

## Surficial Geology

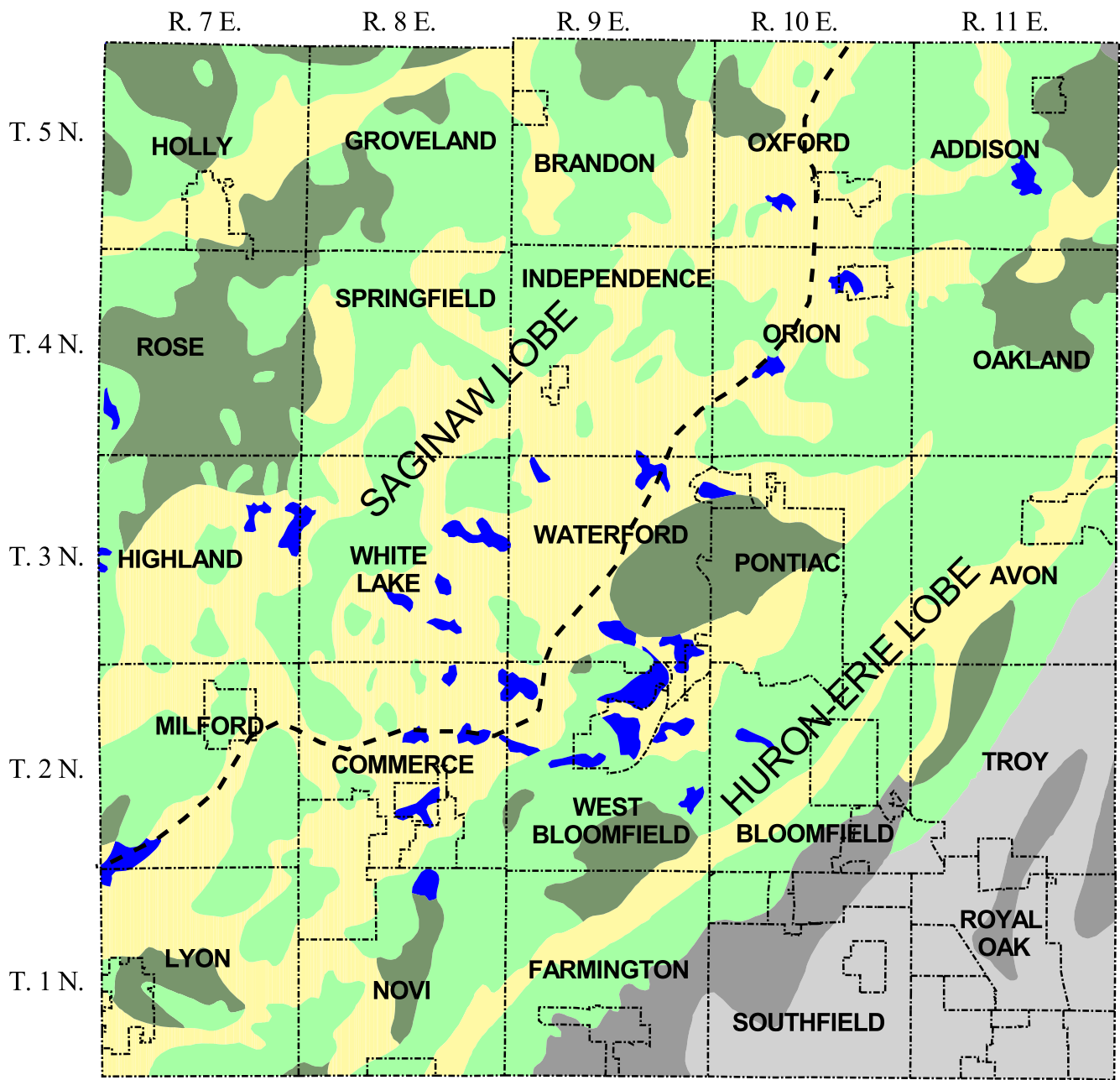
Nearly all of the hills and lakes in Oakland County were formed during the retreat of the last continental glacier, approximately 14,000 years ago (Winters and others, 1985). For the preceding 60,000 years, the area that is now Oakland County was intermittently covered by as much as a mile of ice. During the retreat of the ice, an ice-free area formed between the Saginaw Lobe in the northern part of the county and the Huron-Erie Lobe to the south (fig. 4), the axis of which tracks through Commerce, Waterford, and Oxford (Leverett and Taylor, 1915; Winters and others, 1985). This area formed a conduit for large quantities of water and sediment flowing off the melting glacier, known as outwash. Outwash environments deposit sorted sediments, so that materials of a certain size and composition are layered vertically and are exposed together on the landscape. A broad outwash plain (shown in yellow in figure 4) stretches across central Oakland County from northeast to southwest.

On either edge of the outwash plain region are areas of moraine and other types of till (shown in green hues in figure 4), deposited directly by the ice at the margins of the glacial lobes. The materials in these features are unsorted, and include clays, sands, pebbles, and boulders. These areas usually have much higher clay fractions than the outwash plain region, which results in lower permeability.

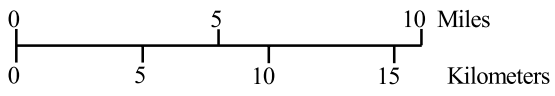
Following the retreat of the ice back to the Great Lakes basins, large lakes formed from meltwater occurred at much higher elevations than the current elevations of the Great Lakes (Eschman and Karrow, 1985). The beds of these lakes collected clays and other sediments in broad blankets. The highest of these lakes in the Huron-Erie basin was Lake Maumee, which maintained an elevation between 775 and 810 ft above sea level (covering much of southeastern Oakland County) for a period of approximately 300 years starting 14,000 years ago (Eschman and Karrow, 1985). The beds of these proglacial lakes are evident in the flat-lying, clay-rich sediments of southeastern Oakland County (shown in gray tones in figure 4). These clay-rich sediments have dramatically lower permeability than the outwash sediments.

The thickness of these glacial materials vary greatly across the county. The thickness of the surficial sediments exceeds 400 feet across the central part of the county, but can be less than 100 feet in the southeast and northwest corners (Twenter and Knutilla, 1972). Throughout most of the county, the surficial deposits are the primary aquifer. Fewer than 3 percent of the wells in the county's WELLKEY database are completed in bedrock.

The underlying bedrock units throughout most of the county are not considered good sources of potable water, and water drawn from these units is frequently high in sulfate, iron, chloride, and dissolved solids. The Marshall Sandstone is a productive bedrock aquifer for the northwestern townships of Holly, Groveland, Brandon, and Rose. Even in this area, the vast majority of wells are completed in the glacial sediments.



Source:  
 Geologic information modified from Ferrand and Bell(1982).  
 Interlobate divide modified from Winters and others (1985).



EXPLANATION

- Glacial till
- End moraines of glacial till
- Glacial outwash sand and gravel
- Lacustrine clay and silt
- Lacustrine sand and gravel
- Lakes
- Municipal boundaries
- Interlobate divide



Figure 4: Surficial geology of Oakland County, Michigan.