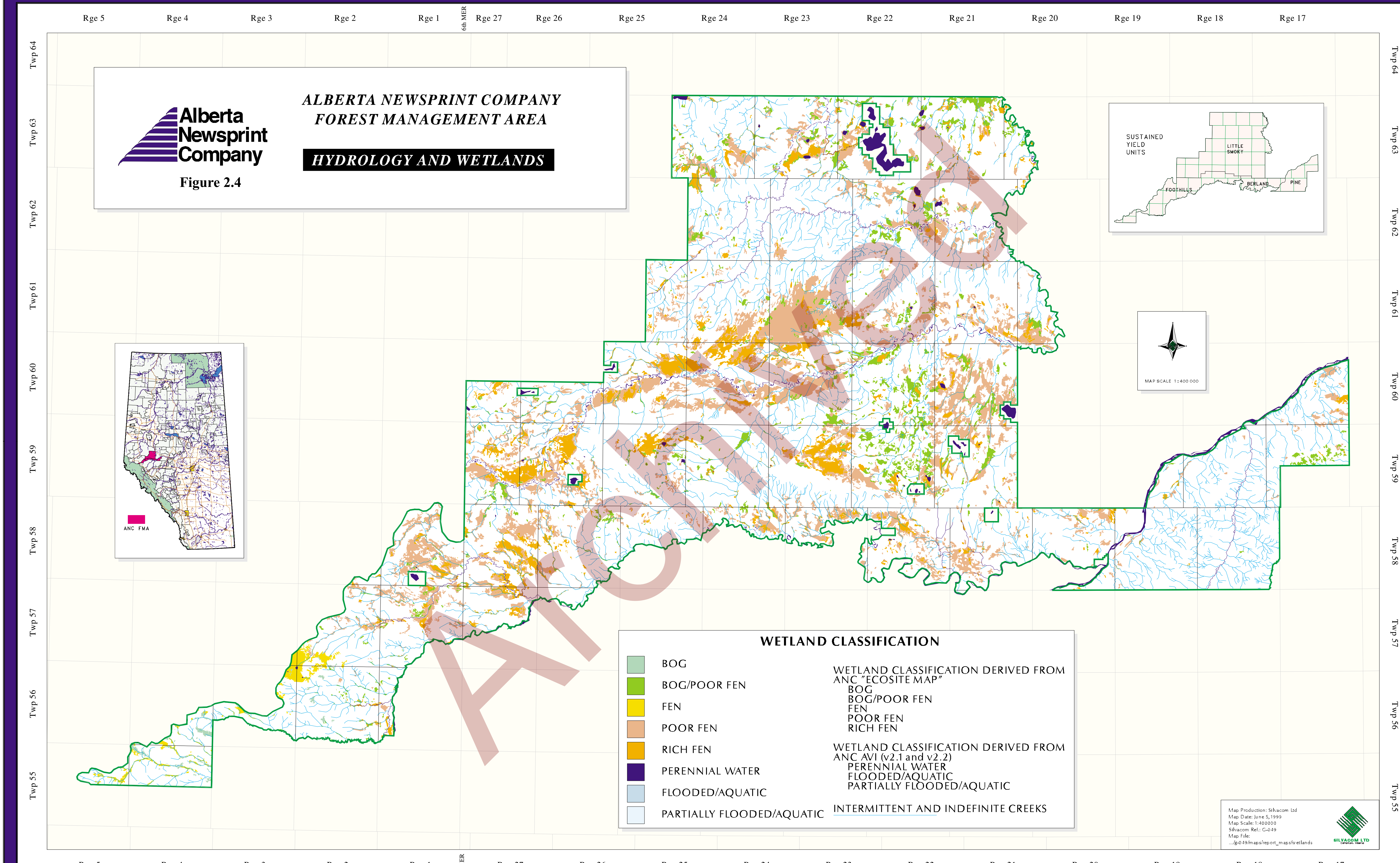
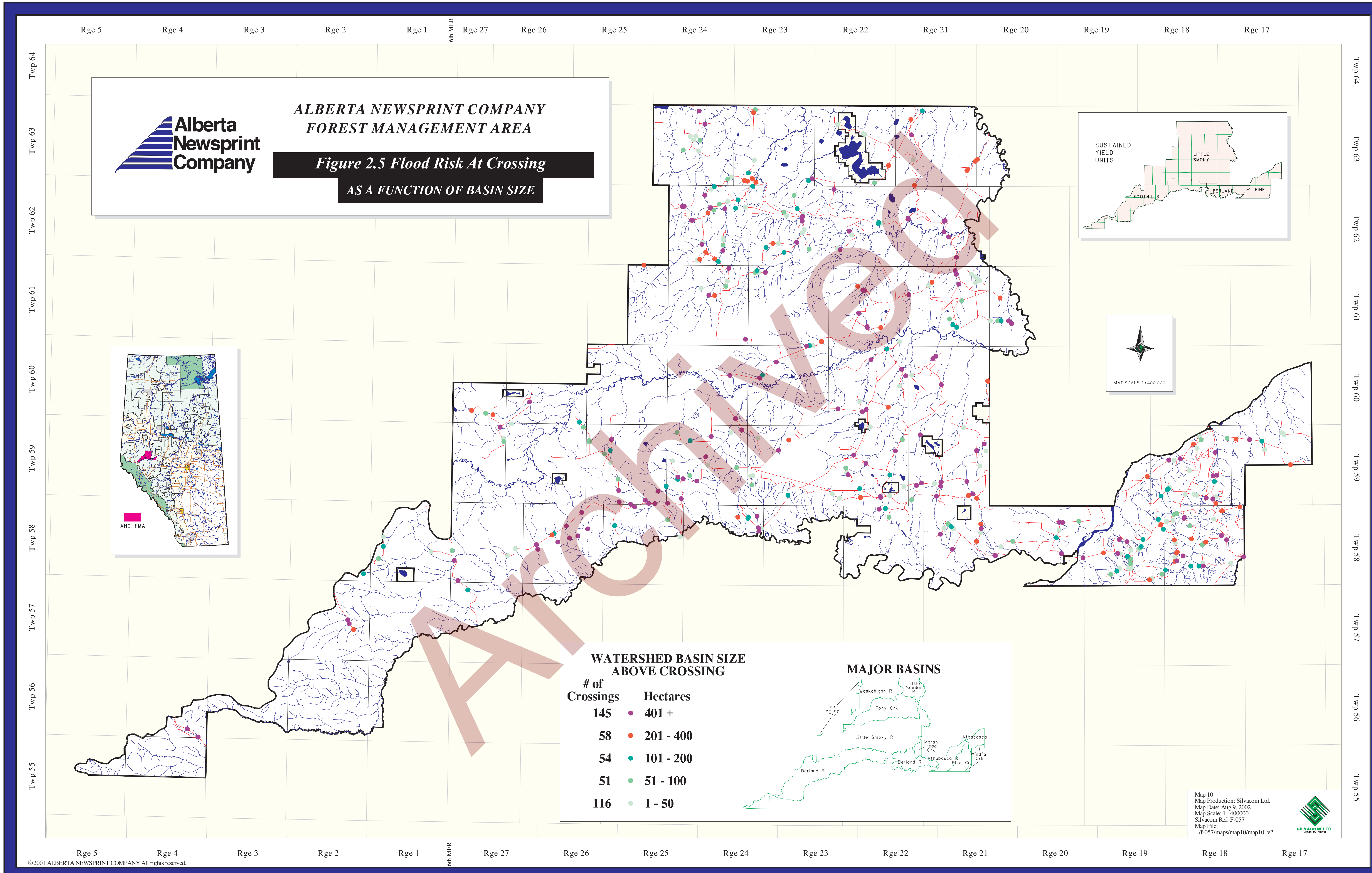


ALBERTA NEWSPRINT COMPANY
FOREST MANAGEMENT AREA
HYDROLOGY AND WETLANDS
Alberta Newsprint Company
Figure 2.4
Rge 5
Rge 4
Rge 3
Rge 2
Rge 1
6th MER
Rge 27
Rge 26
Rge 25
Rge 24
Rge 23
Rge 22
Rge 21
Rge 20
Rge 19
Rge 18
Rge 17
Twp 64
Twp 63
Twp 62
Twp 61
Twp 60
Twp 59
Twp 58
Twp 57
Twp 56
Twp 55
ANC FMA
SUSTAINED YIELD UNITS
LITTLE SMOKY
FOOTHILLS
BERLAND
PINE
MAP SCALE 1:400 000
WETLAND CLASSIFICATION
BOG
BOG/POOR FEN
FEN
POOR FEN
RICH FEN
PERENNIAL WATER
FLOODED/AQUATIC
PARTIALLY FLOODED/AQUATIC
WETLAND CLASSIFICATION DERIVED FROM ANC "ECOSITE MAP"
BOG
BOG/POOR FEN
FEN
POOR FEN
RICH FEN
WETLAND CLASSIFICATION DERIVED FROM ANC AVI (v2.1 and v2.2)
PERENNIAL WATER
FLOODED/AQUATIC
PARTIALLY FLOODED/AQUATIC
INTERMITTENT AND INDEFINITE CREEKS
Map Production: Silvacom Ltd
Map Date: June 5, 1999
Map Scale: 1:400000
Silvacom Ref.: G-049
Map File:
.../g-049/maps/report_maps/wetlands
SILVACOM LTD
Edmonton, Alberta
Archived



ALBERTA NEWSPRINT COMPANY
FOREST MANAGEMENT AREA
Alberta Newsprint Company
Figure 2.5 Flood Risk At Crossing
AS A FUNCTION OF BASIN SIZE
Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17
Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55
SUSTAINED YIELD UNITS
LITTLE SMOKY
FOOTHILLS
BERLAND
PINE
ANC FMA
MAP SCALE 1:400 000
Archived
WATERSHED BASIN SIZE ABOVE CROSSING
# of Crossings
Hectares
145 401 +
58 201 - 400
54 101 - 200
51 51 - 100
116 1 - 50
MAJOR BASINS
Waskahigan R
Little Smoky R
Deep Valley Crk
Tony Crk
Little Smoky R
Athabasca
Marsh Head Crk
Athabasca R
Windfall Crk
Berland R
Pine Crk
Berland R
Map 10
Map Production: Silvacom Ltd.
Map Date: Aug 9, 2002
Map Scale: 1 : 400000
Silvacom Ref: F-057
Map File:
./f-057/maps/map10/map10_v2
SILVACOM LTD

Table 2.7 Long-term flow rates and average flows for various flood events

Monitoring Station Location	Maximum Instantaneous Flow Rate (m^3/sec)	Minimum Daily flow Rate (m^3/sec)	Mean Annual Flow Rate (m^3/sec)	Peak Flows for Flood Events (m^3/sec)				
				1:2 Year Flood	1:10 Year Flood	1:20 Year Flood	1:50 Year Flood	1:100 Year Flood
Simonette River near Goodwin	6500	1	36.7	427	2159	2905	3891	4636
Spring Creek near Valleyview	26	0	0.5	5	20	27	36	43
Wolverine Creak near Valleyview	34	0	0.0	1	14	20	28	33
Spring Creek (upper) near Valleyview	12	0	0.2	2	7	10	13	16
Bridlebit Creek near Valleyview	8	0	0.1	1	4	6	8	9
Rocky Creek near Valleyview	6	0	0.1	1	3	5	6	7
Horse Creek near Valleyview	1	0	0.0	0	1	1	1	2
Deep Valley Creek near Valleyview	1200	0	6.5	107	691	942	1274	1526
Waskahigan River near the mouth	180	0	4.9	70	163	203	256	296
Little Smoky River at Little Smoky	445	1	24.5	155	358	446	562	650
Iosegun River near Little Smoky	283	0	14.0	102	228	283	354	409

Notes: Values taken directly from the Water Survey of Canada.
Peak Flows for Flood Events are calculated based on the annual flood rates measured by the Water Survey of Canada
Peak flows are based on return periods, which are the **average** length of time between events of similar magnitude.
This table may be used to assess risk, however it is not predictive, and should not be used to predict when these events may or may not occur.
These values are based on at most 31 years of data, and there are inherent problems with using 31 years of data to determine a 1:100 or 1:50 year event.

Stream Crossings

A key component in harvesting activities is maintaining an access network of roads for the extraction of timber on a sustainable basis. An inventory of water crossing densities within the FMA area is provided in Table 2.8. Figure 2.5 shows the stream crossings in the FMA area. Roads (all classes), trails (includes seismic lines) and utility (major transmission lines, railroads, and major pipelines) base features were used to determine stream crossing densities. The original AVI inventory (based on 1990 photography) was used to make Figure 2.5. The inventory information has been periodically updated through various update programs. Stream location information was captured through the original inventory process as well. In the latter case, provincial 1:20,000 digital base streams was used and the centerline positions were updated using the 1990 photography. ANC will ensure that regulations and procedures are applied to each crossing, and that changes to these sites will be monitored (see Section 5.3.2).

Table 2.8 List of water crossing densities for each type of linear disturbance within the FMA area

Berland Sustained Yield Unit (E6) Crossing Densities

Compartment[1]	Area (km^2)	Permanent Roads		Temporary Roads		Utility Corridors		Seismic Lines	
		Total Number	Density (#/km^2)	Total Number	Density (#/km^2)	Total Number	Density (#/km^2)	Total Number	Density (#/km^2)
E6-1	118	14	0.12	6	0.05	0	0.00	216	1.82
E6-2	36	0	0.00	1	0.03	0	0.00	67	1.85
E6-3	49	0	0.00	1	0.02	0	0.00	70	1.42
E6-4	29	5	0.17	2	0.07	0	0.00	87	2.98
Table Total	233	19	0.08	10	0.04	0	0.00	440	1.89

[1] Compartment locations are depicted on Figure 3.8 in Chapter 3

Foothills Sustained Yield Unit (E7) Crossing Densities

Compartment	Area (km^2)	Permanent Roads		Temporary Roads		Utility Corridors		Seismic Lines	
		Total Number	Density (#/km^2)	Total Number	Density (#/km^2)	Total Number	Density (#/km^2)	Total Number	Density (#/km^2)
E7-1	61	6	0.10	0	0.00	4	0.07	238	3.91
E7-2	70	8	0.11	1	0.01	1	0.01	193	2.77
E7-3	39	7	0.18	2	0.05	4	0.10	116	3.01
E7-4	36	7	0.20	1	0.03	0	0.00	107	2.98
E7-5	35	2	0.06	1	0.03	0	0.00	41	1.17
E7-6	78	3	0.04	3	0.04	0	0.00	101	1.30
E7-7	113	3	0.03	6	0.05	0	0.00	107	0.95
E7-8	103	3	0.03	0	0.00	0	0.00	98	0.96
E7-9	40	0	0.00	1	0.03	0	0.00	65	1.65
E7-10	57	0	0.00	3	0.05	0	0.00	74	1.29
E7-11	59	0	0.00	0	0.00	0	0.00	48	0.82
E7-12	42	0	0.00	0	0.00	0	0.00	40	0.95
E7-13	67	2	0.03	0	0.00	0	0.00	87	1.30
E7-14	64	1	0.02	2	0.03	1	0.02	81	1.27
Table Total	862	42	0.05	20	0.02	10	0.01	1396	1.62

Table 2.8 Continued

Little Smoky Sustained Yield Unit (W1) Crossing Densities

Compartment	Area (km^2)	Permanent Roads Total Number	Permanent Roads Density (#/km^2)	Temporary Roads Total Number	Temporary Roads Density (#/km^2)	Utility Corridors Total Number	Utility Corridors Density (#/km^2)	Seismic Lines Total Number	Seismic Lines Density (#/km^2)
W1-0	70	4	0.06	7	0.10	7	0.10	120	1.70
W1-1	70	7	0.10	1	0.01	4	0.06	123	1.76
W1-2	126	10	0.08	3	0.02	2	0.02	290	2.30
W1-3	97	6	0.06	2	0.02	0	0.00	264	2.71
W1-4	41	0	0.00	4	0.10	2	0.05	115	2.80
W1-5	207	8	0.04	1	0.00	7	0.03	263	1.27
W1-6	19	0	0.00	0	0.00	0	0.00	40	2.11
W1-7	25	0	0.00	0	0.00	0	0.00	45	1.79
W1-8	69	4	0.06	0	0.00	0	0.00	89	1.29
W1-9	67	6	0.09	0	0.00	0	0.00	132	1.98
W1-10	56	0	0.00	0	0.00	1	0.02	90	1.60
W1-11	16	0	0.00	6	0.38	0	0.00	21	1.33
W1-11A	106	0	0.00	6	0.06	0	0.00	110	1.04
W1-12	88	1	0.01	13	0.15	0	0.00	149	1.69
W1-13	43	0	0.00	9	0.21	0	0.00	55	1.27
W1-14	123	0	0.00	11	0.09	0	0.00	233	1.89
W1-15	93	0	0.00	9	0.10	0	0.00	172	1.84
W1-16	98	3	0.03	4	0.04	8	0.08	129	1.31
W1-17	66	2	0.03	6	0.09	2	0.03	152	2.32
W1-18	70	0	0.00	5	0.07	1	0.01	94	1.34
W1-19	39	1	0.03	4	0.10	12	0.31	43	1.11
W1-20	57	0	0.00	7	0.12	7	0.12	48	0.85
W1-22	55	2	0.04	9	0.16	7	0.13	55	0.99
W1-24	71	0	0.00	7	0.10	5	0.07	76	1.08
W1-25	64	0	0.00	4	0.06	4	0.06	42	0.66
W1-26	90	0	0.00	8	0.09	2	0.02	103	1.15
W1-27	116	0	0.00	16	0.14	9	0.08	101	0.87
W1-28	29	0	0.00	0	0.00	1	0.03	45	1.54
W1-29	67	0	0.00	4	0.06	5	0.07	58	0.87
W1-30	55	0	0.00	17	0.31	10	0.18	82	1.49
W1-31	32	4	0.12	3	0.09	4	0.12	52	1.62
W1-32	31	1	0.03	0	0.00	1	0.03	58	1.88
W1 Total	2,256	59	0.03	166	0.07	101	0.04	3449	1.53

Table 2.8 Continued

Pine Sustained Yield Unit (W8) Crossing Densities

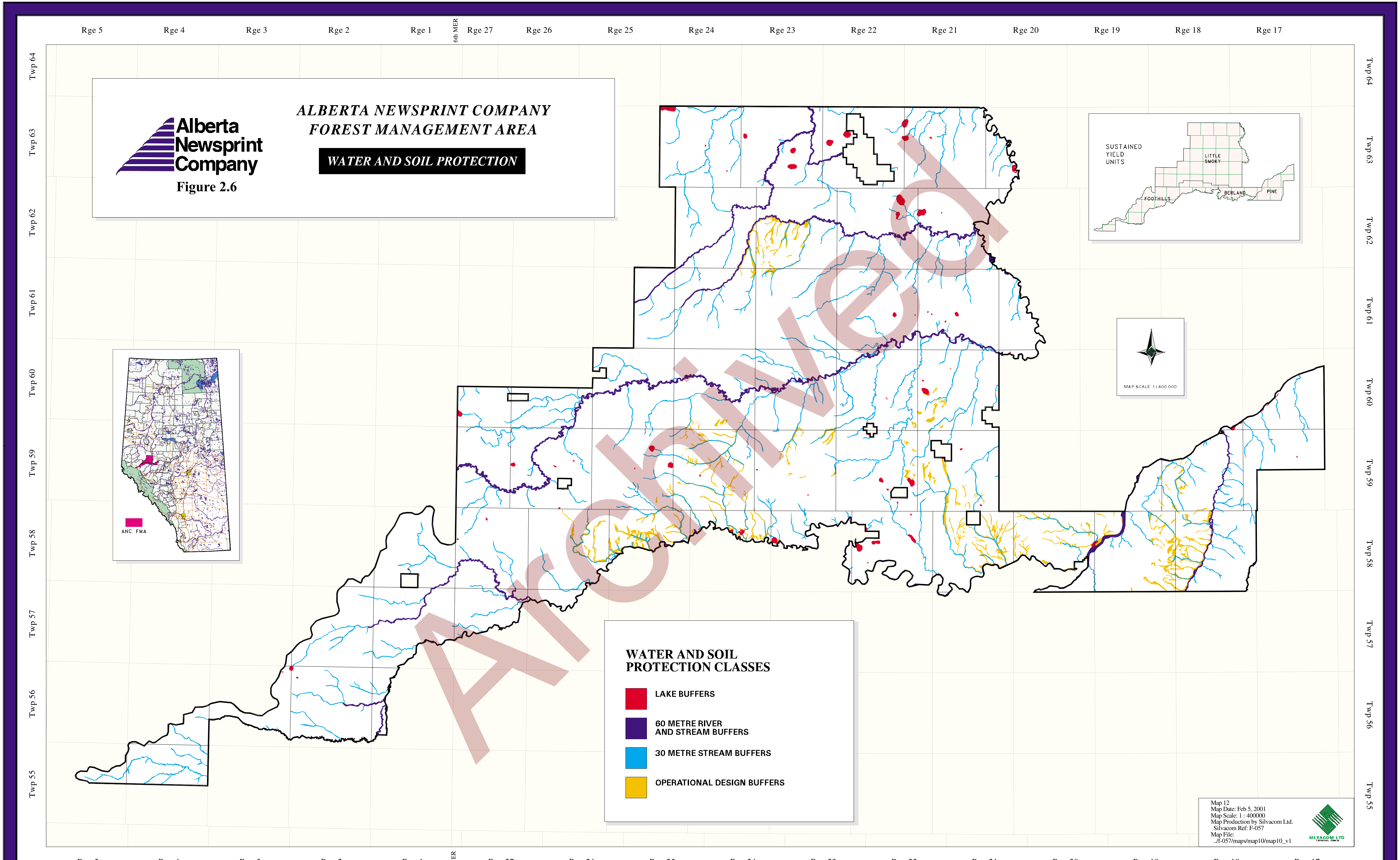
Compartment	Area (km^2)	Permanent Roads		Temporary Roads		Utility Corridors		Seismic Lines	
		Total Number	Density (#/km^2)	Total Number	Density (#/km^2)	Total Number	Density (#/km^2)	Total Number	Density (#/km^2)
W8-1	8	0	0.00	0	0.00	2	0.26	13	1.67
W8-2	33	0	0.00	0	0.00	1	0.03	79	2.40
W8-3	27	2	0.07	1	0.04	0	0.00	53	1.94
W8-4	43	4	0.09	1	0.02	5	0.12	52	1.21
W8-5	37	1	0.03	13	0.35	18	0.49	83	2.25
W8-6	38	3	0.08	10	0.27	8	0.21	65	1.73
W8-7	8	1	0.12	1	0.12	3	0.36	8	0.96
W8-8	12	0	0.00	1	0.08	7	0.59	10	0.84
W8-9	11	0	0.00	0	0.00	0	0.00	21	1.88
W8-10	34	6	0.18	8	0.24	3	0.09	88	2.59
W8-11	21	16	0.76	4	0.19	4	0.19	84	3.97
W8-12A	38	8	0.21	2	0.05	4	0.11	164	4.32
W8-12B	39	0	0.00	14	0.36	7	0.18	176	4.57
W8-13	15	1	0.07	0	0.00	0	0.00	34	2.33
W8-14	23	3	0.13	6	0.26	3	0.13	61	2.60
W8 Total	387	45	0.12	61	0.16	65	0.17	991	2.56

While many measures are taken during harvesting to prevent modifications to the productive soil, intense weather events (such as heavy rains or rapid melting and runoff over frozen soils) can cause damage to the soils and aquatic systems. The potential for severe damage is increased if operations are conducted immediately adjacent to streams, rivers or lakes. This practice has the potential to be detrimental not only to the aquatic systems that could see increased inputs and changes in the sediment content, but also to forest regeneration, through the loss of valuable soil materials and nutrients. Therefore, it is normally advantageous to forest managers to maintain areas of natural vegetation adjacent to waterbodies and streams and rivers in order to buffer any potential negative impacts on aquatic and soil resources. Lands within the FMA area that have been set aside for the purpose of protecting water are listed in Table 2.9. Figure 2.6 shows the location of these areas.

Table 2.9 Water and soil protection lands area summary

Water and Soil Protection Class	Sustained Yield Unit				
	Berland/ E6	Foothills/ E7	Little Smoky/ W1	Pine/W 8	Total Area (ha)
Lake Buffers (20 m & 100 m)	185	127	1,033	50	1,396
River and Stream Buffers (60 m)	478	1,445	4,632	764	7,319
Stream Buffers (30 m)	406	1,897	4,859	872	8,034
Operational Design Buffers	896	1,153	1,614	1,063	4,726
Total Area (ha)	1,964	4,622	12,139	2,749	21,474
Total Sustained Yield Unit Area (ha)	23,300	86,200	25,600	38,700	373,800
% of Sustained Yield Unit Protected	8.4	5.4	5.4	7.1	

Lakes <4ha in size have been assigned 20 m buffers. All other lakes have 100 m buffers



ALBERTA NEWSPRINT COMPANY
FOREST MANAGEMENT AREA
WATER AND SOIL PROTECTION
Alberta Newsprint Company
Figure 2.6
Rge 5
Rge 4
Rge 3
Rge 2
Rge 1
6th MER
Rge 27
Rge 26
Rge 25
Rge 24
Rge 23
Rge 22
Rge 21
Rge 20
Rge 19
Rge 18
Rge 17
Twp 64
Twp 63
Twp 62
Twp 61
Twp 60
Twp 59
Twp 58
Twp 57
Twp 56
Twp 55
SUSTAINED YIELD UNITS
LITTLE SMOKY
FOOTHILLS
BERLAND
PINE
ANC FMA
MAP SCALE 1:400 000
WATER AND SOIL PROTECTION CLASSES
LAKE BUFFERS
60 METRE RIVER AND STREAM BUFFERS
30 METRE STREAM BUFFERS
OPERATIONAL DESIGN BUFFERS
Map 12
Map Date: Feb 5, 2001
Map Scale: 1 : 400000
Map Production by Silvacom Ltd.
Silvacom Ref: F-057
Map File:
../f-057/maps/map10/map10_v1
SILVACOM LTD
Edmonton, Alberta
Archived

2.2.4 Natural Disturbance Patterns

The forests of northern Alberta and particularly of ANC Timber's FMA have been strongly influenced by natural disturbances throughout time. The primary disturbance agent has long been acknowledged as being forest fires. Prior to the intervention of man fire disturbances varied in size, intensity and duration of burn.

Figure 2.7 illustrates the current condition of the natural disturbance strata as defined by work done within the Natural Disturbance Program of the Foothills Model Forest.

Fire History

Fire is an important force in the boreal forest that has been shaping the landscape for thousands of years. Tables 2.10 and 2.11 provide selected fire statistics for the ANC FMA area and the surrounding areas within 100 km (the greater ANC FMA area) for the years of 1932 to 2000. Figure 2.8 illustrates the pattern and distribution of fires coded by decade for this area. Data for this period was obtained from Alberta Sustainable Resource Development.

Table 2.10 shows that during this 68-year time period 1214 fires were recorded in the greater ANC FMA area, burning a total of 1,547,337 ha.

Table 2.10 Number of fires and area burned for different size classes, for the greater ANC area

Size Class (ha)	Number of fires	% of total # of fires	Area (ha)	% of total area burned
<1	485	39.95%	129.8	0.01%
1-10	140	11.53%	442.6	0.03%
10-99	166	13.67%	6,176.0	0.40%
100-999	246	20.26%	106,505.1	6.88%
1,000-9,999	144	11.86%	445,219.6	28.77%
10,000-99,000	31	2.55%	707,558.5	45.73%
>100,000	2	0.16%	281,305.7	18.18%

The majority of these fires (65.16 %) were small (< 100 ha in size), with only a small proportion (< 1 %) exceeding 100, 000 ha. Approximately one third of all the fires in this area were mid-sized (100-100,000 ha). The largest fires accounted for over 18% of the area burned, while mid-sized to large fires (10, 000–100, 000 ha) consumed nearly three quarters of the landbase in this area.

Table 2.11 indicates that there is a great deal of variability in the frequency (1–399) and size (34.5–279,842.2 ha) of fires from year to year. Note that some years are not included in this summary as no fires were recorded for those years in the greater ANC area.

Table 2.11 Number of fires and area burned per year in the greater ANC area

Year	# of Fires	Area Burned (ha)
1932	1	294.3
1933	4	1,747.5
1936	1	892.5
1938	31	144,755.5
1940	6	7,786.7
1941	54	129,270.3
1942	6	18,446.8
1943	8	12,413.0
1944	19	147,194.1
1945	20	36,949.1
1946	121	40,509.8
1947	8	21,960.7
1948	2	3,741.1
1949	23	238,342.1
1950	399	107,084.7
1951	4	2,804.3
1952	3	8,503.0
1953	9	15,732.8
1954	3	1,334.0
1955	1	798.3
1956	26	279,842.2
1957	5	1,899.6
1958	4	2,209.4
1959	12	6,254.0

Year	# of Fires	Area Burned (ha) #
1961	22	33,947.0
1962	1	991.8
1964	1	251.3
1967	5	3,276.5
1968	15	43,224.9
1969	2	192.1
1970	6	5,387.5
1971	2	1,537.0
1972	5	6,426.0
1974	5	11,240.1
1976	2	357.5
1981	4	15,815.8
1982	2	1,735.5
1983	1	945.1
1984	1	200.7
1987	5	2,157.4
1988	17	2,107.4
1989	2	875.2
1995	1	164.8
1997	112	2,268.4
1998	225	183,186.7
1999	6	248.3
2000	2	34.5