SCHEDULE 8

2002

ALBERTA
PROPERTY ASSESSMENT MANUAL
FOR
MANAGED WOODLOT OPERATIONS

Alberta
MUNICIPAL AFFAIRS

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PROPERTY ASSESSMENT MANUAL FOR MANAGED WOODLOT OPERATIONS

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8.000 SCHEDULE 8 - LAND ASSESSMENT FOR WOODLOT PRODUCTION

This procedure follows very closely to that of the 1984 Assessment Manual (Alberta Assessment Standards Branch 1984).

This procedure is designed to measure the capability of a designated woodlot to produce income from forest production. The ratings measure the ability of the site to produce timber under present climatic conditions using normal management practices.

The assessment value established for land under agricultural production is computed using a rating system that reflects the ability of the various types of soils to generate a net income from the production of woodlot products. The rating system assigns a numeric rating of 100 to the soil type proven to be capable of consistently producing, over an extended period of time, the highest net income under average climatic conditions and typical management practices. The rating of 100 also assumes that the highest net income is produced under optimum physical characteristics of the soil. All other soils are rated through a comparative rating system which reflects the net income relationships that exists between other types of soils and the soil type rated at 100. Further adjustments are made to account for less than optimal physical characteristics. In summary, soils that generate a lesser net income are assigned a correspondingly lower rating which in turn is reflected in the assessed value of the land. In extreme cases, where the gross income produced from a woodlot does not cover costs of production, the land may be rated for its potential as improved or native pasture lands.

The first step in applying the rating system is to identify and describe the physical properties present in a specific property. A comparative numeric rating system has been established that uses those properties to determine how each specific property rates on a provincial basis. That rating is then multiplied by a regulated base rate and a regulated factor to form an assessment on a per unit of area basis.

The comparative rating is divided into two parts. The first part is the **Net Productivity Rating** (NPR) which is the expected production of a site based on environmental conditions. It is calculated from the maximum climatic potential (Master Rating) and modified by soil and site moisture regimes, soil nutrient regimes, and rooting volume considerations.

The basis of net productivity rating is the identification of natural areas with similar maximum production potentials based on inherent climatic characteristics. The basis of these areas is the Natural Regions and Subregions of Alberta, as defined by the Alberta Ecological Working Group (Alberta Environment 1994, Map 1). This map defines natural forest types that have developed in response to long-term temperature and moisture conditions. Eleven natural ecological areas (Map 2) have been recognized for woodlot assessment in the forested White Area of Alberta. They include the Dry Mixedwood, the Central Mixedwood the Lower Foothills, the Montane and the Parkland Subregions within four general forest regions: the Peace, the North-Central, the West-Central and the Southwest.

The Master Rating reflects the maximum forest production expected in each of the defined ecological (climatic) regions. It represents the climatic potential assuming no soil limitations. The Master Ratings are based on measured forest production values converted to a scale of 100.

The soil moisture considerations include texture and water table. Soil texture and associated water holding capacity influences the amount of water that can be held for forest use. Sands hold little water while clays hold the most water but have decreased aeration. Medium textures are preferred. The first adjustment is based on the surface texture (0-20 cm) with a modification for strongly contrasting subsoils (20-100 cm).

Site moisture or external landscape drainage also impacts on the amount of water available for tree growth. Steep slopes shed water, while depressions accumulate water or have a high water table. The lower portions of long slopes often receive lateral seepage that can be

high in both oxygen and nutrients. This is mainly a landform concern but extremes of soil textures also impact the assessment. For example, fine textured clayey soils are, at best, moderately well drained, while sands are commonly assessed "very rapid" drainage in sloping positions. Allowances are made for the benefits of seepage situations in lower slope positions and for water table influences not apparent in the soil profile.

Natural fertility is assessed through a nutrient adjustment. The main factors in mineral soils are organic content, a source of Nitrogen and pH which affects the availability of mineral elements. Slightly acidic conditions are considered ideal. Organic soils have additional limitations. Fortunately, there is a good relationship between pH, level of decomposition of the organic material (fibre content) and nutrient regime. More highly decomposed humic materials are generally more productive than non-decomposed fibric materials.

Rooting volume is another factor that can affect tree growth. This factor recognizes that tree roots need some minimum soil volume for both nourishment and stability.
There may be other soil or landscape factors encountered from time-to-time that can affect tree production. For example, salinity is seldom encountered in a forest environment, but it does affect tree growth.

Net Productivity Rating is calculated from the accumulated effects of the above factors.
NPR = Master Rating – soil moisture and site moisture adjustments – nutrient adjustment – rooting zone adjustments.

The second part of the assessment is the **Increased Cost of Production** (ICP). Optimum costs of production have been established encompassing those costs used to generate woodlot income based on typical practices of the day. Certain landscape may be encountered that require input costs over and above the typical costs. Additional adjustments are made to reflect their effect on the net income.

Topography or slope steepness is a principle consideration. The amount of slope affects both access, the cost of roads, and attention to erosion control. This is particularly true as slope steepness increases beyond about 20%.

The amount of surface stones can affect the operation of mechanical equipment and reforestation efforts. This is not a major concern in Alberta but has been included for completeness.

Surface wetness is another factor that can affect woodlot management. It can affect trafficability and may limit time of harvesting or other operations. As Alberta has a long winter season, this is not a major concern but has been recognized.

The continuity or shape of a parcel of land can create a nuisance factor and increases the cost of production. The main concern is for stream crossings that affect both access (transportation) and erosion (or buffer requirement) management.

Increased Cost of Production is calculated as the sum of the ICP factors.
ICP = (topography + stoniness + wetness + pattern).
Net Productivity Rating minus the Increased Cost of Production = Final Site Rating.

NPR = Master Rating – (soil moisture and site moisture adjustments) – (nutrient adjustment) – (rooting zone adjustment) – (other adjustments).

For assessment purposes, all woodlot lands are classified into three classes:

Productive – where there is economic tree harvesting
Restricted – when land is designated as non-harvestable for specified reasons such as water course protection, erosion control or protected species habitat.
No economic value – This designation is applied to any area that makes no contribution to net income.

Note: In the following sections, soil descriptions will follow the CanSIS Manual for describing soils in the field (1983). The general format and many of the individual soil limitations follow the Land Suitability Rating System (AIWG 1995).

8.100 PRODUCTIVE WOODLOT

Productive woodlots will be evaluated on their potential to produce a tree crop based on soil and site conditions irrespective of the present standing crop.

8.200 NET PRODUCTIVITY RATING (NPR)

This is the expected production of a site based on environmental conditions. It is calculated from the maximum climatic potential (Master Rating) modified by soil and site moisture regimes, soil nutrient regimes and rooting volume considerations.

Maximum woodlot productivity is established for each of 11 natural ecological areas (Map 1). These areas are the forested Natural Subregions as defined by the Alberta Ecological Working Group (Alberta Environment 1994) that are found in the White Area of Alberta and the adjoining Green Areas. They include the Dry Mixedwood, the Central Mixedwood, the Lower Foothills, the Montane and the Parkland. These are further segregated into four general forest regions: the Peace, the North-Central, the West-Central and the Southwest.

Calculated from the accumulated effects of the following factors:
NPR = Master Rating – (soil moisture and site moisture adjustments) – (nutrient adjustment) – (rooting zone adjustment) – (other adjustments)

8.200.100 MASTER RATING

The Master Rating reflects the maximum forest production expected in each of the defined ecological (climatic) regions (see Map 1). It represents the climatic potential based on measured forest production as found in the referenced ecosite Guidebooks and field testing (Table 1).

Table 1 Master ratings for defined ecological regions

Forest Areas	Ecological Subregions	Average GDD	Average P-PET	Maximum MAI	Master Rating
Peace	Dry Mixedwood	1250	+30	3.36	**85**
	Central Mixedwood	1200	+80	3.64	**90**
	Lower Foothills	1100	+100	3.93	**95**
North Central	Dry Mixedwood	1350	+30	3.36	**85**
	Central Mixedwood	1250	+80	3.93	**95**
West Central	Parkland	1350	+10	2.79	**75**
	Dry Mixedwood	1250	+60	3.50	**90**
	Central Mixedwood	1200	+100	3.93	**95**
	Lower Foothills	1100	+120	4.21	**100**
Southwest	Montane	1250		2.50	**70**
	Lower Foothills	1150	+170	3.64	**90**

*GDD = Growing Degree Days above 50 C; P-PET = precipitation minus potential evapotranspiration; MAI = mean annual increment in m^3/ha/yr

8.200.200 SOIL MOISTURE (TEXTURE) ADJUSTMENT

Soil texture and associated water holding capacity influences the amount of water that can be held for forest use. Sands hold little water while clays hold the most water but have decreased aeration. Medium textures are preferred (Table 2). The first adjustment is based on the surface texture (0-20 cm) with a modification for strongly contrasting subsoils (20-100cm) (Table 3).

Table 2 Soil moisture adjustment

Texture	S	LS	SL	L	CL	SiL	C	SiC	HC
% C+Si	10	20	40	60	70	75	80	85	95
mm/m	40	60	100	150	170	180	190	200	225
% reduction	**20**	**10**	**5**	**0**	**0**	**0**	**2**	**5**	**10**

S = sand, LS = loamy sand, SL = sandy loam, L = loam, CL = clay loam, SiL = silt loam
C = clay, SiC = silty clay, HC = heavy clay

Table 3 Subsoil moisture modification

Average subsurface texture	Average surface texture	
	Sandy (S, LS)	Loamy (SL, L)
Sandy (S, LS)	0	-5
Loamy (SL, L)	5	0
Clayey (CL+)	10	5

Note: To be subtracted from soil moisture adjustment.

8.200.300 SITE MOISTURE ADJUSTMENT

This factor recognizes that external and internal soil drainage impact the amount of water available for tree growth (Table 4). Steep slopes shed water, while depressions accumulate water or have a high water table. The lower portions of long slopes often receive lateral seepage that can be high in both oxygen and nutrients. This is mainly a landform concern but extremes of soil textures also impact the assessment. For example, fine textured clayey soils are, at best, moderately well drained while sands are commonly assessed "very rapid" drainage in sloping positions.

Table 4 Site moisture (drainage) adjustment

Drainage Class	Common depth to water table (cm)	% reduction/ addition	Associated moisture regime
Very rapid	-	**20**	Xeric
Rapid	-	**15**	Subxeric
Well	>125	**10**	Submesic
Moderately well	100	**5**	Mesic
Imperfect*	75	**0**	Subhygric
Imperfect to poor*	50	**5**	Hygric
Poor	25	**10**	Subhydric
Very poor	0	**30**	Hydric

*For seepage situations in lower slope positions, decrease the reduction by 5% (that is, Imperfect to Poor becomes 5 and Imperfect would become +5).

Water table influences not apparent in the soil profile would be handled in the same manner. This would apply particularly to very sandy situations where deep rooted vegetation can take advantage of water tables at 1.5 to 2 metres depth.

8.200.400 NUTRIENT ADJUSTMENT

The nutrient adjustment is an assessment of natural fertility. The main factors in mineral soils are organic matter content, a source of Nitrogen, (Table 5) and pH which all affect the availability of mineral elements (Table 6). Organic soils have additional limitations. Fortunately, there is a good relationship between pH, level of decomposition of the organic material (fibre content) and nutrient regime (Table 7).

Table 5 Organic matter adjustment for mineral soils

Type	Peatymor		Mull		Moder		Mor		
Depth L-H (cm)	-	-	2	3	5	8	10	5	2
Depth O (cm)	30	10	-	-	-	-	-	-	-
Depth Ah (cm)		10	20	10	5	2	<2	<2	<2
% reduction	**10**	**0**	**0**	**0**	**2**	**5**	**10**	**15**	**20**
Typical Soil Taxonomy	Peaty Gleysolic		Black Chernozemic		Dark Gray Luvisolic		Gray Brunisolic		

Note: Ah has a Munsell color value darker than 5.

Table 6 pH adjustment for mineral soils

pH	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
% reduction	**30**	**20**	**15**	**10**	**5**	**0**	**0**	**5**	**10**	**15**	**25**

Table 7 Nutrient adjustment for organic soils

Reaction pH	Decomposition class*	Fibric	Mesic	Humic
	Fibre content (%)	80	25	5
	Von Post scale	2	5	9
7.5		50	30	15
7.0		45	25	10
6.5		40	25	10
6.0		40	25	10
5.5		40	25	10
5.0		45	30	15
4.5		50	35	20
4.0		55	40	30
3.5		60	45	40
3.0		70	55	50

*Fibric = non-decomposed (composed mainly of sphagnic material), mesic = moderately decomposed (composed mainly of brown mosses or sedges), humic = strongly decomposed. Mesic is the most common situation. See glossary for definitions.

8.200.500 ROOTING DEPTH ADJUSTMENT

This factor recognizes that tree roots have a minimum soil volume requirement for both nourishment and stability (Table 8).

Table 8 Percent reduction for rooting depth limitation

Depth to restricting layer (cm)	Root penetration		
	restricted	limited	none
0	50	80	100
10	40	70	95
20	30	50	90
40	10	30	80
60	0	10	60
80	0	5	40
100	0	0	20
120	0	0	10

Note: Restricted = tough B horizons = clay texture with Db >1.60; CL >1.65; L> 1.70; S>1.75
Limited = paralithic material = diggable sandstones and shales (Cretateous and Tertiary)

8.200.600 MISCELLANEOUS DEDUCTIONS

Deductions may be applied for other soil characteristics that clearly affect production. Salinity is seldom encountered in a forest environment but if it does it will affect tree growth (Table 9).

Table 9 Salinity adjustment

Salinity (dS/m)	0	2	4	6	8	10
% reduction	0	10	30	50	70	90

8.300 INCREASED COST OF PRODUCTION (ICP)

Optimum costs for production have been established including those costs used to generate woodlot income based on typical practices of the day. Certain landscape features may be encountered that require input costs over and above the typical costs: additional adjustments are made to reflect their effect on net income.

Increased cost of production is calculated as the sum of the following ICP factors:
ICP = % reduction (topography + stoniness + wetness + pattern)

8.300.100 TOPOGRAPHY (SLOPE STEEPNESS)

The amount of slope affects access, the cost of roads, and attention to erosion control. This is particularly true as slope steepness increases beyond about 20% (Table 10).

Table 10 Slope steepness adjustment

Slope steepness (%)	5	10	15	20	25	30	35	40	45
% reduction	0	0	3	6	9	12	16	20	25

8.300.200 STONINESS

The amount of surface stones can affect the operation of mechanical equipment and reforestation efforts (Table 11). This is not a major concern in Alberta but has been included for completeness.

Table 11 Stoniness adjustment

Stoniness class	0	1	2	3	4
% reduction	0	0	0	5	20

8.300.300 FLOODING/DRAINAGE

Wetness affects trafficability and may limit harvesting access or other operations. As Alberta has a long winter season, this is not a major concern but has been recognized (Table 12).

Table 12 Site wetness adjustment

Drainage	Well	Imperfect	Poor	Very poor	Bog	Fen
% reduction	0	2	5	10	15	20
Flooding likelihood (years/10)	0	2	4	6	8	10

8.300.400 PATTERN

Pattern recognizes the nuisance effect of land continuity or shape. The main concern is for stream crossings that affect both access (transportation) and erosion (or buffer requirement) management (Table 13).

Table 13 Pattern adjustment

Number of crossings/km	**0**	**2**	**4**	**6**	**8**	**10**
% reduction	**0**	**1**	**3**	**7**	**12**	**20**
Number of obstructions per ¼ sec.	0	2	4	6	8	10

8.400 RESTRICTED USE LAND

Restricted use land is land that is designated as non-harvestable for specified reasons such as water course protection erosion control or protected species habitat. There may be limited harvesting.
It may be assessed based on inherent hayland or pasture value or at a specified base rate.
If there is limited harvesting, it is suggested that the Master Rating be reduced by 50%.

8.500 FINAL SITE PRODUCTIVITY RATING

The Final Site Rating is calculated as the Net Productivity Rating minus the Increased Cost of Production.
NPR – ICP = Final site rating

8.600 ASSESSMENT VALUE CALCULATION

8.600.100 BASE RATE AND ASSESSMENT YEAR MODIFIER

The Woodlot Base Rate per acre, prescribed by regulation for each class of woodlot land, is multiplied by the appropriate assessment year modifier for each class of woodlot land to produce the Woodlot Use Value Base Rate, per acre, for the base year of the assessment.

8.600.200 FINAL RATING

The final rating for each field is converted to value by applying the final rating as a factor, to the appropriate Woodlot Use Value Base Rate, per acre. The resultant value per acre is then multiplied by the number of acres in the field. This process is applied to each field in the parcel and the addition of the values determined for each field produces the Woodlot Use Value for the parcel.

8.600.300 LOCATION RATING

The assessment of a woodlot parcel is modified using location rating factors located in Section 7.060.500: the result is the Woodlot Use Value.

8.600.400 ASSESSMENT

The assessment value entered on the assessment roll for taxation purposes is calculated as:
Assessment = Base Rate x assessment year modifier x final productivity rating x acres x location rating

APPENDICES

APPENDIX 1 GLOSSARY OF TERMS

The soils terms were taken mainly from Canadian Society of Soil Science (1976):

Term	Definition
A horizon	A mineral horizon formed at or near the surface in the zone of removal of materials in solution and suspension, or maximum accumulation of organic carbon, or both.
Ae	A horizon that has been eluviated of clay, iron, aluminium, or organic matter, or all of these.
afforestation	Conversion of bare or cultivated land into forest.
Ah	A horizon in which organic matter has accumulated as a result of biological activity.
acid soil	A soil having a pH of less than 7.0.
aggregate	A group of soil particles cohering so as to behave mechanically as a unit.
alkaline soils	Any soil that has pH greater than 7.0.
arable	Tillage; agricultural production based on cultivation practices; land that is cultivated or capable of being cultivated. Arable is used as a comparison to agriculture based on grazing (non-cultivated) systems.
B horizon	A subsoil horizon characterized by one of: a) enrichment in clay, iron, aluminium, or humus (Bt or Bf). b) a prismatic or columnar structure that exhibits pronounced coatings or stainings associated with significant amounts of exchangeable sodium (Bn or Bnt). c) an alteration by hydrolysis, reduction, or oxidation to give a change in color or structure from the horizons above or below, or both (Bm).
bedrock	The solid rock underlying soils and the regolith or exposed at the surface.
bog	A peat-covered or peat-filled wetland, generally with a high water table. The water of a bog is generally acid and low in nutrients. Bogs usually support a black spruce forest but may also be treeless. They are usually covered with sphagnum and feathermosses and ericaceous shrubs.
Brunisolic	An order of soils whose horizons are developed sufficiently to exclude them from the Regosolic Order but lack the degrees or kinds of horizon development specified for soils in other orders. They always have Bm or Btj horizons.
buffer or buffer zone	A strip or area of forest or land, usually along sensitive sites such as watercourses or key wildlife habitats, that are under a protected or restricted management regime.
bulk density, soil	The mass of dry soil per unit bulk volume.
C horizon	A mineral horizon comparatively unaffected by the pedogenic processes operative in the A and B horizons except for the process of gleying (Cg) or the accumulation of calcium carbonate (Cca) or other salts (Csa). A naturally calcareous C horizon is designated Ck.

Term	Definition
Chernozemic	An order of soils that have developed under xerophytic or mesophytic grasses and forbs, or under grassland-forest transition vegetation, in cool to cold, subarid to subhumid climates. The soils have a dark-coloured surface (Ah,Ahe or Ap) horizon and a B or C horizon, or both, of high base saturation. The order consists of the Brown, Dark Brown, Black and Dark Gray great groups.
classification, soil	The systematic arrangement of soils into categories and classes on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties.
clay	A size fraction <0.002 mm equivalent diameter: See also texture.
clod	A compact, coherent mass of soil produced by digging, plowing or remoulding.
coarse fragments	Rock or mineral particles >2.0 mm in diameter.
coarse texture	The texture exhibited by sands, loamy sands, and sandy loams except very fine sandy loam. A soil containing large quantities of these textural classes.
drainage	Soil drainage refers to the frequency and duration of periods when the soil is not saturated. Terms used are - excessively, well, moderately, imperfectly and poorly drained.
duff	The layer of partially and fully decomposed organic materials lying below the litter and immediately above the mineral soil.
edatope	Moisture/nutrient grid that displays the potential ranges of relative moisture (very dry to wet) and nutrient (very poor to very rich) conditions and outlines relationships between each ecosite.
ecosite	Relatively small (restricted) ecological units that develop under specific environmental influences of climate, moisture and nutrient regimes.
eolian	Material that has been deposited by wind action.
erosion	The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep.
evapotranspiration	The combined loss of water from a given area and during a specific period of time, by evaporation from the soil surface and by transpiration from plants.
fen	A peat-covered or peat-filled wetland with a water table which usually at or above the surface. The waters are mainly nutrient-rich, minerotrophic waters from mineral soils. The vegetation consists mainly of sedges, grasses, reeds and brown mosses with some shrub cover and at times, a scanty tree layer.
fertility, soil	The status of a soil with respect to the amount and availability of elements necessary for plant growth.
fibre (rubbed)	Amount of fibre in an organic soil, > than 0.15 mm, remaining after a specified amount of abrasion (rubbing). A fibric soil has > 40 % rubbed fibre, a mesic soil has 10% to 40% rubbed fibre and a humic soil has < 10% rubbed fibre.
fibric	An organic layer containing large amounts of weakly decomposed material whose origins are readily identifiable (von Post 1-4).
fine texture	Consisting of or containing large quantities of the fine fractions, particularly of silt and clay.
fluvial	Material that has been transported and deposited by streams and rivers. Also alluvial.
frost-free period	Season of the year between the last frost of spring and first frost of fall.

Term	Definition
Gleysolic	An order of soils developed under wet conditions and permanent or periodic reduction. These soils have low chromas, or prominent mottling, or both, in some horizons. The great groups Gleysol, Humic Gleysol and Luvic Gleysol are included in the order.
gravelly	Containing appreciable or significant amounts of gravel (particles 2 to 75 mm in diameter).
Green Area	An administrative classification of public lands in Alberta that are managed primarily for forest production, watershed protection, fish and wildlife habitat, recreation and other multiple uses.
groundwater	That portion of the hydrosphere which at any particular time is either passing through or standing in the soil and the underlying strata and is free to move under the influence of gravity.
growing degree days (GDD)	The accumulated heat units above a threshold temperature – in this case, 5°C. They are calculated as (mean daily temperature – 5) x days.
growing season	Nominally, the length of time with a mean daily temperature above 5°C.
horizon	A layer in the soil profile approximately parallel to the land surface with more or less well-defined characteristics that have been produced through the operation of soil forming processes. Soil horizons may be organic or mineral.
humic	An organic layer of highly decomposed material containing little fibre (von Post 7-10).
hummocky	Abounding in rounded or conical knolls or mounds, generally of equidimensional shape and not ridge-like.
impeded drainage	A condition which hinders the movement of water through soils under the influence of gravity.
infiltration	The downward entry of water into the soil.
irrigation	The artificial application of water to the soil for the benefit of growing crops.
lacustrine	Material deposited in lake water and later exposed.
landscape	All the natural features such as fields, hills, forests, water, etc., which distinguish one part of the earth's surface from another part. Usually that portion of land or territory which the eye can comprehend in a single view, including all its natural characteristics.
lithic	A feature of a soil subgroup which indicates a bedrock contact within 50 cm of the soil surface.
litter	Standing and fallen dead plant material that was produced naturally on site.
loam	See soil texture. A mixture of sand, silt and clay. It is not related to colour.
Luvisolic	An order of soils that have eluvial (Ae) horizons, and illuvial (Bt) horizons in which silicate clay is the main accumulation product. The soils developed under forest or forest-grassland transition in a moderate to cool climate. The most common forest soils in western Canada.
map unit	A map unit is any identified parcel of land that appears different from the rest of the area in terms of topography, vegetation or soils.
management unit	An area or tract of forestland that is managed in the same way.
Mean Annual Increment (MAI)	The average volume of wood accumulated by a tree or stand on a yearly basis. The usual measurement is m^3/ha/y.

Term	Definition
medium texture	Intermediate between fine-textured and coarse-textured (soils). (It includes the following textural classes: very fine sandy loam, loam, silt loam, and silt).
merchantable timber	A tree or stand of trees that are "of acceptable age" or "of acceptable quality" to be harvested and converted into saleable products.
mesic	An organic layer of intermediately decomposed material (between that of fibric and humic) (von Post 4-6).
mixedwood stands	Stands containing both deciduous and coniferous species.
moderately-coarse texture	Consisting predominantly of coarse particles. (In soil textural classification, it includes all the sandy loams except the very fine sandy loam).
moder	Humus form that displays the diagnostic organic horizons with varying degrees of intermixing between the organic and mineral horizons, producing a gradual transition between the horizons
moderately-fine texture	Consisting predominantly of intermediate-size (In soil textural classification, it includes clay loam, sandy clay loam, and silty clay loam).
moisture regime	Represents the available moisture supply for plant growth on a relative scale. It is assessed through an integration of species composition and soil and site characteristics.
mor	Humus form that displays diagnostic F and H horizons, with a distinct boundary evident between the organic and mineral layer. There is no intermixing of organic and mineral horizons.
morphology, soil	The makeup of the soil, including texture, structure, consistence, colour, and other mineralogical, physical and biological properties of the various horizons of the soil profile.
mull	Humus form where the diagnostic F and H horizons are commonly lacking. There is considerable mixing of organic material into the surface mineral horizon thereby creating a relatively thick Ah horizon.
Natural Regions	Small scale landscape patterns with similar combinations of vegetation, landforms and soils. Six regions are identified in Alberta: Grassland, Parkland, Boreal Forest, Rocky Mountains and Canadian Shield.
Natural Subregions	Subdivisions of the regions. Twenty are recognized in Alberta.
nutrient regime	Amount of essential nutrients that are available for plant growth. The determination of nutrient regime requires the integration of many environmental and biotic parameters.
Organic	An order of soils that have developed dominantly from organic deposits. The majority of organic soils are saturated for most of the year, unless artificially drained. The great groups include Fibrisol, Mesisol, Humisol and Folisol.
organic matter	The decomposition residues of biological materials derived from: (a) plant and animal materials deposited on the surface of the soils; and (b) roots and micro-organisms that decay beneath the surface of the soil.
P-PET	Precipitation – potential evapotranspiration is an index of moisture balance.
paralithic	Poorly consolidated bedrock which can be dug with a spade when moist. It is severely constraining but not impenetrable to roots.
parent material	The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of a soil is

Term	Definition
	developed by pedogenic processes.
peat	Unconsolidated soil material consisting largely of organic remains (mainly derived from mosses or sedges).
peatymor	Humus form that is strongly associated with lowland, poorly or very poorly drained sites. It is sharply delineated from the mineral soil and is composed of Of, Om and/or Oh horizons.
pH, soil	The negative logarithm of the hydrogen-ion activity of a soil. The degree of acidity (or alkalinity) of a soil as determined by means of glass, quinhydrone, or other suitable electrode or indicator at a specified moisture content of soil-water ratio, and expressed in terms of the pH scale.
productivity	A measure of the physical yield of a particular crop. It must be related to a specified management. Productivity may be used to describe or define suitability but it would be inappropriate as a definition of capability which puts more emphasis on vulnerability or flexibility - on available options - rather than simply yields
profile, soil	A vertical section of the soil through all its horizons and extending into the parent material.
reaction, soils	The degree of acidity or alkalinity of soil, usually expressed as a pH value.
Regosolic	An order of soils having no horizon development or development of the A and B horizons insufficient to meet the requirements of the other orders. Included are Regosol and Humic Regosol great groups.
rotation	The period of years required to establish and grow even-aged timber stands to a specified condition of maturity.
saline soil	A nonalkali soil containing soluble salts in such quantities that they interfere with the growth of most crop plants. The conductivity of the saturation extract is greater than 4 dS/m (formerly mmhos/cm), the exchangeable- sodium percentage is less than 15, and the pH is usually less than 8.5.
sand	A soil particle between 0.05 and 2.0 mm in diameter.
volume	Amount of wood in a tree, stand of trees or other specified area, according to some unit of measure, usually in terms of cubic meter.
silt	A soil separate consisting of particles between 0.05 to 0.002 mm in equivalent diameter.
silviculture	The theory and practice of controlling the establishment, composition, structure and growth of forests.
Site Index (SI)	Predicted height for a specific tree species at a given breast height age (50 years used in this report)
soil	The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.
soil map	A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the earth's surface.
soil moisture	Water contained in the soil.
soil structure	The combination or arrangement of primary soil particles into secondary particles, unit or peds. These secondary units may be, but usually are not, arranged in the profile in such a manner as to give a distinctive characteristics pattern. The secondary units are characterized and classified on the basis of size, shape, and degree of distinctness into classes, types, and grades,

Term	Definition
	respectively. Common terms for kind of structure are - single grain, amorphous, blocky, subangular blocky, granular, platy, prismatic and columnar.
soil survey	The systematic examination, description, classification, and mapping of soils in an area. Soil surveys are ranked according to the kind and intensity of field examination.
Solonetzic	An order of soils developed mainly under grass or grass-forest vegetative cover in semiarid to subhumid climates. The soils have a stained brownish or blackish solonetzic B (Bn, Bnt) horizon and a saline C horizon. The order includes the Solonetz, Solodized Solonetz and Solod great groups.
stand	A community of trees sufficiently uniform in species, age, arrangement or condition so as to be distinguishable as a group in the forest or other growth in the area.
stand tending	Activities such as weeding, pruning, and thinning undertaken to benefit the growth or quality of a forest or stand of trees.
sustained yield	Management of forest land for continuous production with the aim of achieving, at the earliest practical time, a balance between net growth and harvest.
stocking	A measure of the proportion of an area occupied by trees/seedlings, expressed in terms of number of trees per specified area.
subsoil	Although a common term it cannot be defined specifically. It may be the B horizon of a soil with a distinct profile. It can also be defined as the zone below the plowed soil in which roots normally grow. In this publication it refers to the soil material between 20 cm and 100 cm depth.
texture	The relative proportions of sand, silt and clay (the soil separates). It is described in terms such as sand (S), loamy sand (LS), sandy loam (SL), loam (L), silt loam (SiL), clay loam (CL), silty clay loam (SiCL) and clay (C). See Figure 3 at end of this section.
till	Unstratified glacial drift deposited directly by the ice and consisting of clay, sand, gravel, and boulders intermingled in any proportion.
volume	Amount of wood in a tree, stand of trees or other specified area. Usually measured in terms of cubic metres/area.
Von Post humification scale	A manual method for estimating degree of decomposition of peat materials. It is a 10 point scale with assessment based on colour of drained water and structure of hand squeezed material.
water table	The upper surface of groundwater or that level below which the soil is saturated with water.
Wetland:	Land that has the water table at, near or above the land surface or which is saturated for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation and various kinds of biological activity that are adapted to the wet environment (Tarnocai et al., 1988).
Woodlot	A tract of land, on a farm, ranch or other private property, set aside primarily for the growing, management, and harvest of trees for sale as unprocessed logs and potentially a variety of other ancillary products.

APPENDIX 2 STANDARD WOODLOT CONVERSION FACTORS

Solid Measure to Solid Measure
1 m^3 = 35.3 ft^3 or .353 cunits
1 cunit = 1— ft^3 or 2.83 m^3
1 ft^3 = 0.0283 m^3

Stacked Measure to Stacked Measure
1 m^3 (stacked) = 0.275 cord
1 cord = 128 ft^3 (stacked) = 3.62 m^3 (stacked)

Stacked Measure to Solid Measure
Conifer: 1 m^3 (stacked) = 0.664 m^3 (solid) 1 cord = 85 ft^3 = 2.4 m^3 (solid)
Deciduous: 1 m^3 (stacked) = 0.557 m^3 (solid) 1 cord = 71 ft^3 = 2.0 m^3 (solid)

Roundwood to Weight
1 m^3 (spruce, pine, fir) roughly equals 0.825 tonne [may vary by ecoregion]
1 m^3 (aspen, balsam poplar) roughly equals 0.975 tonne [may vary by ecoregion]

APPENDIX 3 GENERAL FIELD APPLICATION OF ASSESSMENT PROCEDURES

In order to ensure that the productivity ratings and assessment procedures are appropriate and meet expectations, it is felt that a brief description of field protocols might be useful.

To perform an assessment it is assumed that a woodlot management plan is in place, and that the plans have been reviewed to ensure that they are complete and that logical and practical "management units" (partitions) have been identified. The identification of these units is key to a good assessment.

1) Management Unit Definition
   A management unit can be described as a practical sized land unit (> 5 ha) that requires a single management strategy. The land units would be characterized by a relatively uniform site of environmental conditions (vegetation, soil topography) or by a repeating landscape pattern that only requires a single type of management. For example, a floodplain would be separated from an adjacent upland, or a relatively flat fine textured lacustrine area from a hilly morainal upland, or a recent burn from an older mature forest.
   Recognized features displayed on a map include:
   Vegetation: general tree species, stand density and height
   Topography: general slope steepness, shape, and patterns
   Soils: material (texture) and drainage

2) Management Unit Descriptions
   Each unit is characterized by selecting a site (or sites) that is representative of the unit. The site could be characterized as a relatively uniform landscape unit or it could include several sites to represent the range of characteristics in the case of a non-uniform unit.
   Descriptions of vegetation, landforms and soils include:
   Vegetation: tree species, understory type, merchantable volumes
   Landform: typical slope steepness and length, stoniness, likelihood of flooding, dissection or other non-uniformity features.
   Soils: texture, drainage, organic profile (including duff), depth to root restrictions, pH general classification.

3) Application Issues
   One of the most common questions is whether to use a single site or several sites to characterize the unit and whether to average the results or treat as proportions. The general approach should be to evaluate the amount of contrast in each of the vegetation landform and soil components. If there is little contrast in all three components then a single site is appropriate. If there are significant differences in any or all the components then more than one site should be evaluated for productivity assessment.

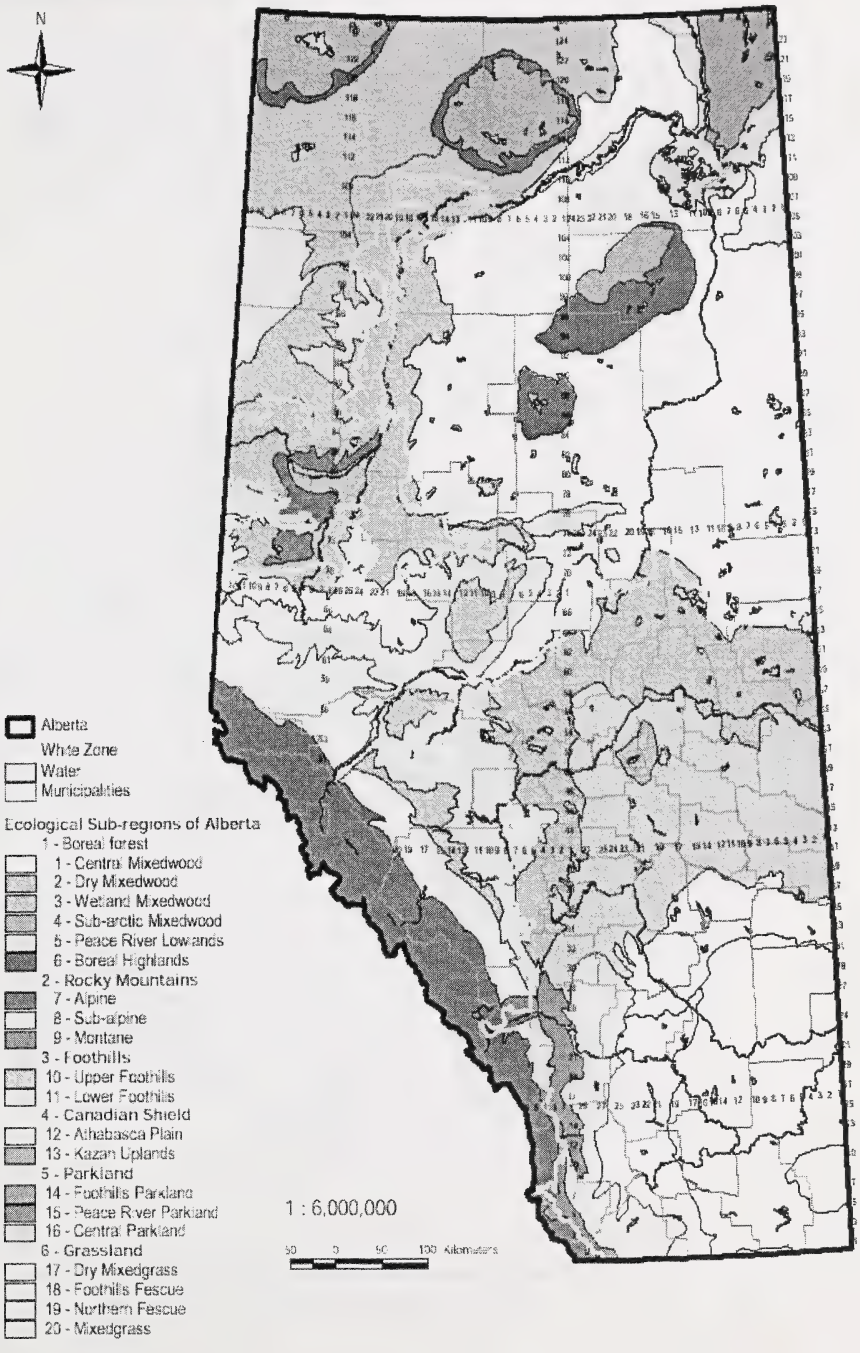
   For example, a hummocky or rolling landform will typically have different drainage classes. It might be
   a) 40% moderately well drained (crests, upper slopes)
   b) 40% imperfectly to poorly drained (lower slopes)
   c) 20% poorly drained (shallow organic soils)

   These should be evaluated separately. The results might be
   a) MAI of 2 m^3/ha/y (white spruce, aspen)
   b) MAI of 2.5 m^3/ha/y (white spruce, aspen)
   c) MAI of 0.9 m^3/ha/y (black spruce, tamarack)

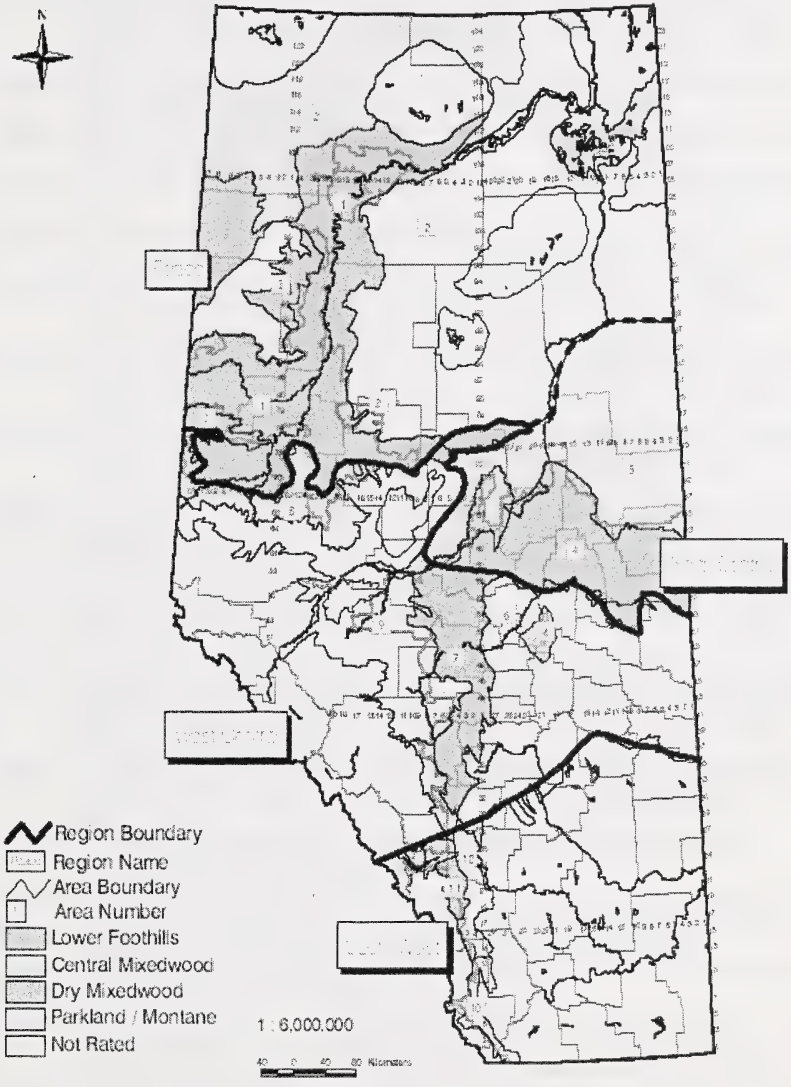
   It would be appropriate to average a) and b) but not c). With different species as well as probable harvesting strategies. The final assessment would be 80% @ 2.25 and

20% @ 0.9. This proportion would be carried forward into the assessment when values would be put on the proportion (acres) of each and then summed for a single total value. The wetland portion might be designated as "no economic value" or "non-productive" and valued on that basis.

Map 1 **Natural Regions and Subregions of Alberta**



Map 2 **Woodlot Production Regions and Areas of Alberta (with Natural Region and Subregion Boundaries)**



Map 2. Woodlot Production Regions and Areas of Alberta
(with Natural Regions and Subregions boundaries)

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