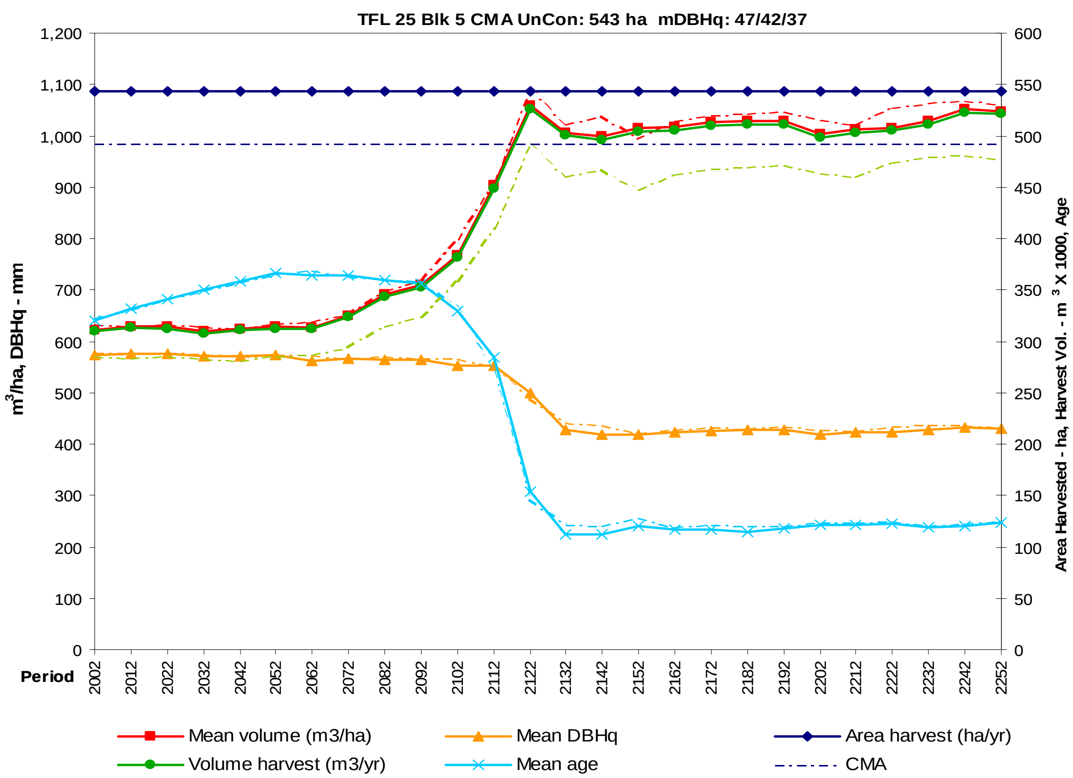

Figure 88. Block 5 CMA UnCon

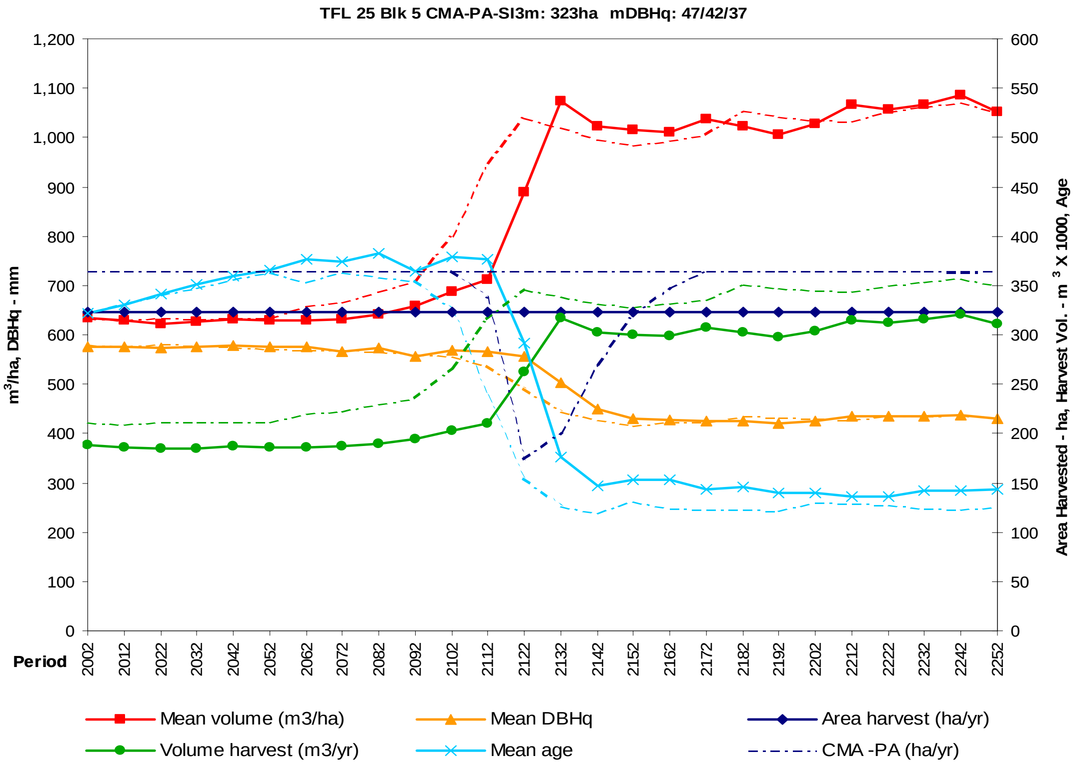

Figure 89. Block 5 CMA –PA –SI3m

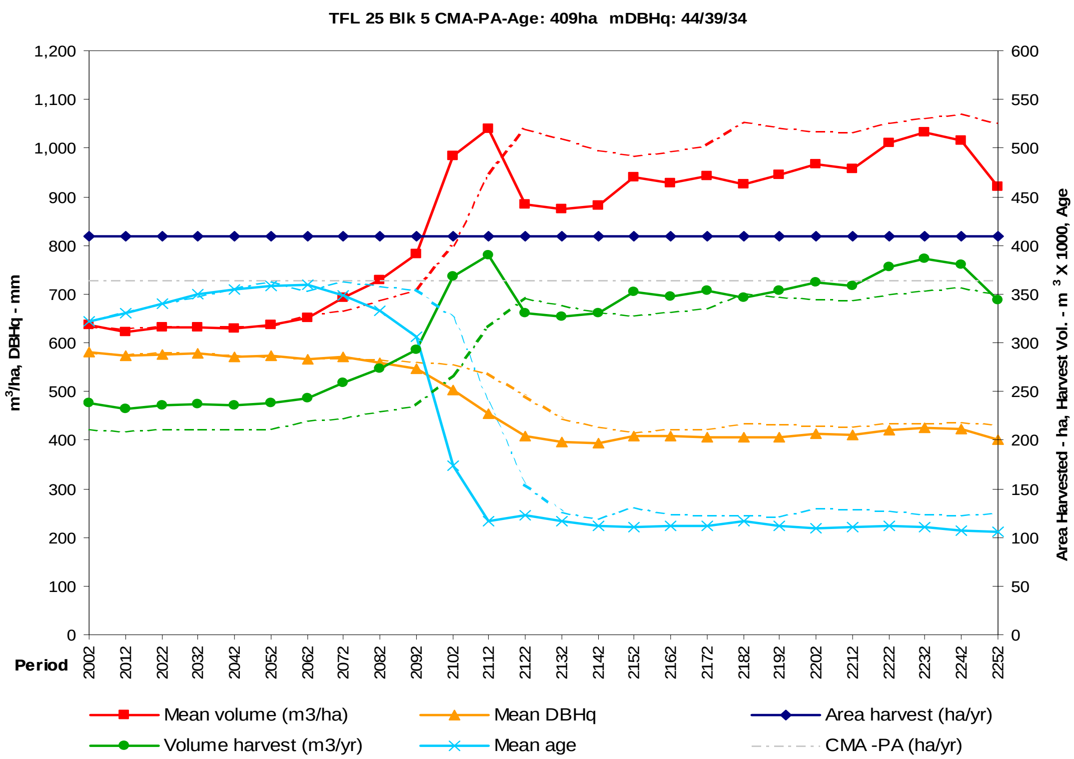

Figure 90. Block 5 CMA –PA –age

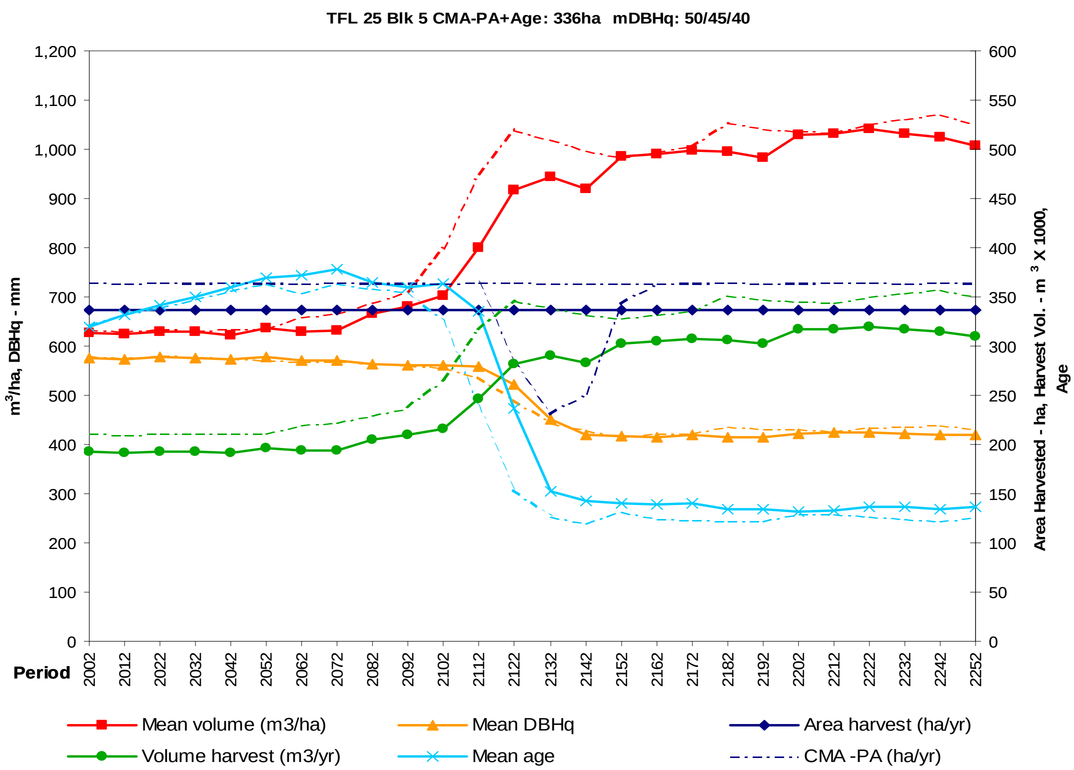

Figure 91. Block 5 CMA –PA +age

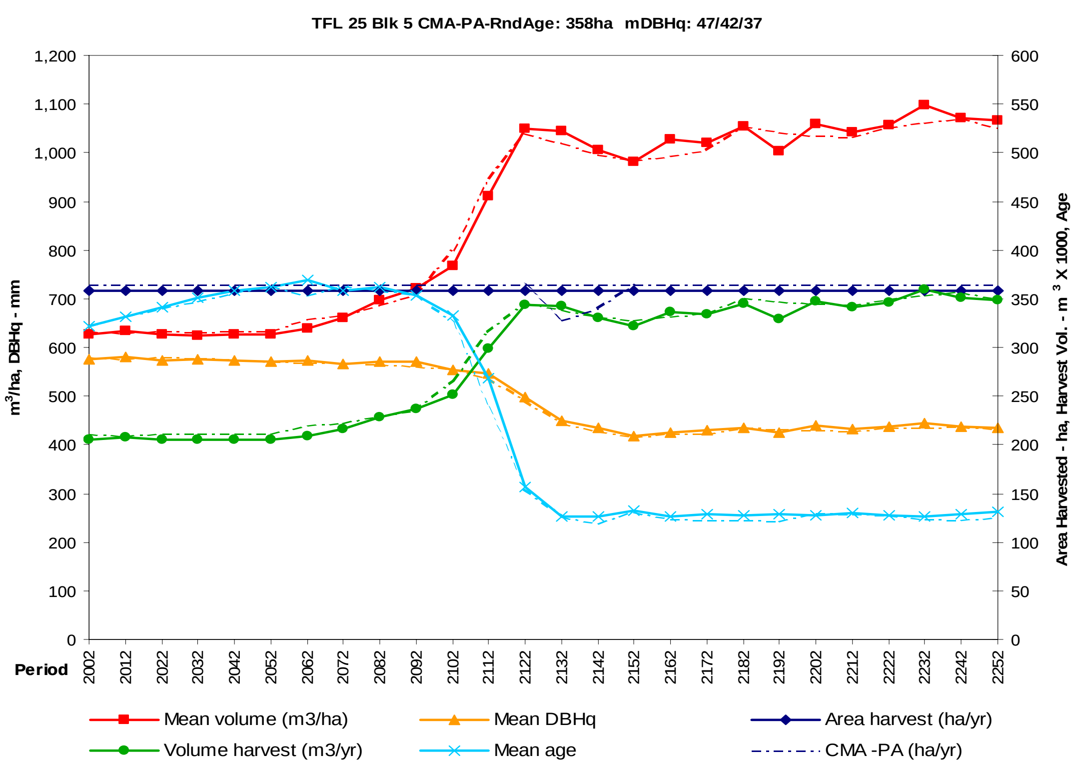

Figure 92. Block 5 CMA –PA –RndAge

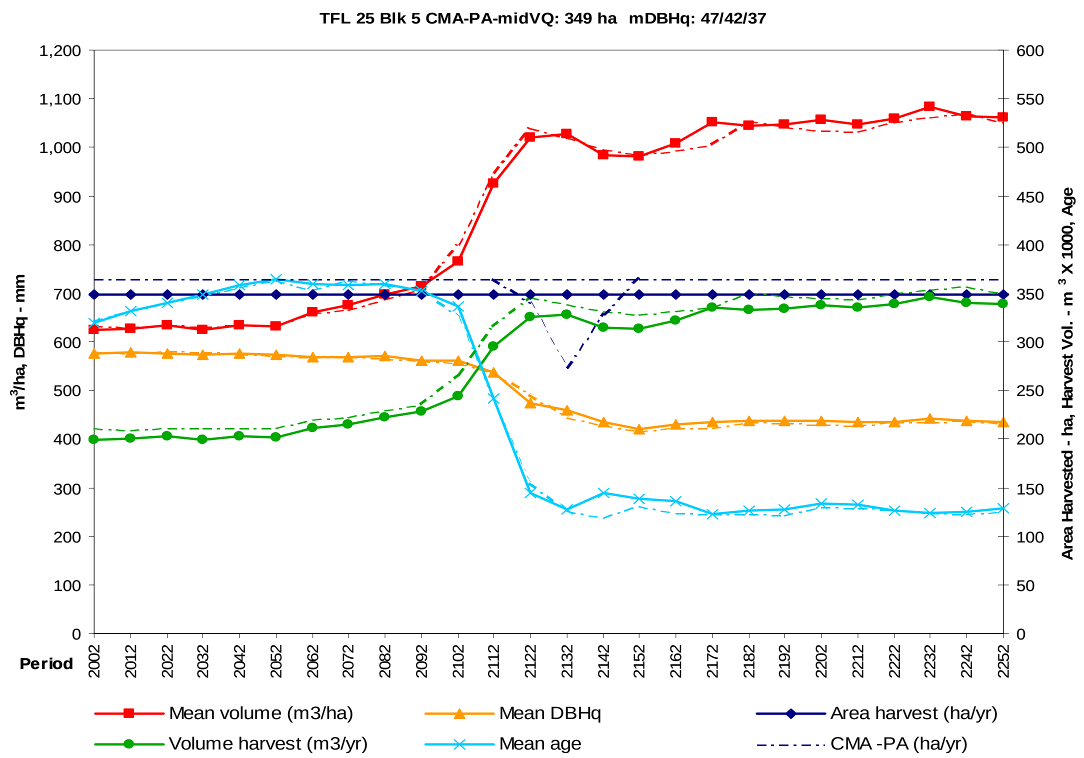

Figure 93. Block 5 CMA –PA –midVQ

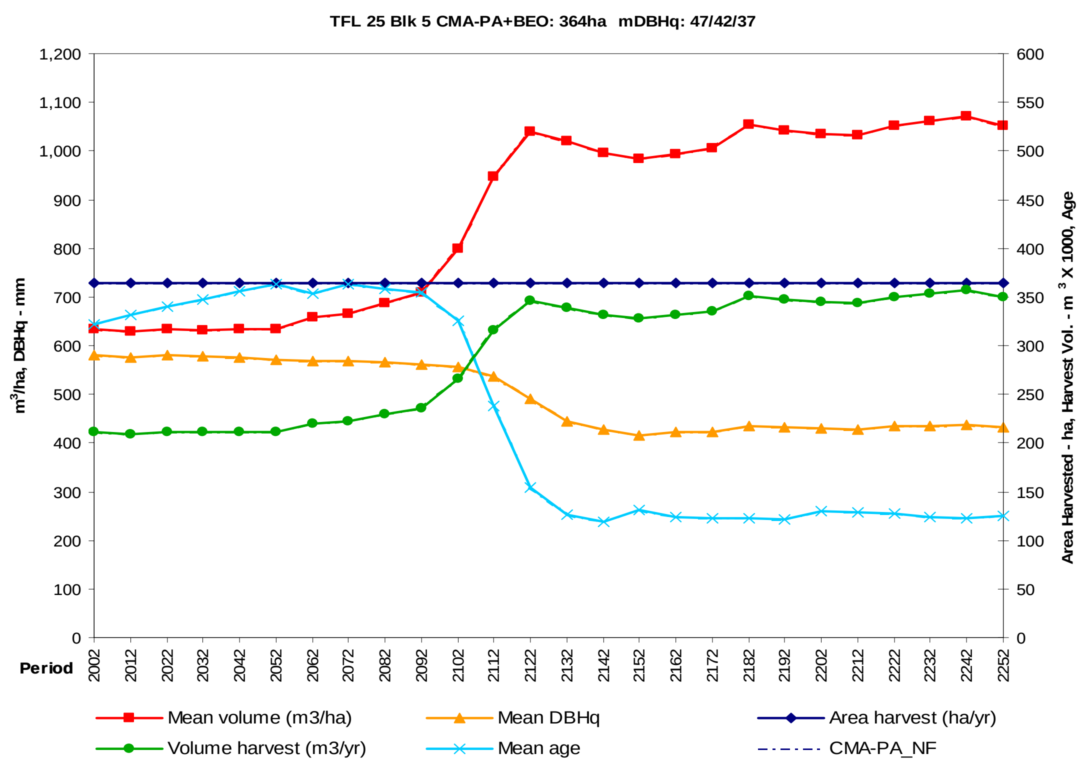

Figure 94. Block 5 CMA –PA +BEO

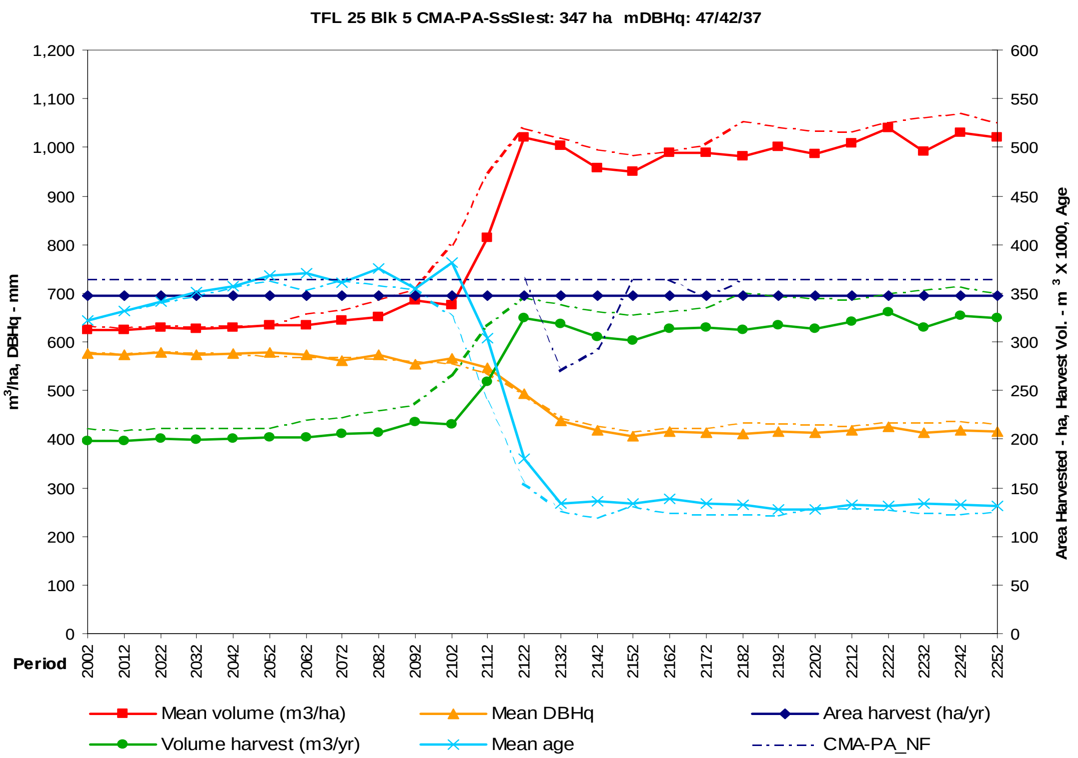

Figure 95. Block 5 CMA –PA –SsSlest

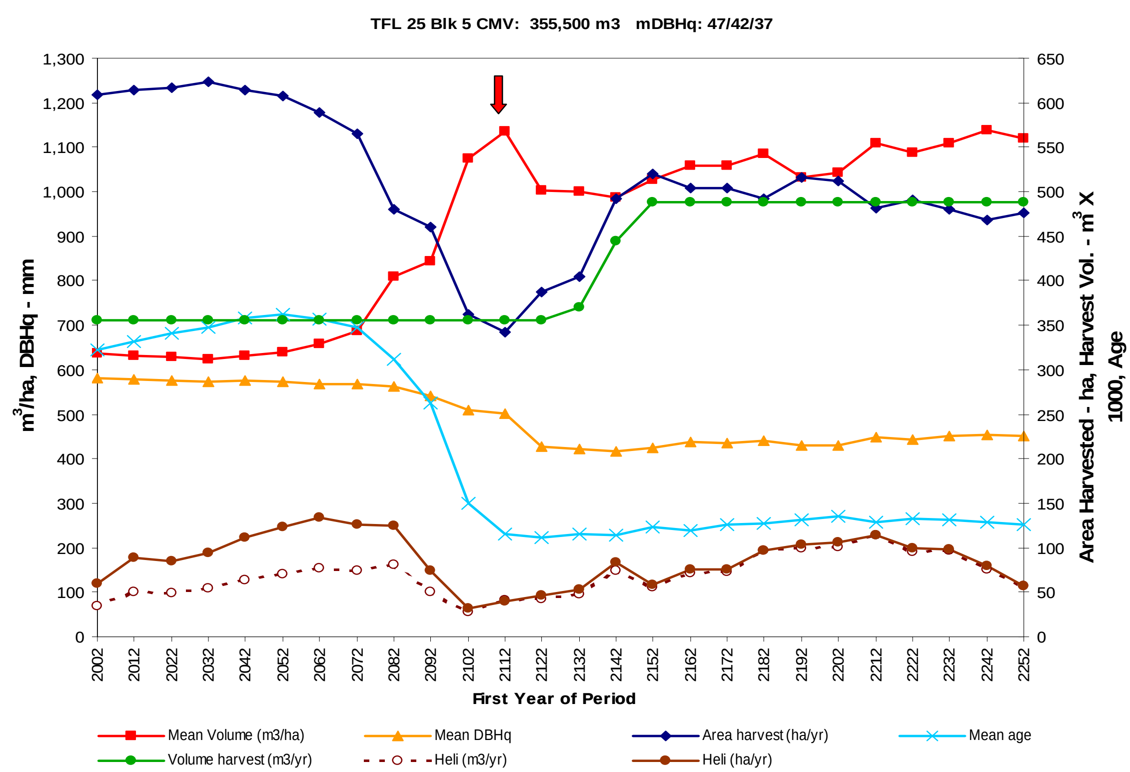

Figure 96. Block 5 CMV (Volume Regulated)

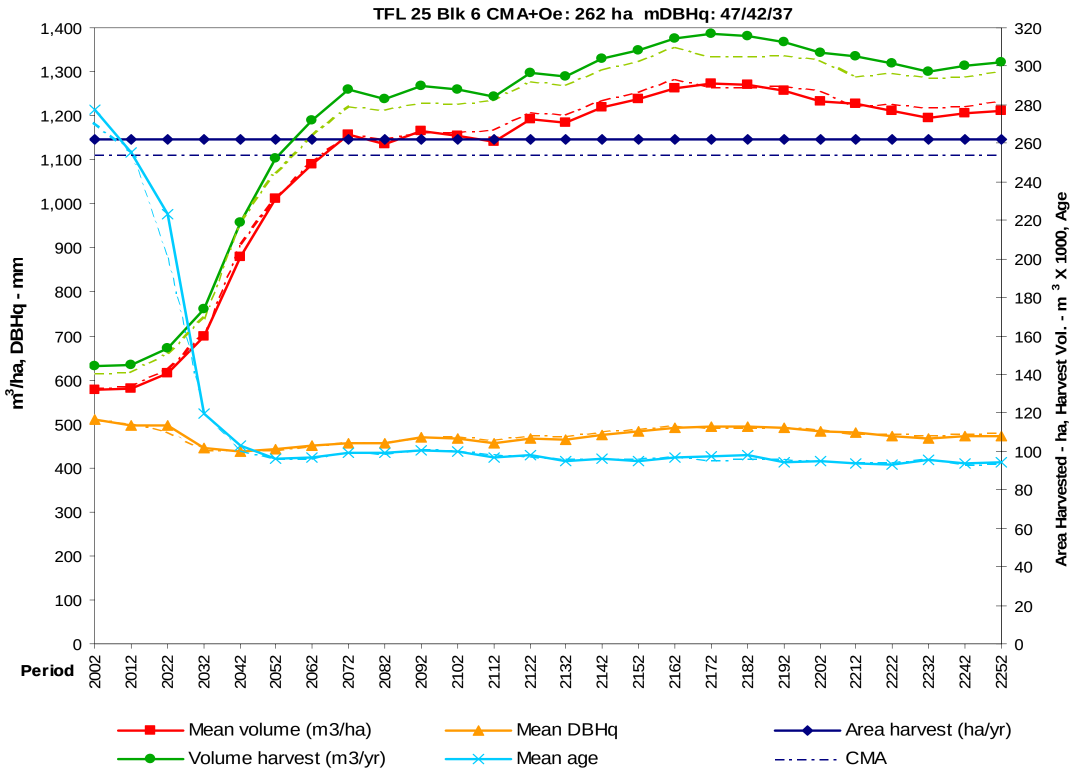

Figure 97. Block 6 CMA +Oe

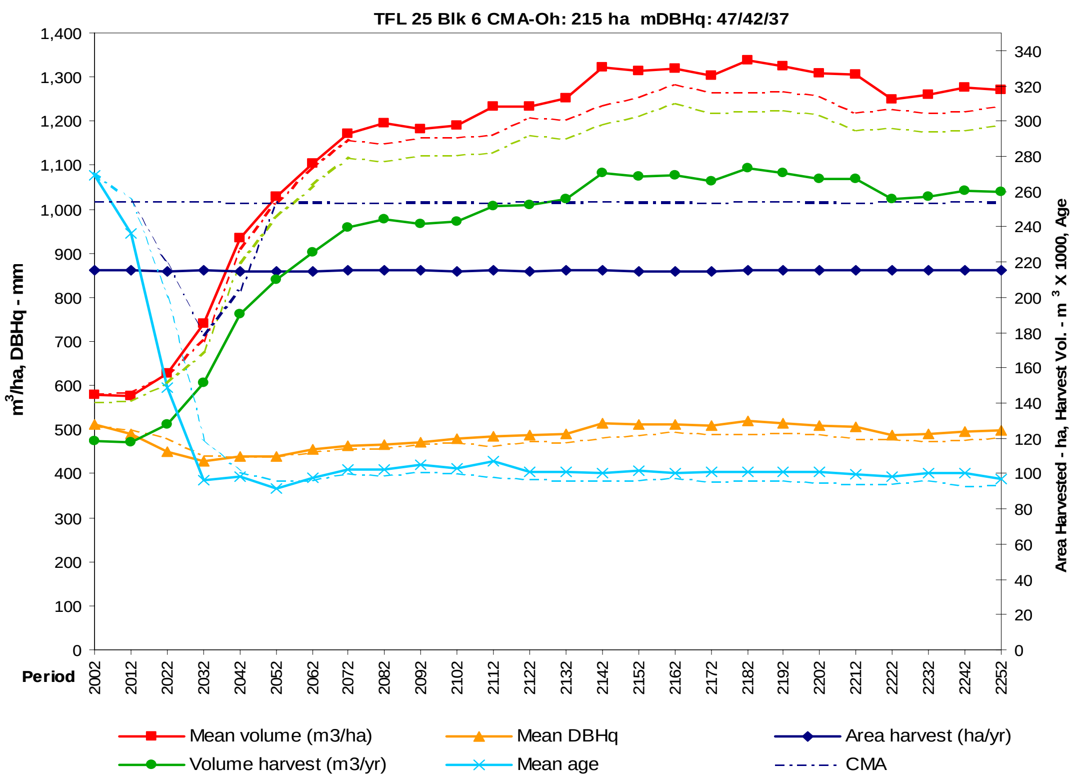

Figure 98. Block 6 CMA -Oh

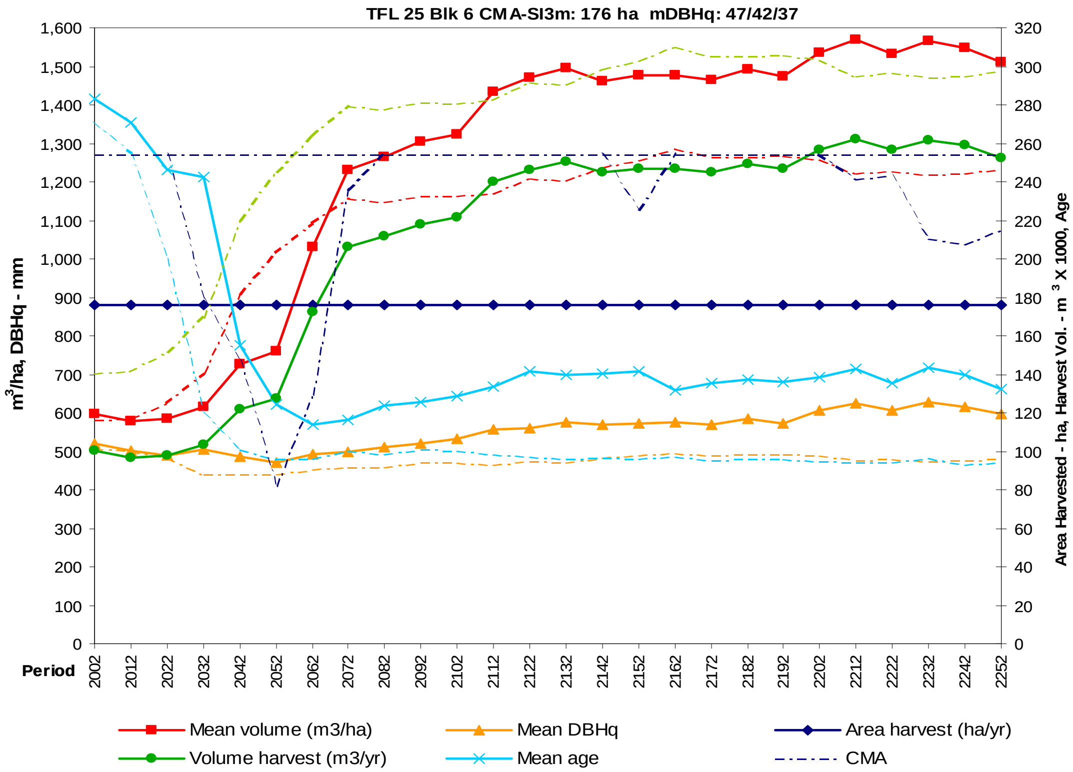

Figure 99. Block 6 CMA –SI3m

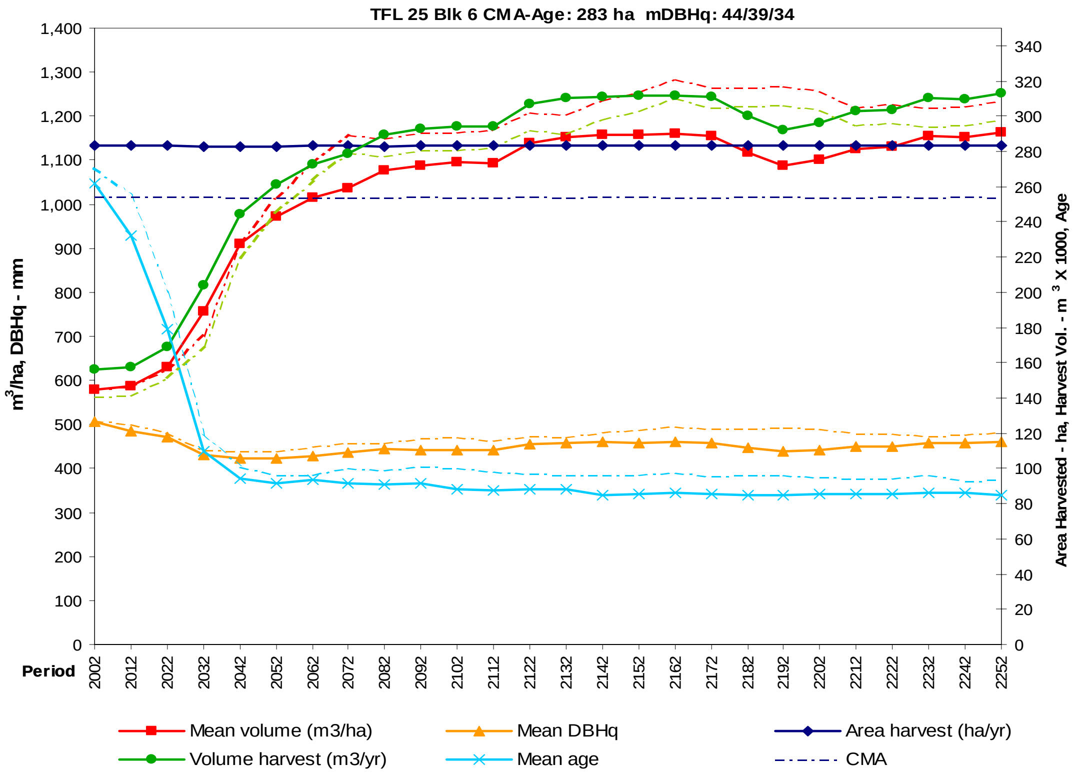

Figure 100. Block 6 CMA -age

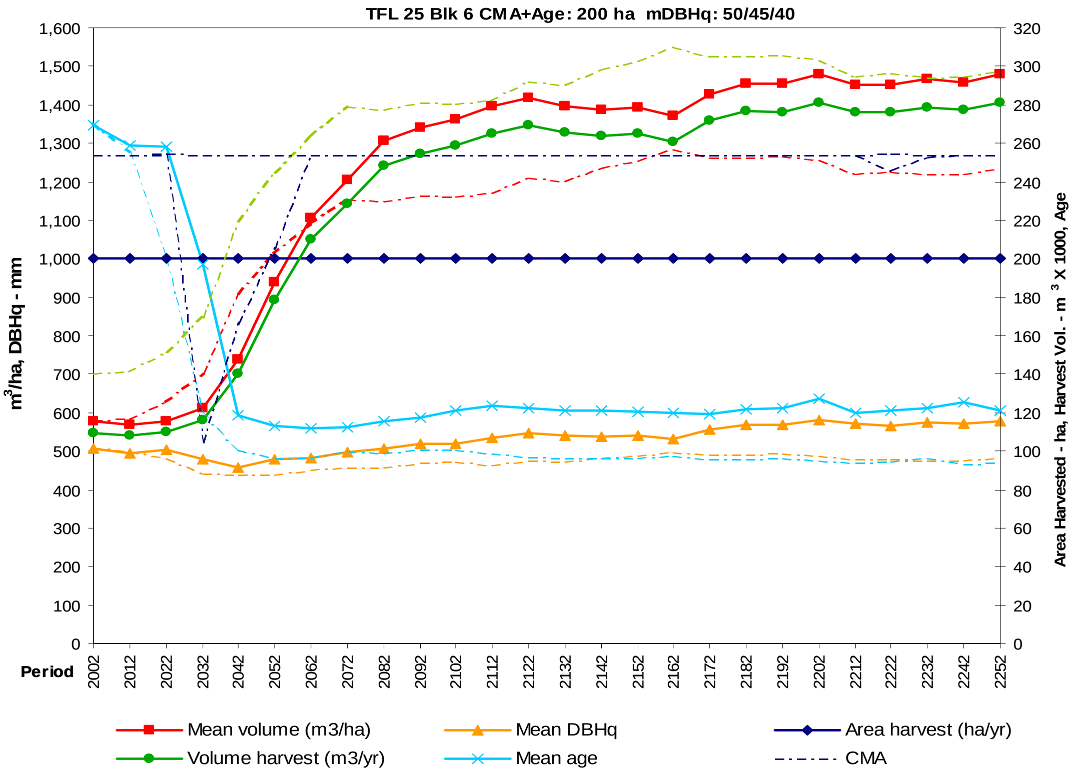

Figure 101. Block 6 CMA +age

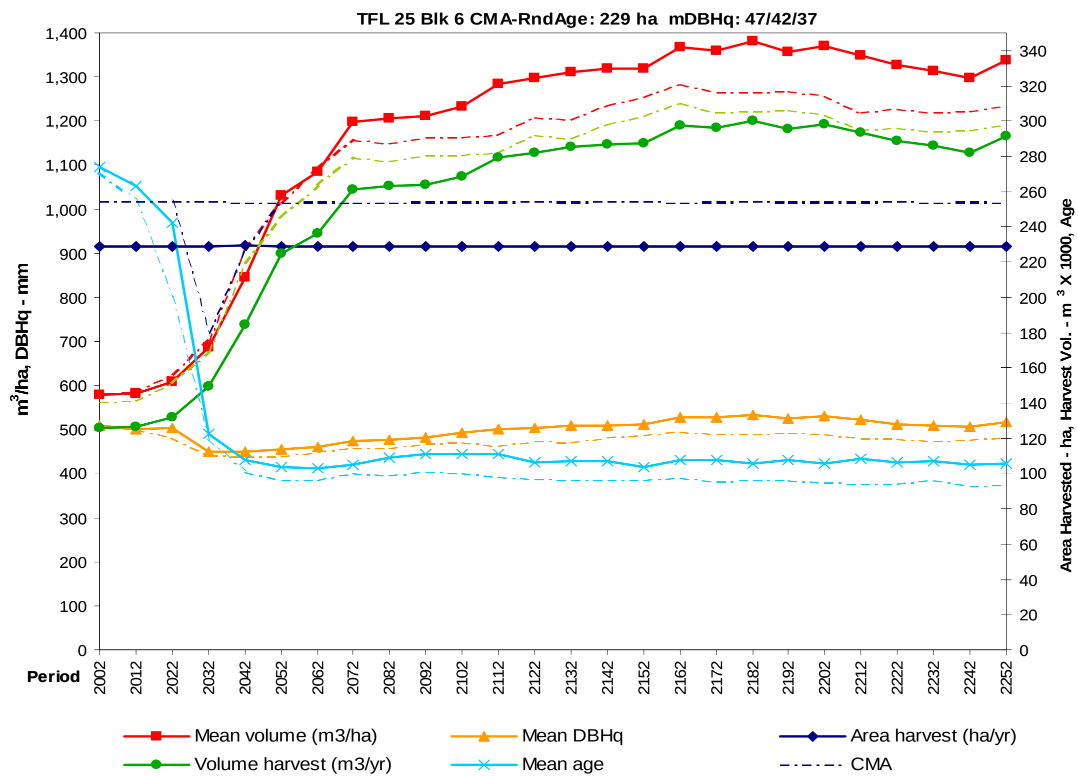

Figure 102. Block 6 CMA -RndAge

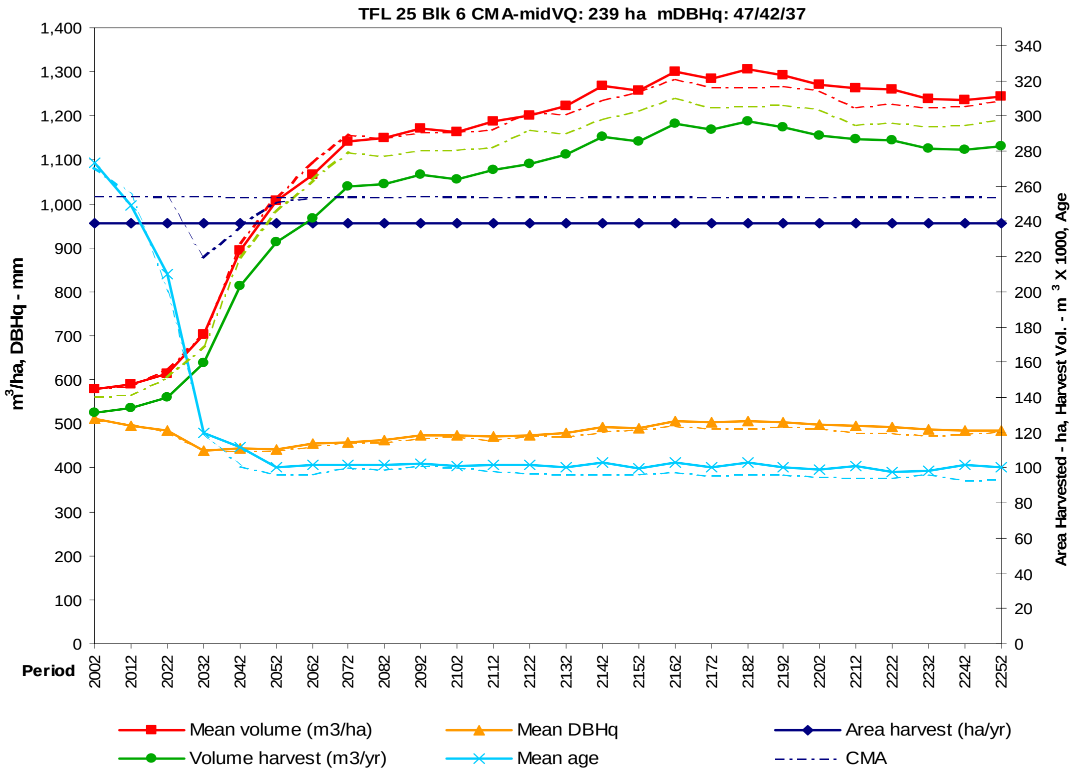

Figure 103. Block 6 CMA -midVQ

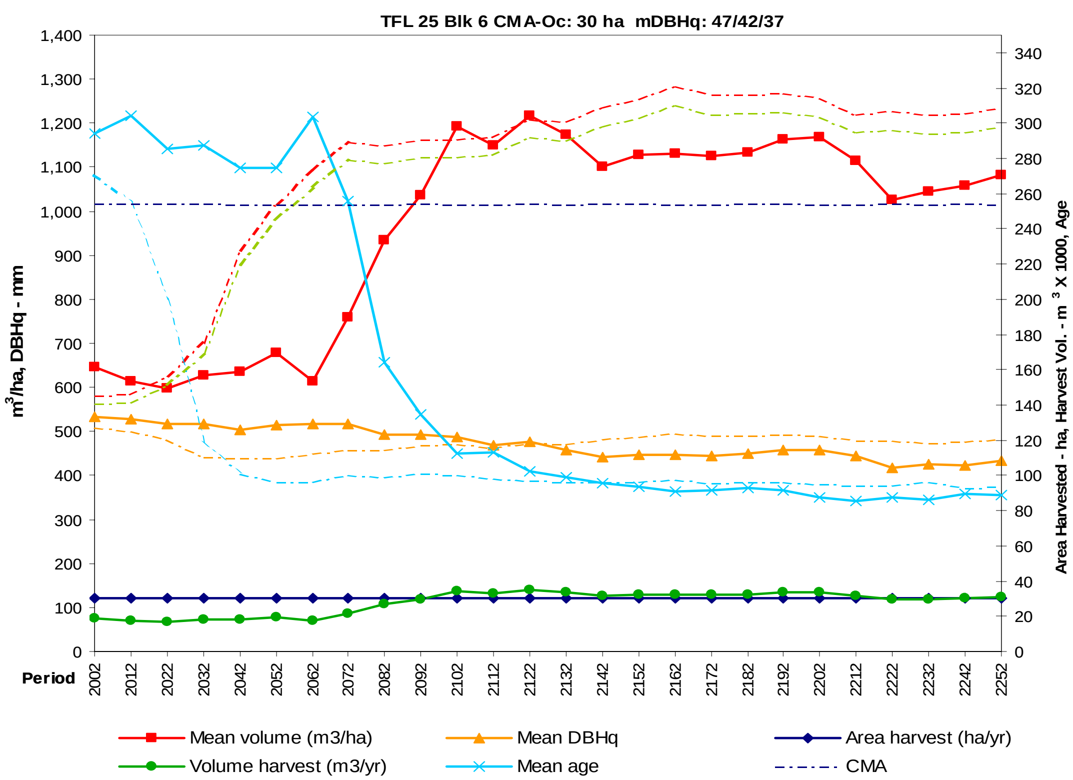

Figure 104. Block 6 CMA -Oc

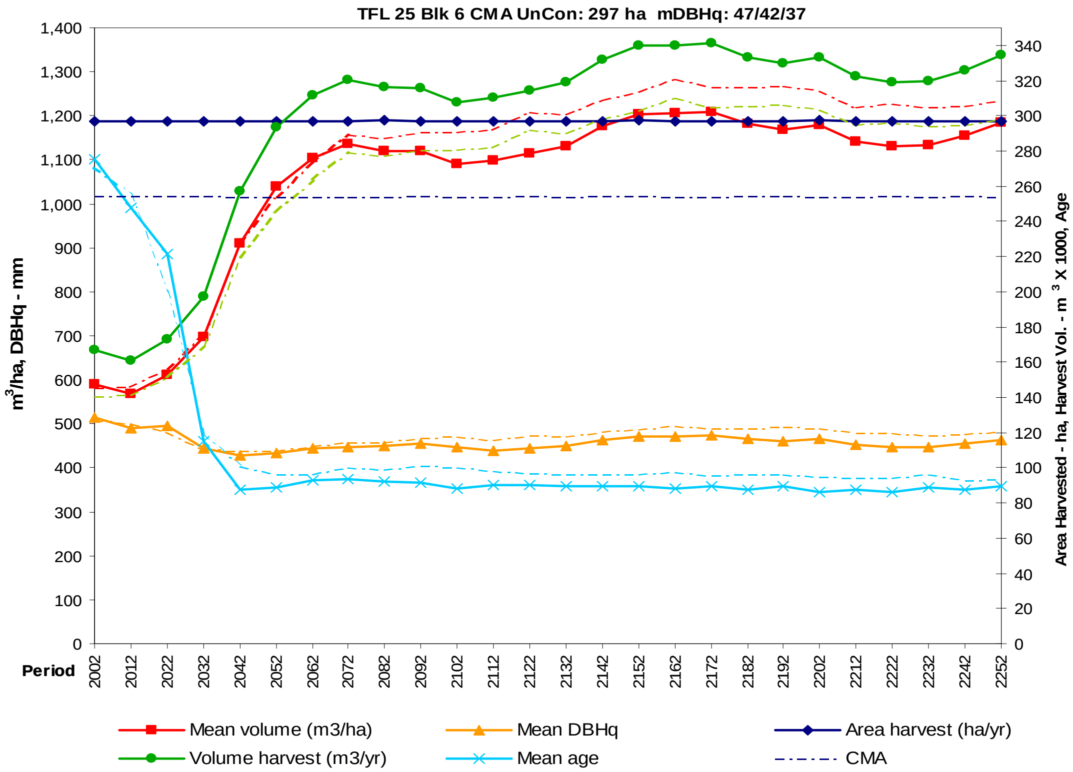

Figure 105. Block 6 CMA UnCon

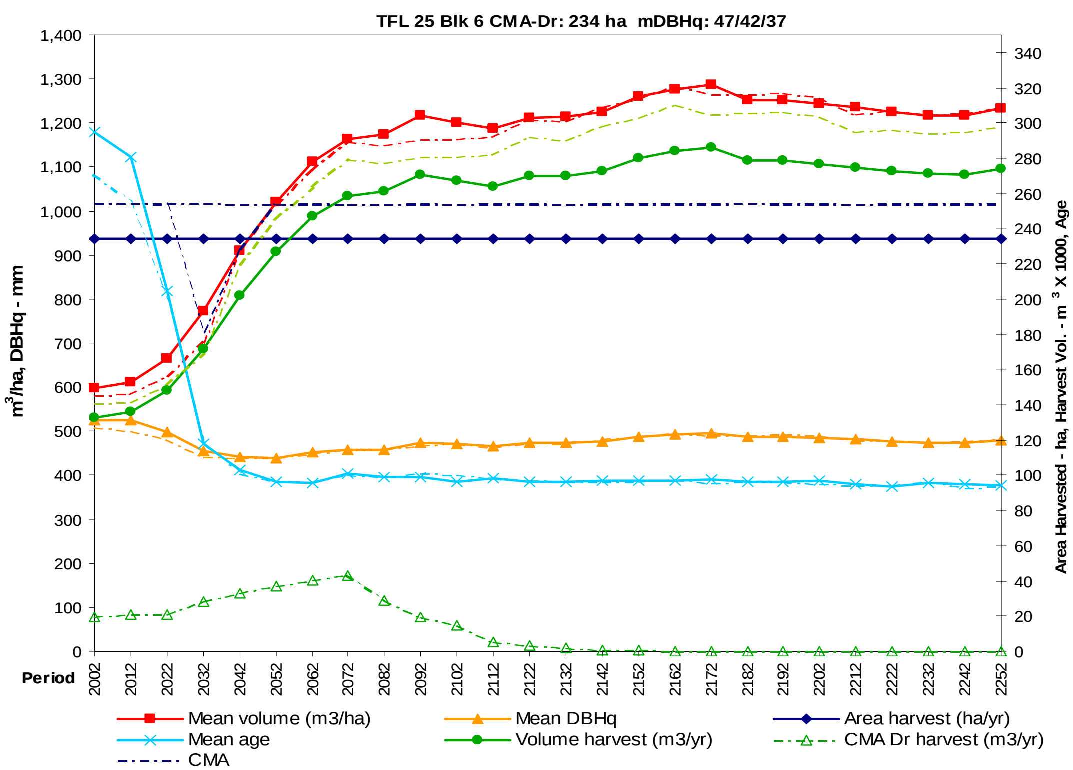

Figure 106. Block 6 CMA -Dr

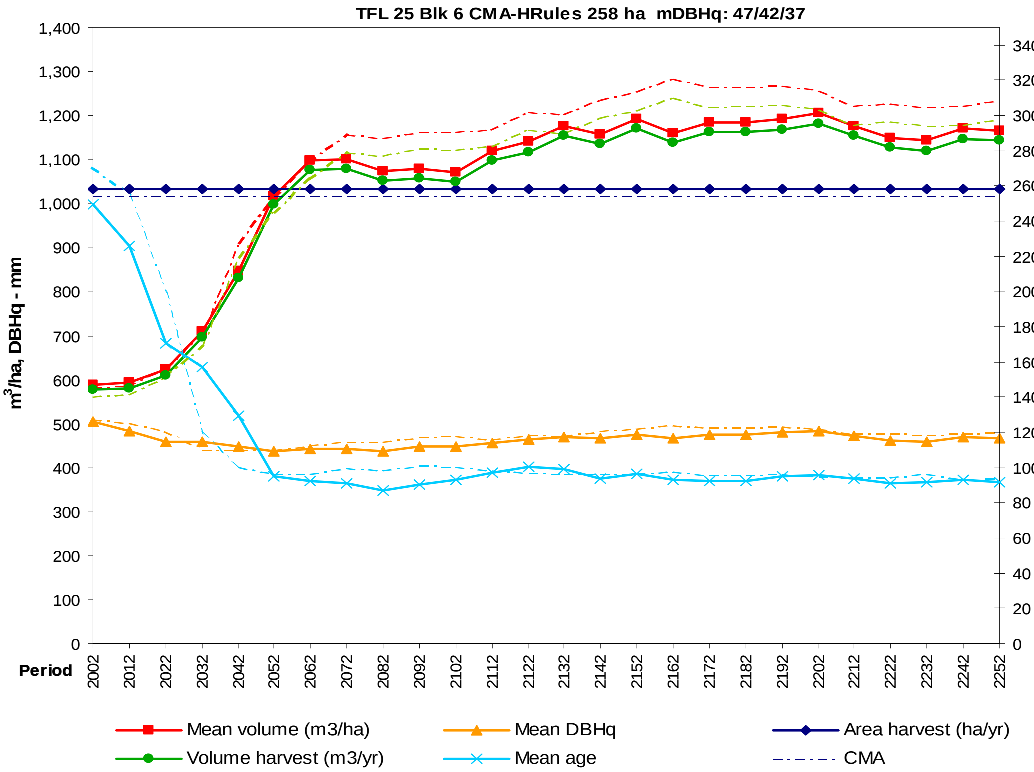

Figure 107. Block 6 -HRules

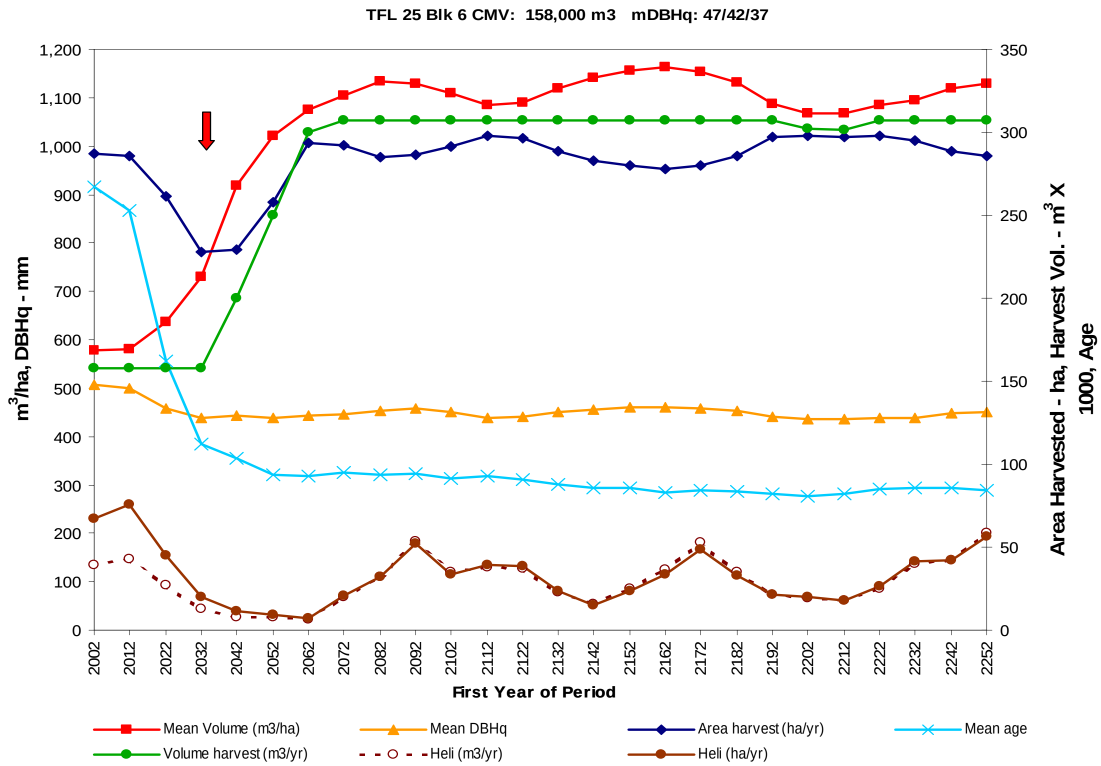

Figure 108. Block 6 CMV (Volume Regulated)

Appendix B
Change Summaries for Simulation Runs Relative to CM

Table 9. Annual Area Harvest Summary

Harvest (ha)	Block					
Run ID	**1**	**2**	**3**	**5**	**5-PA**	**6**
CMA	292	124	88	492	364	254
_up10	321.2	136.4	96.8	541.2		279.4
_down10	262.8	111.6	79.2	442.8		228.6
+Oe	294	126	90	511		262
-Oh	286	101	80	404		215
-SI3m	236	106	71	434	323	176
-age	309	142	101	559	409	283
+age	239	105	74	448	336	200
-RndAge	283	120	84	483	358	229
-PA				364		
-PA-OA				206		
-midVQ	289	122	81	477	349	239
+BEO		120		492	364	
-SsSIest				469	347	
-Oc		24				30
UnCon	307	133	92	543		297
-Dr						234
-HRules		125				258
+ageX2	196					
-ageX2	318					

Table 10. Change in Annual Area Harvest Summary

Change (ha)	Block					
Run ID	1	2	3	5	5-PA	6
CMA	292	124	88	492	364	254
_up10	29	12	9	49		25
_down10	-29	-12	-9	-49		-25
+Oe	2	2	2	19		8
-Oh	-6	-23	-8	-88		-39
-SI3m	-56	-18	-17	-58	-41	-78
-age	17	18	13	67	45	29
+age	-53	-19	-14	-44	-28	-54
-RndAge	-9	-4	-4	-9	-6	-25
-PA				-128		
-PA-OA				-286		
-midVQ	-3	-2	-7	-15	-15	-15
+BEO		-4		0	0	
-SsSlest				-23	-17	
-Oc		-100				-224
UnCon	15	9	4	51		43
-Dr						-20
-HRules		1				4
+ageX2	-96					
-ageX2	26					

Table 11. Percentage Change in Annual Area Harvest Summary

Change (%)	Block					
Run ID	**1**	**2**	**3**	**5**	**5-PA**	**6**
CMA	292	124	88	492	364	254
_up10	10.0	10.0	10.0	10.0		10.0
_down10	-10.0	-10.0	-10.0	-10.0		-10.0
+Oe	0.7	1.6	2.3	3.9		3.1
-Oh	-2.1	-18.5	-9.1	-17.9		-15.4
-SI3m	-19.2	-14.5	-19.3	-11.8	-11.3	-30.7
-age	5.8	14.5	14.8	13.6	12.4	11.4
+age	-18.2	-15.3	-15.9	-8.9	-7.7	-21.3
-RndAge	-3.1	-3.2	-4.5	-1.8	-1.6	-9.8
-PA				-26.0		
-PA-OA				-58.1		
-midVQ	-1.0	-1.6	-8.0	-3.0	-4.1	-5.9
+BEO		-3.2		0.0	0.0	
-SsSIest				-4.7	-4.7	
-Oc		-80.6				-88.2
UnCon	5.1	7.3	4.5	10.4		16.9
-Dr						-7.9
-HRules		0.8				1.6
+ageX2	-32.9					
-ageX2	8.9					

Table 12. Volume Harvest Summary[44]

Volume Changes		Block						Totals	
Run ID		1	2	3	5	5-PA	6		-PA
CMA	Near	*3,290,689*	*1,804,675*	*1,366,849*	*5,685,158*	*4,202,677*	*2,817,458*	*14,964,829*	*13,482,348*
	Mid	*9,485,043*	*4,529,882*	*3,486,836*	*14,224,787*	*10,631,840*	*10,477,782*	*42,204,329*	*38,611,383*
	Long	*40,497,623*	*22,003,138*	*14,110,692*	*77,965,375*	*57,282,168*	*52,937,604*	*207,514,432*	*186,831,225*
	total	***53,273,355***	***28,337,695***	***18,964,377***	***97,875,320***	***72,116,686***	***66,232,844***	***264,683,590***	***238,924,956***
_up10	Near	295,286	161,777	149,366	606,013		280,090	1,492,532	
	Mid	210,996	546,603	91,613	1,455,009		231,007	2,535,228	
	Long	119,066	-221,025	26,543	3,728,089		1,593,543	5,246,217	
	total	**625,348**	**487,356**	**267,522**	**5,789,110**	**0**	**2,104,640**	**9,273,977**	**0**
_down10	Near	-331,979	-186,512	-118,184	-592,618		-290,416	-1,519,709	
	Mid	-850,346	-464,403	-387,890	-1,394,214		-1,211,057	-4,307,909	
	Long	-2,276,797	-1,094,557	-358,527	-6,994,001		-2,413,468	-13,137,351	
	total	**-3,459,122**	**-1,745,471**	**-864,601**	**-8,980,833**	**0**	**-3,914,942**	**-18,964,969**	**0**
+Oe	Near	5,881	18,121	44,461	195,718		70,613	334,794	
	Mid	50,784	98,774	54,386	383,054		223,140	810,138	
	Long	204,829	397,782	403,834	1,395,432		1,139,030	3,540,907	
	total	**261,494**	**514,677**	**502,681**	**1,974,204**	**0**	**1,432,784**	**4,685,840**	**0**
-Oh	Near	-113,792	-341,175	-125,560	-1,007,168		-456,765	-2,044,460	
	Mid	-168,064	-805,616	-320,814	-2,531,151		-1,424,607	-5,250,252	
	Long	-995,535	-4,052,905	-1,284,923	-13,381,738		-6,402,669	-26,117,769	
	total	**-1,277,392**	**-5,199,695**	**-1,731,297**	**-16,920,057**	**0**	**-8,284,041**	**-33,412,481**	**0**
-SI3m	Near	-646,329	-264,691	-256,024	-674,991	-466,242	-848,975	-2,691,010	-2,482,261
	Mid	-1,290,332	-703,709	-704,861	-1,736,730	-1,354,326	-4,251,409	-8,687,042	-8,304,638
	Long	-2,332,405	-1,675,352	-993,693	-11,353,601	-7,890,131	-9,248,464	-25,603,514	-22,140,045
	total	**-4,269,066**	**-2,643,752**	**-1,954,578**	**-13,765,322**	**-9,710,700**	**-14,348,848**	**-36,981,566**	**-32,926,944**
-age	Near	131,295	252,886	215,696	779,472	501,442	318,744	1,698,093	1,420,063
	Mid	150,460	698,426	474,796	2,026,703	1,266,600	1,038,259	4,388,645	3,628,542
	Long	-44,262	519,351	-59,956	6,594,617	4,591,111	1,324,443	8,334,193	6,330,686
	total	**237,493**	**1,470,663**	**630,536**	**9,400,793**	**6,359,153**	**2,681,446**	**14,420,930**	**11,379,291**
+age	Near	-614,724	-295,108	-201,921	-535,572	-358,268	-640,327	-2,287,652	-2,110,349
	Mid	-776,149	-693,513	-588,626	-1,305,648	-963,409	-2,932,219	-6,296,154	-5,953,915
	Long	-2,302,275	-1,675,794	-705,531	-10,459,084	-6,960,139	-5,004,809	-20,147,492	-16,648,548
	total	**-3,693,148**	**-2,664,415**	**-1,496,077**	**-12,300,303**	**-8,281,817**	**-8,577,356**	**-28,731,298**	**-24,712,812**
-RndAge	Near	-101,964	-49,920	-56,918	-112,573	-70,187	-291,307	-612,681	-570,296
	Mid	44,484	-147,413	-181,702	-249,000	-332,354	-1,209,512	-1,743,143	-1,826,497
	Long	-275,867	-334,777	-62,507	-942,316	-684,677	-1,792,302	-3,407,768	-3,150,130
	total	**-333,346**	**-532,110**	**-301,127**	**-1,303,889**	**-1,087,219**	**-3,293,121**	**-5,763,593**	**-5,546,923**
-PA	Near				-1,482,481				
	Mid				-3,592,946				
	Long				-20,683,207				
	total	**0**	**0**	**0**	**-25,758,634**	**0**	**0**	**0**	**0**
-PA-OA	Near				-3,318,322	-1,835,841			
	Mid				-8,223,637	-4,630,691			
	Long				-46,412,503	-25,729,296			
	total	**0**	**0**	**0**	**-57,954,462**	**-32,195,827**	**0**	**0**	**0**

1.1

[44] "Near" refers to first two decades; "Mid" to next five decades; "Long" to decade 8 and beyond.

Volume Changes		**Block**						**Totals**	
Run ID		**1**	**2**	**3**	**5**	**5-PA**	**6**		**-PA**
-midVQ	Near	-51,139	-30,844	-113,352	-191,526	-201,782	-164,816	-551,677	-561,933
	Mid	-64,649	-78,783	-277,738	-377,468	-461,055	-749,954	-1,548,592	-1,632,179
	Long	-297,555	-352,932	-612,421	-2,121,303	-2,203,528	-2,482,001	-5,866,213	-5,948,437
	total	**-413,343**	**-462,560**	**-1,003,511**	**-2,690,298**	**-2,866,365**	**-3,396,771**	**-7,966,482**	**-8,142,550**
+BEO	Near		-46,983		0	0			
	Mid		-149,357		0	0			
	Long		-387,443		0	0			
	total	**0**	**-583,784**	**0**	**0**	**0**	**0**	**0**	**0**
-SsSlest	Near				-240,880	-240,221			
	Mid				-688,840	-616,604			
	Long				-7,001,528	-5,138,009			
	total	**0**	**0**	**0**	**-7,931,248**	**-5,994,834**	**0**	**0**	**0**
-Oc	Near		-1,458,314				-2,456,582		
	Mid		-3,670,563				-9,574,542		
	Long		-17,961,127				-47,309,926		
	total	**0**	**-23,090,004**	**0**	**0**	**0**	**-59,341,050**	**0**	**0**
UnCon	Near	85,147	130,858	71,172	538,208		456,414	1,281,798	
	Mid	290,445	302,657	130,936	1,321,438		1,845,719	3,891,194	
	Long	1,653,518	1,688,789	670,334	6,569,146		5,471,160	16,052,948	
	total	**2,029,110**	**2,122,304**	**872,442**	**8,428,792**	**0**	**7,773,294**	**21,225,941**	**0**
-Dr	Near						-128,155		
	Mid						-521,853		
	Long						-3,875,219		
	total	**0**	**0**	**0**	**0**	**0**	**-4,525,228**	**0**	**0**
-HRules	Near		5,082				77,988		
	Mid		-21,029				44,865		
	Long		-499,888				-2,246,364		
	total	**0**	**-515,835**	**0**	**0**	**0**	**-2,123,511**	**0**	**0**
+ageX2	Near	-614,724							
	Mid	-776,149							
	Long	-2,302,275							
	total	**-3,693,148**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
-ageX2	Near	224,191							
	Mid	272,761							
	Long	-113,328							
	total	**383,624**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Appendix C
Description of Simulation Runs

Run naming conventions

CMA means current management area-based (base case)
CMV means current management volume-based
CMA_ means change in harvest flow
_NF means "no flow". I.e. original flow is requested but not maintained
40/35/30 means minimum harvestable quadratic mean stand diameter (mDBHq) in centimeters (cm) for Good/Medium/Poor sites respectively.
+ means factor added for sensitivity analysis
– means factor removed for sensitivity analysis

Table 13. Simulation Run Labels and Descriptions

Run ID	Description
CMA	Area-based current management option
_up10	Alternate flatline request up 10% of CMA
_down10	Alternate flatline 90% of CMA
+Oe	Include Oce and Ohe polygons in THLB
-Oh	Remove helicopter operable polygons
-SI3m	Reduce SI estimates for age class 1-2 and future stands by 3m
-age	Lower minimum harvest age by decreasing mDBHq by 3 cm
+age	Increase minimum harvest age by increasing mDBHq by 3 cm
-RndAge	Uses the mDBHq ages rounded up to the nearest 10th year (effectively adds 5 years to
-PA	Remove protected area candidates as identified in April, 2001 announcement
-PA-OA	As above and also remove Option Areas identified in April, 2001 announcement
-midVQ	Use mid range disturbance target
+BEO	Apply specific BEOs to draft or legislated landscape units where not included in CM0
-SsSIest	Adjust SI so that Good site Spruce SI=34m instead of 39m - Piece size remains 47-42-37
CM12356	Combine all blocks as one to test for age class and constraint complement potentials
CM23	Combine Blocks 2 and 3 to test for complementary age class structures
-Oc	Simulation on THLB accessible by helicopter only to estimate flat line portion of harvest attributable to helicopter harvesting.
UnCon	Remove all non-timber land base and volume constraints to simulate timber potential.
-Dr	Remove alder leading stands from the harvest flow permanently (no long term succession to conifers).
-HRules	turn off oldest first and minimize growth loss harvest rules.
+ageX2	Increase minimum harvest age by increasing mDBHq by 3X2=6cm
-ageX2	Decrease minimum harvest age by decreasing mDBHq by 3X2=6cm

Appendix D
Modeling for Cultural Cedar

As there is interest in the sustainability of cedar harvesting, a preliminary model was developed to predict cedar availability into the future. WFP cruise information from TFL 25 and the adjacent Timber Supply Areas was analysed to develop a cedar diameter class distribution for old growth stands and TIPSY was used to generate distributions for second growth at various stand ages. These distributions were used, based on inventory or estimated future stand species composition and simulation age, to forecast the cedar component of harvests and growing stock through the 250-year simulation.

There are a number of difficulties with such a model:

- Although TIPSY does produce a diameter distribution, it does not report diameters beyond 90 cm DBH.
- TIPSY is calibrated for predicting second growth volumes and may not reliably predict diameter distributions at older stand ages that are approaching and beyond the ages within the calibration data set.
- The western redcedar data set on which TIPSY is calibrated is much smaller than for other coastal species and therefore predictions are less certain. There is no data for yellow cedar hence it is assumed to mimic western redcedar in its growth and yield habits.
- “Monumental” and cultural cedar is not easily defined. Tree sizes and quality needed for cultural purposes likely vary considerably depending on the use. For example, large totem poles, canoes, and buildings would need large, sound trees. Large decayed trees could provide split planks and carving blocks. Sound but smaller trees may provide for smaller canoes, poles, roundwood posts and beams, and sawn planks/blocks. Trees of almost any size could provide bark for stripping if a section of clear bole is present. Perhaps smaller or more vigorous cedars provide good roots. Clearly guidance is needed from First Nations to better define the characteristics of various types of cultural cedars.
- Cruise data was used to estimate cedar diameter distributions in old growth forests, but associated decay-indicator data was not felt suitable for predicting the percentage of old growth trees that are sound and suitable for monumental purposes. Again guidance is needed from First Nations to estimate the proportion of larger trees actually suitable.

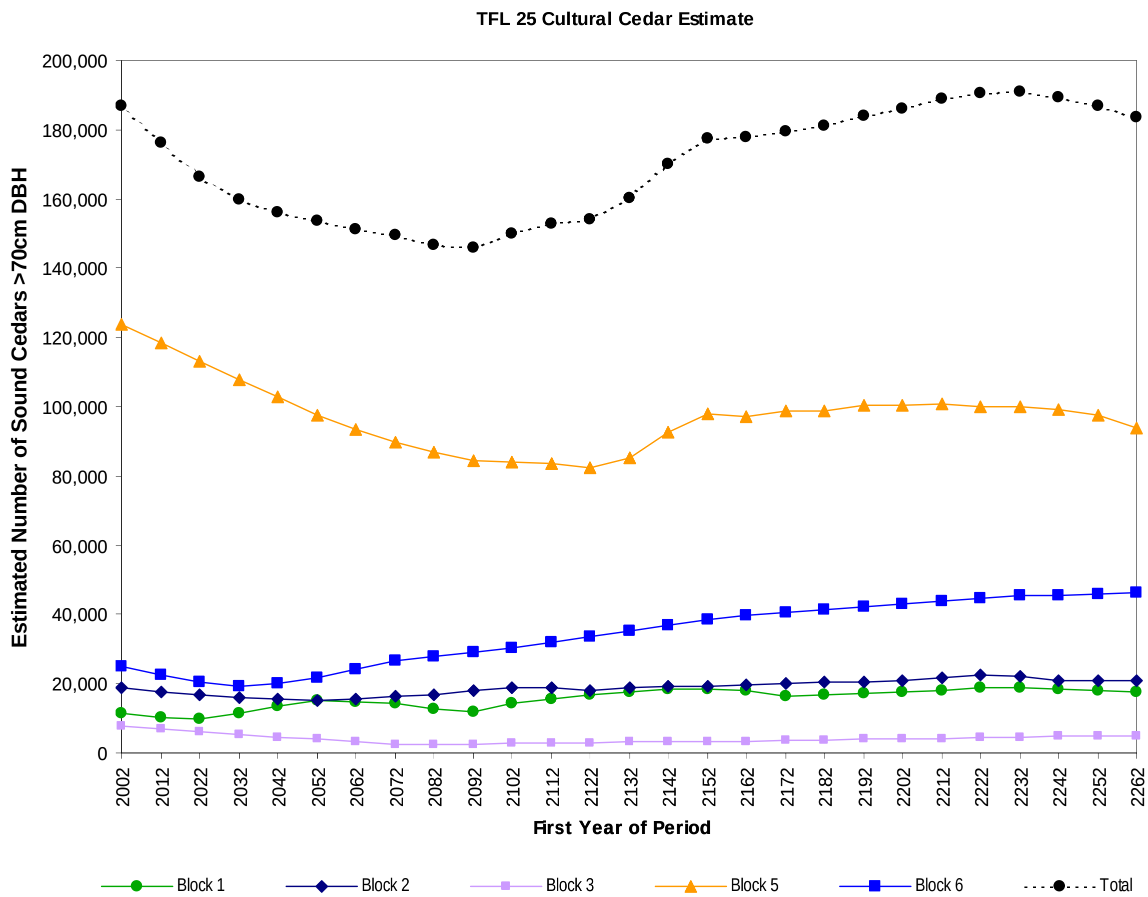

Figure 109. Test Estimate of Cultural Cedar Availability for TFL 25 through 250 years.

Figure 109 presents the results of a model test for each TFL Block using the assumptions that one in twenty large diameter old growth cedars (likely many centuries old) is sound and that most second growth cedars (<200-years-old) are sound. The data indicates the estimated number of larger, sound cedar trees occurring on the land base through time. In all blocks there is an initial decline until harvesting shifts to second growth forests and most blocks recover in the long term. In Block 5 the decline is 34% but much extended as old forest is the primary source of timber for the next century. Block 5 dwarfs the other management units due to its large land area and high percentage of timber reserved from harvest for operability or environmental reasons.

For the TFL as a whole, estimated availability of larger cedars declines 22% through the middle of the simulation but recovers in the long term to current levels.