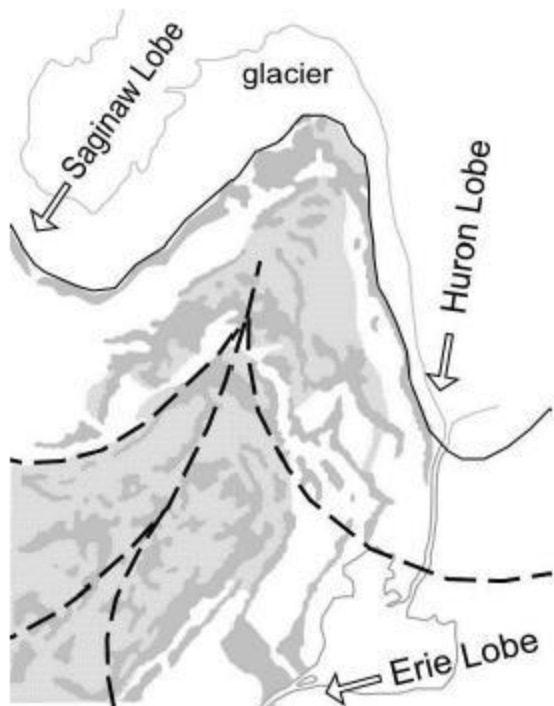


Two Glacial Lobes

The last glacier advanced south across the Thumb as two huge ice lobes. A west lobe moved through Saginaw Bay, and an east lobe through Lake Huron, divided in part by sandstone at the future tip of the Thumb. The Huron lobe joined south of the Thumb with a third lobe moving southwest through Lake Erie. The Saginaw and Huron lobes met in the middle of the Thumb, forming higher, hilly ground between. This "glacial interlobate" area extends from southeastern Tuscola County down through Lapeer and Oakland Counties and into northern Indiana. Except for moraine ridges, river valleys, ravines, and other minor features, the land surrounding the central interlobate region is gently rolling glacial till plain transitioning to flat lakeplain. As the glacial ice melted, over half the Thumb was covered by water, forming the lakeplain. Large parts of Tuscola, Huron, Saint Clair, and Macomb Counties were covered at various stages for roughly 2,000 years.



Glacial Interlobate

Unlike most of the Thumb, the interlobate region is hilly, up to about 100 feet higher than the glacial till plain around it, and about 250 feet higher than the lakeplain. Material was deposited here along two glacial fronts of the Saginaw and Huron lobes. Sediment was also deposited around and over large ice chunks, forming "kettle lakes" as the ice melted. There are few natural lakes in the Thumb outside this area. The interlobate contains large deposits of sand and gravel, typically washed out from moraine ridges.

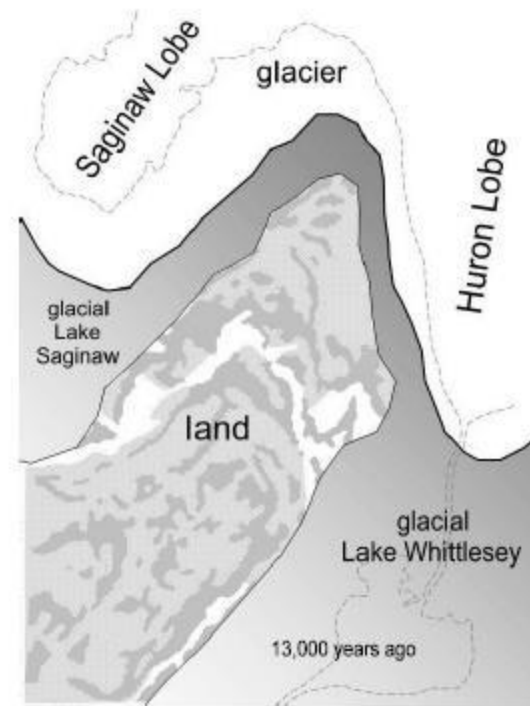
End Moraines

Where the glacier paused, continued transport of sediment to the glacial front formed "end moraine" ridges, typically a few miles wide and many long. The Port Huron Moraine marks the southern limit of the last glacial advance, paralleling the Lake Huron shoreline in Ontario, around the Thumb, and into northern Michigan. The Port Huron Moraine determined the courses of both the Black and Cass Rivers. The first settlements and roads were often on moraines.



Lakeplain

In contrast to the interlobate and central till plain, the lakeplain is a vast flat land covering most of the Thumb, where waters deposited lake sediments over glacial till. The surface ranges from sand to clay, but underlain by a thick layer of lake bottom clay throughout. Lower parts of the Great Lakes Basin were first covered by a series of pro-glacial lakes, formed between the retreating glacial front and moraine ridges. These drained as the melting glacier uncovered new outlets and waters receded to various stages of ice-free post-glacial lakes. Over 13,000 years, the glacial melt water receded to present levels of the Great Lakes leaving the old glacial lakeplains well inland. The majority of remaining wetlands and hydric soils in the Thumb are concentrated on the lakeplain where surface water readily collects on the flat and relatively impermeable land. Lakeplain plant communities in the Thumb include extensive swamp forest, shrub swamp, oak openings or savanna, wet prairie, dune and swale complex, and beaches.



The Great Lakes

The Great Lakes are largely glacial relicts, but unlikely to drain completely despite the earth's crust still rising since being depressed by glacial ice and water still downcutting. The Great Lakes started millions of years ago as rift valleys, becoming large river valleys after multiple glaciations. The last glacial advance, starting about 85,000 years ago, scoured the river basins deeper and wider. As the ice melted back about 14,000 years ago, melt waters formed a series of glacial lakes. Not until about 10,000 years ago did the waters resemble the modern Great Lakes, but lake levels fluctuated widely for about 5,000 years before settling near present levels. The benefits and affects of the Great Lakes are many. Summer cooling near Lake Huron is one factor in the extension of northern flora through the Port Huron area, supporting a unique northern forest complex characteristic of forest north of Saginaw Bay. Unique and rare species of the Great Lakes and shoreline in the Thumb include Lake Sturgeon, Lake Herring, Sauger, Forster's, Common, and Black Terns, and Piping Plover.

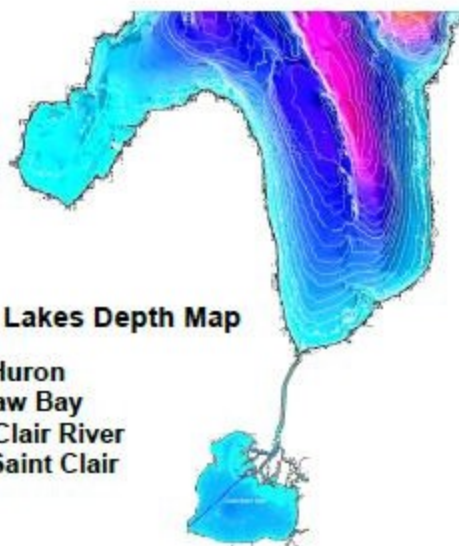
Saint Clair River Delta

The Saint Clair River delta, at the outlet of the river to Lake Saint Clair, is one of the largest freshwater deltas in the world. The oldest part of the delta began forming about 9,000 years ago, ceased while water flowed out the Georgian Bay, and continued about 4,000 years later when the outlet switched back. The delta contains the largest remaining coastal marsh in southern Michigan, providing critical habitat for migratory waterfowl and other wildlife. The delta and adjacent lakeplain contains some of the most imperiled plant communities in the world, including Great Lakes marsh, and fire-dependent lakeplain prairie and lakeplain savanna or oak openings. Rare species include Few-flowered Nut Rush, Wild Rice, Yellow Fringed Orchid, Prairie White-fringed Orchid, Gattinger's Gerardia, Skinner's Gerardia, King Rail, Least Bittern, Forster's Tern, Common Tern, and Eastern Fox Snake.

Thumb Nature Guide

Post-Glacial Landscape

The key to understanding the ecology of the Thumb is realizing that it is a post-glacial landscape located within a transition zone between northern and southern flora. Most of the Thumb is covered by 200 to 300 feet of glacial till; sediment deposited over bedrock by multiple glacial advances, beginning about 2 million years ago, the last about 13,000 years ago. Repeated glacial advances and retreats left four basic landscape zones across the Thumb: 1) Lakeplain - flat lake sediments once covered by pro-glacial lakes along the melting glacial front, and various post-glacial lake stages; 2) End moraines - ridges deposited along stationary glacial fronts; 3) Till plains and outwash plains - Sediment complex deposited by glacial movement and melt waters; and 4) Glacial interlobate - Hilly and higher land deposited lengthwise through the center of the Thumb between two glacial lobes.



Great Lakes Depth Map

Lake Huron
Saginaw Bay
Saint Clair River
Lake Saint Clair



Saint Clair River delta
at Lake Saint Clair



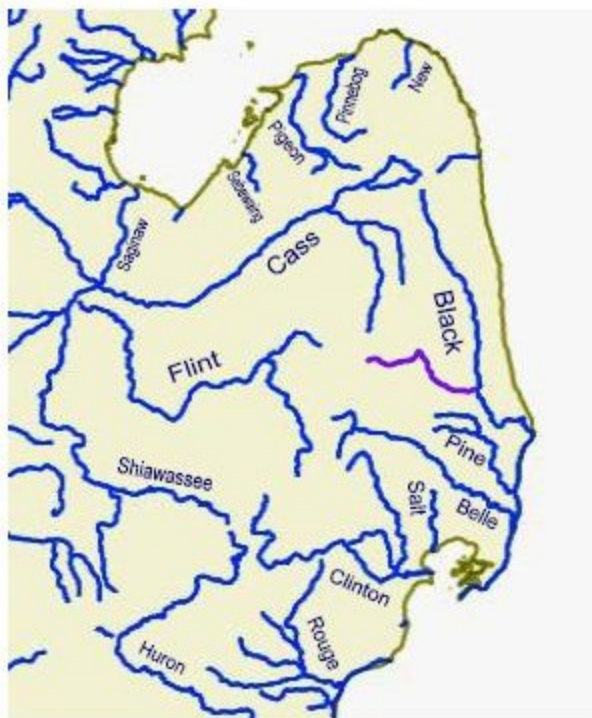
Relief Map
Southeast Michigan



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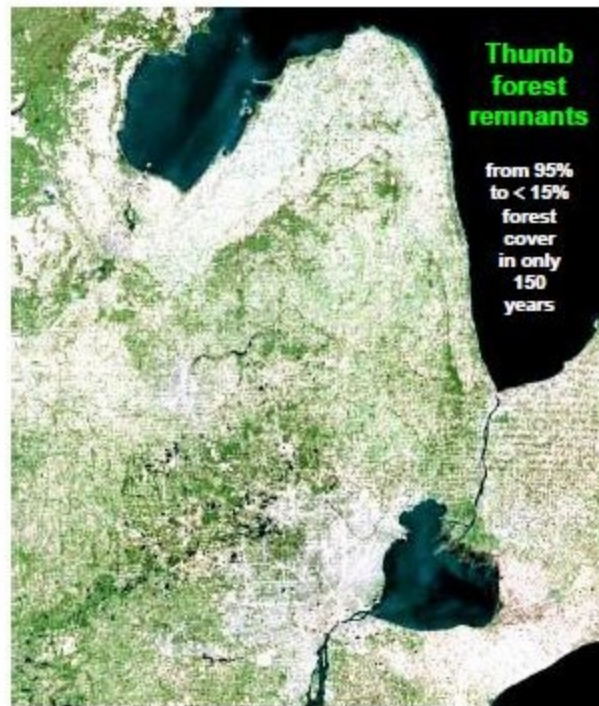
The Rivers

The big rivers of the Thumb are the Black, Cass, Flint, Clinton, Belle, Pine, Salt, New, Pinnebog, Pigeon, and Sebawaing, with many large tributaries. As the last glacier melted, these carried higher volumes of water, carving out broad valleys. In the intensely agricultural and partially urbanized Thumb, rivers are channelized, polluted, highly sedimented, and used as drains. Despite this, some rivers have retained abundant and diverse fish and mussel communities. The Black and Belle Rivers are especially known for rare mussels like the Northern Riffleshell, Rayed Bean, Salamander Mussel, Round Hickorynut, and Snuffbox. Rare fish include the Eastern Sand Darter, Pugnose Shiner, and Brindled Madtom. With huge declines in native mussels across North America, rivers in the Thumb are critical mussel refuges. Rivers, valleys, and floodplains are important as wildlife and plant corridors, migratory routes, large forest preserves, havens for rare and southern species, for flood control, water quality, recreation, and much more.



The Forest

Just 200 years ago, 95% of the Thumb was forested, part of a primeval forest across eastern North America. Only 10 to 15% remains forested, with more cleared daily. Most woodlots are highly fragmented, perpetually immature due to over-cutting and lack of species recruitment. Edge-species competition and tree diseases have caused widespread degradation. Forests vary by soil, moisture, landscape, and climate, and include largely northern and southern hardwoods, hardwood and conifer swamps, floodplain forest, and oak and pine savanna in the Thumb. Remnants are critical havens for species here for thousands of years. Rare species include Painted Trillium, Broad-leaved Sedge, Large Toothwort, Heart-leaved Plantain, Cerulean Warbler, and Red-shouldered Hawk. The largest forests remaining in the Thumb are along the Cass River, the glacial interlobate region, and the Port Huron State Game Area. The many forest benefits include habitat, atmospheric and water quality, timber, fuel, food, medicine, hunting, recreation, and more.



Northern and Southern Flora

The Thumb is located within a transition zone between southern and northern flora where forest shifts from oak and hickory to hardwoods and conifers of the northern Great Lakes. The contrast was clearer before logging of the 1800's. Northern hardwood-conifer forest covered most of the Thumb, Beech-Sugar Maple the lakeplain, and oak-hickory the south interlobate and moraines. Hemlock, White Pine, Tamarack, and Northern White-cedar were far more extensive. As along Lake Michigan, northern species dip along Lake Huron due to the cooler growing season and sandy soils. Northern species at southern extremes, like Mountain Maple, occur in ravines near Lake Huron. Hemlock covers north slopes of the Black River valley. Forest diversity is high in the Port Huron area where southern Tulip Tree, Sassafras, and Black-gum grow beside northern Hemlock and Yellow Birch. Minden Bog in northern Sanilac County is one of the southern-most raised bogs in North America, and an outpost for northern species like Tamarack, Bog Birch, and Sheep-laurel.

