

Chapter 4 FUTURE FORECASTING OF THE LANDSCAPE

The forest management strategies adopted by ANC rely upon the landscape characteristics, described in Chapter 2. The key modelling component for determining the likely effects of the proposed harvesting strategy was described in Chapter 3, summary of the Timber Supply Analysis (TSA). In this chapter we describe what the predicted future forest will look like. The strategies for addressing the results of the predicted forest structure are discussed in Section 5.1.

4.1 Methods

Data for the landscape analyses were derived from the forecasted stand ages and related age-class distribution determined by the Timber Supply Analysis and Harvest Scheduling (Silvacom 1999) summarized in Chapter 3. The harvest scheduling data includes a list of stands proposed for harvest, forecasted time of harvest, and stand spatial links. This information is organized by four sustained yield units (SYU), also called forest management units (FMU): E6-Berland, E7-Foothills, W1-Little Smoky, and W8-Pine. Every stand represented in the TSA harvest schedules has been assigned to at least one 5-year harvest period during which the stand will be harvested. For any given stand, the number of times it is harvested ranges between one and three during the 180-year planning horizon. The time of proposed harvest for a specific stand is used to determine the stand's age at any given period. In order to map the distribution of age-classes over time, all stands were linked to AVI information using a unique spatial index field.

In order to assess the predicted state of the forested landscape within ANC's FMA area, forest stands were grouped on the basis of species composition and age. Species groups were calculated from AVI overstorey features, identical to those of time zero landscape analysis (Section 2.3.3).

Stand ages were determined using 1999 as the base year and the AVI stand origin. Cutblocks are included in the youngest age class category. Table 4.1 summarizes harvested and non-harvested areas summarized from the TSA.

Table 4.1 ANC's TSA stand predictions, by NSR and canopy types

Landscape-Level	Number of Records (AVI Database)	Area (ha)	Number of Records (AVI Database)	Area (ha)
Central Mixedwood NSR				
	Non-Harvested		Harvested	
D	323	2,543	115	171
DC	46	230	12	7
C	1,099	3,830	389	1,118
CD	81	217	8	9
NF	-	-	528	641
Subtotal	1,549	6,819	1,052	1,947
Lower Foothills NSR				
	Non-Harvested		Harvested	
D	3,246	18,910	974	1,130
DC	2,122	10,545	634	726
C	31,445	95,670	10,835	24,294
CD	2,156	9,489	609	718
NF	-	-	11,443	9,880
REC	-	-	831	3,450
Subtotal	38,969	134,613	25,326	40,197
Upper-Foothills NSR				
	Non-Harvested		Harvested	
D	419	2,068	150	260
DC	317	1,295	88	121
C	24,657	126,993	12,393	38,763
CD	402	1,880	100	166
NF	-	-	7,414	7,753
REC	-	-	615	1,448
Subtotal	25,795	132,236	20,760	48,510
Sub-Alpine NSR				
	Non-Harvested		Harvested	
C	1,222	9,014	1,246	4,744
NF	-	-	505	645
Subtotal	1,222	9,014	1,751	5,389

See Section 2.3.4.1 for the meaning of the Landscape level codes

Age-class distribution is evaluated at time zero (1999) and forecasted at five key points in time (10, 20, 50, 100, and 180 years). For these time intervals, a stand's age is recalculated based on its AVI age, actual harvest, and harvest scheduling history. The age of a harvested stand is reset to zero after a harvest. The age of non-harvested stands is determined using the stand's AVI age and the length of projection time. Horizontal stand structure is also considered analyzing age-class structure similar to the time zero landscape assessment (Section 2.3.3). Over the 180-year planning horizon, no species group transitions were predicted (Silvacom 1999).

4.2 Age-Class Distribution

4.2.1 FMA Area

Stands were grouped into four canopy species groups (D, DC, C, and CD) and eleven 20-year age-classes. Stands over 201 years old were assigned into a single '201+' age-class. Table 4.2 and Figures 4.1 to 4.4 summarize the predicted age-class distribution.

Table 4.2 Current area and area projections, by species groups, after deletions (in order to determine the netdown landbase for harvesting)

Age Class (yrs)	1999 (ha)	2009 (ha)	2019 (ha)	2049 (ha)	2099 (ha)	2179 (ha)
Forested --			354,909(ha)			
Pure Deciduous --			25,082(ha)			
0-20	19	1,589	1,987	6,504	7,194	7,300
21-40	2,548	551	19	2,188	2,459	10,738
41-60	4,789	4,458	2,544	591	9,461	2,738
61-80	5,763	6,993	4,774	551	2,466	2,267
81-100	4,456	3,318	5,732	4,458	1,940	478
101-120	6,208	7,411	4,149	6,468	0	0
121-140	1,099	661	5,636	1,441	139	0
141-160	199	101	225	2,631	320	0
161-180	0	0	14	215	192	0
181-200	0	0	0	34	319	0
201+	0	0	0	0	591	1,561
Mixedwood - Deciduous Leading --			12,924			
0-20	2	1,353	1,925	3,063	3,490	3,771
21-40	1,695	390	2	1,439	1,169	4,710
41-60	1,661	2,276	1,693	653	4,645	1,468
61-80	1,435	1,569	1,661	390	1,012	1,927
81-100	2,245	905	1,347	2,276	1,754	194
101-120	5,363	5,998	1,889	1,359	1	0
121-140	505	405	4,316	579	56	0
141-160	17	29	87	3,070	172	0
161-180	0	0	3	94	45	0
181-200	0	0	0	0	218	1
201+	0	0	0	0	363	853
Pure Conifer --			304,425			
0-20	30,215	52,196	64,679	59,153	61,558	69,445
21-40	3,392	2,869	17,509	51,538	47,639	46,116
41-60	10,641	9,941	3,386	40,553	44,027	55,277
61-80	47,723	29,115	10,613	2,869	51,036	50,954
81-100	63,895	52,953	47,076	9,941	31,247	13,715
101-120	98,475	96,061	60,369	25,335	14	0
121-140	21,073	28,992	70,025	39,672	170	0
141-160	18,562	13,955	13,639	44,571	1,716	0
161-180	2,811	10,272	10,636	13,602	6,634	0
181-200	4,941	3,557	1,897	9,328	19,272	14
201+	2,699	4,515	4,597	7,863	41,113	68,905

Age-Class Distribution

Table 4.2 Continued

Age Class (yrs)	1999 (ha)	2009 (ha)	2019 (ha)	2049 (ha)	2099 (ha)	2179 (ha)
Mixedwood - Conifer Leading --			12,478			
0-20	1	1,869	2,474	4,129	1,394	1,697
21-40	375	60	1	1,969	1,774	4,851
41-60	882	820	374	906	4,330	2,597
61-80	1,025	949	882	58	1,985	2,219
81-100	2,009	1,052	1,023	820	2,103	222
101-120	6,863	6,840	1,812	858	0	0
121-140	1,034	687	5,531	647	10	0
141-160	243	176	345	2,901	38	0
161-180	28	7	17	118	68	0
181-200	18	0	2	50	209	0
201+	0	18	18	23	568	892
Non-Forested	18,918					
Recreational	4,899					
Total Area (ha)	378,726					

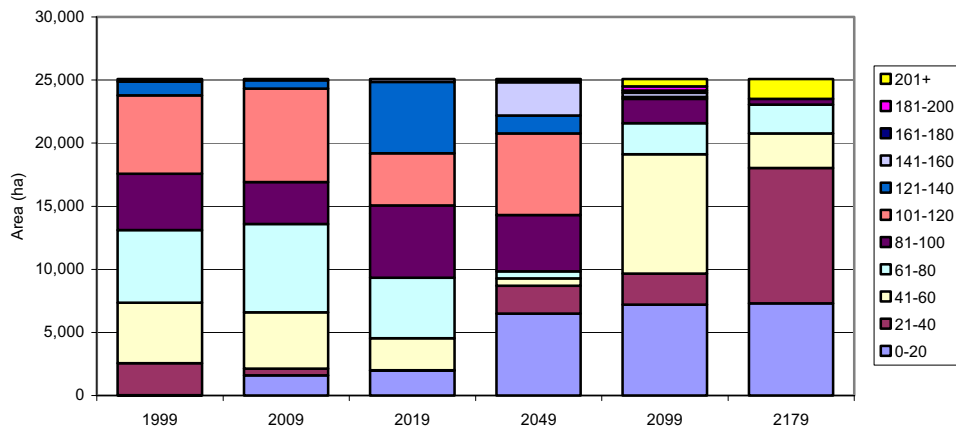


Figure 4.1 Age-class Summary for the Pure Deciduous Species Group in the FMA Area

Age-Class Distribution

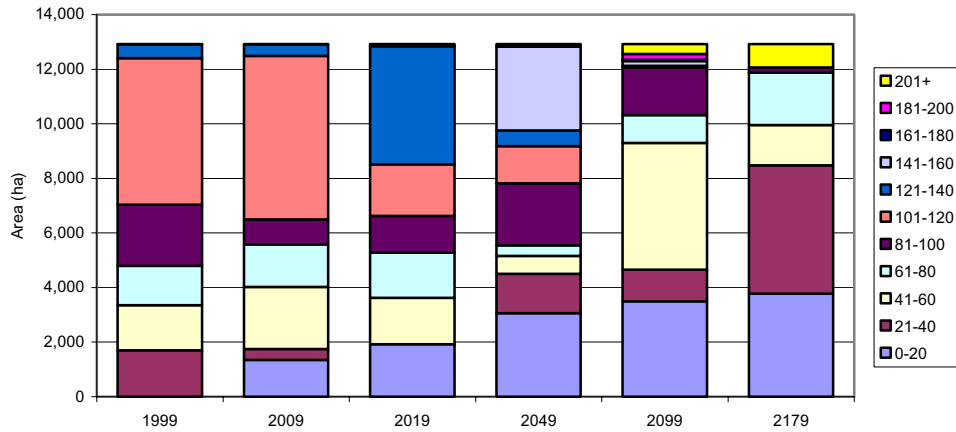


Figure 4.2 Age-class Summary for the Deciduous Leading Mixedwood Species Group in the FMA Area

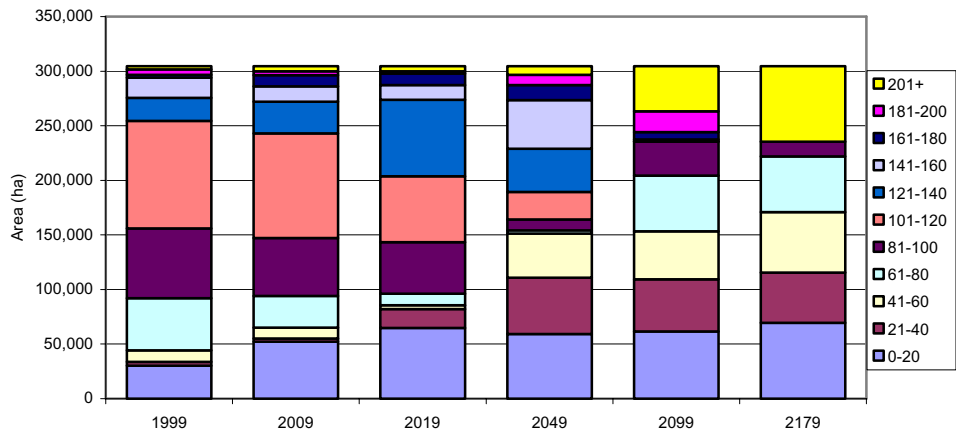


Figure 4.3 Age-class Summary for the Pure Conifer Species Group in the Entire FMA Area

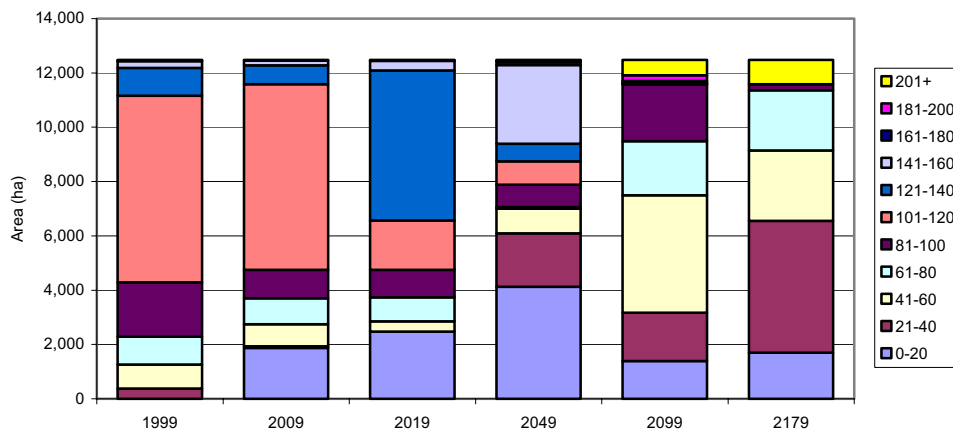


Figure 4.4 Age-class Summary for the Conifer Leading Mixedwood Species Group in the FMA Area

For the next 20 years, forest age-class distribution in the FMA area will not change significantly and selected forest management strategies described in Chapter 3 are sustainable. However, longer planning horizon projections (over 50 years) show that proposed forest management practices could result in an uneven age-class structure. By the end of planning horizon (180 years), the youngest age-class increases from the present area of 30,237 ha to 82,213 ha. And, the oldest age-class increases from 2,699 ha to 72,211 ha. Future forests will have 15 ha that are between 100 and 200 years old. This bimodal age-class distribution is typical for the entire FMA area regardless of canopy species group.

4.2.2 Natural Subregions

The natural subregion analysis is based on the entire FMA area analysis subdivided into four natural subregions: 1) Central Mixedwood, 2) Lower Foothill, 3) Subalpine, and 4) Upper Foothill Natural Subregion (NSR). As for the entire FMA area, the stands were grouped into four canopy species groups (D, DC, C, and CD) and eleven 20-year age-classes. Stands over 201 years old were assigned into a single '201+' age-class. Tables 4.3–4.6 and Figures 4.5–4.17 summarize the predicted age-class distribution by species groups in each of the natural subregions in the FMA area.

Table 4.3 Central Mixedwood NSR -- area projections, by species groups.

Age Class (yrs)	1999 (ha)	2009 (ha)	2019 (ha)	2049 (ha)	2099 (ha)	2179 (ha)
Forested --			8,125 (ha)			
Pure Deciduous --			2,714 (ha)			
0-20	-	336	336	1,030	605	605
21-40	643	195	-	599	227	1,339
41-60	59	507	643	-	1,111	263
61-80	262	208	59	195	263	336
81-100	883	937	262	507	336	-
101-120	475	475	883	190	-	-
121-140	392	48	475	137	39	-
141-160	-	7	56	-	2	-
161-180	-	-	-	48	19	-
181-200	-	-	-	7	72	-
201+	-	-	-	-	40	171
Mixedwood - Deciduous Leading --			237			
0-20	-	84	110	59	20	20
21-40	21	21	-	118	32	91
41-60	-	-	21	-	59	34
61-80	75	75	-	21	34	84
81-100	10	10	75	-	84	-
101-120	41	41	10	23	-	-
121-140	90	6	15	10	1	-
141-160	-	-	6	0	-	-
161-180	-	-	-	6	0	-
181-200	-	-	-	-	1	-
201+	-	-	-	-	6	7
Pure Conifer --			4,947			
0-20	1,159	1,866	1,549	667	1,216	634
21-40	5	-	629	966	528	1,646
41-60	11	6	5	1,212	1,118	-
61-80	1,705	1,343	11	-	10	1,019
81-100	119	492	1,705	6	958	531
101-120	785	777	119	761	-	-
121-140	994	370	473	425	-	-
141-160	168	69	383	448	5	-
161-180	-	25	72	368	594	-
181-200	-	-	-	69	33	-
201+	-	-	-	25	487	1,118
Mixedwood - Conifer Leading --			227			
0-20	-	139	139	-	-	-
21-40	-	-	-	139	79	79
41-60	-	-	-	-	-	-
61-80	38	38	-	-	-	139
81-100	46	46	38	-	139	-
101-120	-	-	46	38	-	-
121-140	141	3	-	46	-	-
141-160	1	-	3	-	-	-
161-180	-	-	-	3	6	-
181-200	-	-	-	-	-	-
201+	-	-	-	-	3	9
Non-Forested	641					
Recreational	-					
Total Area (ha)	8,766					

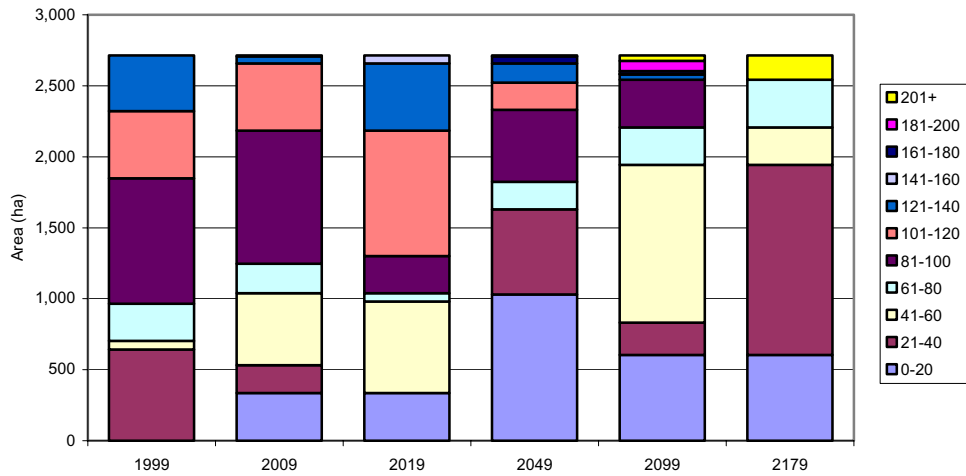


Figure 4.5 Age-class Summary of the Pure Deciduous Species Group in the Central Mixedwood NSR

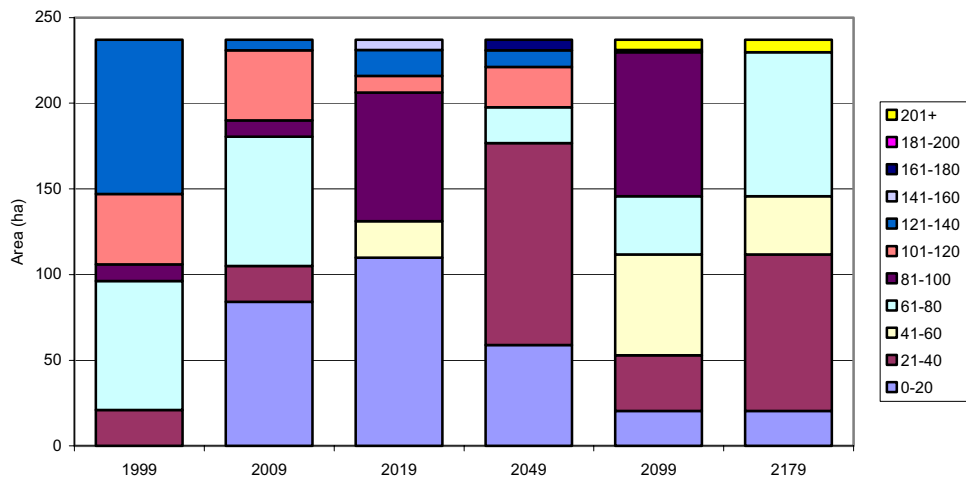


Figure 4.6 Age-class Summary of the Deciduous Leading Mixedwood Species Group in Central Mixedwood NSR

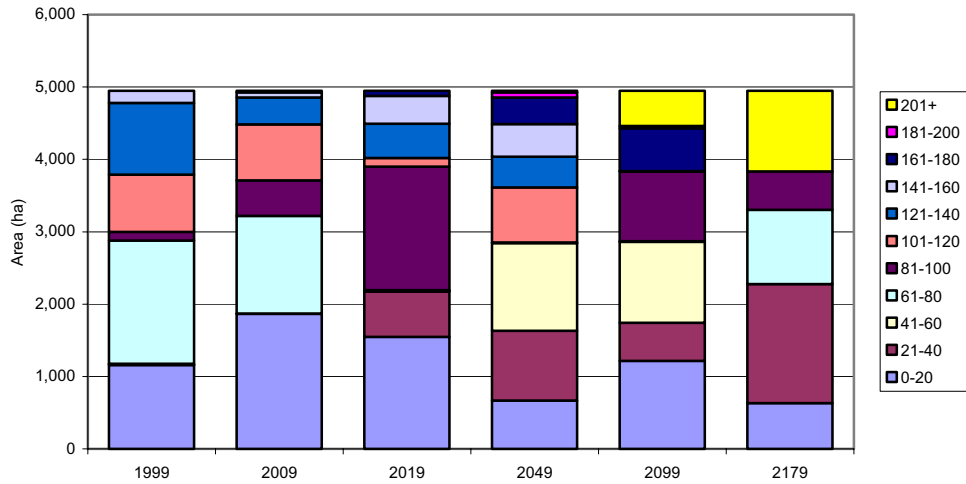


Figure 4.7 Age-class Summary for the Pure Conifer Species Group in the Central Mixedwood NSR

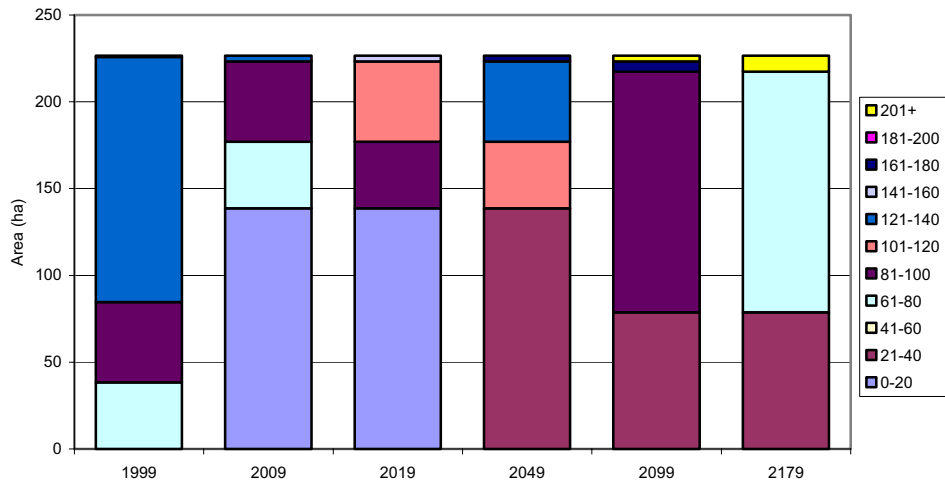


Figure 4.8 Age-class Summary for the Conifer Leading Mixedwood Species Group in the Central Mixedwood NSR

Table 4.4 Lower Foothills NSR -- area projections, by species groups

Age class (yrs)	1999 (ha)	2009 (ha)	2019 (ha)	2049 (ha)	2099 (ha)	2179 (ha)
Forested --	161,481 ha					
Pure Deciduous --	20,040 ha					
0-20	18	1,183	1,566	5,230	5,500	5,179
21-40	1,512	290	18	1,498	1,749	9,103
41-60	4,345	3,391	1,510	545	8,046	2,354
61-80	4,630	5,909	4,332	290	2,094	1,812
81-100	3,303	2,105	4,607	3,391	1,519	462
101-120	5,342	6,539	3,015	5,440	-	-
121-140	691	528	4,808	1,035	90	-
141-160	199	94	169	2,442	229	-
161-180	-	0	14	140	120	-
181-200	-	-	-	27	240	-
201+	-	-	-	0	450	1,130
Mixedwood - Deciduous Leading --	11,271					
0-20	2	1,147	1,664	2,762	2,934	3,154
21-40	1,598	357	2	1,196	958	4,346
41-60	1,332	2,108	1,597	592	4,325	1,233
61-80	1,095	1,028	1,332	357	794	1,657
81-100	2,128	828	1,007	2,108	1,535	155
101-120	4,708	5,404	1,780	881	1	-
121-140	406	384	3,809	515	54	-
141-160	2	14	80	2,773	89	-
161-180	-	-	0	87	39	-
181-200	-	-	-	-	203	1
201+	-	-	-	-	339	725
Pure Conifer --	119,964					
0-20	23,431	33,944	30,427	24,954	35,512	26,553
21-40	1,719	2,305	14,784	17,444	12,112	18,543
41-60	7,131	6,450	1,713	28,408	17,546	19,984
61-80	8,990	7,358	7,124	2,305	18,133	21,463
81-100	12,061	10,450	8,933	6,450	12,366	9,127
101-120	50,735	38,792	11,456	6,136	14	-
121-140	9,337	13,095	36,793	6,049	108	-
141-160	4,533	4,566	5,013	17,008	1,312	-
161-180	1,372	1,537	2,199	5,378	1,949	-
181-200	554	1,278	1,044	3,314	4,227	14
201+	103	188	479	2,517	16,684	24,280
Mixedwood - Conifer Leading --	10,206					
0-20	-	1,511	2,077	3,466	1,053	1,164
21-40	227	41	-	1,719	1,285	4,331
41-60	750	611	225	714	3,968	1,929
61-80	736	774	750	40	1,442	1,851
81-100	1,502	804	736	611	1,740	214
101-120	5,862	5,682	1,318	682	-	-
121-140	841	592	4,746	428	9	-
141-160	242	168	317	2,361	37	-
161-180	28	7	17	113	19	-
181-200	18	-	2	49	106	-
201+	-	18	18	23	546	718
Non-Forested	9,880					
Recreational	3,450					
Total Area (ha)	174,811					

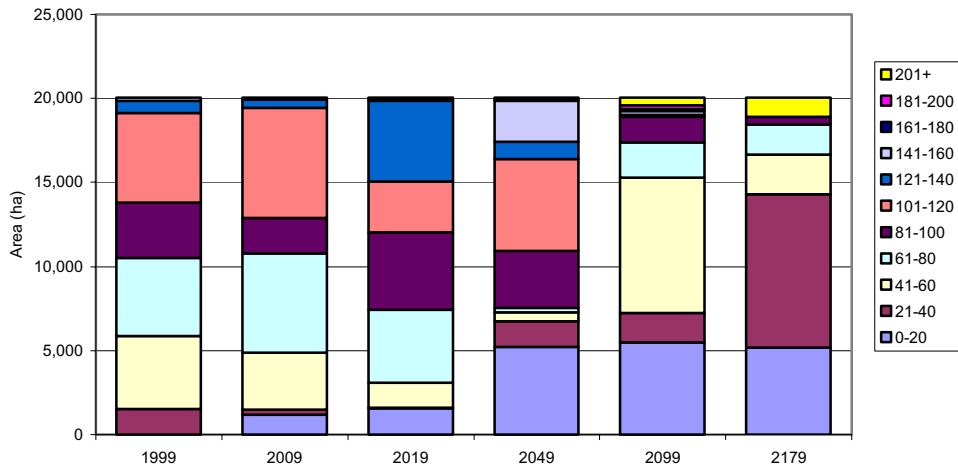


Figure 4.9 Age-class Summary for Pure Deciduous Species Group in Lower Foothills NSR

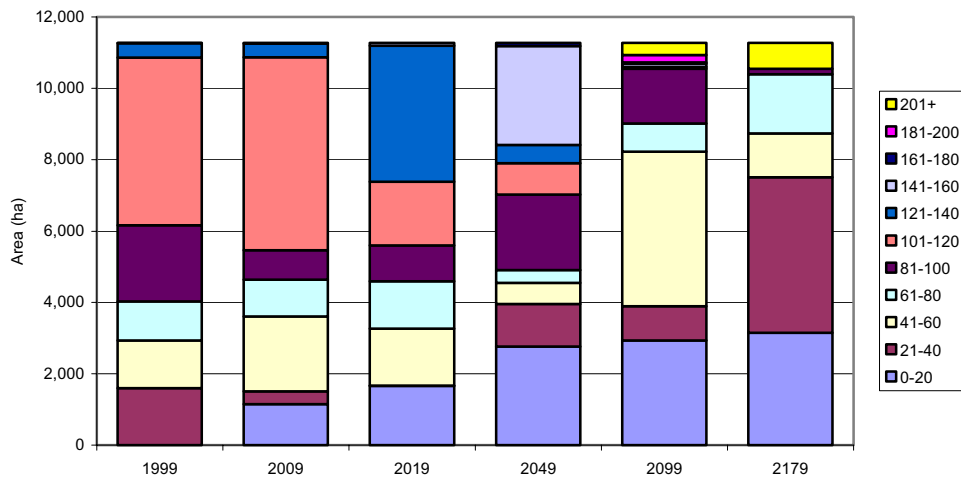


Figure 4.10 Age-class Summary of the Deciduous Leading Mixedwood Species Group in the Lower Foothills NSR

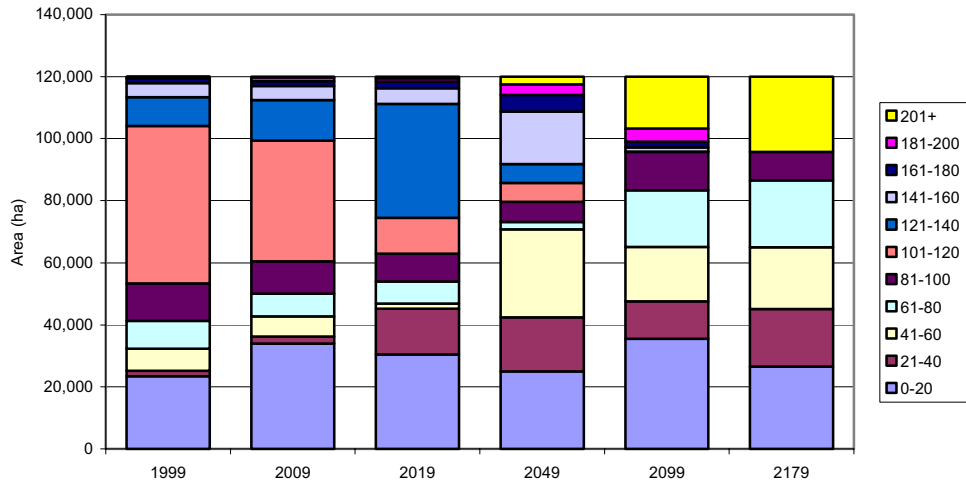


Figure 4.11 Age-class Summary for Pure Conifer Species Group in Lower Foothills NSR

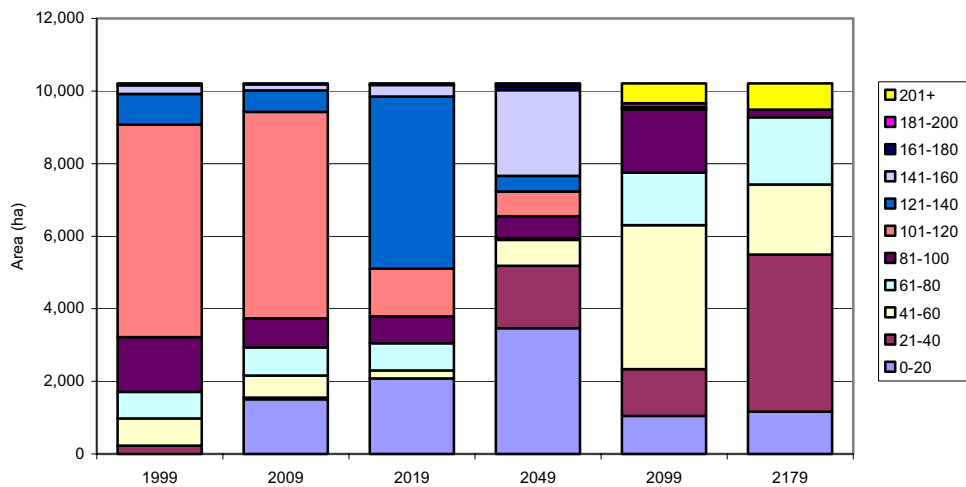


Figure 4.12 Age-class Summary for the Conifer Leading Mixedwood Species Group in the Lower Foothills NSR

Table 4.5 Upper Foothills NSR -- area projections, by species groups.

Age Class (yrs)	1999 (ha)	2009 (ha)	2019 (ha)	2049 (ha)	2099 (ha)	2179 (ha)
Forested --	171,545 (ha)					
Pure Deciduous --	2,328 (ha)					
0-20	1	70	84	244	1,089	1,516
21-40	392	66	1	90	483	297
41-60	385	560	391	46	303	120
61-80	871	876	383	66	108	119
81-100	270	275	862	560	84	16
101-120	392	397	251	838	-	-
121-140	16	84	354	269	10	-
141-160	-	-	0	189	89	-
161-180	-	-	-	26	53	-
181-200	-	-	-	-	7	-
201+	-	-	-	-	101	260
Mixedwood - Deciduous Leading--	1,416					
0-20	-	121	151	242	536	597
21-40	76	12	-	125	178	272
41-60	329	168	75	61	261	201
61-80	265	466	329	12	184	186
81-100	107	67	265	168	136	39
101-120	614	553	99	455	-	-
121-140	9	14	493	54	1	-
141-160	15	15	1	297	83	-
161-180	-	-	3	1	5	-
181-200	-	-	-	-	15	-
201+	-	-	-	-	17	121
Pure Conifer --	165,756					
0-20	5,602	16,362	28,352	33,107	24,723	40,732
21-40	1,651	565	2,072	26,491	33,490	25,587
41-60	3,493	3,463	1,650	10,909	25,026	28,269
61-80	36,719	20,198	3,472	565	26,761	28,405
81-100	50,963	41,620	36,129	3,463	16,994	4,001
101-120	45,419	55,233	48,042	18,222	-	-
121-140	8,837	13,311	31,733	32,808	62	-
141-160	6,758	5,758	6,949	25,858	398	-
161-180	1,081	4,614	4,102	6,910	4,092	-
181-200	3,514	1,586	562	4,179	14,668	-
201+	1,721	3,047	2,692	3,244	19,544	38,763

Table 4.5 Continued

Age Class (yrs)	1999 (ha)	2009 (ha)	2019 (ha)	2049 (ha)	2099 (ha)	2179 (ha)
Mixedwood - Conifer Leading --			2,045			
0-20	1	219	259	663	340	533
21-40	148	19	1	111	410	442
41-60	131	209	148	192	362	668
61-80	251	137	131	19	543	229
81-100	461	202	249	209	224	8
101-120	1,002	1,158	448	137	-	-
121-140	52	92	785	172	1	-
141-160	-	8	24	540	1	-
161-180	-	-	-	1	43	-
181-200	-	-	-	1	103	-
201+	-	-	-	-	18	166
Non-Forested	7,753					
Recreational	1,448					
Total Area (ha)	180,746					

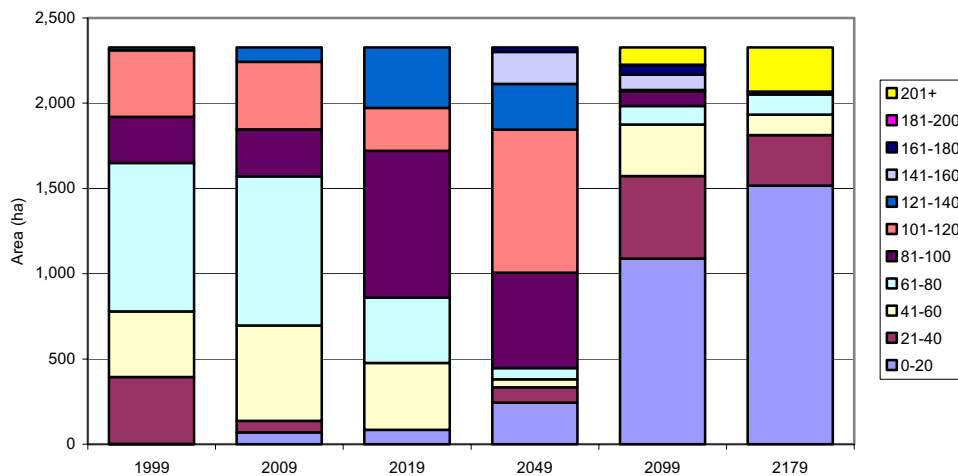


Figure 4.13 Age-class Summary for the Pure Deciduous Species Group in the Upper Foothills NSR

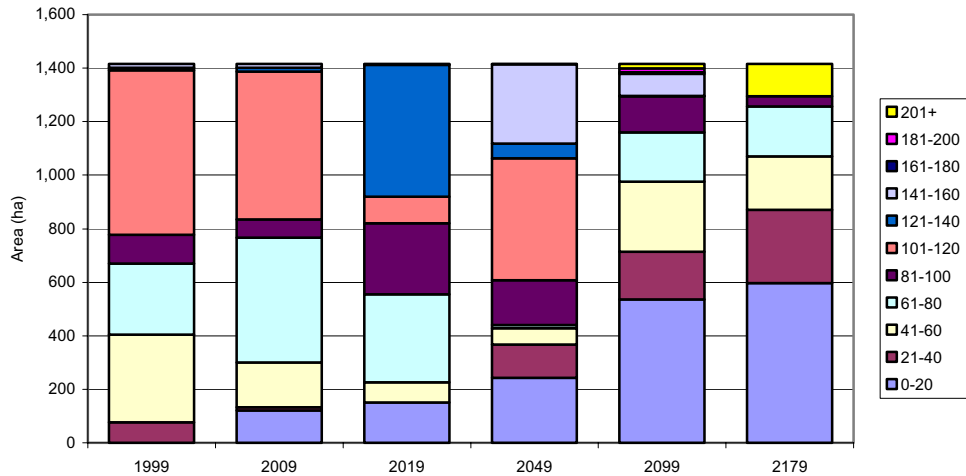


Figure 4.14 Age-class Summary for the Deciduous Leading Mixedwood Species Group in the Upper Foothills NSR

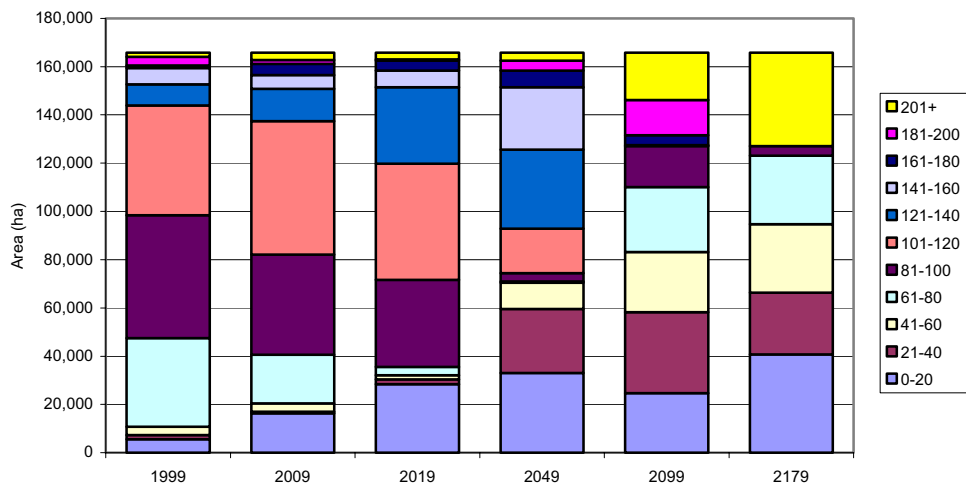


Figure 4.15 Age-class Summary for the Pure Conifer Species Group in the Upper Foothills NSR