BAP REPORT #3:
HABITAT CLASSIFICATION

**Prepared for Millar Western Forest Products'
Biodiversity Assessment Project**

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3.1   INTRODUCTION

Through the implementation of forest management activities, we have the potential to significantly impact forest biodiversity. Timber harvesting changes the structure of habitats as well as their representation and spatial distribution throughout the landbase (Hunter 1990; Thompson III 1993). It is, therefore, important to define habitat units that can be used to track changes in environmental conditions at a landscape scale with disturbance (*i.e.*, anthropogenic or natural).

In BAP, habitat types are the geographic units used for the ecosystem diversity and landscape configuration analyses described in BAP Report #1: The Biodiversity Assessment Project (Duinker *et al.* 2000). Since these analyses involve complex spatial considerations, the accurate classification of meaningful habitat units was a critical step (MacGarigal and Whitcomb 1995) in preparing BAP. Moreover, since one of the categories for selection of indicator species for use in HSM development was habitat specificity (often presented as a habitat/wildlife matrix (D'Eon and Watt 1994)), habitat classification also had an impact on species selection for the habitat modelling process. For species-specific wildlife habitat analyses, it was the goal of the BAP team to select indicator species that would cover all of the different habitat types encountered within Millar Western's FMA area (Doyon and Duinker 2000).

3.2   HABITAT CLASSIFICATION

Classification of the map units is a critical step in many biodiversity analyses, particularly when spatial considerations are taken into account. Because different analyses might require a different level of distinction among the units, a hierarchical classification procedure was utilised. Figures 3.1a, 3.1b, and 3.1c show a generalisation of this system. Habitats were first separated into terrestrial and aquatic habitats.

Aquatic Habitats

Aquatic habitats were separated into two categories: stagnant water bodies and running water. The stagnant water bodies category includes two subcategories: marshes and lakes. These were distinguished by the presence of aquatic vegetation. In the AVI, marshes are also considered "flooded lands". Rivers are larger than streams and are, therefore, shown as double line features in the spatial database, while streams are shown as single lines (Figure 3.1a).

Terrestrial Habitats

Terrestrial habitat types were first separated based on their ability to produce a commercially viable source of timber. As such, the landscape was divided into forested and non-forested habitat types.
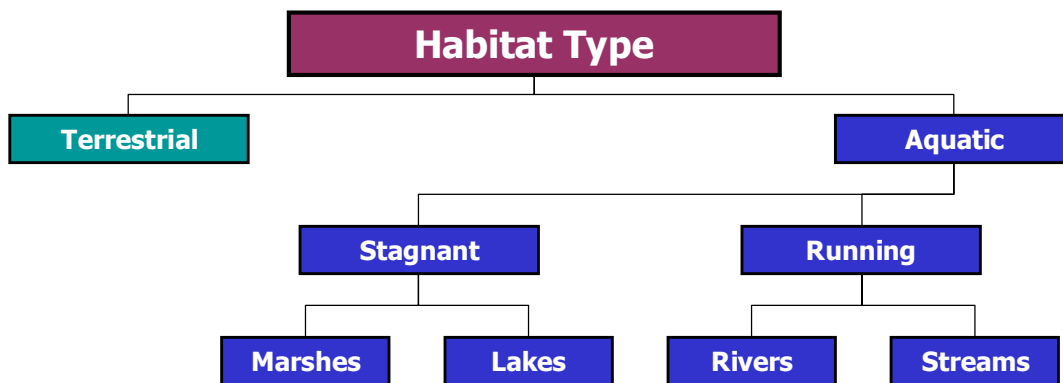

Figure 3.1a.   Aquatic habitat classification.

Forested Habitat Types

Forested habitat types were further divided based on the developmental stage and tree species composition of the stand. Four broad developmental classes have been identified: opening, developing, forested, and old. Clearcuts and burned areas were both classified as openings. The broad developmental classes of developing and forested were further subdivided into several fine developmental stages. In all, there are six fine developmental classes.

Forested habitat types identified as developing include both regenerating and young stands. Regenerating stands consist of small trees that are struggling to gain ascendancy over herbaceous growth. This category is comprised of trees with height less than 2 m. Although trees within young stands have reached the 'free-to-grow' stage of development, they have not yet reached a merchantable size. There are two levels within the forested developmental stage. The immature stage corresponds to pole-sized stands, while the mature stage contains trees of sawlog size. The last developmental stage is old.

The second dimension of forested habitat classification is based on tree species composition of forest stands. The first level of classification distinguishes hardwoods (*i.e.*, non-coniferous), mixedwoods, and coniferous stands. A stand was classified as coniferous if it was composed of at least 70% coniferous species, hardwood if it contained at least 70% non-coniferous species, and mixedwood otherwise.

These broad composition habitat types were further subdivided based on the most prominent tree species. Hardwood habitats were classified as either aspen, poplar, or white birch stands and coniferous stands were separated into white spruce, black spruce, lodgepole pine, and larch. Rare stands that cover less than 1% of the FMA area were not classified separately; balsam fir stands with white spruce and white birch-dominated mixedwoods were grouped with aspen-dominated mixedwoods.

The forested habitat type classification tree shown in Figure 3.1b cannot illustrate the complex relationship between developmental stage and tree species composition. This is summarised in Table 3.1.
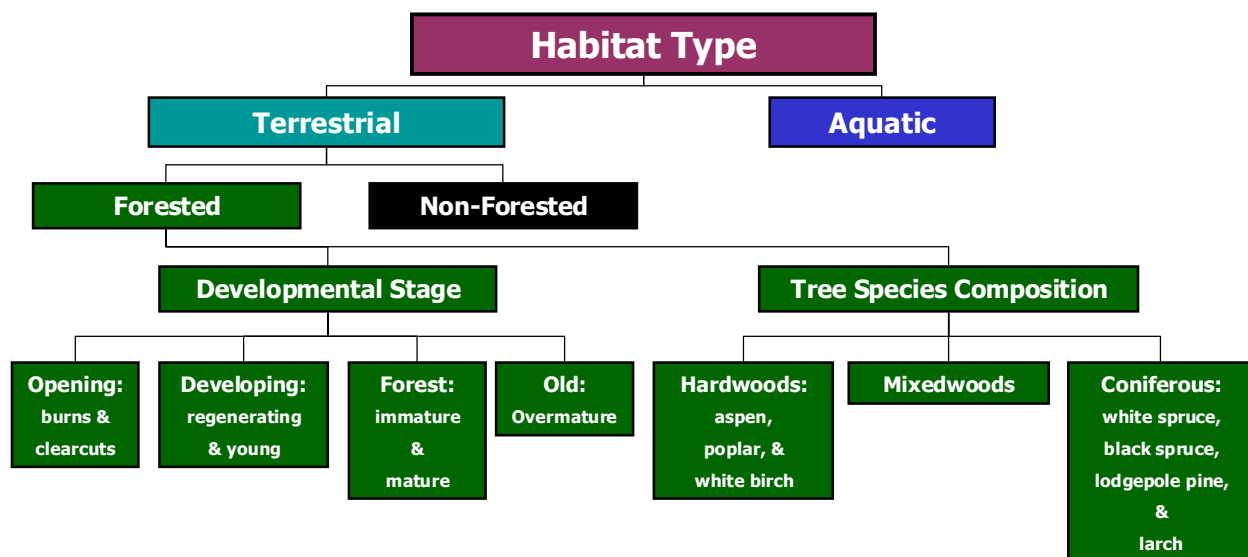

Figure 3.1b.   Forested habitat classification.

Table 3.1. Forested habitat types classified under BAP by tree species composition and developmental stage according to age in years.

Broad	Specific	Opening / Burns and Clearcuts	Developing / Regenerating	Developing / Young	Forest / Immature	Forest / Mature	Old / Overmature
Hardwoods	Aspen	0-2	3-10	11-20	21-50	51-100	101+
	Poplar	0-2	3-10	11-20	21-50	51-110	111+
	White birch	0-5	5-10	11-25	26-60	61-90	91+
Hardwood Mixed	Aspen-Pine	0-4	5-10	11-20	21-50	51-115	116+
	Aspen-White spruce	0-5	6-13	14-25	26-65	66-120	121+
	Aspen-Black spruce	0-5	6-13	14-25	26-70	71-130	131+
	Poplar-Pine	0-4	5-10	11-20	21-55	56-120	121+
	Poplar-White spruce	0-5	6-13	14-25	26-65	66-125	126+
	Poplar-Black spruce	0-5	6-13	14-25	26-70	71-135	136+
Softwood Mixed	Pine-Poplar	0-6	7-10	11-20	21-55	56-110	111+
	Pine-Aspen	0-6	7-10	11-20	21-60	61-115	116+
	White spruce-Poplar	0-7	8-13	14-25	26-75	76-130	131+
	White spruce-Aspen	0-7	8-13	14-30	31-71	71-125	126+
	Black spruce-Poplar	0-7	8-13	14-25	26-75	76-140	141+
	Black spruce-Aspen	0-7	8-13	14-30	31-70	71-140	141+
Conifers	Pine	0-5	6-10	11-20	21-60	61-120	121+
	White spruce	0-8	9-15	16-30	31-80	81-150	151+
	Black spruce	0-8	9-15	16-30	31-90	91-160	161+
	Larch	0-4	5-10	11-25	26-50	51-150	151+

Non-forested Habitat Types

There are a variety of terrestrial habitat types that do not support commercial tree crops. These include quasi-permanent clearings such as anthropogenic clearings, barrens and land with scattered trees, and meadows, and woody habitat types, such as shrub thickets and treed muskegs (Figure 3.1c).
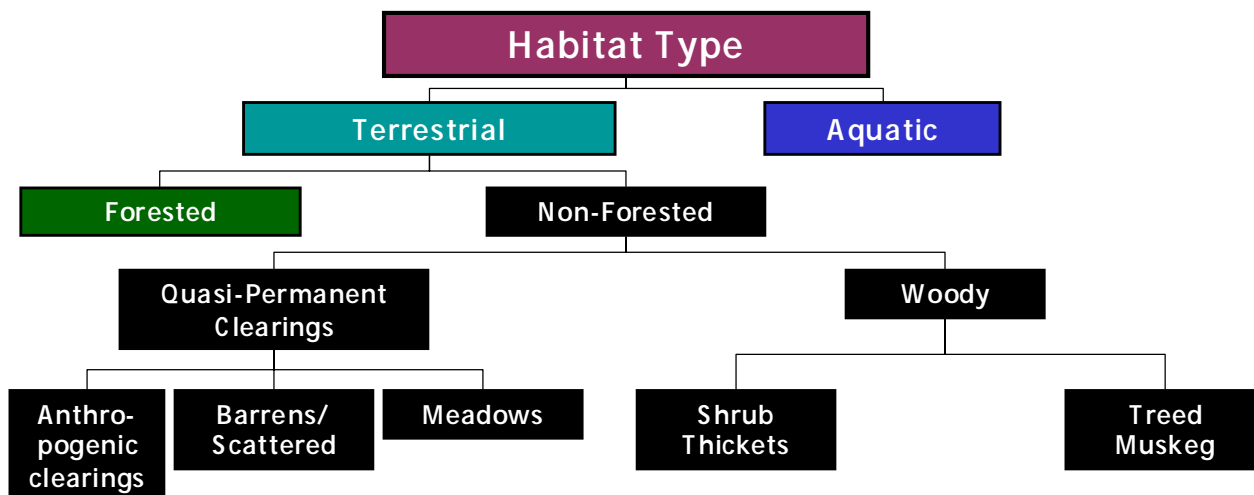

Figure 3.1c. Non-forested habitat classification.

3.3   RESULTS AND DISCUSSION

Softwood forests (Table 3.2, Figure 3.2) dominate Millar Western's FMA area. Hardwoods are common, however, in W13-Whitecourt Mountain and along the Athabasca River in W13-Athabasca River (Figure 3.2). Indeed, valley bottoms are often associated with the presence of poplar. Mixedwood habitats, both hardwood- and softwood-dominated, are only sparsely distributed throughout the landscape (Table 3.2, Figure 3.2). Habitat comprised of overmature forest stands are present on only 12% of the FMA area (Table 3.3), concentrated predominantly in the upper portion of W13-Athabasca River (Figure 3.3). Openings are concentrated in the southeast portion of W13-Athabasca River and in the middle of W13-Headless Valley. These openings were created under the traditional two-pass silviculture system that produces a characteristic checkerboard pattern (Figure 3.3).

Table 3.2.   Current distribution of broad composition classes within Millar Western's FMA area.

Broad Composition Class	Area (ha)	Percentage of Area
Pure Hardwood	77277	31%
Hardwood-dominated Mixedwood	11358	5%
Softwood-dominated Mixedwood	23946	10%
Pure Softwood	136589	55%

Table 3.3.   Current distribution of broad developmental classes within Millar Western's FMA area.

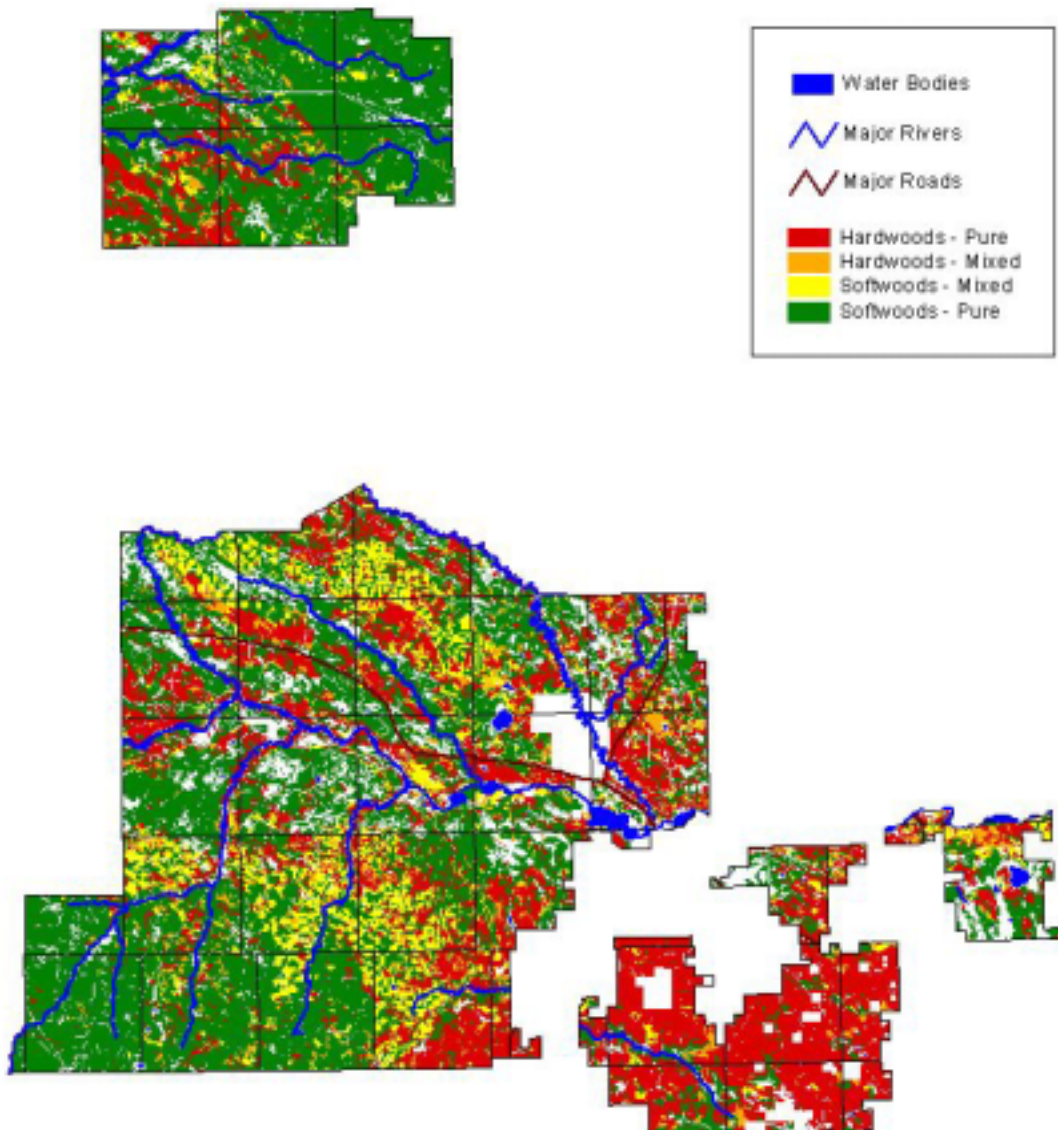| Developmental Stage	Area (ha)	Percentage of Area
Opening	28964	12%
Developing	17080	7%
Forest	173480	70%
Old	29645	12%

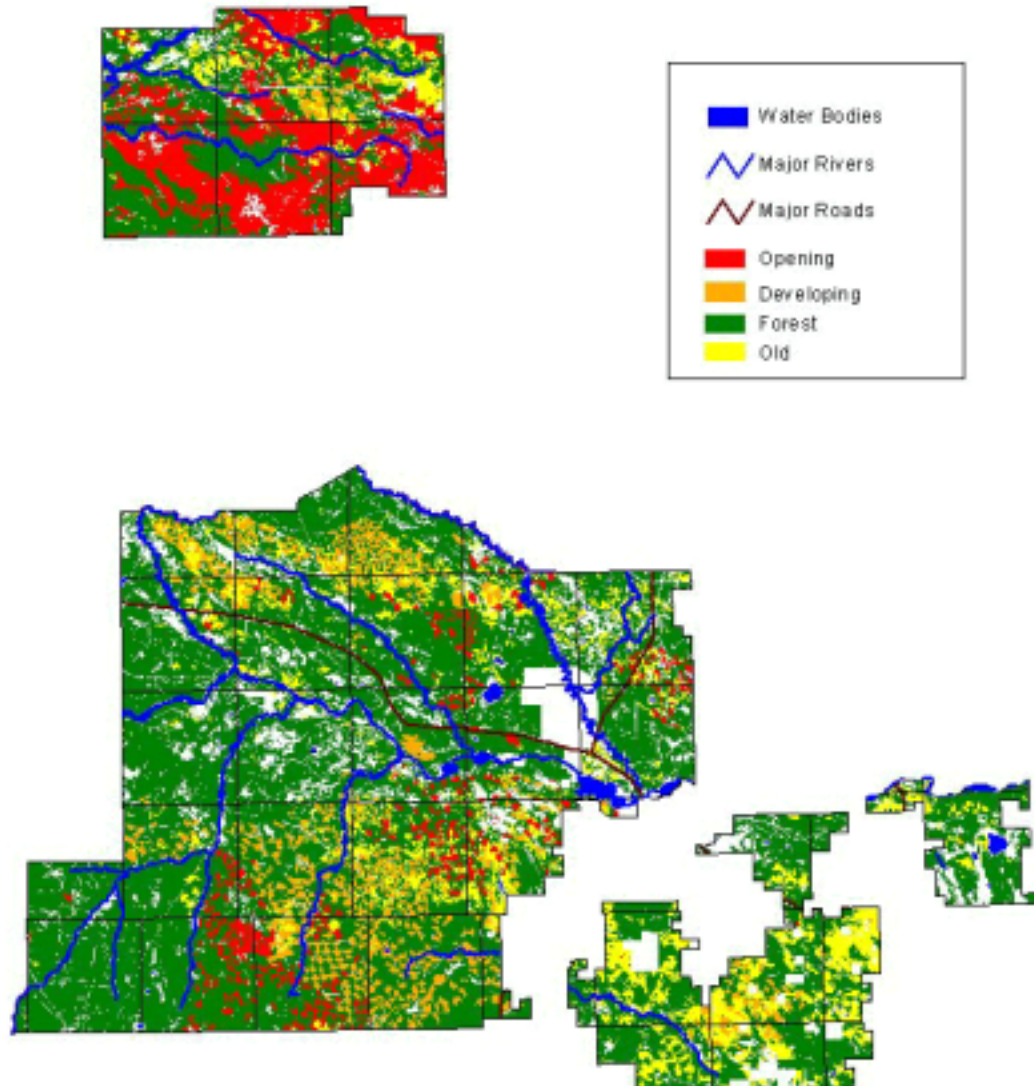**Figure 3.2.** **Current distribution of broad composition classes within Millar Western's FMA area.**

Figure 3.3. **Current distribution of broad developmental classes within Millar Western's FMA area.**

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