

DETERMINING SUB-APPELLATIONS IN ONTARIO'S WINE REGIONS DÉTERMINER LES SUB-APPELLATIONS DANS LES RÉGIONS VITICOLES DE L'ONTARIO

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Abstract:

Vintners Quality Alliance (VQA) Ontario is responsible for administering and enforcing standards in connection with wine quality, Appellation of Origin, grape varieties and production methods. Wines produced in accordance with VQA regulations are currently labelled under three distinct but broad viticultural areas (Niagara Peninsula, Lake Erie North Shore and Pelee Island). The present system of production permits a single grape variety to be grown in several highly dissimilar soils, topographies and mesoclimates, resulting in wines that are highly variable in their character.

The objective of this project is to evaluate specific properties of the soil, geology and climate that are suitable for certain varieties, wine styles and consumer preferences. Furthermore, it aims to identify broad zones or sub-appellations that possess a combination of climatic, soil, geological and topographic elements that would enable the designated grape varieties to achieve optimum ripening potential, produce wine of consistent quality and avoid excessive freeze injury. Accordingly, this project uses several databases relating to the soil, topography, location, geology and climate of Ontario's wine regions along with GIS (Geographic Information System) tools to determine the spatial distribution and homogeneity related to several proposed sub-appellations. A composite index based on several key environmental variables was then constructed; the results were mapped for the region and the boundary of each sub-appellation was carefully defined.

Résumé: Vintners Quality Alliance (VQA) Ontario, (Alliance de qualité Vintners) est responsable de l'administration et de l'imposition des normes en liaison avec la qualité du vin, l'appellation d'origine, les variétés de raisin et les méthodes de production. Des vins produits selon les règlements de VQA sont actuellement étiquetés de trois distinctes mais larges régions d'appellation : Niagara Peninsula (péninsule de Niagara), Lake Erie North Shore (Rivage nord du lac Érié) et Pelee Island (Île Pelée). Le système actuel de production permet à une seule variété de raisin d'être développée dans plusieurs hautement différents sols, topographies et mésoclimats, avec pour résultat des vins de qualité très variée.

L'objectif du présent projet est d'évaluer les propriétés spécifiques du sol, de la géologie et du climat qui conviennent à certaines variétés, styles et préférences des consommateurs de vin. En outre, le projet vise à identifier les grandes zones ou les sub-appellations qui recèlent une combinaison d'éléments climatiques, du terroir, géologiques et topographiques qui permettraient aux variétés de vignes indiquées d'atteindre un potentiel de maturation optimum, de produire un vin de qualité consistante et d'éviter des dommages excessifs causés par le gel. Dans la conduite de cette recherche, le projet a exploité plusieurs bases de données relatives au sol, à la topographie, au lieu, à la géologie et au climat des régions viticoles de l'Ontario et a utilisé des outils du GIS (système d'information géographique) afin de déterminer la distribution spatiale et l'homogénéité de plusieurs sub-

appellations proposées. Un indice composé basé sur plusieurs variables environnementales clés a, donc, été élaboré; les résultats ont été arrêtés pour la région et la frontière de chaque sub-appellation soigneusement définie.

Mots-clés: Ontario, sub-appellations, Alliance de qualité Vintners

Introduction

VQA Ontario has begun a process to establish sub-appellations within the VQA Ontario's existing viticultural areas as defined in its enabling legislation. The purpose of establishing sub-appellations is to fulfill VQA Ontario's role in maintaining the integrity of Ontario's wines of origin through regulations and ensuring that the claims of origin are valid in the interest of both consumers and VQA members. As well, VQA Ontario hopes to further educate the public about the importance of origin and terroir in terms of where the grapes are grown and promote the unique characteristics of Ontario wines.

Lake Erie North Shore, Pelee Island and Niagara Peninsula are well-established Ontario wine regions and are recognised nationally and internationally for their wide variety of quality wines. The production of quality wine is generally restricted to areas with significant topographic features that provide protection from polar winds, facilitate drainage of cold air on frosty nights and maximize solar radiation reaching the vines. Each wine region possesses unique geographic features that set it apart from other wine regions and the surrounding areas in terms of geology, soils, topography and climate. Because each wine region covers a large geographic area, significant spatial variations exist in the soil type, climatic, topographic and geological attributes that bear a strong influence on the choice of grape varieties and the range and quality of the wines produced. Within each wine region, there are spatially distinctive areas or sub-appellations and each possesses a distinguishing array of physical characteristics that make it uniquely different from the others. At this smaller scale, these environmental characteristics and their spatial distribution are generally recognized as influential in the choice of cultivars, differences in grape and wine quality and viticultural practices. According to Vaudour (2002), any approach being aimed at geographical differentiation of quality, and starting with the product, needs a precise description of the area of production.

General Objectives

The following objectives were pursued in identifying and delimiting the boundaries of the proposed sub-appellations and in analyzing their physical characteristics:

1. Compilation of relevant data and the creation of several databases that pertain to the soil, topography, climate and geology of the Niagara Peninsula and Lake Erie North Shore viticulture areas;
2. Analysis of topographic, climatic and soil characteristics of each sub-appellation;
3. Preparation of digital maps of the two viticulture areas];
4. Preparation of digital maps showing spatial distribution of the topographic characteristics, i.e. slope, elevation, aspect, of the two viticulture regions;
5. Preparation of digital maps showing the spatial distribution of the main soil types and drainage characteristics within the two viticulture regions;
6. Demarcation of the boundaries of each sub-appellations based on the spatial distribution of the topographic and soils characteristics; and
7. Description of the physical characteristics of each sub-appellation based on the data compiled

Data and Methodology

Traditionally, wine producing areas in Europe have been delineated strictly on geography, taking into account the geology, soils, topography, mesoclimate, grape varieties, and whether there has been a consistent distinctive character associated with the wines produced over a long period of time. This approach is the basis of the French AOC (Appellation d'Origine Contrôlée) system (White, 2003). In recent years, broad spatial approaches have been used increasingly to divide viticultural regions into

an unlimited number of territorial or production units which can then be analyzed through GIS technologies (Vaudour et al 1998; Watkins, 1997; Badcock, 1998; Smith and Whigham 1999; Boyer and Wolf, 2000; Franz et al (2000). Others such as Sotes et al (1997), Doledéc (1995) and Vaudour (2001) proposed a multivariate approach using climatic, geological, pedological, topographical and phytological factors to derive a set of final spatial/terroir units for the production of quality wine. Bodin and Morlat (2003) developed an operational method of characterizing terroirs based on both a survey of the empirical knowledge of vine growers and a characterization of the natural factors related to the geological, pedological and mesoclimatic components of the landscape.

The results of this study are based on the topographic soils and geologic data that are available in digital form that could be mapped and analyzed using standard GIS (Geographic Information Systems) methods. The geologic data includes bedrock geology as well as the composition and depth the sub-surface materials derived from the Ontario Geological Survey maps at 1:50,000 scale. The soils data includes soil texture, depth, drainage characteristics and the spatial distribution of each attribute derived from maps of the Ontario Ministry of Agriculture and Food and the Ontario Institute of Pedology at 1:100,000 and 1:25,000 scales. The digital elevation data at the 30 m² resolution were derived from Natural Resources Canada. Arc GIS Version 8.2 software was used for data analysis and to delimit the approximate boundaries of each sub-appellation based on the spatial distribution of the topographic and soil attributes. The topographic attributes (slope, aspect and elevation) are also indicative of the topoclimate of each area. Slope angle and aspect were classified and percentage distribution calculated for each area. Gentle slopes range from 0 to 3%; moderate slopes range from 3 to 6% and strong slopes exceed 6%. Surface hydrology and cultural features such as roads, canals and railroads were added to the final maps for referencing the data.

The climatic summaries such as mean, maximum, minimum temperatures and are based on long-term averages exceeding at least twenty years. The statistics were derived from the Canadian Climate Normals for the period 1971-2000. The estimated growing degree days were calculated using the mean daily temperature above a base of 10° C. The frost-free period was calculated as the number of consecutive days when the critical minimum temperature was above -2° C. Estimated values are based both long-term and short-term averages. In the case of the short-term data, the length of record extends for at least nine years.

In determining the boundaries for each sub-appellation, the study used GIS tools to identify broad topographically distinct areas in which the elements of slope, elevation and aspect are more or less homogeneous. Next, the study delineated broad spatial pattern in soil attributes (drainage characteristics, water holding capacities, depth and texture) that are presumed to influence the performance of the vine. Finally, the soil layer was superimposed on the topographic layer and broad spatial patterns were identified between the two sets of attributes. The proposed boundaries around each sub-appellation follow: 1) contour lines that mark a major transition in the topography (slope and elevation) and soil attributes; 2) borders of water bodies such as a creek, lake or canal; 3) major roads and access routes; and 4) approximate mesoclimatic boundaries.

Results and Conclusions

On the basis of the topographic, pedological, geological and climatic data, the project identified ten sub-appellations within the Niagara Peninsula Viticulture Area and three sub-appellations within the Lake Erie North Shore Area shown in Figures 1a, 1b and 2. It is important to note that the proposed sub-appellation boundaries are based on the spatial distribution of the unique physical characteristics within a particular viticultural area. The author has made no attempt to include a subjective evaluation or ranking of any of the sub-appellations. Moreover, the study provided no recommendation with respect to grape varieties, viticultural practices and wine style.

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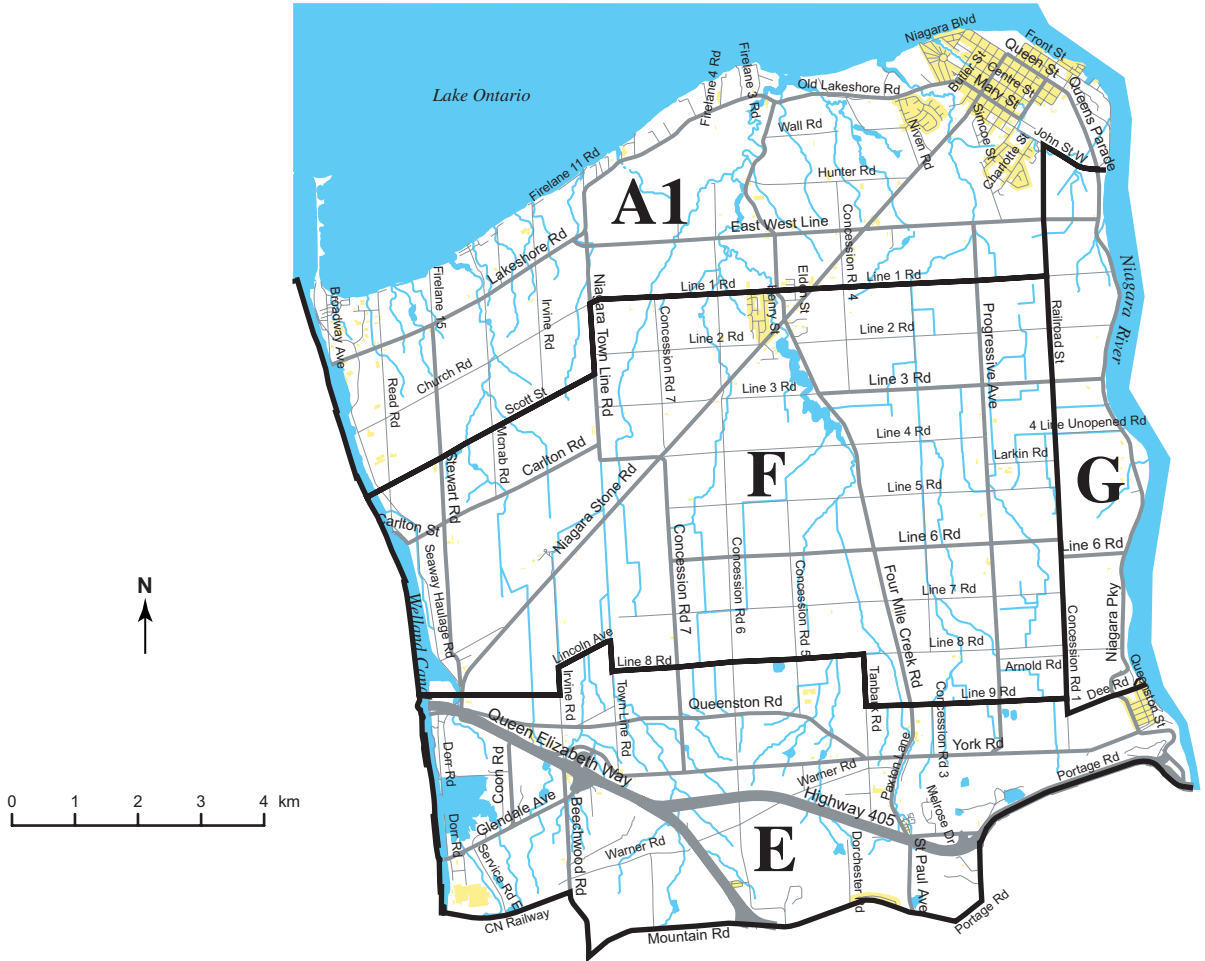


Fig. 1a Proposed sub-appellations for Niagara viticultural region east of St. Catharines

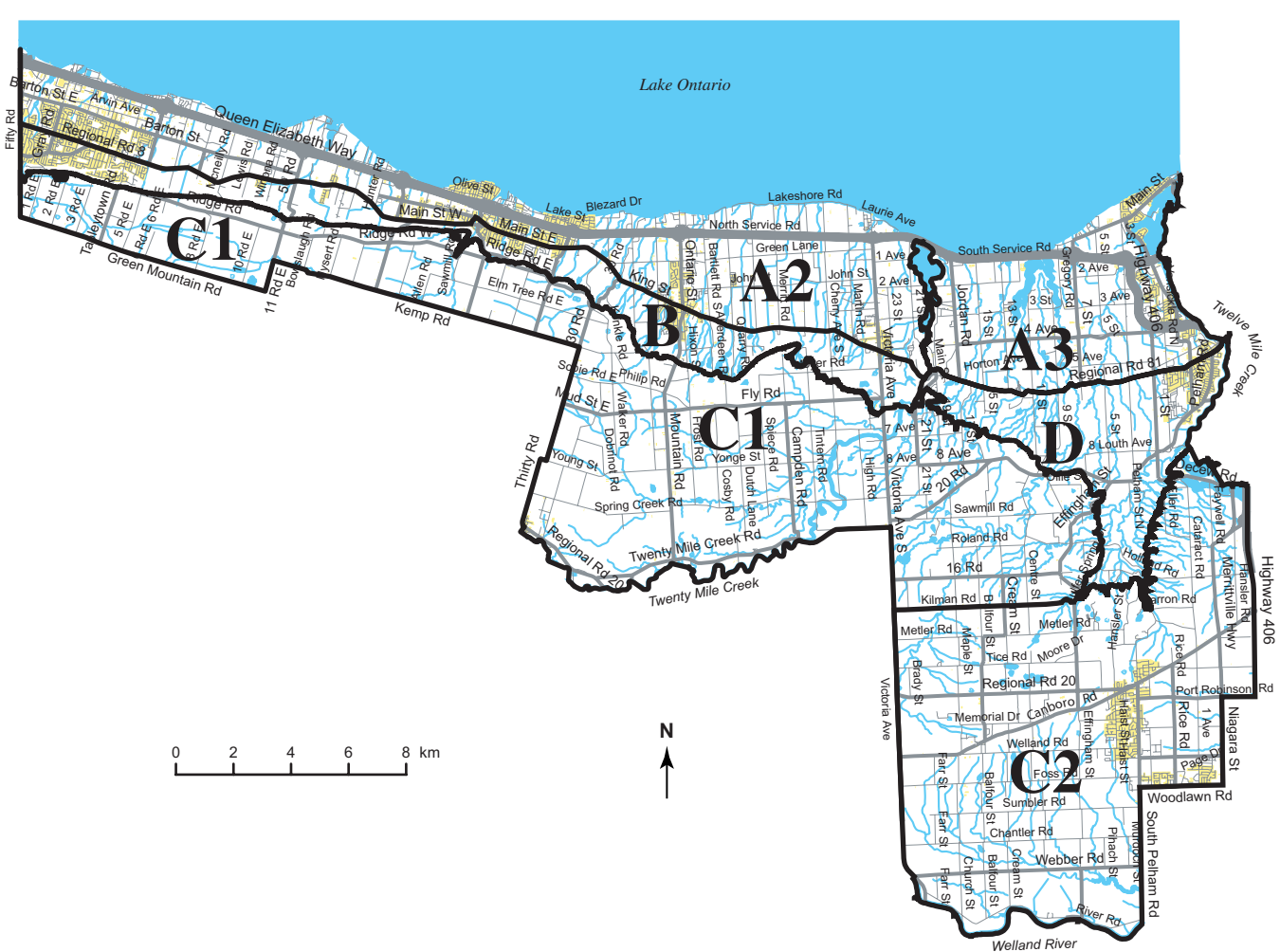


Fig. 1b Proposed sub-appellations for Niagara viticultural region west of St. Catharines



Fig. 2a Proposed sub-appellations for Cedar Springs viticultural area

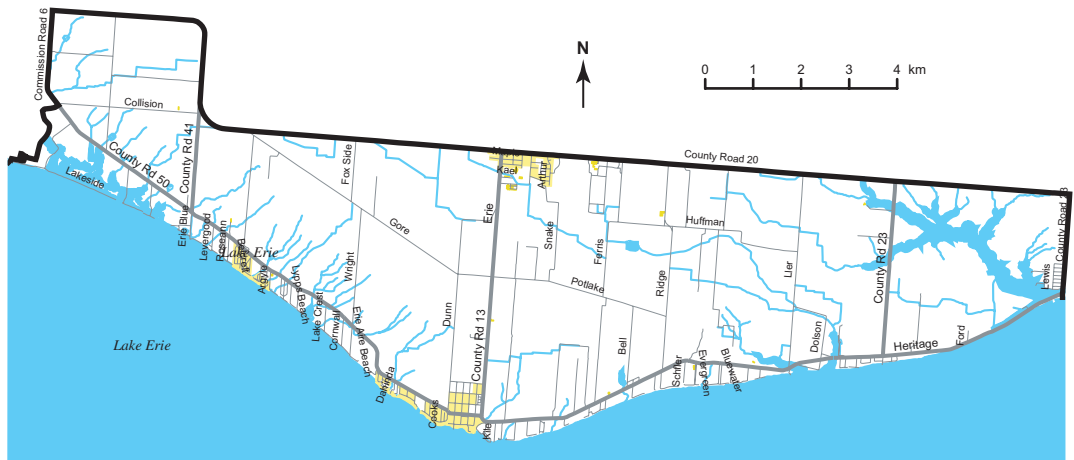


Fig. 2b Proposed sub-appellations for Colchester Ridge viticultural area

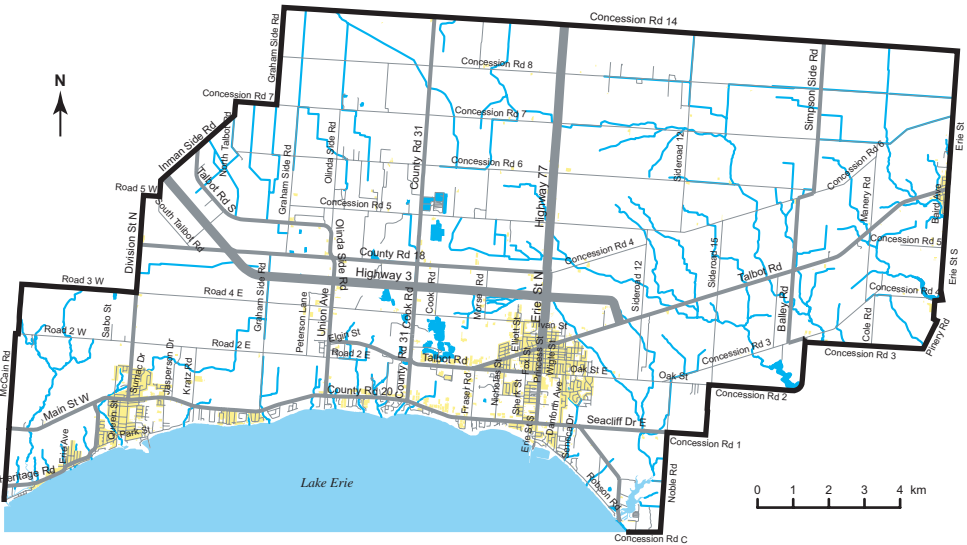


Fig. 2c Proposed sub-appellations for Mersea viticultural area