Assessment of Biotic Resource Information:

An Evaluation of Historical Biotic Resources for the

Oxford County Terrestrial Ecosystems Study

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Appendices

1.0 Introduction

Comprehensive forest inventories were undertaken and compiled in Conservation Reports in the 1950s by Conservation Authorities under the direction of the Department of Planning and Development. The forestry information contained in these reports was digitized into the UTRCA's Geographic Information Systems (GIS) and used to assess Oxford County's historical forest resource. This provided context for the contemporary data collected in 71 vegetation patches located in the eight trial landscapes (sample areas). The details of the field methodology and results are provided in Bowles, 1997. A comparison between this historical data and current information reveals the changes which have occurred over time. These results are discussed in King, 1997. As well, both the base forestry information and the interpretive GIS layer (Map 1) provides a valuable historical information base for the County. The following provides details on the methods used to develop the interpretive historical forestry layer (Map 1).

2.0 Methodology

The purpose of the exercise was to categorize the biotic information in order to identify general trends and patterns in terms of ecosystem composition, structure and function across the landscape. Two historical forest inventories were located for Oxford County: Conservation Reports produced by Conservation Authorities during the 1950s, and Forest Resource Inventories (FRI) produced by the Ministry of Natural Resources in 1978.

A comparison of the two methodologies, Conservation Reports and FRI, indicated that the Conservation Report forest cover information was preferable for this purpose. An investigation of the FRI methodology showed that the majority of forest patches were not ground-truthed within Oxford County, as they commonly were in northern areas. This resulted in the use of aerial photography interpretation. Study of the FRI maps identified a lack of quality and accuracy in the dominant cover identified. A review of the methodology used for Conservation Reports, however, concluded that all forest patches greater than 0.5 hectares were ground-truthed by forestry crews. Recent comparison, by the Upper Thames River Conservation Authority and Grand River Conservation Authority, of the Conservation Report forest cover information to recent forest cover inventories yielded an accurate correlation. Therefore, staff determined that the Conservation Reports were the most accurate source for dominant forest cover for all of Oxford County. Conservation Reports were obtained for the Thames River, Nith River, Central - Whiteman's Creek, Big Creek and Otter Creek watersheds. The mapping information from the Catfish Creek Conservation Report was not located, resulting in the use of FRI mapping information within this area.

Specific indices were selected in order to produce a summary of more detailed information in categories or ecological units. Patches were generally categorized as upland, wetland or riparian according to the available dominant tree species information. Upland habitats were defined as vegetation patches which occur on mesic soils. Wetland types included vegetation patches on wet or hydric soils. Riparian habitats were those associated with a stream order of 2, 3 or 4.

Species information was further interpreted to determine each patch's soil moisture affinity and level of succession. Soil moisture affinity categories included Mesic and Wet Mesic. Stages of succession categories included Young, Subclimax, Climax, and Subclimax-Climax. The stage of succession was not determined by the age of the woodlot or trees but, rather, by whether the dominant species was considered a climax, subclimax or young species according to its ability to tolerate shade. For example, if the dominant cover of a forest patch was a shade tolerant species, the patch was identified as a climax forest.

The various combinations identified for these two classifications were coded (Figure 1). The results of the classification process included the following combinations: Mesic Young (MY), Mesic Subclimax (MS), Mesic Climax (MC), Wet Mesic Young (WY) and Wet Mesic Subclimax-Climax (WSc). An additional classification, Transitional (T), was used to describe Hickory-Ash associations due to the range of interpretations of age and soil moisture affinity which were possible for this type. Plantations were identified by a separate symbol (P). The results of this review are shown on Map 1 and Table 1.

3.0 Terrestrial Ecosystem Characteristics Within the Eight Abiotic Groups

A review of the forestry information reveals a number of historical trends in Oxford County. According to the interpretation exercise, the most abundant forest communities present across the County, fifty years ago, appear to be drier Beech/Sugar Maple forests in the later stages of forest succession, and wetter Silver Maple/ Elm forests in sub-climax to climax successional stages. In addition a high percentage of young forests existed at that time, as seen in the percentages of wet or dry shrubs shown in Table 1.

From a historical agricultural perspective, the presence, shape and spatial distribution of the remaining patches of dominant forest types may have been influenced by economic considerations. For example, mesic climax forest stands hold value in terms of firewood and maple sugar production, which may have been an important factor in preserving these remnants. Areas with very wet soils, such as wetland areas, most prominent in abiotic group 1, were left in tact, in many cases, due to the high cost and effort required to drain them for agricultural uses.

Site characteristics also influence the shape of remaining woodlots and wetlands and their spatial distribution across the landscape. Patterns can be observed in all eight abiotic groups. Abiotic group 1 was dominated by wetlands and irregularly shaped vegetation patches and higher overall cover. Different spatial patterns were also present in abiotic group 3 due to its riparian landscape characteristics. The other six abiotic groups showed similarities in terms of the geometrically shaped patches and "back 40" spatial patterns. Vegetation patches were and continue to be, in many cases, aligned with roads and located along lot boundaries at the rear of farms. This pattern is most notable in abiotic groups 2a, 2b, 2c, 4 and 5 where prime agricultural soils exist (Table 1).

Across the County, the vegetation located along watercourses during the 1950s and 60s was predominantly early successional. This may be because historically, riparian corridors or flood plain were used for pasturing livestock if they were unsuitable for cash crops. With the farm industry changing and feedlots becoming more common, more lands are being left idle to naturally regenerate.

The uniqueness of each of the eight abiotic groups in terms of their biotic characteristics becomes apparent using historical information, adding verification to the OCTES sampling methods (see Nethercott, 1997). Abiotic group 1 is the most visually distinct area in the County. Wetland vegetation is most abundant compared to any other cover type in that group. In addition, the percentage of total vegetation cover is more than fifty percent higher in abiotic group 1 than all other groups. From a precursory examination, the differences among the other seven abiotic groups are more subtle. All seven groups are fairly equally dominated by both wet and dry sub-climax to climax successional forest communities. Abiotic groups 3 and 6 stand out in terms of vegetation diversity. The lowest total vegetation cover is found in group 2c which is comprised of well drained soils, most suitable for agriculture. Relatively speaking, groups 2a and 2b are very similar. Group 5 appears to have the least amount of regeneration occurring.

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Figure 1: Biotic Code System.

Landscape

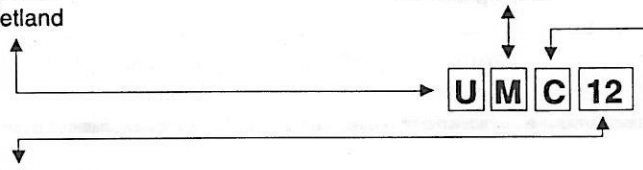
U = Upland
R = Riparian
W = Wetland

Soil Affinity

M = Mesic
W = Wet/Mesic

Age

Y = Young
S = Subclimax
Sc = Subclimax - Climax
C = Climax
T = Transitional



Forest Cover Types

MY

DS = Dry Shrubs

MC

11 = Hemlock
12 = Sugar Maple, Beech, Yellow Birch
13 = Sugar Maple, Basswood
14 = Sugar Maple
57 = Beech, Sugar Maple
58 = Beech

T

59 = Ash, Hickory

'P = Plantation

MSc

4b = Cottonwood
5 = Pin Cherry
8 = White Pine, Red Oak, White Ash
9 = White Pine
10 = White Pine, Hemlock
14a = Black Cherry
47 = Black Locust
49 = White, Red & Black Oak
49a = White Oak, Black Oak, Hickory
50 = White Oak
51 = Red Oak, Basswood, White Ash
52 = Red Oak

WY

4 = Aspen
4a = Poplar
WS = Wet Shrubs

WSc

6 = Paper Birch
15 = Yellow Birch
24 = White Cedar
25 = Tamarack
26 = Black Ash, White Elm, Red Maple
45 = Burr Oak
60 = Silver Maple
60a = White Elm
88 = Willow

Table 1: Historical Forest Composition and Structure: 1951 to 1957 and 1978

Abiotic Group	Dominant Species Associations (%)							Dominant Site Type	Dominant Forest Cover Types	Patch Shape*	Community Diversity within Patches**	Total Vegetation Cover (%)
	AS	SM	WC	AEO	BSM	SME	WDS					
1	12	4	9	12	8	27	18	Riparian Wetland	**WSc**, WY, MC	Irregular	high	22
2a	4	7	3	0	15	16	35	Upland	**MC/WSc** MY, WY, T	Geometric	low	11
2b	2	6	5	1	23	18	24	Upland	**MC/WSc** MY, WY	Geometric	low	17
2c	2	15	7	2	13	7	28	Upland	**MC** Wetland	Geometric	very low	4
3	5	2	7	1	14	16	11	**Riparian** Upland	**MC/WSc,** WSc, MS, MY, WY	Irregular	high	9
4	4	7	2	3	18	18	22	**Riparian** Upland	mixed+	Geometric	medium	14
5	5	8	3	4	24	23	8	Riparian Upland	mixed+	Geometric	medium	10
6	5	7	11	3	13	16	25	**Wetland** Upland	**WSc**, MC	Irregular, geometric	high	11

N.B. Species association data does not include the Catfish Creek watershed area and only includes dominant species associations. Caution should be applied in using cover statistics due to the limitations of the survey criteria.

AS=Aspen, SM=Sugar Maple, WC=White Cedar, AEO=Black Ash-White Elm-Red Oak, BSM=Beech/Sugar Maple, SME=Silver Maple/ White Elm, WDS=Wet or Dry Shrubs

WY=Wet Mesic Young, WSc=Wet Mesic Subclimax-Climax, MY=Mesic Young, MS=Mesic Subclimax, MC=Mesic Climax, T=Transitional +mixed: no obvious dominants

MC: bold is dominant

* general pattern observed to be dominant, geometric refers to squared lines, straight edges

**refers to the number of community codes within a single patch (low = 1)

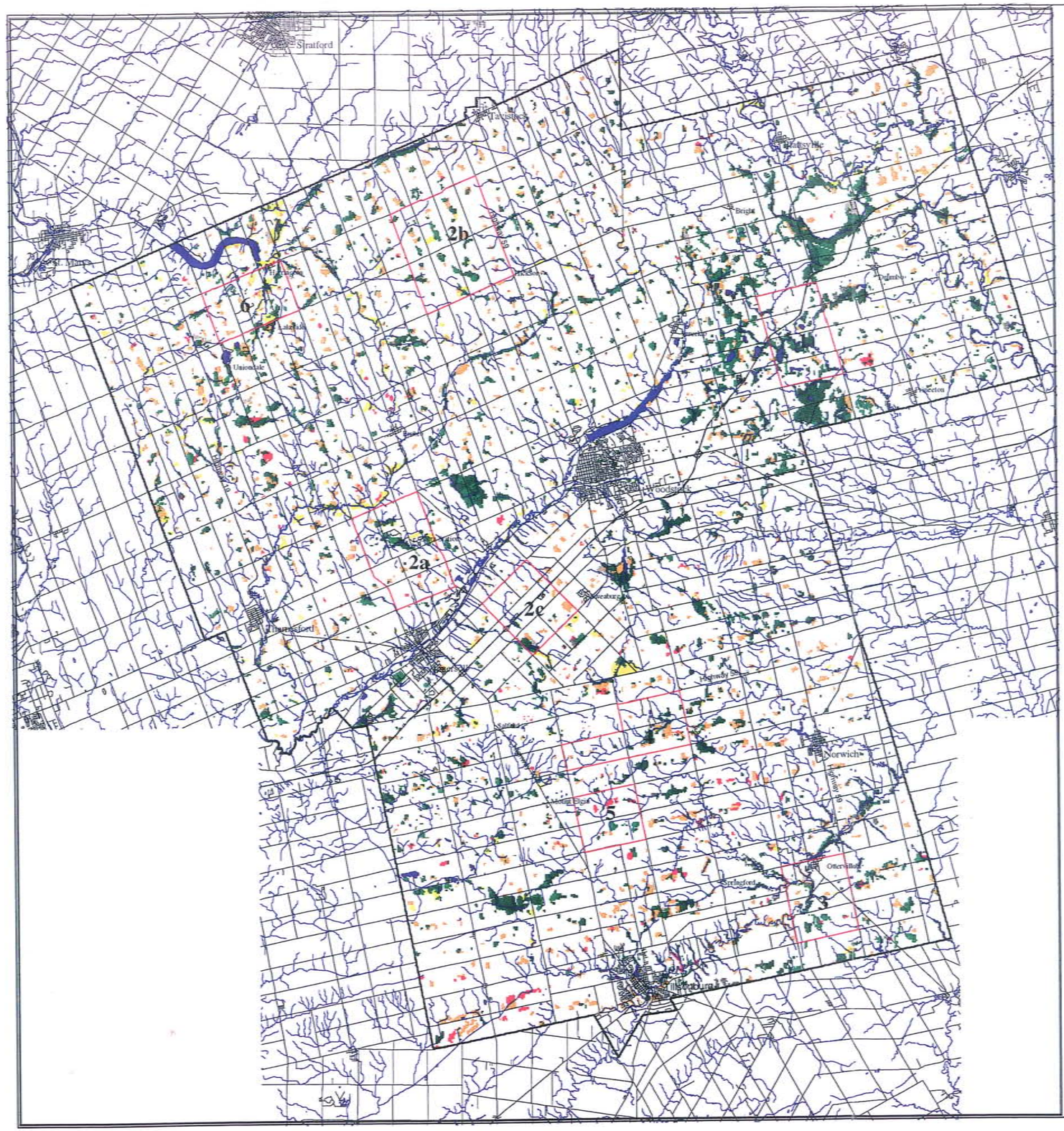
Data generated from UTRCA GIS services

Source: Department of Planning and Development, 1951 to 1957, Ontario Ministry of Natural Resources, 1978

Map 1

OXFORD COUNTY TERRESTRIAL ECOSYSTEMS STUDY

Historical Forest Classification for Soil Moisture and Stage of Succession



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Legend

- Mesic Young
- Mesic Sub-Climax
- Mesic Climax
- Wet\Mesic Young
- Wet\Mesic Sub-Climax to Climax
- Transitional
- Plantation
- Trial Landscape Boundaries
- County Boundary

Base Mapping Ref: Base mapping is based on information taken from the National Topographic System map sheets 40p/1,2,3,6,7,8,40I/14,15 © 1995. Her Majesty the Queen in Right of Canada with permission of Natural Resources Canada.

Forest Classification for Soil Moisture and Stage Succession based on Conservation Authority Reports and Ministry of Natural Resources, Forest Resource Inventories (FRI) maps. Mapping is divided by watershed and inventories were completed in years as follows, Thames River 1952, Grand River 1954, Big Creek 1953, Otter Creek 1957, Nith River 1951, Catfish Creek (FRI) 1978.