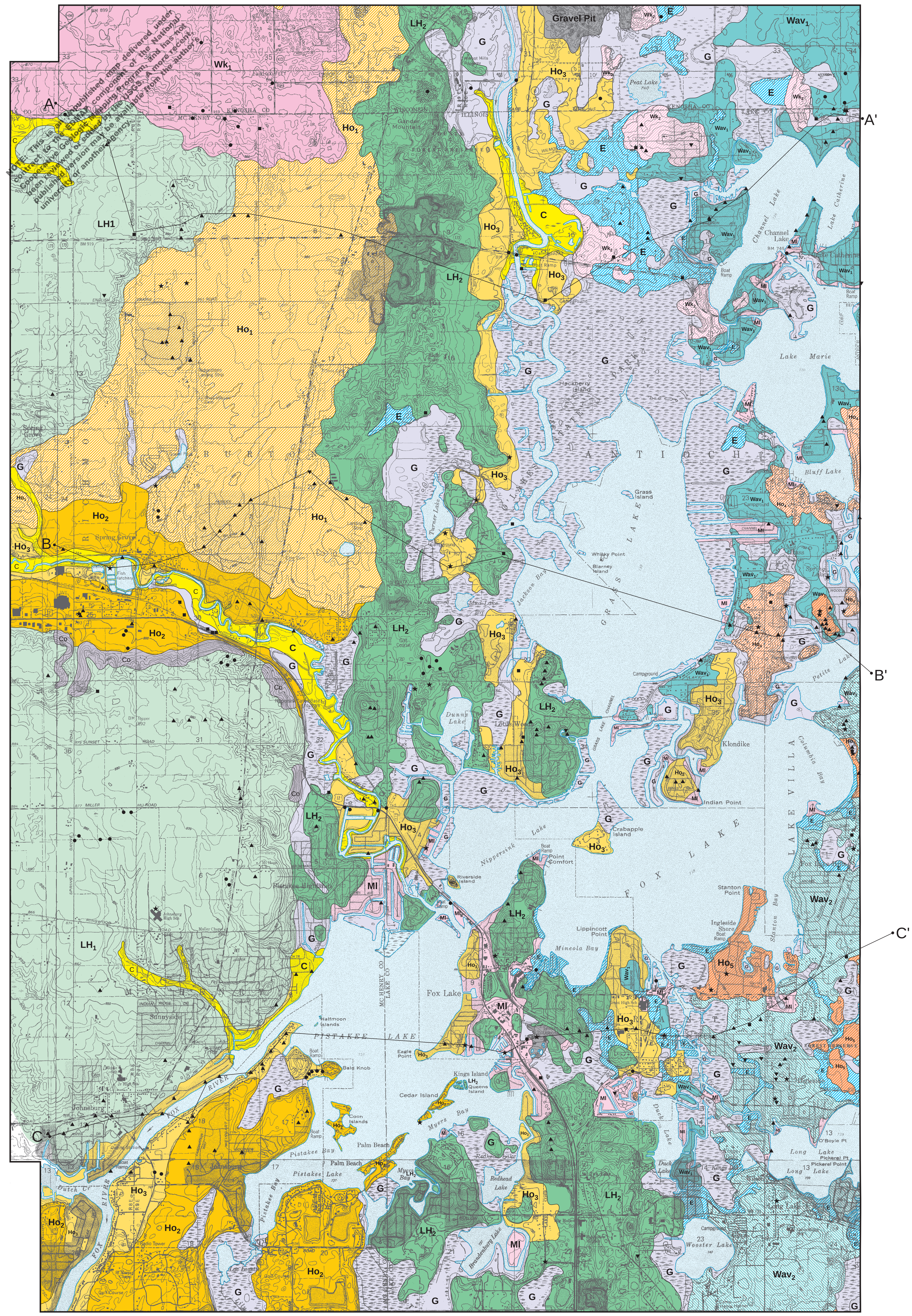
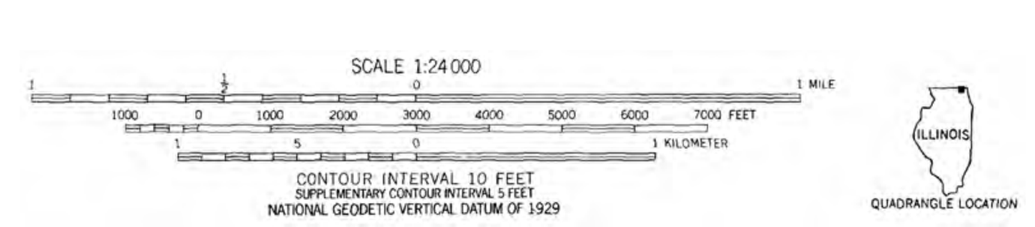
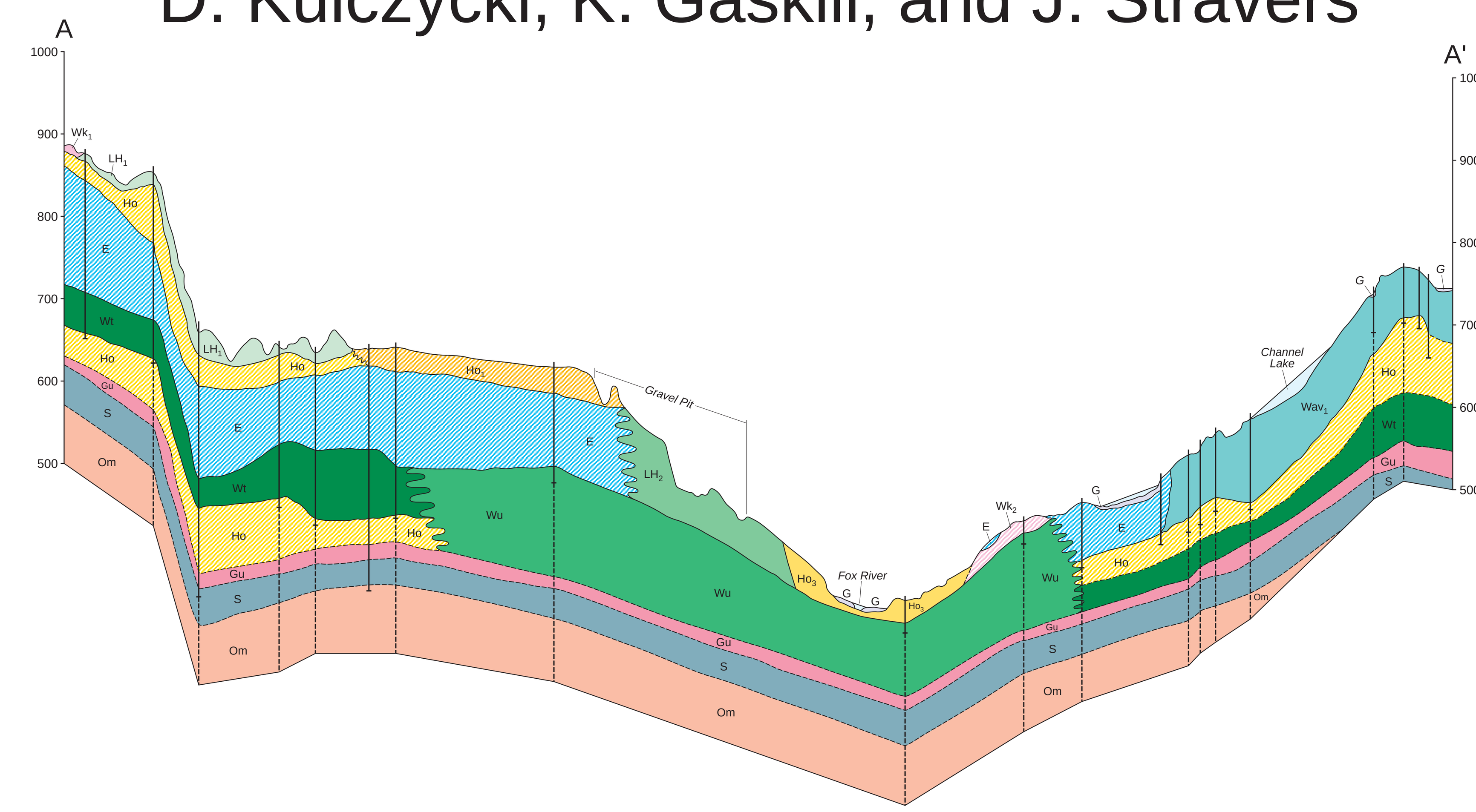


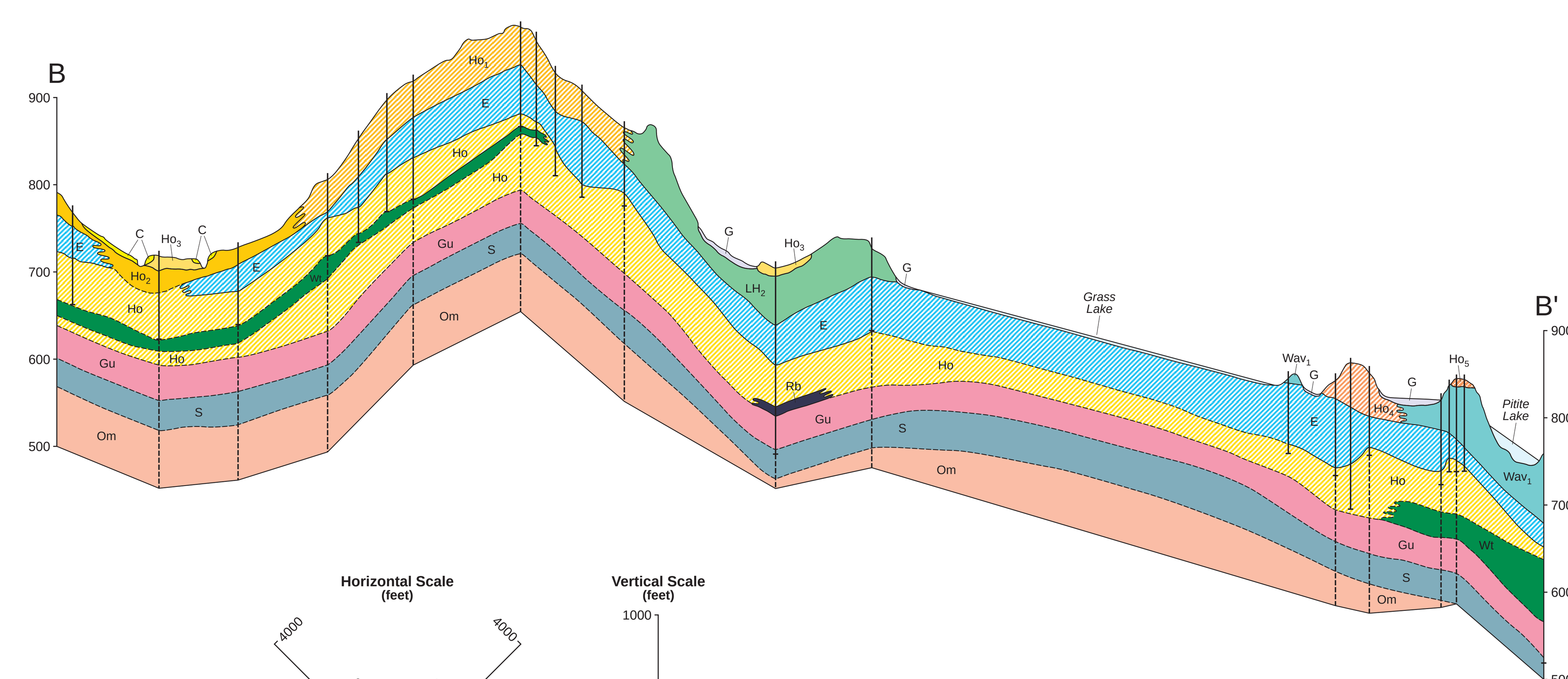
- ISGS Control Borings
- WGS and Engineering Borings
- ISGS Sample Sets
- ISGS Water Wells
- ISGS Borehole Gamma Logs

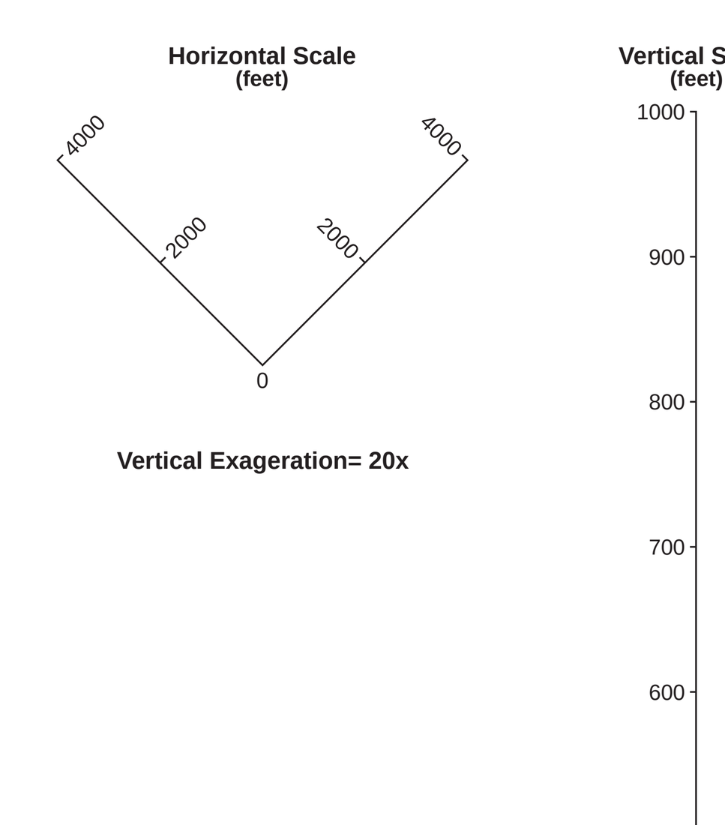


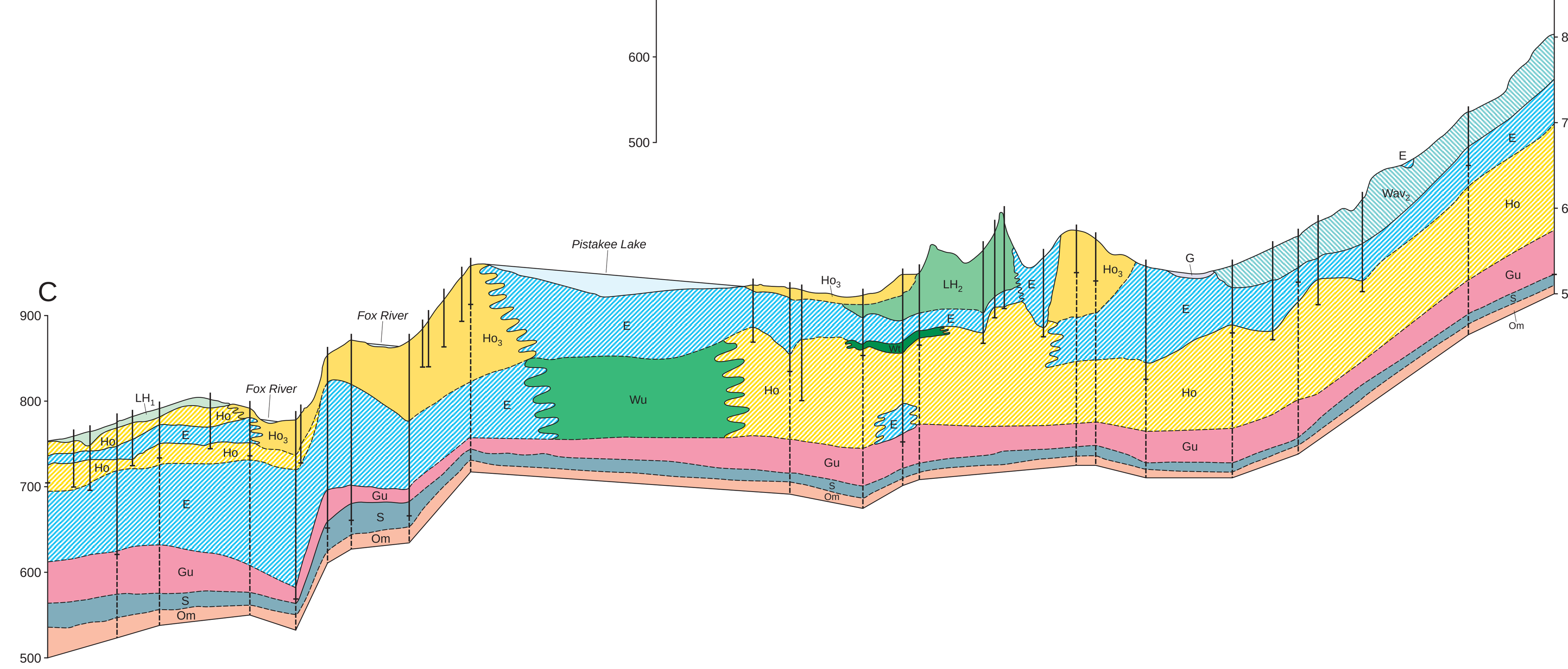
Quaternary Geologic Map of the Fox Lake Quadrangle and Adjacent Areas, NE Illinois

D. Kulczycki, K. Gaskill, and J. Stravers









Map Units and Correlations

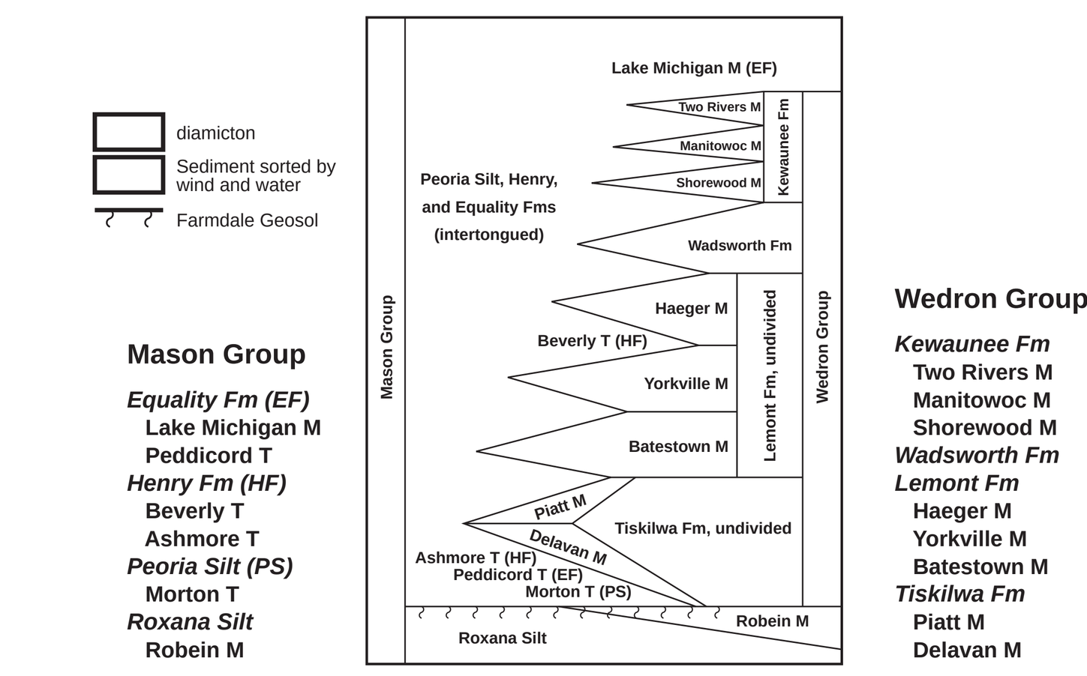
Holocene Units

Ml — Made and/or disturbed land; found in areas where swamps and lowlands were filled, usually thin (<10 feet thick).

G — Greyslake Peat - peat and organic rich fluvial or lacustrine sediment (locally marl) deposited in glacial and holocene lake basins or on shallow gradient flood plains.

C — Cahokia Formation - Alluvium; primarily silt and sand or courser sediment reworked from Wisconsin episode outwash.

Co — Colluvium - unsorted sediment subjected to creep on steeper slopes.



Stratigraphic relationships for the late Wisconsinan Wedron and Mason Groups. The Wedron Group consists primarily of unsorted or poorly sorted diamictons (subglacial tills and diamictons in end moraines) that are interbedded with the sorted sediments (loess, fluvial outwash, and lacustrine deposits) of the Mason Group. (from Hansel and Johnson, 1996)

Wisconsin Episode Units

Mason Group Deposits

Ho5 — Henry Fm – glacial outwash - stratified sands and gravels; correlates to later phase of WAV2 (same surface elevation as HO3)

Ho4 — Henry Fm – glacial outwash - stratified sand and gravel; correlates to initial deposition of WAV2 (surface elevation above HO3 and HO5)

Ho3 — Henry Fm – glacial outwash - stratified sand and gravel; may correlate to either late phase Haeger ice or early Wadsworth Fm (WAV1) (low elevation outwash surface)

Wk2 — Wasco Facies (Henry Fm) - kames - ice contact stratified sands, gravels, and diamictons; correlative to Haeger Mb and/or Tiskilwa Fm – Wisconsinan stagnant ice deposits found in the Chain-O'-Lakes Lowland

E — Equality Fm - glacial lacustrine – fine-grained sands, silts and clays, laminated to uniform; locally found at the surface or subsurface where frequently interbedded with Henry Fm

Ho2 — Henry Fm - glacial outwash - stratified coarse to very coarse sands and gravels; major outwash trains of the Fox River and Nippersink Valley (intermediate elevation outwash surface)

Ho1 — Henry Fm – proglacial outwash - stratified coarse sands and gravels; extensive outwash plain or coalescing outwash fans related to initial phase of formation of the Fox Lake Moraine (highest elevation outwash surface)

Wk1 — Wasco Facies of the Henry Fm - kames - Ice contact stratified sands, gravels, and diamictons (stagnant ice deposits); correlative to the Haeger Mb - oldest Haeger Kames (stagnant ice)

Ho — Henry Fm outwash (subsurface only) - stratified sand and gravel; also found beneath the Haeger member as the Beverly Tongue and beneath the Tiskilwa Formation as the Ashmore Tongue (lowermost Mason Group)

Wedron Group Deposits

Wav2 — Wadsworth Formation - morainal facies – silty clay diamicton with some sand and gravels beds, gray to grayish brown; inner (youngest) moraine of the Valparaiso Morainic System (youngest of the Valparaiso moraines present in the Fox Lake quadrangle).

Wav1 — Wadsworth Formation - morainal facies - silty clay diamicton with interbedded silts and sands, gray to grayish brown; outermost (oldest) moraine of the Valparaiso Morainic System.

LH2 — LH2 Haeger Member (Lemont Fm) – sandy to sandy loam diamicton with numerous interstratified sand and gravel beds, yellowish brown to brown; Fox Lake Moraine, "kamic moraine" - locally may consist of only an ice contact slope against which HO1 accumulated.

LH1 — Haeger Member (Lemont Fm) – sandy loam to loam diamicton, yellowish brown to brown to pinkish brown; (active subglacial deposition) overlying and deformed into underlying sequences of thick glacitectonized outwash sand and gravel.

Wt — Tiskilwa Formation (subsurface only) - loam to clay loam diamicton, gray to pinkish gray, oxidizes to red brown, brown, or yellow brown; locally contains thick beds of silt (lacustrine), and stratified sand and gravel (outwash); lowermost diamicton of the Wedron Group.

Wu — Wedron Group undifferentiated – stagnant ice and/or deltaic deposits – interbedded sand, gravel, silt, clay, and diamicton; complex sequence of subsurface deposits found beneath the Chain-O'-Lakes Lowland, possibly vary from early to late Wisconsinan in age.

Sangamon Episode Units

Rb — Morton Tongue or Robein Member – organic-rich silty to clayey sediment; lies above the Glasford Formation and below the Wedron and Mason Groups

Illinois Episode Units

Gu — Glasford Formation undifferentiated - (subsurface only) loam to sandy loam diamicton, pinkish brown to yellow brown; locally contains beds of stratified silts, sands, and gravel; of variable thickness due to erosion by succeeding glacial advances; directly overlies bedrock in this area

Bedrock Units

S — Silurian - dolomite; preserved as erosional remnants on bedrock highs

Om — Ordovician Maquoketa Formation; interbedded shales, shaley limestones and dolomites

QUATERNARY GEOLOGY

Bedrock in the study area consists of Ordovician shales and shaley carbonates (Maquoketa Group), and Silurian dolomites which dip gently towards the east. Glacial drift thicknesses are substantial however (50 to 150m), and natural bedrock outcrops are absent within the map areas.

The oldest Quaternary deposits preserved in the subsurface consist of Illinois Episode Glasford Formation diamictons deposited primarily as subglacial tills and correlative proglacial outwash sands and gravels of the Pearl Formation. No buried morainal facies are present in this region, and the topography or morphology of the top of the Illinoisan deposits does not appear to be reflected at the surface. The Illinois Episode dates from approximately 180,000 to 130,000 years ago but the specific time of deposition in the study area is unknown. A major unconformity is indicated by the deeply weathered Sangamon Geosol, which formed in both the Glasford and Pearl formation deposits between about 130,000 to 55,000 years ago (Curry, 1989; Curry and Pavich, 1996). Wisconsin episode glacial erosion however has stripped much of the geosol as seen in quarry exposures and as reconstructed from cored strata.

Late Wisconsinan sediments in NE Illinois consist of subglacial diamictons (tills) and morainal deposits of the lower and middle Wedron Group as well as correlative interbedded glacial-fluvial and lacustrine sediments of the Mason Group. Various sublobes of the Lake Michigan lobe in NE Illinois have also been defined on the basis of geographic expression of ice flow from two differing sources. The Harvard and Joliet sublobes are fed solely from an ice source flowing southward down the Lake Michigan trough (Harvard ice restricted to the trough and trough margins, Joliet ice expanding laterally out of the trough onto the plains). The Princeton sublobe results from Lake Michigan flow augmented and deflected to the SW by ice flow from the Huron-Erie Lobe.

The initial late Wisconsinan advance of ice into the map area (Marengo phase) resulted in deposition of the Tiskilwa formation diamicton and stratified sands and gravels of the Ashmore Tongue between 25,000 and 23,500 radiocarbon years before present. During this phase, an ice margin stabilized to form the prominent Marengo moraine to the west of Fox Lake. Curry, et.al. (1997) suggest that ice retreat from the Marengo moraine resulted in the deposition of a second moraine in eastern McHenry County that was later buried by subsequent readvances. Portions of the "Ringwood Upland" in the western portion of the map area may consist of a buried morainal topography expressed at the surface.

Ice marginal positions for the Shelby Phase (Batestown Member) are well established across central Illinois but the subsurface position in the Fox Lake quadrangle is unknown. The Batestown Member is absent from the subsurface in the Fox Lake and Wauconda quadrangles but may be present further west because the degree of glacial erosion during subsequent readvances decreased toward the Richmond and McHenry areas. An alternative explanation is that Shelby ice was prevented from advancing across McHenry County by residual Marengo ice (Curry, et.al., 1997). Likewise, the Livingston phase (Yorkville Member) ice margin is speculative in this area. The Yorkville Member was not recognized beneath the Fox Lake quadrangle but may occur in the subsurface of Richmond or McHenry quadrangles to the west.

During the Woodstock Phase ice overrode much of McHenry County, depositing the sandy Haeger diamicton and constructing of the Woodstock moraine (west of the Fox Lake quadrangle). Glacial tectonic thrust faulting and folding of underlying pro-glacial stratified sands in the western part of the Fox Lake quad occurred during this phase. The ice margin then retreated to the central portion of the quadrangle and stabilized to form the Fox Lake moraine and an expansive system of ice pitted glacial fluvial outwash deposits in the Fox River Valley.

Subsequently, the Woodstock ice retreated to the central part of the Lake Michigan trough and then readvanced into Illinois during the Crown Point Phase. This phase was characterized by a prolonged episode in which the ice margin persisted in the eastern portion of the Fox Lake quadrangle and the adjacent Antioch quadrangle to form the Valparaiso "morainic system" (Wadsworth Formation)

Following deglaciation, the youngest geological materials to accumulate in the study area consist of Holocene alluvial deposits (Cahokia Formation) and Grayslake peat, which accumulated in wetlands that developed in the closed depressions and shallow gradient drainages of this area.

MAPPING METHODS

Initial reconnaissance was conducted using 1:40,000 scale color infra-red aerial photography in conjunction with the definition of landform physiographic characteristics that were observable from the topographic base. Definition of the initial map units was also aided by the soils data and soils maps of Ray and Wascher (1965) and the "stack unit" maps of Berg and Kempton (1988). Field investigations, ground truth verification, and sampling were conducted primarily by shallow (2-10m) hydraulic coring using a Giddings Probe. Over 30 shallow cores were obtained during the study with the definitive cores sites shown on the map. Lithologic logs from ISGS control wells, "Power Probe" cores, engineering borings and to a limited extent, water well logs, were also used as an aid to defining the distribution of surficial map units. Several outcrops examined in this study occur in the quarries along the western and central portions of the quadrangle and in shallow excavations in developing subdivisions.

This geologic map also represents an extension of general geologic mapping completed for environmental planning in McHenry County (Curry et al., 1997) and extensive 3-D mapping in the Antioch quadrangle to the east (Berg, et.al., 2000). The criteria for differentiating surficial map units and the stratigraphic nomenclature used here is adopted and expanded from those studies and from Hansel and Johnson (1996). Texture (grain size), sedimentary structures, clast lithology, and clay mineralogy where the primary characteristics used for differentiation and correlation of stratigraphic units. Holocene alluvial deposits were mapped on the basis of flood plain topography and morphostratigraphic sequence for the low terraces.

Subsurface data for the cross sections are based upon scattered deeper borings including 1) "Power Probe" cores obtained under this study, 2) control wells with lithologic logs completed by the ISGS, 3) water well/borehole gamma logs, 4) unpublished engineering borings from bridges and the road beds, and 5) scattered driller's logs from water wells completed within the quadrangle (on file with the ISGS).

REFERENCES

Berg, R.C., Bluer, N.K., Jones, B.E., Kincare, K.A., Pavey, R.R., and Stone, B.D., 2000, Mapping the glacial geology of the central Great Lakes region in 3-dimension / a model of state/federal cooperation. United States Geological Survey open file report 99-349

Berg, R.C., and Kempton, J.P., 1988, Stack-unit mapping of geologic materials in Illinois to a depth of 15 meters. Illinois State Geological Survey, Circular 542.

Curry, B.B., 1989. Absence of Altonian glaciation in Illinois: Quaternary Research, v. 31, p. 1-13.

Curry, B.B., Berg, R.C., and Vaiden, R.C., 1997, Geologic mapping for environmental planning, McHenry County, Illinois. Illinois Geological Survey Cir. 559, 79p

Curry, B.B., and Pavich, M.J., 1996. Absence of glaciation in Illinois during marine isotope stages 3 through 5. Quaternary Research, Vol. 31, pp. 19-26.

Hansel, A.K., and Johnson, W.H., 1996, Wedron and Mason Groups: Lithostratigraphic reclassification of deposits of the Wisconsin Episode, Lake Michigan lobe area. ISGS Bull. 104.

Ray, B.W., and Wascher, H.L., 1965, McHenry County Soils Report 81: University of Illinois Agricultural Experiment Station, in cooperation with Soil Conservation Service, U.S, Department of Agriculture, 132 p.

Wickham, S.S., Johnson, W.H., and Glass, H.D., 1988. Regional geology of the Tiskilwa Till Member, Wedron Formation, Northeastern Illinois: Illinois State Geological Survey, Circular 543, 35 p.