WSPSS

Association of Women Soil Scientists

ISCA

ILLINOIS
SOIL
CLASSIFIERS
ASSOCIATION

8YR 10/16

Agenda

Location: Illinois Beach Resort and Conference Center, Spring Bluff Forest Preserve, and Lyons Woods Forest Preserve on the boundary of Wisconsin, Illinois and the shore of Lake Michigan, near the towns of Zion and Winthrop Harbor in Lake County, Illinois

Wednesday, Oct 15 – Illinois Beach Resort and Conference Center, Conference Room

6:00-7:00 pm – Registration

7:00-9:00 pm – Master of Ceremonies, Robert McLeese
Presentations by:

- ***Don Wilson***, Illinois Beach State Park Steward will discuss the natural resources and human impact of the area.
- ***Jim Miner***, Geologist with Illinois State Geological Survey, will discuss the geologic history of post-glacial Lake Chicago, the Zion City moraine and his study of the water table at Spring Bluff.
- ***President*** (or representative) from each professional organization
- ***Mark Bramstedt***, ISCA Public Relations and Education Committee Chair will present a quick overview and directions for the field trip

9:00-? pm – Bonfire (weather permitting) and social time to interact with our fellow soil scientists. You may bring your own refreshments.

Thursday, Oct 16 – Field Tour

8:00 am-1:00 pm – Leave from the Resort by car and head to Spring Bluff Forest Preserve to see soils formed in the ridge and swale deposits of post-glacial Lake Chicago. After a mid-morning break (refreshment provided) test your texturing skills (with prizes for the winners!). Travel by car only a short distance to Lyons Woods Forest Preserve to view till soils of the Zion City moraine.

1:00 pm – Farewell

Acknowledgements

Lake County Forest Preserve District for access and use of their property.

James Miner, Geologist, Illinois State Geological Survey for his presentation.

Don Wilson, Volunteer Steward, Illinois Beach State Park for his presentation.

Michael Konen and ***Northern Illinois University*** for lab analysis.

V3 Companies and ***Jennifer Wollenweber*** for donation of prizes.

AWSS, WSPSS, and ***ISCA*** for their generous donations.

NRCS for allowing their employees to attend.

Everyone who helped pull this all together, specifically:

Dale Calsyn
Ron Collman
Mark Krupinski
Jesse Kurylo
Robert McLeese
Karla Petges
Christy Sabdo
Alison Steglich
Kevin Traastad
Roger Windhorn
Jericho Winter
Jennifer Wollenweber

All those who attended to help make this a success!

Thanks, so much,

Mark Bramstedt, Chair
ISCA Public Relations & Education Committee

Field Trip Travel Guide

8:00 AM – Depart from the Conference Center

- Travel west from the Conference Center to Sheridan Road (Route 137)
- Turn north (right) onto Sheridan Road and travel 3.7 miles through the city of Zion to 7th Street (Main) in Winthrop Harbor
- Turn east (right) onto 7th Street and travel 0.7 miles
- Turn north (left) onto the access road and enter through the gate into Spring Bluff Forest Preserve
- Travel north to the end of the lane.
- Park in a line on the road along the right side. Do not park off of the road
- Gather at the north gate.

8:30 – 10:00 AM – STOP 1: Spring Bluff Forest Preserve

- Antung, Granby, Plainfield, and Watseka soils developed in beach deposits from post glacial Lake Chicago
- **No bathroom facilities are available at this stop**

Travel to Stop 2: Lyons Woods Forest Preserve

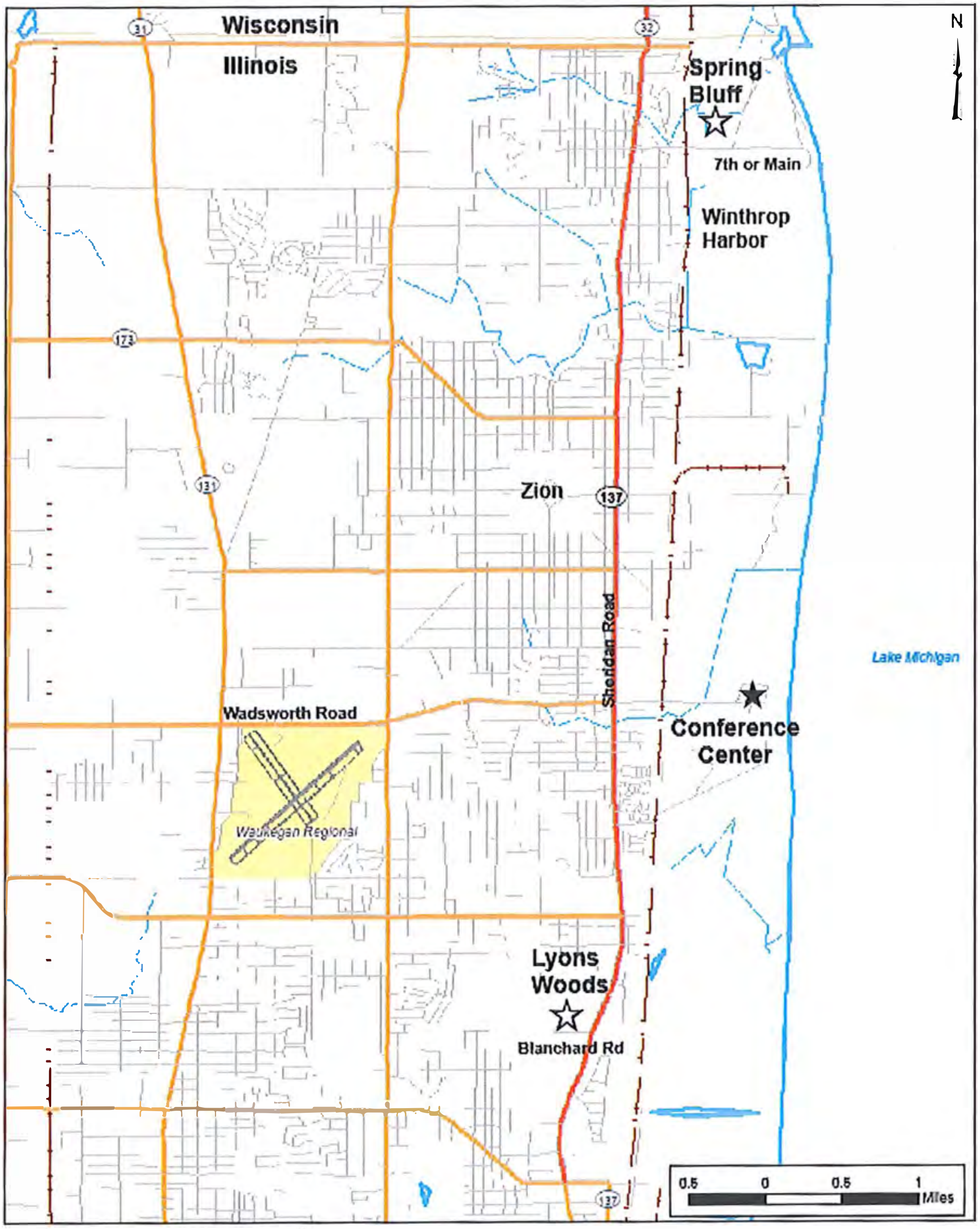
- Travel north on the Spring Bluff access road. Go through the north gate and turn south as soon as possible
- Continue south past the yacht club and marina to 7th Street
- Turn west (right) onto 7th Street and continue to Sheridan
- Turn south (left) onto Sheridan Road. Continue south through the city of Zion for 5.9 miles
- A split rail fence along the west (right) side of Sheridan Road is a sign that you are approaching the entrance to Lyons Woods
- Turn west (right) onto Blanchard Road and then turn north (right) immediately into the parking area for Lyons Woods

10:30 AM – 1:00 PM – STOP 2: Lyons Woods Forest Preserve

- Refreshments and Texture Contest
- Beecher and Ozaukee soils developed in till on the Zion City moraine
- Bathroom facilities are available at this stop.

1:00 PM – Return to the Conference Center and Depart

ISCA/WSPSS/AWSS Joint Fall 2008 Field Trip



GEOLOGIC HISTORY OF ILLINOIS BEACH RIDGE COMPLEX
(Summarized and condensed version)

The Illinois Beach Ridge Complex as it is known extends about 14 miles from Kenosha, Wisconsin to Waukegan, Illinois. In general, it is no more than about 1 mile wide. It began to form during the Nipissing Lake Stage of ancient Lake Chicago about 4,000 to 3,000 years before present. The water level averaged about 600 feet above sea level or about 20 feet above the current average lake level of 580 feet.

Ancient Lake Chicago has a long and rather complicated history of lake level changes, flow pattern changes, and shore line development and destruction. As the final stages of glaciation in northern Illinois occurred and the ice front receded northward, the Tinley Moraine blocked the melt water and caused glacial Lake Chicago to form in the present lake basin. It was at an elevation of approximately 640 feet. This stage of the lake was called the Glenwood Stage and occurred about 14,000 years before the present. During this same time as the retreating ice pulsed back and forth, four moraines of the Lake Border System were also formed. Due to an influx of huge quantities of additional melt water from the Huron and Erie Basins into Lake Chicago (~13,000 years before present) an outlet channel for the lake was eroded through a low spot in the surrounding moraines. As water drained rapidly through the outlet to the southwest, the lake level was lowered dramatically.

As geologic time passed, the glaciers continued to melt back to the north and eventually an eastward outlet was exposed near the Straits of Mackinac. The lake drained through this outlet and a new level was established below the level of the present lake. (Indicated by the forest bed at Two Creeks, WI). When the Lake Michigan Lobe glacier re-advanced, it again blocked this eastward outlet and Lake Chicago returned to its 620 foot elevation and again discharged through the southwestern outlet. (Calumet Stage) Continued erosion of this outlet due to a large diversion of water from the Huron Basin into Lake Chicago caused trenching of the outlet and massive erosion of the bedrock. This bedrock armored outlet determined the next level of Lake Chicago. Eventually the lake was lowered to a level of about 600 feet. This level was called the Toleston Stage and was formed about 11,500 years before the present.

When the ice retreated entirely from the "upper Midwest" the lowest outlet to the east was opened and Lake Nipissing was formed, which essentially occupied most of the three upper lake basins including Lake Michigan. The formation of Lake Nipissing marks the "close" of glacial history and the opening of post-glacial times. This lake was entirely surrounded by land and had no glacial ice margin. The lake level here rose again to the Toleston level of about 600 feet. This was about 4,000 to 3,000 years before present.

It was at this time that shoreline erosion of the recently deposited glacial moraines to the north began to supply abundant quantities of sand and gravel that was transported south by wave action and littoral currents. Ridges were constructed when large wave deposited sand and gravel on the upper slopes of the beach during high water periods of the lake level cycle. Records indicate that Lake Michigan has cycles of 10 to 20 years of high and low levels with ranges of five years or so. This suggests that successive ridges may differ in age by as little as 10 to 20 years. However, there is a high probability that the age may be 100 years or more because of the re-working during high lake level storms. The natural fall of the lake level from 600 to 580 feet combined with the isostatic rebound allowed a succession of beach ridges to form in the older northwestern portion of the complex. Greatest proportion of the complex is less than 3,500 years old. Approximately 80 percent of the complex formed since 2,000 years ago after Lake Michigan stabilized at the current 580 feet elevation.

Several researchers studying soil development in these deposits have set up a series of six soil groups that trace soil development from youngest to oldest. Group A soils are the youngest and have an age of 100 years old to present day assigned to them. Group F soils are the oldest soils in the area and have an age of 2300 – 3500 years old assigned to them. They studied processes of soil development through the entire range and attempted to track the process from initial deposition of the sand to a relatively stabilized soil. Factors of development they were primarily interested in were the accumulation of the dune sand in the various particle sizes, the buildup of organic matter, and the leaching of the clays, organics and certain mineral constituents creating distinctive horizons.

During the construction of the coarser parts of the beach ridges by wave action, finer textured sand was blown onto the ridges by on-shore winds. Growth of vegetation trapped additional amounts of sand and eventually the ridges became stabilized. Some of the sand was also blown into the swales between the ridges. Essentially every beach ridge and swale is capped by eolian sand deposits. Migration of the dunes through time is believed to be minimal. In general, there is a coarsening of dune textures with decreasing age. This is more a reflection of a gradual coarsening of the parent material sand that is available for dune formation from the erosion of the till bluffs north along the Lake Michigan shoreline.

The sandy soils on this stop have been assigned a Group F designation (2300-3500 years old). The northern part of the complex has lower lying and less distinct ridges as compared to those on southern end. The swales are often Histosols or Mollisols, depending on natural drainage. The ridge soils were originally mapped as Plainfield but the greater than 50% FS and VFS in the control section have "pushed" them closer to the Chelsea soil. The drainage on these soils is not Excessively Drained but instead closer to Moderately Well Drained in most instances. Some of the more highly developed soils in this area have thick E horizons indicating significant leaching of organics and mineral constituents. Further south in the complex, closer to the Resort itself, the ridges are more distinct. These soils have been assigned a Group C (300 -700 years) which makes them significantly younger. Soils showing less development in regard to leaching and horizon development are more common. The swales can be Mollisols or Histosols, again depending upon natural drainage.

The displacement of the ridges in a southeasterly direction occurred as a result of erosion at the north end of the complex, transportation of eroded sediment by littoral processes, and deposition of eroded material a the southern end of the complex. Shorelines along the northern part of the complex are receding at an average rate of 10 feet per year. Beach building along the southern reaches causes an average accretion rate of 5 feet per year.

The Lake Border Moraines that make up the last two stops on our tour were formed during the early Glenwood Stage (approximately 13,000 to 14,000 years ago). The Lake Border Moraine System only extends about 25 miles inland from Lake Michigan. It includes five named moraines. From west to east, they are the Park Ridge, Deerfield, Blodgett, Highland Park and

Zion City Moraines. Our sites are located on the Zion City Moraine which is the youngest. The diamicton is glacial till which is generally silty clay loam or clay loam texture. The two soils studied are the Ozaukee and the Beecher series. These soils are typical of those found on the moraines and till plains in this area and reflect the deciduous timber and/or savannah –type native vegetation found in this area.

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Antung Series

Taxonomic classification: Sandy, mixed, mesic Histic Humaquepts

One mapping unit of the Antung series was correlated for this project:
9777A – Antung muck, 0 to 2 percent slopes

Geomorphic setting: low flat areas, depressions and swales
Parent materials: thin layer of organic material over glacio-lacustrine sand
Natural drainage class: very poorly drained
Depth to seasonal high water table: inundated with 0.5 feet or more to 1.0 feet below the soil surface *(estimated)*
Permeability: moderately rapid to rapid, 2.0-6.0 inches/hour to 6.0 to 20.0 inches/hour *(estimated)*
Probable native vegetation: marsh vegetation

Antung soils have not been identified in Illinois prior to this study. However, areas of Antung soils have been identified in northwestern Indiana on similar landscape positions in recent years. The areas mapped as Antung for this project were previously identified as Adrian soils in the Soil Survey of Lake County, Illinois *(Calsyn, 2005). Adrian soils have more than 16 inches of organic material over sand, which is the dominant condition for these soils in Lake County. Antung soils have less than 16 inches of organic material over sand, which is the dominant condition for the Spring Bluff area. Antung soils occur throughout the project area. However, the areas mapped as Antung soils are intermixed with places where the organic deposits are greater than 16 inches thick and can be defined as Adrian soils. These areas of Adrian soils occur sporadically and cannot be separated from the Antung soils.*

Antung Profile Description (R. Windhorn)
UTM Coordinates: 433134E, 4703722N, NAD 83

Oa1 – 0 to 8 inches; black (N 2.5/0) broken face and rubbed muck (sapric material); moderate fine and medium subangular blocky structure parting to fine granular; friable; common fine roots; neutral; abrupt smooth boundary.

Oa2 – 8 to 11 inches; black (N 2.5/0) broken face and rubbed muck (sapric material); moderate fine subangular blocky structure; friable; common very fine and fine roots; neutral; abrupt boundary.

Cg1 – 11 to 30 inches; grayish brown (10YR 5/2) sand; single grain; loose; many medium yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; neutral; clear smooth boundary.

Cg2 – 30 to 44 inches; light gray (10YR 7/2) sand; single grain; loose; few coarse prominent yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; mildly alkaline; clear smooth boundary.

Cg3 – 44 to 60 inches; light brownish gray (10YR 6/2) sand; single grain; loose; slight effervescence; mildly alkaline.

Beecher Series

Taxonomic classification: Fine, illitic, mesic Udollic Epiaqualfs

One mapping unit of the Beecher series was established for this project:
298A – Beecher silt loam, 0 to 2 percent slopes

Geomorphic setting: on slight rises of the till plain
Parent materials: calcareous till or thin layer of loess over calcareous till
Natural drainage class: somewhat poorly drained
Depth to seasonal high water table: 0.5 to 2 feet *(estimated)*
Permeability: slow, 0.06 – 0.2 inches/hour *(estimated)*
Probable native vegetation: mixture of deciduous trees and prairie grasses

Beecher Profile Description (J. Winter 8/08)
UTM Coordinates: 431574E 4694886N, NAD 83

A – 0 to 9 inches; very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; strong medium granular structure; friable; 1 percent pebbles; abrupt smooth boundary.

BE – 10 to 13 inches; dark grayish brown (10YR 4/2) silt loam; common coarse prominent yellowish brown (10YR 5/8) accumulations of iron oxides; moderate fine subangular blocky structure; friable; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; 2 percent pebbles; clear smooth boundary.

Bt – 13 to 26 inches; dark grayish brown (10YR 4/2) silty clay loam; many medium prominent gray (2.5Y 5/1) iron depletions and many coarse prominent yellowish brown (10YR 5/8) accumulations of iron oxides; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct very dark gray (10YR 3/1) organo-clay coatings on faces of peds; 5 percent pebbles; clear smooth boundary.

Cd – 26 to 53 inches; brown (10YR 5/3) silty clay loam; many medium prominent gray (2.5Y 5/1) iron depletions and common medium prominent strong brown (7.5YR 5/8) accumulations of iron oxides; massive; very firm; 5 percent pebbles; strongly effervescent.

Granby Series

Taxonomic classification: Sandy, mixed, mesic Typic Endoaquolls

One mapping unit of the Granby series was established for this project:
***513A** – Granby sandy loam, 0 to 2 percent slopes*

Geomorphic setting: flat areas, slight depressions, swales
Parent materials: glacio-lacustrine sand
Natural drainage class: very poorly drained
Depth to seasonal high water table: +0.5 to 1.0 feet *(estimated)*
Permeability: rapid, 6.0 – 20.0 inches/hour *(estimated)*
Probable native vegetation: marsh grasses and sedges

***Comments:** The Granby soils occurred in areas intermediate between the Antung soils, which are slightly lower on the landscape and the Watseka soils, which are slightly higher on the landscape (figure 5.). In some areas, the Granby soils contain inclusions of the Antung soils.*

Granby Profile Description (R. Windhorn)
UTM Coordinates: 433549E 4704234N, NAD 83

A – 0 to 9 inches; black (10YR 2/1) fibrous sandy loam; sapric material in some thin layers; moderate fine subangular blocky structure parting to fine granular; very friable; common fine roots; neutral; abrupt smooth boundary.

Bg1 – 9 to 15 inches; dark grayish brown (10YR 4/2) loamy sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; neutral; abrupt smooth boundary.

Bg2 – 15 to 33 inches; grayish brown (10YR 5/2) loamy sand; very weak coarse subangular blocky structure; loose; few medium yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; neutral; gradual wavy boundary.

Cg – 33 to 60 inches; light brownish gray (10YR 6/2) sand (medium to coarse); single grain; loose; few coarse prominent yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; neutral.

Ozaukee Series
Taxonomic classification: **Fine, illitic, mesic Oxyaquic Hapludalfs**

Three mapping unit of the Ozaukee series were established for this project:
*530A – **Ozaukee silt loam, 0 to 2 percent slopes***
*530B – **Ozaukee silt loam, 2 to 4 percent slopes***
*530C – **Ozaukee silt loam, 4 to 6 percent slopes***

Geomorphic setting: **on ridge tops and sideslopes of moraines and till plains**
Parent materials: **calcareous till or a thin layer of loess over calcareous till**
Natural drainage class: **moderately well drained**
Depth to seasonal high water table: **3 to 5 feet** ***(estimated)***
Permeability: **slow, 0.06 – 0.2 inches/hour** ***(estimated)***
Probable native vegetation: **deciduous trees**

Ozaukee Profile Description (J. Wollenweber 8/08)
UTM Coordinates: 431494E 4695002N, NAD 83

A – 0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; grayish brown (10YR 5/2) dry; few fine faint brown (10YR 5/3) accumulations of iron oxides; moderate medium granular structure; friable; clear smooth boundary.

2E – 6 to 12 inches; brown (10YR 4/3) silt loam; common medium distinct yellowish brown (10YR 5/6) accumulations of iron oxides; weak coarse platy structure parting to moderate fine subangular blocky; friable; 3 percent pebbles; clear smooth boundary.

2Bt – 12 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct yellowish brown (10YR 5/6) accumulations of iron oxides; moderate medium and coarse angular blocky structure; firm; common distinct dark gray (10YR 4/1) clay films on faces of peds; common fine nodules of iron and manganese; 3 percent pebbles; clear smooth boundary.

2Cd – 24 to 62 inches; light olive brown (2.5Y 5/3) silty clay loam; common medium prominent strong brown (7.5YR 5/8) accumulations of iron oxides and common medium prominent grayish brown (2.5Y 5/2) iron depletions; massive; very firm; 5 percent pebbles; strongly effervescent.

Plainfield Series

Taxonomic classification: Mixed, mesic Typic Udipsamments

One mapping unit of the Plainfield series was correlated for this project:
***54B** – Plainfield sandy loam, 1 to 4 percent slopes*

Geomorphic setting: on the higher parts of the dune ridges
Parent materials: glacio-lacustrine sand
Natural drainage class: moderately well drained
Depth to seasonal high water table: 3.0 – 5.0 feet *(estimated)*
Permeability: rapid or very rapid, 6.0->20.0 inches/hour *(estimated)*
Probable native vegetation: deciduous trees or a mixture of deciduous trees and prairie grasses

The Plainfield soils identified in this project area, have a seasonal high water table at depths greater than 3.0 feet. This is outside of the range of properties for the Plainfield soil. However, this is the only property that is outside of the range of the Plainfield soils and no other similar sandy soil has been identified in Illinois with a water table at this depth.

The Plainfield soils occur on the highest parts of the two central dunes in the project area. They are closely associated with the Watseka soils. Included with the Plainfield soils in mapping are several small depression that occur in a linear fashion. These depressions contain water and/or the Granby or Antung soils and are too small to separate from the Plainfield soils at this scale of mapping.

Plainfield Profile Description (R. Windhorn)
UTM Coordinates:433503E 4704256N, NAD 83

A – 0 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bw1 – 7 to 16 inches; yellowish brown (10YR 5/8) loamy fine sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; neutral; gradual smooth boundary.

Bw2 – 16 to 26 inches; yellowish brown (10YR 5/8) loamy fine sand; weak medium subangular blocky structure; very friable; slightly acid; gradual smooth boundary.

Bw3 – 26 to 35 inches; strong brown (7.5YR 5/8) loamy sand; weak coarse subangular blocky structure; very friable; slightly acid; gradual smooth boundary.

BC – 35 to 47 inches; yellowish brown (10YR 5/6) loamy sand; very weak coarse subangular blocky structure; loose; common coarse distinct dark grayish brown (10YR 4/2) iron depletions and few medium yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; moderately acid; gradual wavy boundary.

C – 47 to 60 inches; yellowish brown (10YR 5/6) fine and medium sand; single grain; loose; moderately acid.

Watseka Series

Taxonomic classification: Sandy, mixed, mesic Aquic Hapludolls

One mapping unit of the Watseka series was correlated for this project:
49A – Watseka sandy loam, 0 to 2 percent slopes

Geomorphic setting: on the dune ridges and low dunes
Parent materials: glacio-lacustrine sand
Natural drainage class: somewhat poorly drained
Depth to seasonal high water table: 1.0 – 3.0 feet *(estimated)*
Permeability: rapid, 6.0-20.0 inches/hour *(estimated)*
Probable native vegetation: grasses and sedges

The Watseka soils have not previously been correlated in Lake County. However, these soils are identified in the Soil Survey of DuPage and Part of Cook Counties, Illinois (Mapes, 1979) The Watseka soil occur mainly on the two prominent dune ridges in the center of the site and also along the western edge of the site.. They are closely associated with the Plainfield soils. Included with the Watseka soils in mapping are several small depression that occur in a linear fashion on the central dunes. These depressions contain water and/or the Granby or Antung soils and are too small to separate from the Watseka soils at this scale of mapping.

Watseka Profile Description (R. Windhorn)
UTM Coordinates: 433349E 4704159N, NAD 83

A – 0 to 10 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure parting to fine granular; friable; common fine roots; neutral; abrupt smooth boundary.

Bw1 – 10 to 18 inches; yellowish brown (10YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; neutral; clear smooth boundary.

Bw2 – 18 to 24 inches; yellowish brown (10YR 5/4) loamy sand; weak coarse subangular blocky structure; very friable; common medium distinct grayish brown (10YR 5/2) iron depletions and a few medium yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; neutral; gradual wavy boundary.

Bw3 – 24 to 32 inches; brown (10YR 5/3) loamy sand; weak coarse subangular blocky structure; very friable; common coarse distinct dark grayish brown (10YR 4/2) iron depletions and few medium yellowish brown (10YR 5/8) masses of iron oxide accumulation in the matrix; slightly acid; clear smooth boundary.

Cg – 32 to 60 inches; light gray (10YR 7/2) sand (fine to medium); single grain; loose; slightly acid.

Geologic History of Illinois Beach State Park

Glacial History, Lake Levels, and Current Wetland Research Results

Lake Level History

- Current levels are near historic lows

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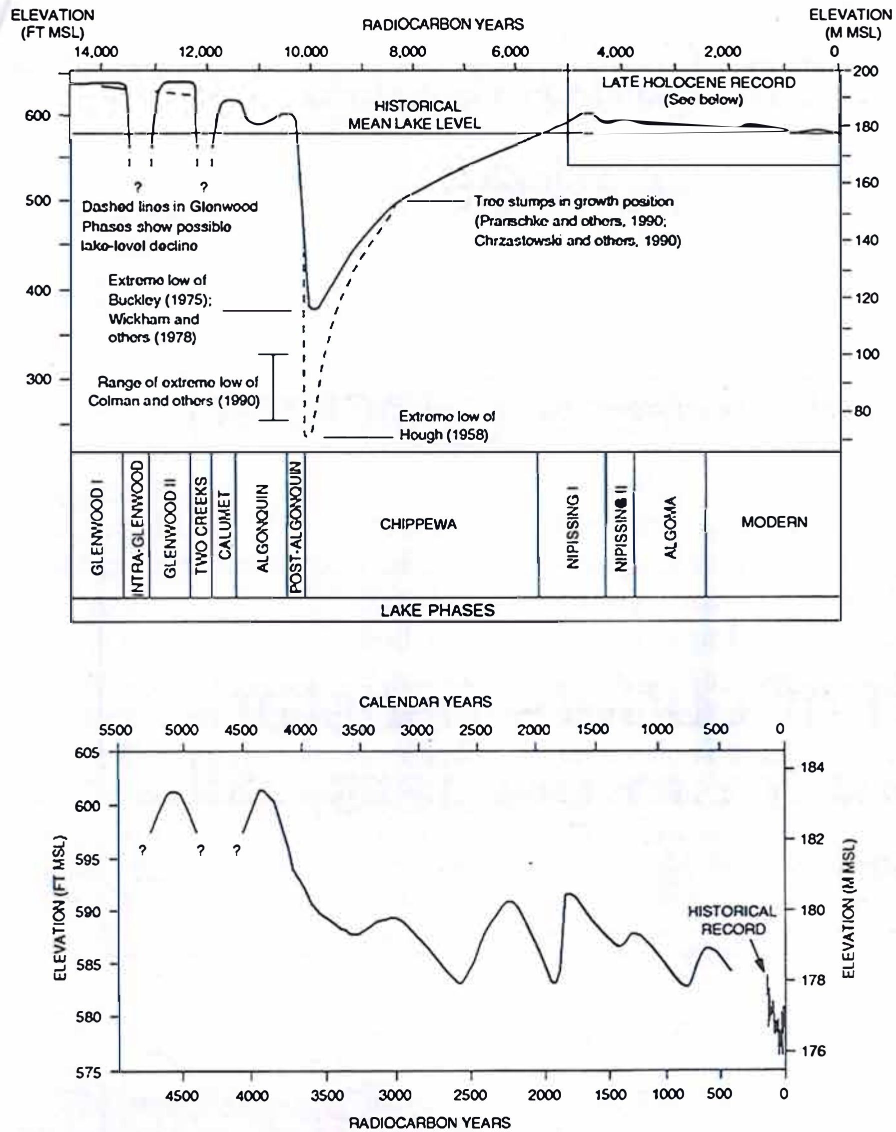
- Historic range of fluctuation is about 6 feet, including most recent highs in the 1980s

Lake Level History

- Current levels are near historic lows
- Historic range of fluctuation is about 6 feet, including most recent highs in the 1980s
- Fluctuations since last glaciation have been about +60 ft to -200/-350

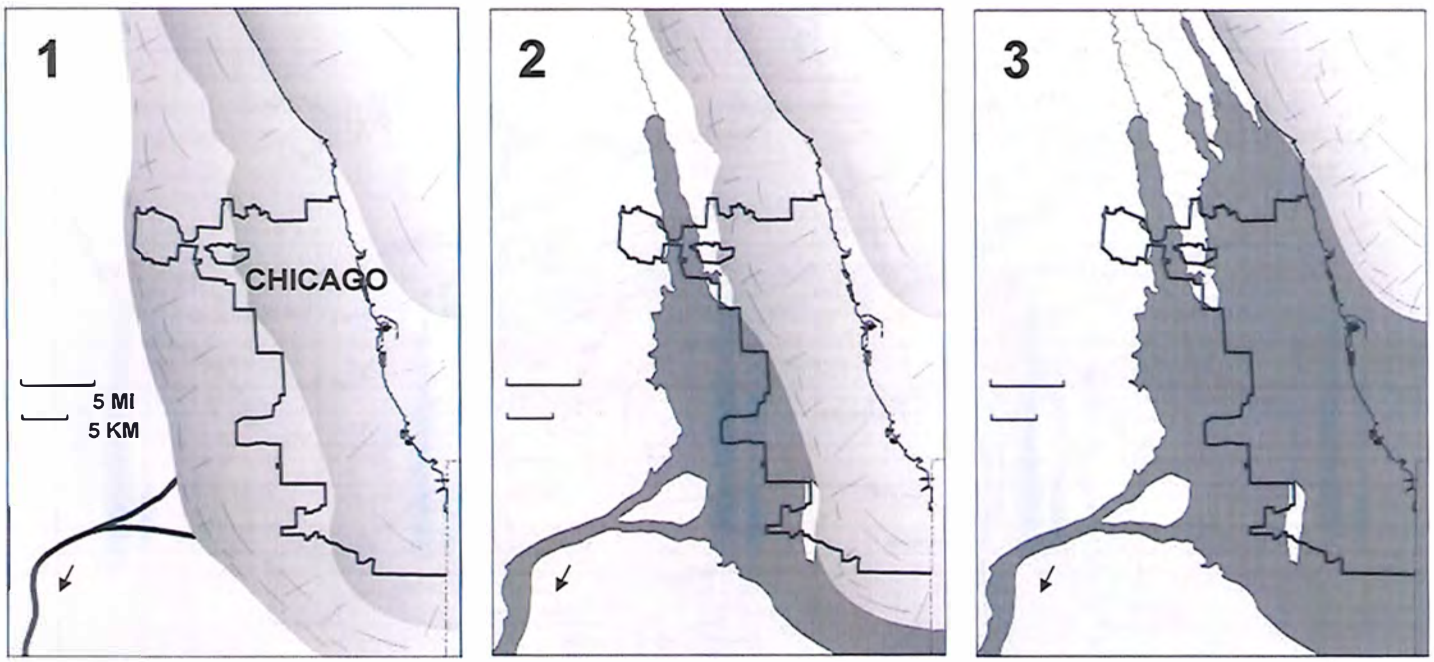

ELEVATION (FT MSL)
RADIOCARBON YEARS
ELEVATION (M MSL)
LATE HOLOCENE RECORD (See below)
HISTORICAL MEAN LAKE LEVEL
Dashed lines in Glenwood Phases show possible lake-level decline
Tree stumps in growth position (Pranschke and others, 1990; Chrzastowski and others, 1990)
Extreme low of Buckley (1975); Wickham and others (1978)
Range of extreme low of Colman and others (1990)
Extreme low of Hough (1958)
GLENWOOD I
INTRA-GLENWOOD
GLENWOOD II
TWO CREEKS
CALUMET
ALGONQUIN
POST-ALGONQUIN
CHIPPEWA
NIPISSING I
NIPISSING II
ALGOMA
MODERN
LAKE PHASES
CALENDAR YEARS
ELEVATION (FT MSL)
ELEVATION (M MSL)
HISTORICAL RECORD
RADIOCARBON YEARS

Control on Extent and Level of Lakes

- Location of outlets (glaciers)
- Elevation of outlets (isostatic depression from glaciers, sill materials)

Figure 7. Measured historic vertical movement, contoured as uplift in feet per century, on the basis of lake-level gauge records. Line of profile is normal to isobases along the east shore of Lake Michigan (adapted from Clark and Persoage, 1970; Larsen, 1985b).

GLACIAL LAKE CHICAGO Lake Level + 60 Ft



14,500 yrs ago **14,300** yrs ago **14,000** yrs ago

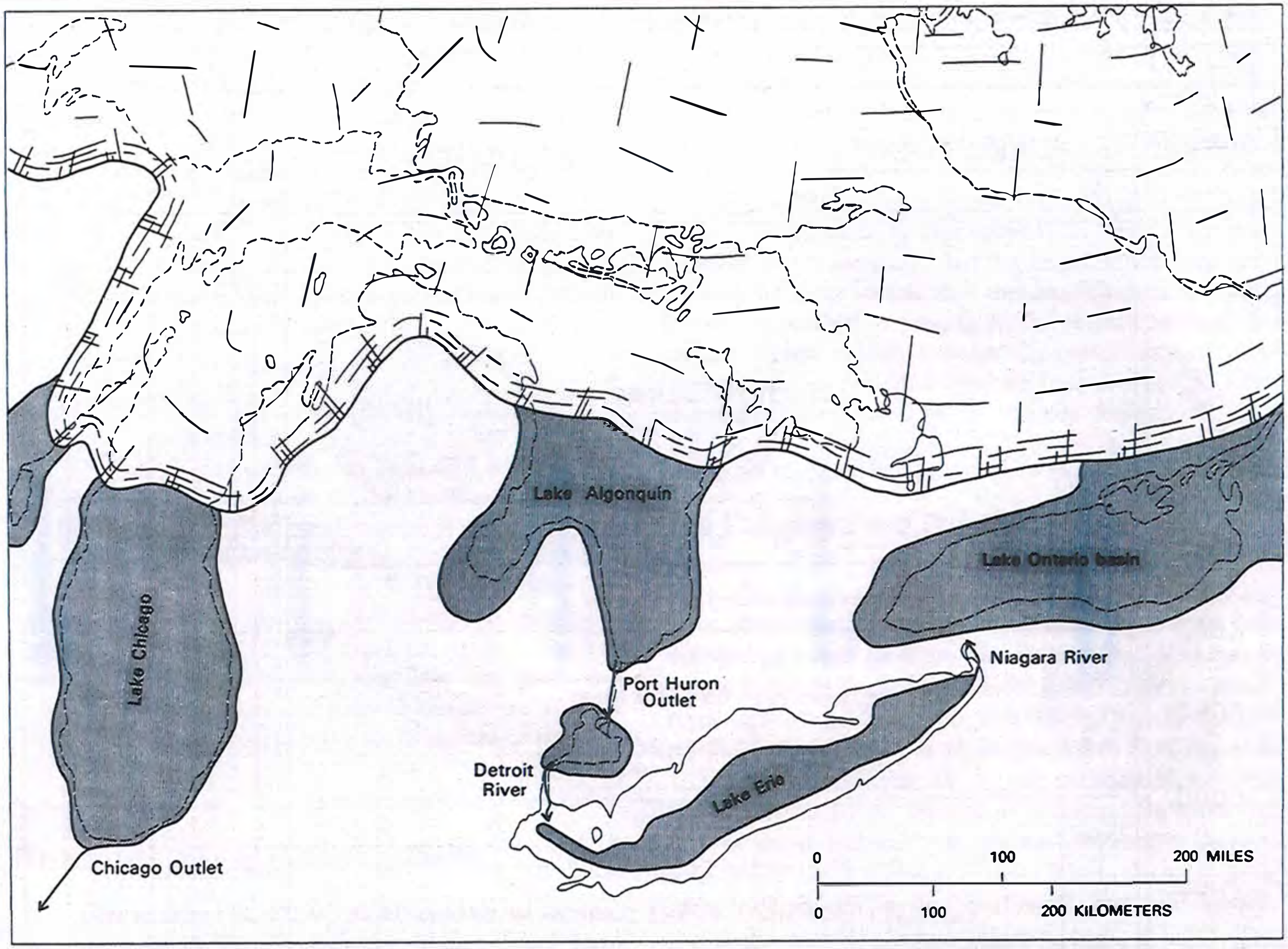


Figure 15. Calumet-level Lake Chicago and Early Lake Algonquin. Overflow was to the south at Chicago and Port Huron at the maximum advance of Two Rivers ice about 11,800 yr B.P. Early Lake Erie drained to the Lake Ontario basin.

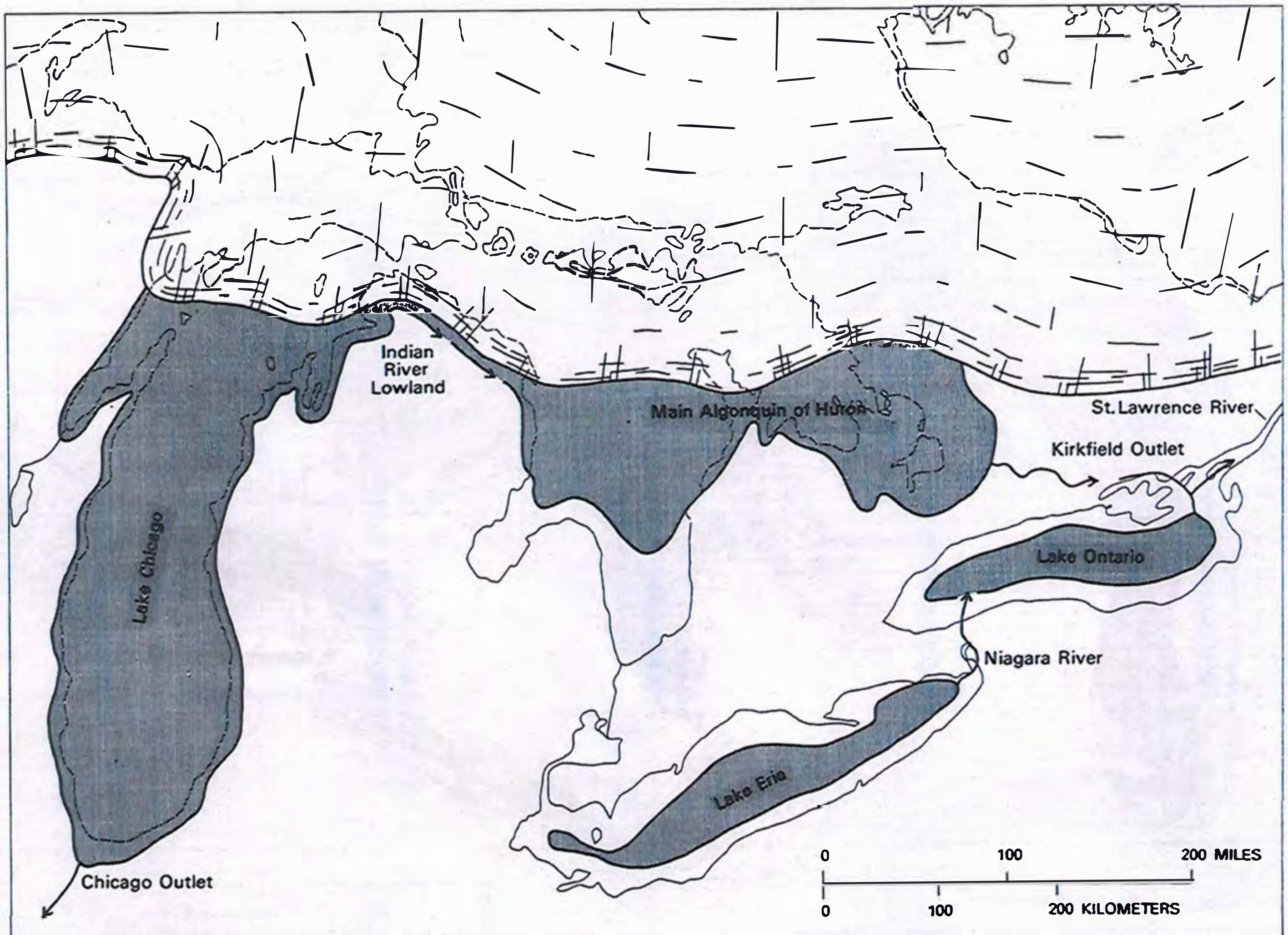


Figure 16. Calumet-level Lake Chicago and the Main Algonquin level of Lake Huron (MAH) (11,600 to 11,300 yr B.P.). Overflow was to the south at Chicago and eastward to Early Lake Ontario at Kirkfield. The Michigan and Huron basins were possibly linked by drainage through the Indian River lowland south of the Mackinac Straits. Lake Erie overflowed to the Lake Ontario basin.

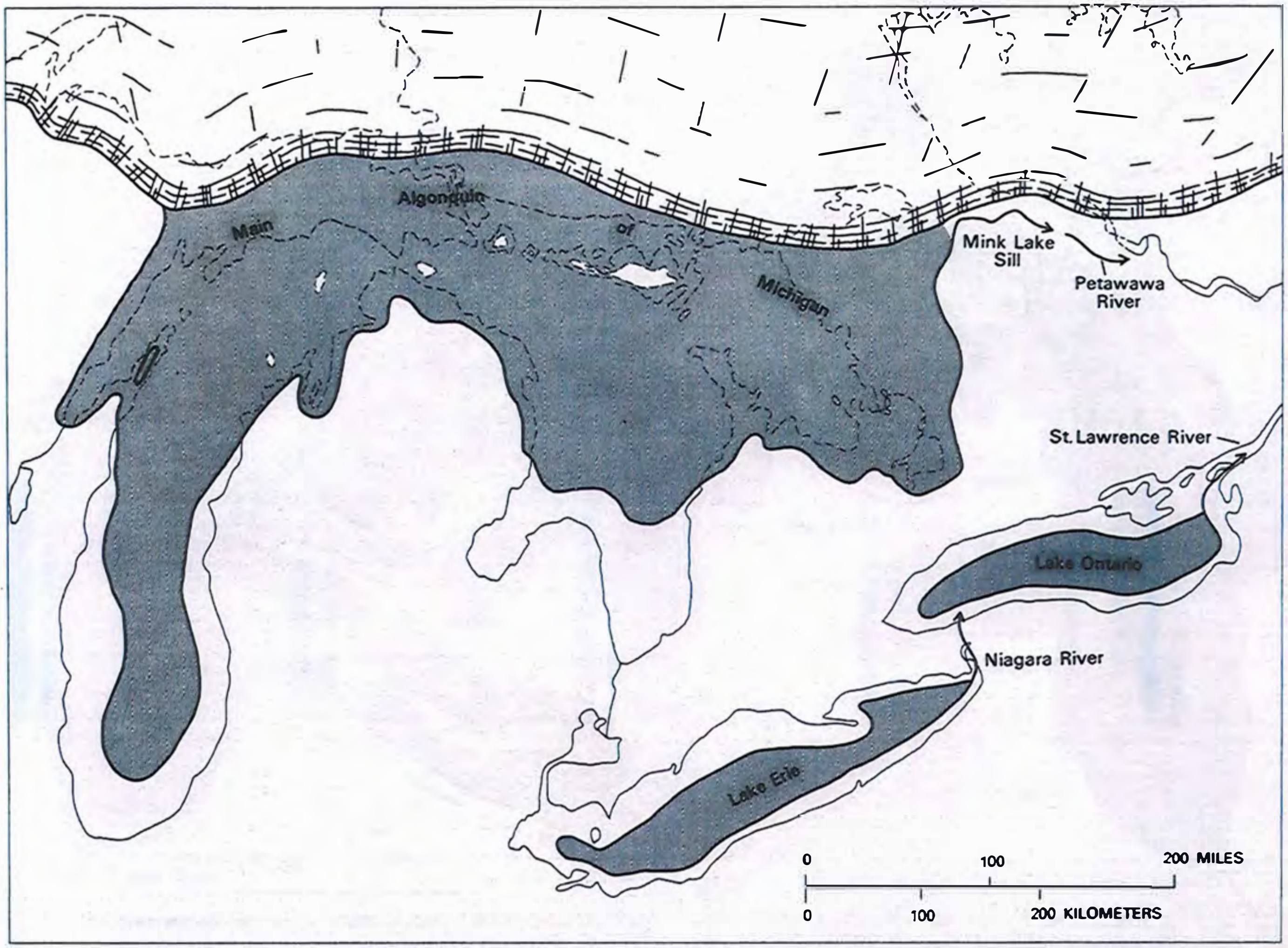


Figure 17. Main Algonquin level of Lake Michigan confluent with the Orillia (?) level of the Lake Huron basin (11,200 to 11,000 yr B.P.). Overflow was eastward to the Ottawa valley at the Mink Lake sill. Lake Erie and Lake Ontario basins contained low lakes controlled by rising northeastern outlets (fig. 5, case 3), which show rising water levels along their western shores.

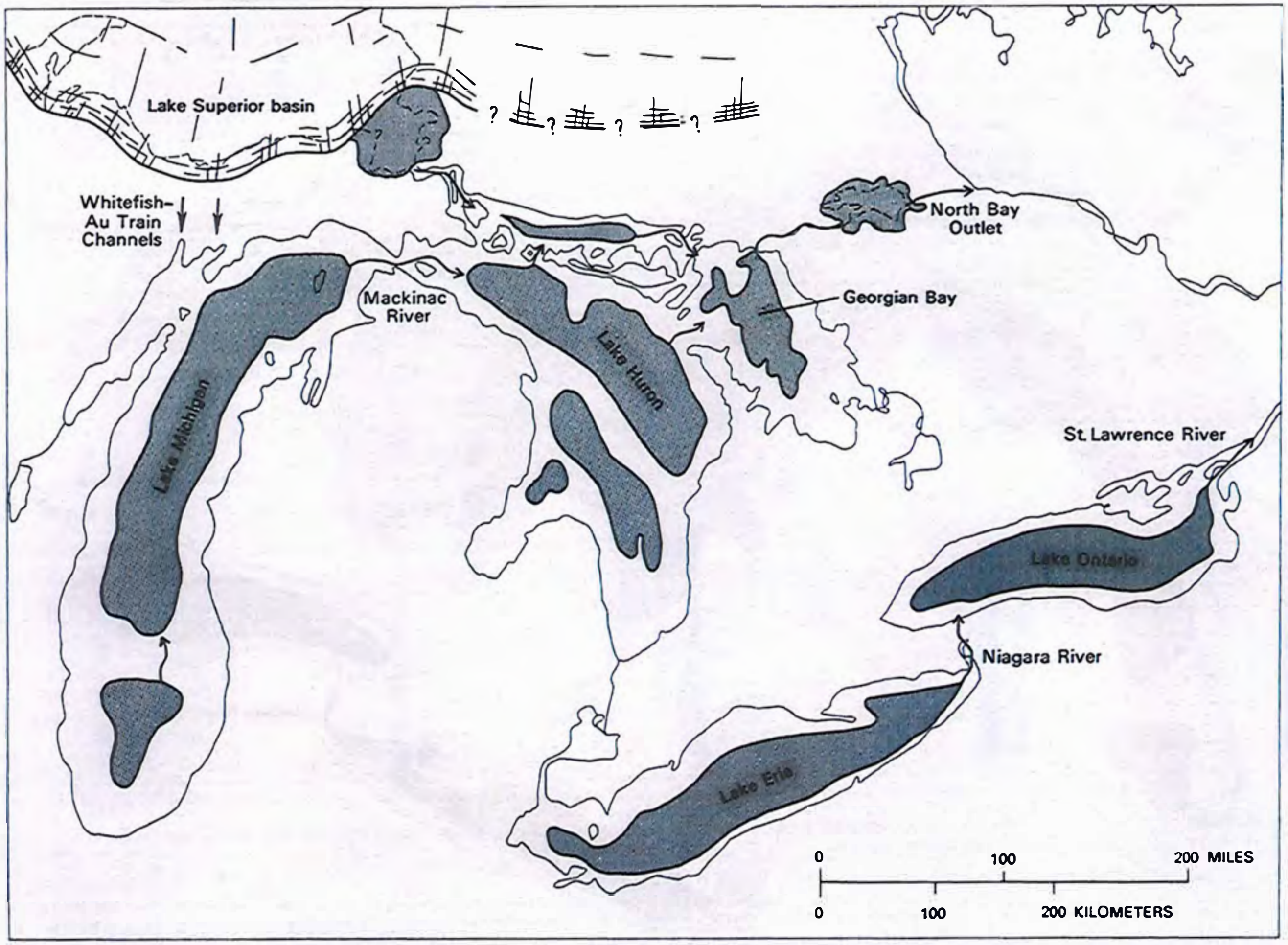


Figure 18. Chippewa and Stanley low levels. Marquette ice filled the Lake Superior basin and supplied overflow through the Whitefish–Au Train channels (9,900 yr B.P.). The upper Great Lakes drained eastward to the Ottawa valley across a controlling sill at North Bay that was deglaciated as early as 10,300 yr B.P. Chippewa-level Lake Michigan overflowed eastward through the Mackinac River channel. Separate lakes occupied the deep basins of Lake Huron and overflowed across the Niagaran escarpment into the Hough low level in Georgian Bay. Lake Erie and Lake Ontario continued to rise and expand westward as their outlets rose.

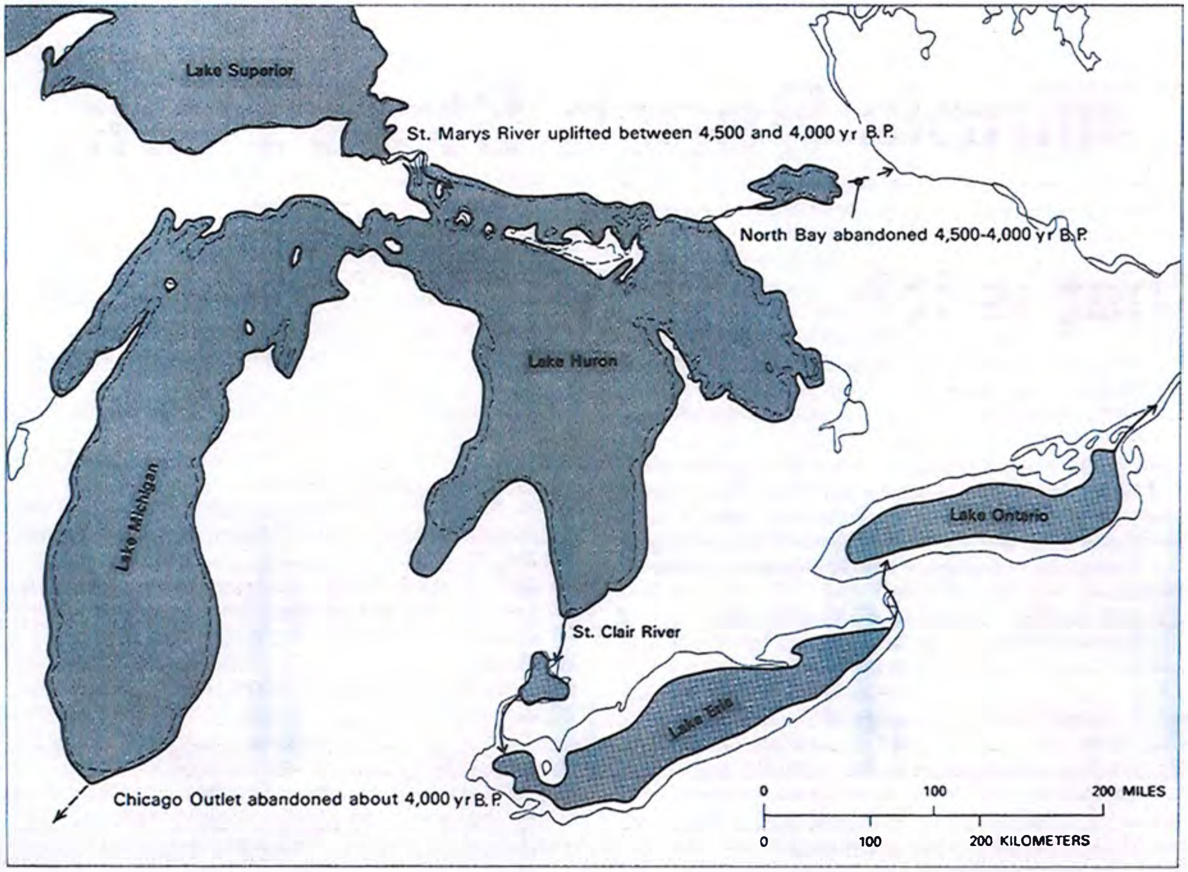


Figure 20. Late Nipissing and Algoma Great Lakes. The rising North Bay outlet reflooded the Lake Michigan, Lake Superior, and Lake Huron basins until overflow returned to first the Port Huron (St. Clair River) and then the Chicago outlets. Lake level rose above the present levels to leave the prominent Nipissing and Algoma terraces. For a brief time, overflow was through three outlets, but the North Bay outlet was abandoned between 4,500 and 4,000 yr B.P. when uplift raised it above the southern outlet controls. Uplift also raised the St. Marys River at about this time, creating a separate Lake Superior. Overflow through the Chicago outlet ceased by 4,000 yr B.P. and may have accommodated a climate-related rise in lake level (Nipissing I). This time period, 4,000 yr B.P., marks the onset of the hydrologically modern upper Great Lakes that continue to overflow through the St. Marys and St. Clair Rivers. Deformation of former Lake Michigan and Lake Huron shorelines now follows the pattern of figure 5, case 2. Lake Erie and Lake Ontario continue to rise in concert with their uplifting eastern outlets.

Illinois Beach State Park

- What is it?

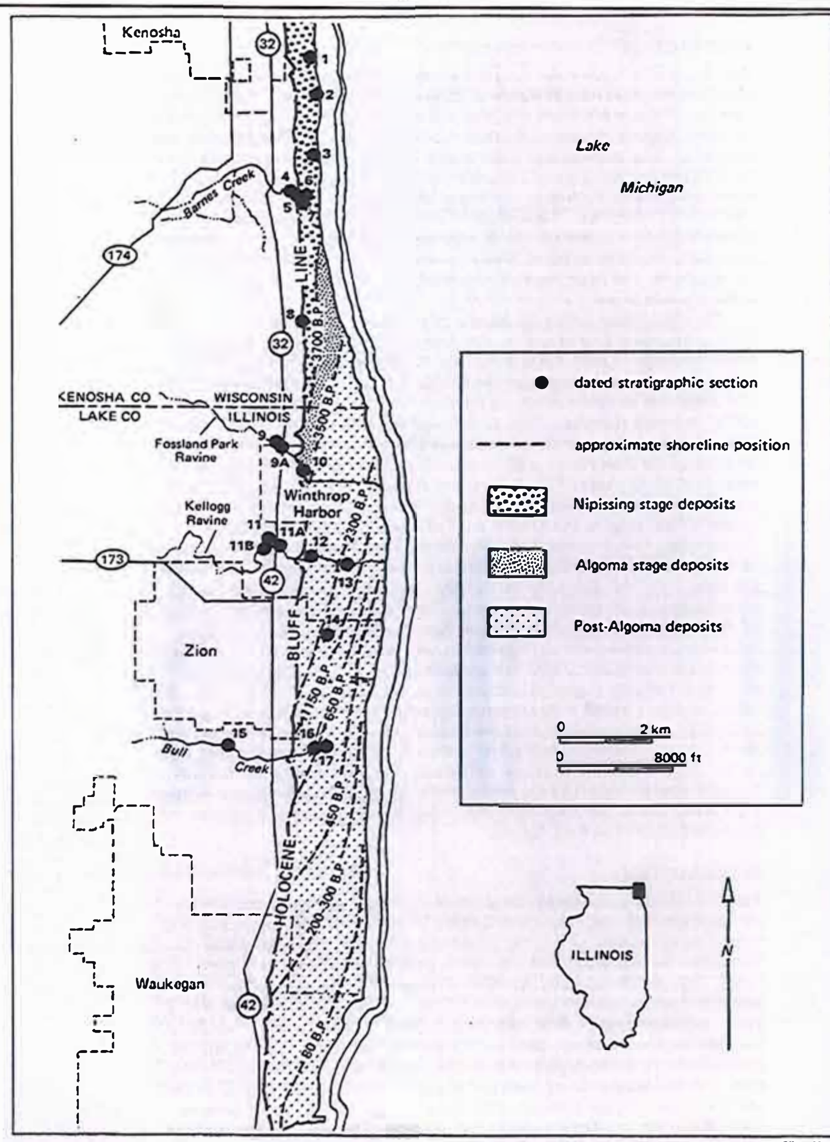


FIGURE 1. Beach ridge progradation sequence and study area.

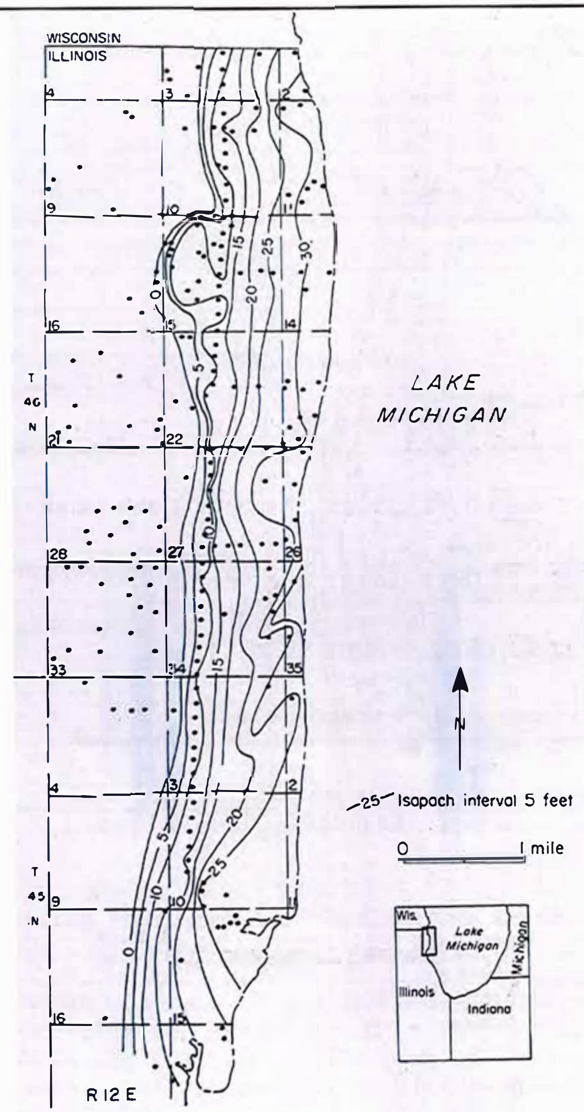
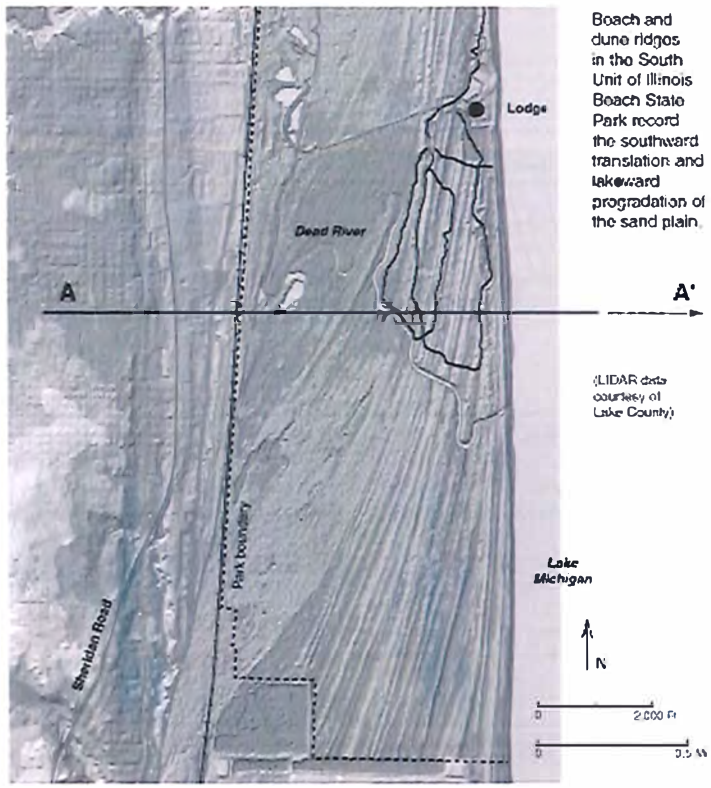


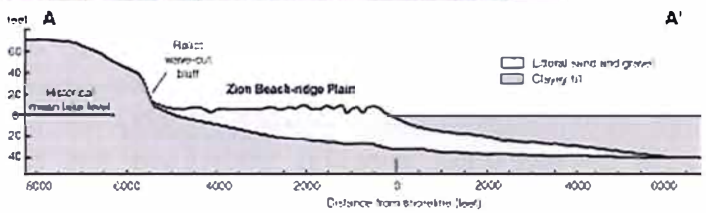
Fig. 5 - Thickness of sediment of beach ridge complex. Datum points are shown.

Stop 1



Beach and dune ridges in the South Unit of Illinois Beach State Park record the southward translation and lakeward progradation of the sand plain.

(LIDAR data courtesy of Lake County)



Generalized cross section showing the beach ridge sediments overlying a relict nearshore profile eroded in till.

(modified from Chrzastowski and Trask 1995) ı9ı<ı.

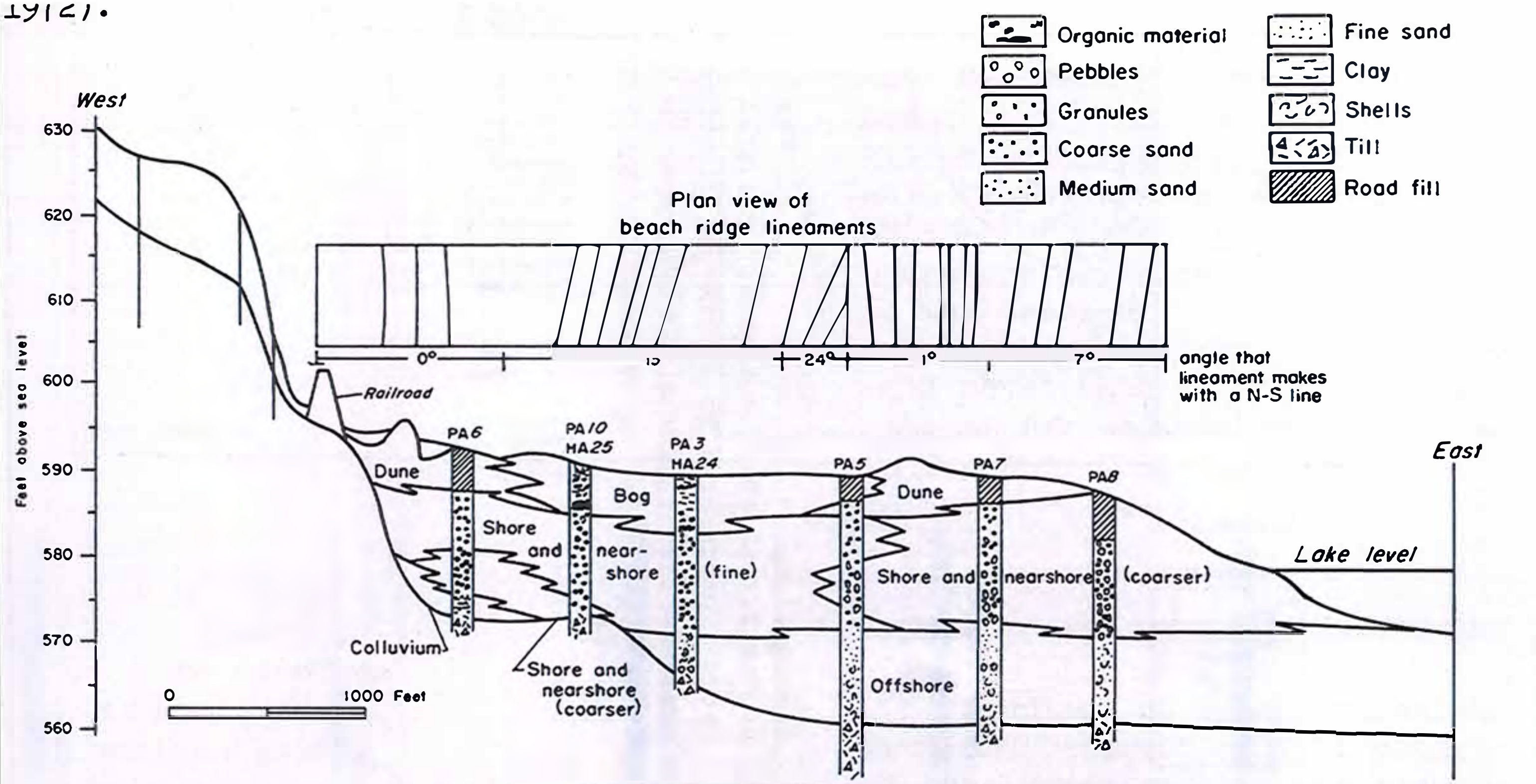
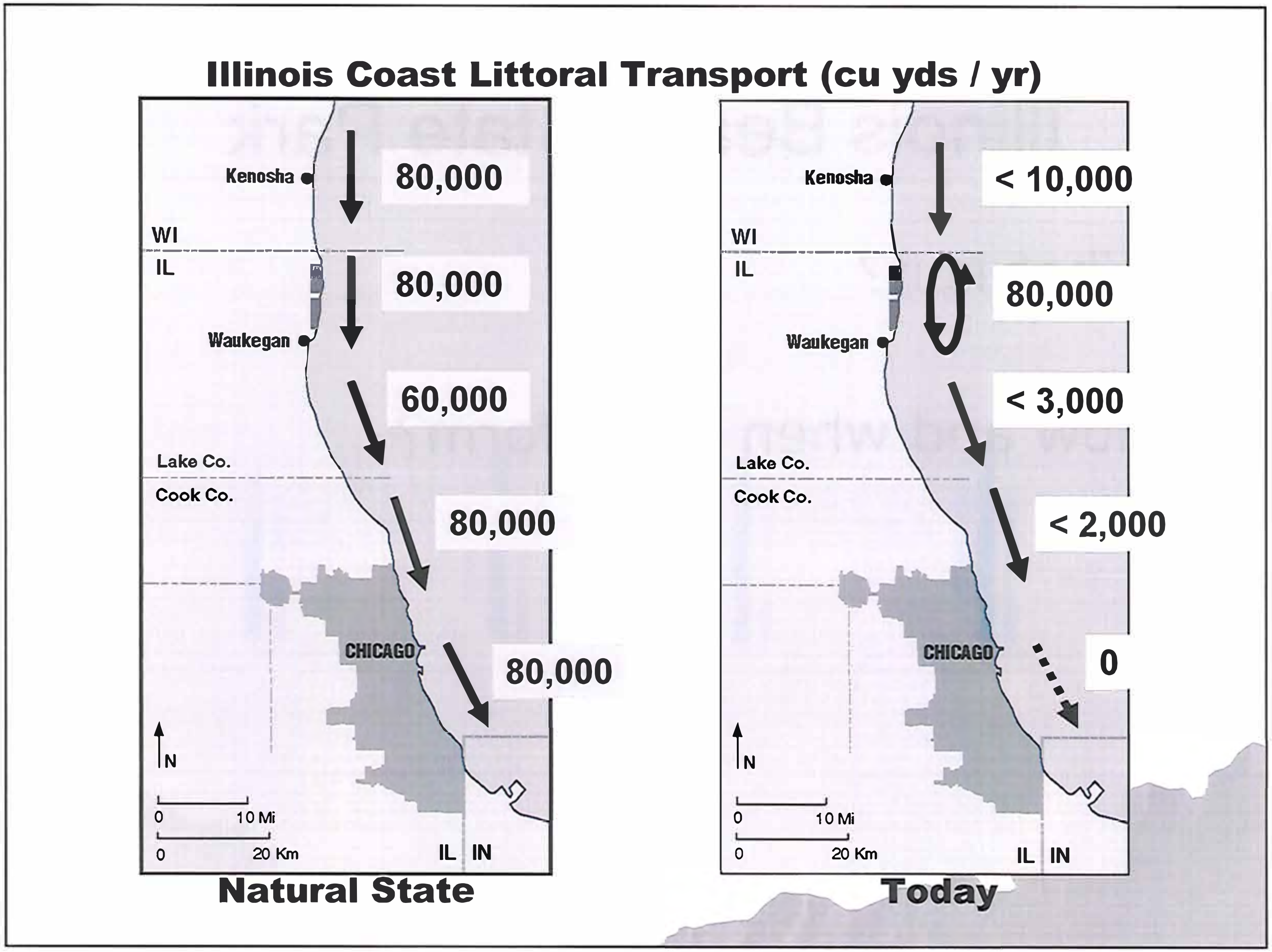


Fig. 18 - East-west cross section through the beach ridge complex along Wadsworth Road (CS3 in fig. 2). The plan view of the lineaments formed by the beach ridges along the cross section show a topographic disconformity near the position of PA5, where ridges oriented at a 24° angle to a north-south line are truncated by ridges oriented in a nearly north-south direction. Gravel layers in the offshore portion of PA7 may be lag deposits formed when erosion truncated the beach ridges.

Illinois Beach State Park

- What is it?
- How and when did it form?



Illinois Coast Littoral Transport (cu yds / yr)
Kenosha
80,000
WI
IL
80,000
Waukegan
60,000
Lake Co.
Cook Co.
80,000
CHICAGO
80,000
N
0
10 Mi
0
20 Km
IL
IN
Natural State
Kenosha
< 10,000
WI
IL
80,000
Waukegan
< 3,000
Lake Co.
Cook Co.
< 2,000
CHICAGO
0
N
0
10 Mi
0
20 Km
IL
IN
Today

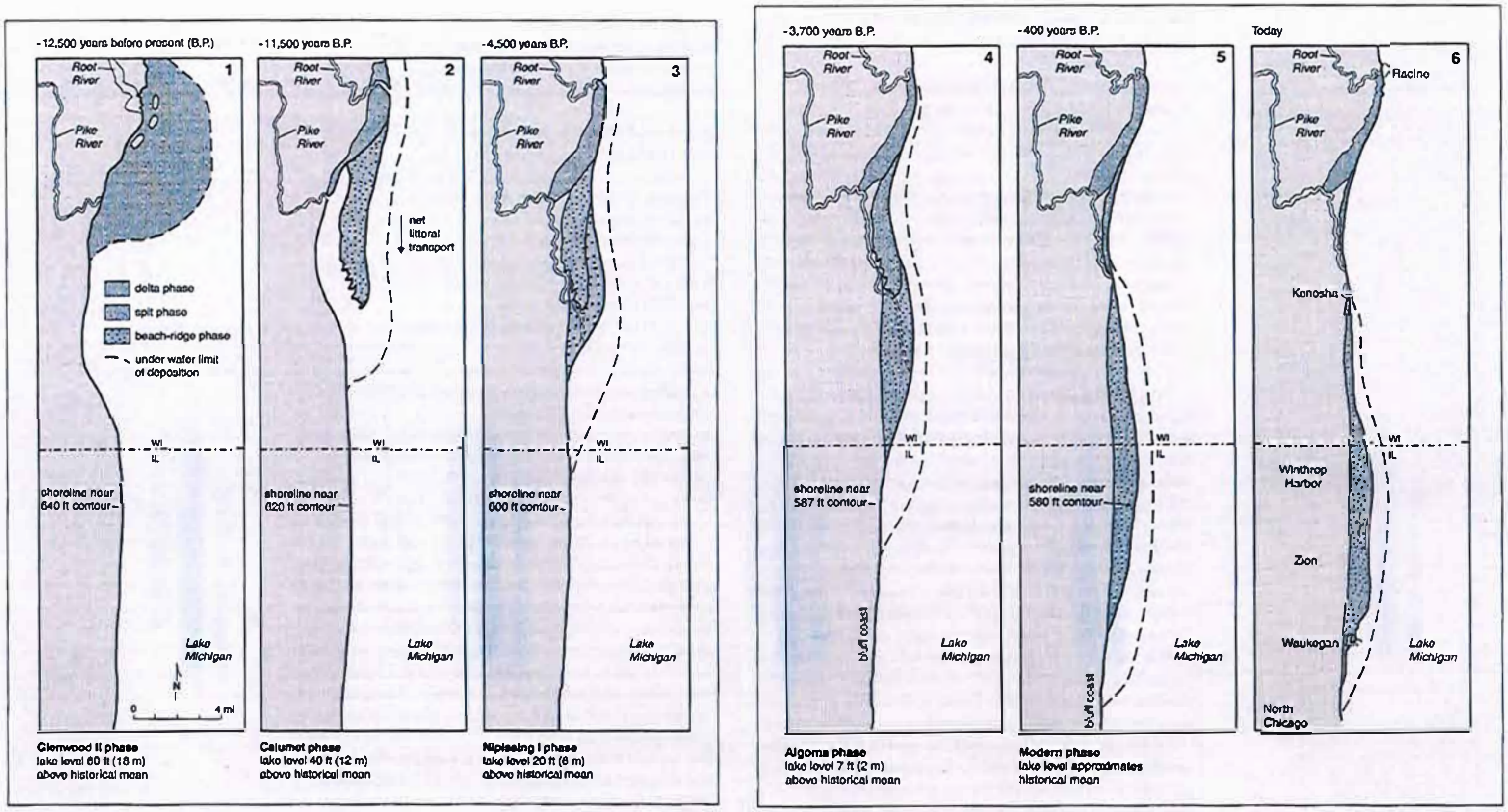
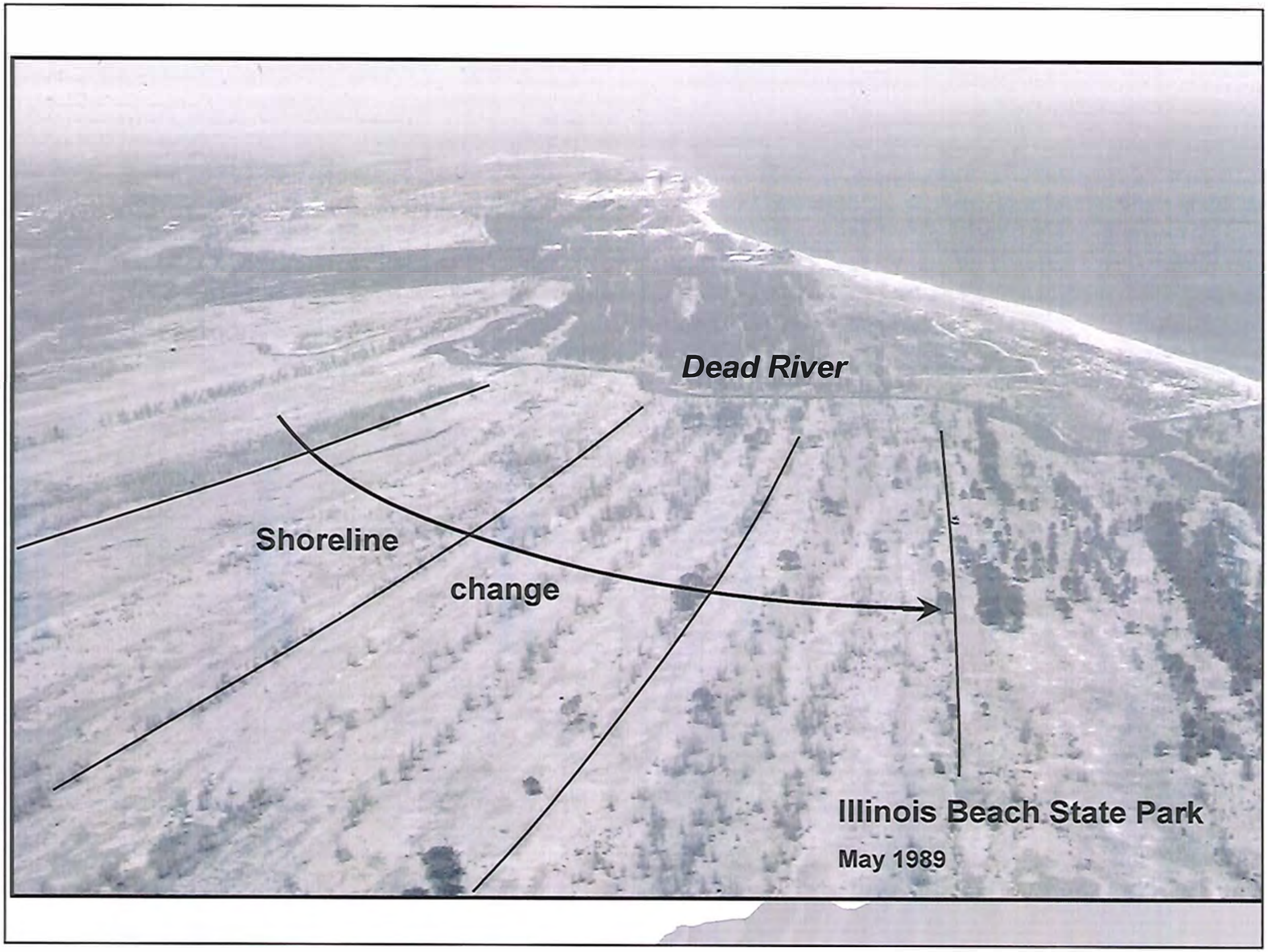


Figure 13 Sequential reconstruction of the coastal geography between Racine, Wisconsin, and North Chicago, Illinois, over the past 12,500 years during the events leading to the formation and evolution of the Zion beach-ridge plain. (From Chrzastowski, unpublished data.)

The ancient delta of this model has been lost to erosion. The coastal bluffs at Racine provide a cross-sectional exposure of the till that was beneath and landward of the glacial delta deposits. During the formation of the delta, a prime factor in preventing the river-supplied sediments from being dispersed southward along the coast was that the glacial ice to the north prevented any significant fetch

from this direction. The open water of southern Lake Michigan only provided a fetch for wave action from southeasterly waves.


Dead River
Shoreline
change
Illinois Beach State Park
May 1989

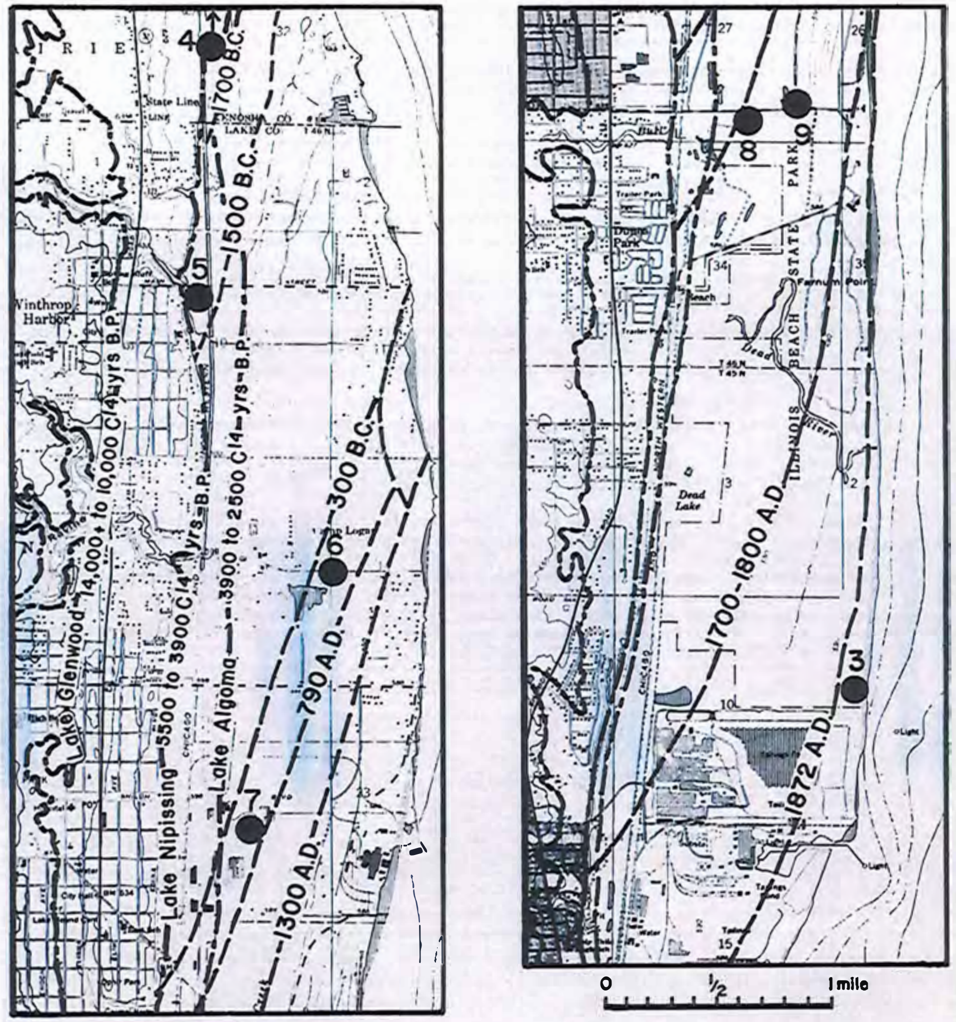
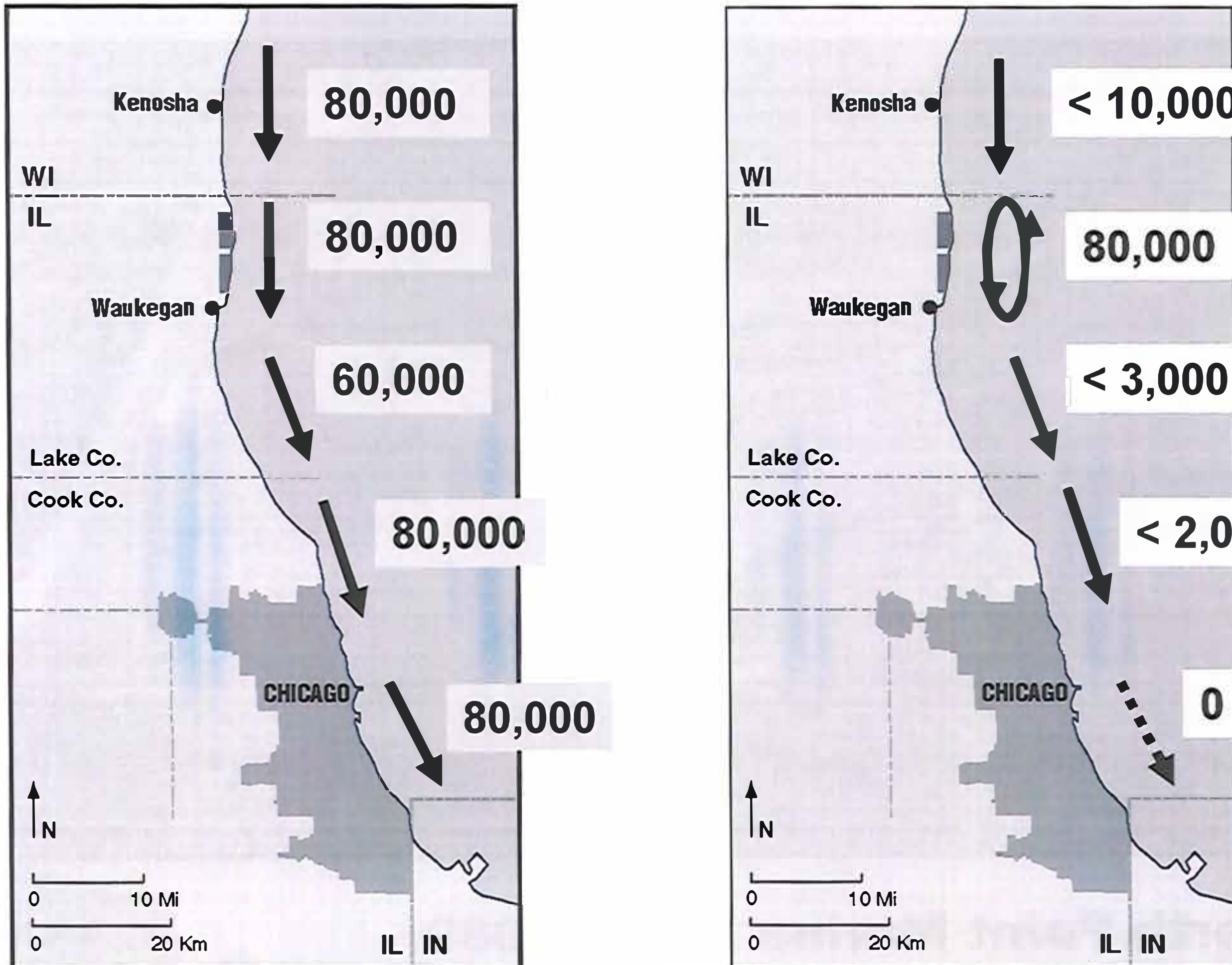


Fig. 14 - Diagram showing preliminary age determinations for beach ridges in the Zion Beach Ridge Complex based on radiometric and archaeologic dating. Approximate shorelines are also given for the Glenwood, Nipissing, and Algoma Lake Stages. Numbered dots refer to sections given in figure 15.

Illinois Beach

Illinois Coast Littoral Transport (cu yds / yr)

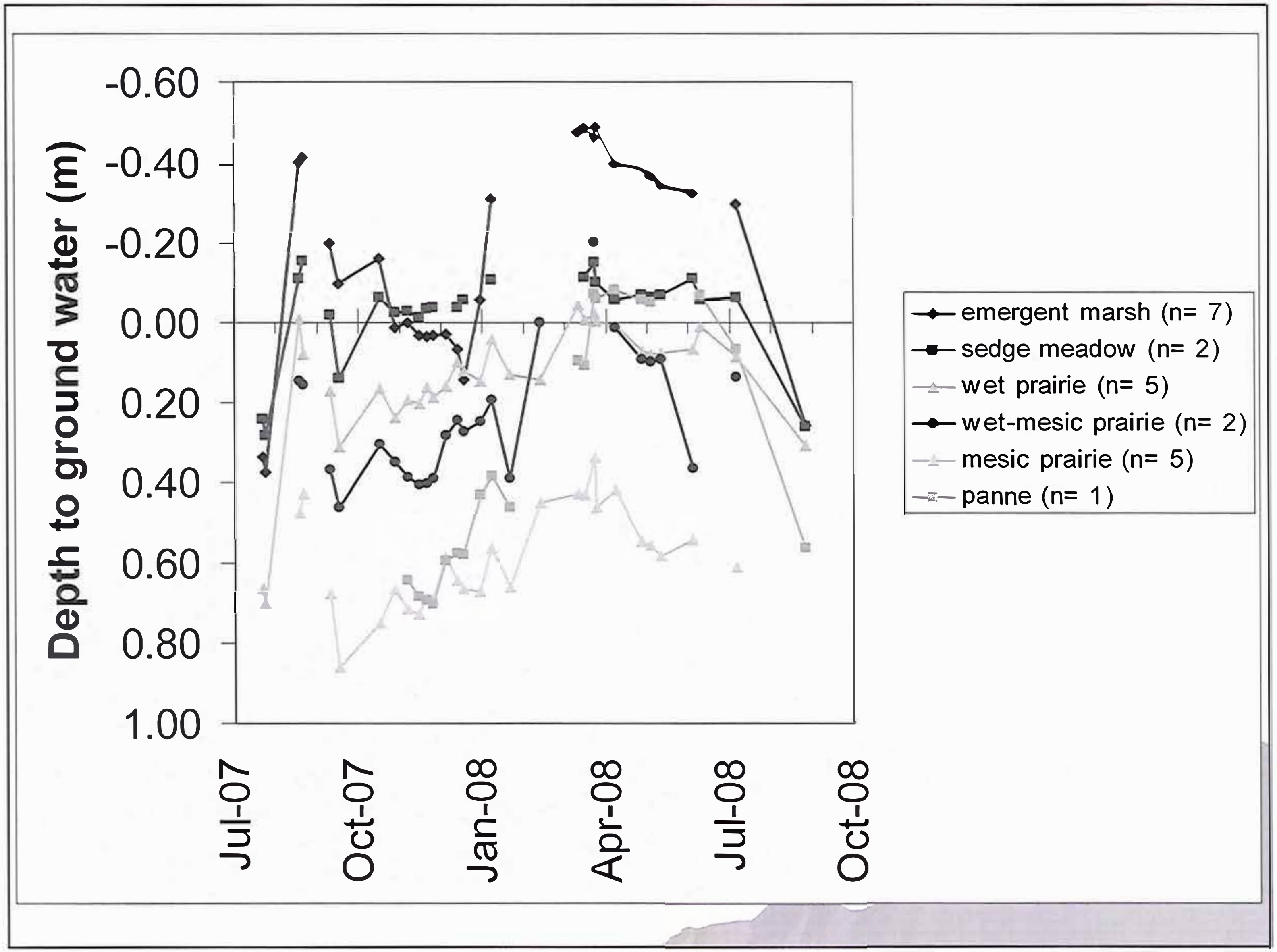


Natural State **Today**

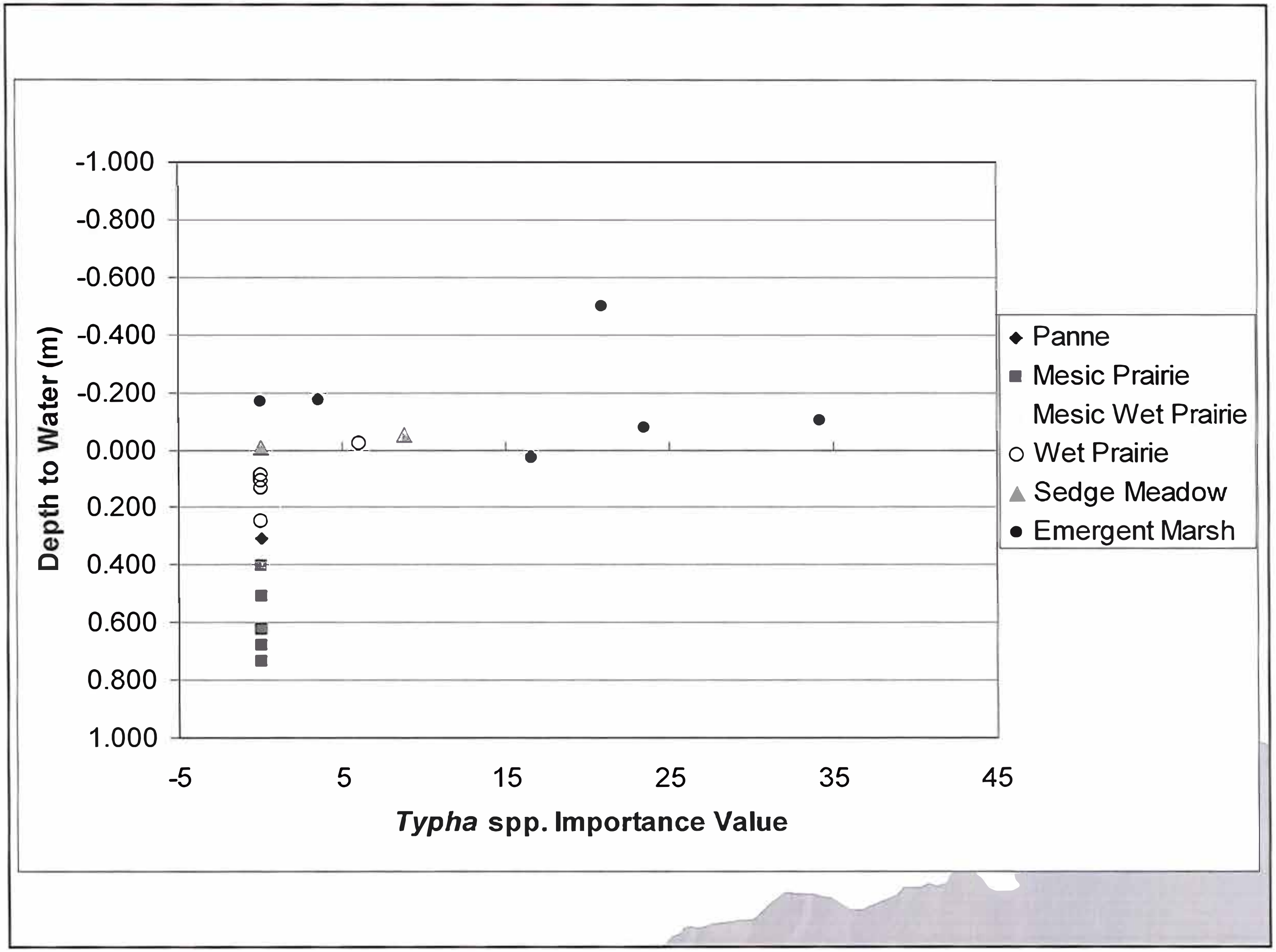
North Point Marina / Aug 1989

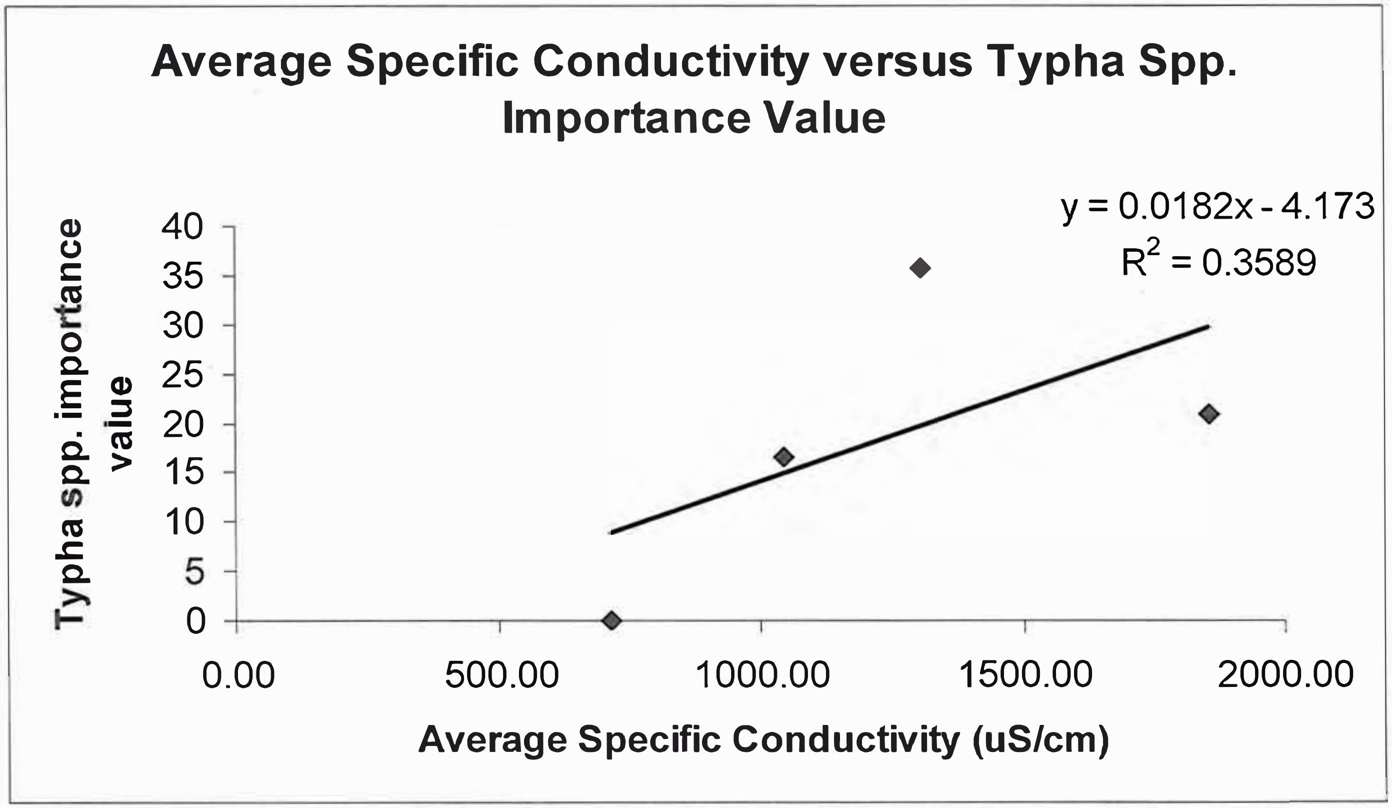
ISGS


Illinois Beach State
July



Depth to ground water (m)
-0.60
-0.40
-0.20
0.00
0.20
0.40
0.60
0.80
1.00
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
emergent marsh (n= 7)
sedge meadow (n= 2)
wet prairie (n= 5)
wet-mesic prairie (n= 2)
mesic prairie (n= 5)
panne (n= 1)


-1.000
-0.800
-0.600
-0.400
-0.200
0.000
0.200
0.400
0.600
0.800
1.000
Depth to Water (m)
-5
5
15
25
35
45
Typha spp. Importance Value
Panne
Mesic Prairie
Mesic Wet Prairie
Wet Prairie
Sedge Meadow
Emergent Marsh


Average Specific Conductivity versus Typha Spp. Importance Value
y = 0.0182x - 4.173
R^2 = 0.3589
Typha spp. importance value
40
35
30
25
20
15
10
5
0
0.00
500.00
1000.00
1500.00
2000.00
Average Specific Conductivity (uS/cm)