

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science Directorate
Geologic Resources Division



Indiana Dunes National Lakeshore

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Indiana Dunes National Lakeshore

indu_geology.pdf

Version: 3/4/2014

Geologic Resources Inventory Map Document for Indiana Dunes National Lakeshore

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Geologic Resources Inventory Map Document



Indiana Dunes National Lakeshore, Indiana

Document to Accompany Digital Geologic-GIS Data

[indu_geology.pdf](#)

Version: 3/4/2014

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Indiana Dunes National Lakeshore, Indiana (INDU).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, geologic cross sections, the geologic report, references and all other pertinent images and information contained in the original publication.

National Park Service (NPS) Geologic Resources Inventory (GRI) Program staff have assembled the digital geologic-GIS data that accompanies this document.

For information about the status of GRI digital geologic-GIS data for a park contact:

Tim Connors
Geologist/GRI Mapping Contact
National Park Service Geologic Resources Division
P.O. Box 25287
Denver, CO 80225-0287
phone: (303) 969-2093
fax: (303) 987-6792
email: Tim_Connors@nps.gov

For information about using GRI digital geologic-GIS data contact:

Stephanie O'Meara
Geologist/GIS Specialist/Data Manager
Colorado State University Research Associate, Cooperator to the National Park Service
1201 Oak Ridge Drive, Suite 200
Fort Collins, CO 80525
phone: (970) 491-6655
fax: (970) 225-3597
e-mail: stephanie.omeara@colostate.edu

About the NPS Geologic Resources Inventory Program

Background

Recognizing the interrelationships between the physical (geology, air, and water) and biological (plants and animals) components of the Earth is vital to understanding, managing, and protecting natural resources. The Geologic Resources Inventory (GRI) helps make this connection by providing information on the role of geology and geologic resource management in parks.

Geologic resources for management consideration include both the processes that act upon the Earth and the features formed as a result of these processes. Geologic processes include: erosion and sedimentation; seismic, volcanic, and geothermal activity; glaciation, rockfalls, landslides, and shoreline change. Geologic features include mountains, canyons, natural arches and bridges, minerals, rocks, fossils, cave and karst systems, beaches, dunes, glaciers, volcanoes, and faults.

The Geologic Resources Inventory aims to raise awareness of geology and the role it plays in the environment, and to provide natural resource managers and staff, park planners, interpreters, researchers, and other NPS personnel with information that can help them make informed management decisions.

The GRI team, working closely with the Colorado State University (CSU) Department of Geosciences and a variety of other partners, provides more than 270 parks with a geologic scoping meeting, digital geologic-GIS map data, and a park-specific geologic report.

Products

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to inventory and review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that identifies a plan to provide digital map data for the park.

Digital Geologic Maps: Digital geologic maps reproduce all aspects of traditional paper maps, including notes, legend, and cross sections. Bedrock, surficial, and special purpose maps such as coastal or geologic hazard maps may be used by the GRI to create digital Geographic Information Systems (GIS) data and meet park needs. These digital GIS data allow geologic information to be easily viewed and analyzed in conjunction with a wide range of other resource management information data.

For detailed information regarding GIS parameters such as data attribute field definitions, attribute field codes, value definitions, and rules that govern relationships found in the data, refer to the NPS Geology-GIS Data Model document available at: <http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm>

Geologic Reports: Park-specific geologic reports identify geologic resource management issues as well as features and processes that are important to park ecosystems. In addition, these reports present a brief geologic history of the park and address specific properties of geologic units present in the park.

For a complete listing of Geologic Resource Inventory products and direct links to the download site visit the GRI publications webpage http://www.nature.nps.gov/geology/inventory/gre_publications.cfm

GRI geologic-GIS data is also available online at the NPS Data Store Search Application: <http://irma.nps.gov/App/Reference/Search>. To find GRI data for a specific park or parks select the appropriate park

(s), enter "GRI" as a Search Text term, and then select the Search Button.

For more information about the Geologic Resources Inventory Program visit the GRI webpage: <http://www.nature.nps.gov/geology/inventory>, or contact:

Bruce Heise
Inventory Coordinator
National Park Service Geologic Resources Division
P.O. Box 25287
Denver, CO 80225-0287
phone: (303) 969-2017
fax: (303) 987-6792
email: Bruce_Heise@nps.gov

The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division.

GRI Digital Map and Source Map Citation

The GRI digital geologic-GIS map for Indiana Dunes National Lakeshore, Indiana (INDU):

GRI Digital Geologic Map of Indiana Dunes National Lakeshore and Vicinity, Indiana (GRI MapCode INDU)

Source digital data,

Thompson, Todd A. and Johnson, Matthew R. (digital compilation), 2014, Quaternary Geology, Southern Lake Michigan Rim: Quaternary Geology Map of Lake, Porter, and LaPorte Counties, Northern Indiana, Indiana Geological Survey, unpublished IGS digital data (ESRI geodatabase), 1:48,000 scale. (*GRI Source Map ID 75806*).

Users are encouraged to refer to the IGS source digital data metadata, QUATERNARY_GEOLOGY_SOUTHERN_LAKE_MICHIGAN_RIM_2014.txt, for information about the source digital data and its production, accuracy, use constraints, release, disclaimer and other information.

Additional information pertaining to each source map is also presented in the Source Map Information (INDUMAP) table included with the GRI geology-GIS data.

Map Unit List

The geologic units present in the GRI Digital Geologic Map of Indiana Dunes National Lakeshore and Vicinity, Indiana map are listed below. Units are listed with their assigned unit symbol and unit name (e. g., Qlmm - Fill and modified/disturbed land). Units are listed by Geologic Sequence and Terrain. No description for water is provided. Information about each geologic unit is also presented in this dataset's Geologic Unit Information (INDUUNIT) table included with the GRI geology-GIS data.

Quaternary Period

Holocene Epoch

Lake Michigan Sequence

Qlmm - [Fill and modified/disturbed land](#)

Tolleston Terrain

Qlma1 - [Channel and floodplain](#)

Qlma2 - [Channel and floodplain over older valley fill](#)

Qlmts - [Strandplain](#)

Qlmtd - [Dunes](#)

Qlmtl - [Lagoon](#)

Late Wisconsin Glaciation

Lake Michigan Sequence

Calumet Terrain

Qlmcn - [Nearshore](#)

Qlmcd - [Dunes](#)

Qlmcl - [Lagoon](#)

Glenwood Terrain

Qlmgd - [Nearshore, dunes](#)

Qlmgs - [Spit](#)

Qlmgp - [Spit platform](#)

Lake Border Sequence

Lake Terrain

Qlb11 - [Glenwood embayment fill](#)

Qlb12 - [Beach, colluvial slope, and fan delta complex](#)

Qlb13 - [Ice-marginal lake complex](#)

Moraine Terrain

Qlbm1 - [Lake border ridges](#)

Qlbr1 - [Tinley inner ramp](#)

Qlbr2 - [Tinley collapsed ramp](#)

Qlbm2 - [Tinley ridge](#)

Qlbm3 - [Tinley out fringe](#)

Qlbm4 - [Ice-marginal drainage trough](#)

Valparaiso Megasequence

Moraine Terrain

Qvr1 - [Inner ramp](#)

Qvr2 - [Hummocky inner ramp](#)

Qvr3 - [Dissected ramp](#)

- Qvm1 - [Collapsed head-of-fan](#)
- Qvm2a - [Broad upland](#)
- Qvm2b - [Core upland](#)
- Qvm3 - [Inner fringe](#)
- Qvm4 - [Outer fringe](#)
- Qvm5 - [Outermost fringe](#)
- Qvm6 - [Meltwater-scoured core](#)
- Qvm7 - [Intra-channel low](#)
- Qvm8 - [Intra-channel/collapsed drainage](#)

Tunnel Channel Terrain

- Qvt1 - [Collapsed channel](#)
- Qvt2 - [Filled channel](#)
- Qvt3 - [Dissected channel walls](#)
- Qvf1 - [Upper fan surface](#)

Outwash-fan Terrain

- Qvf2 - [Collapsed fan](#)
- Qvf3 - [Mixed fan](#)
- Qvf4 - [Open fan channels](#)

Kankakee Terrain

- Qvf5 - [Lower fan surface](#)
- Qvs - [Dunes](#)
- Qvk - [Kankakee River floodplain](#)

Map Unit Descriptions

Descriptions of all geologic map units are presented below. All unit description provided by the primary author of the source data, Todd A. Thompson (Indiana Geological Survey).

Qlmm - Filled and modified/disturbed land (Holocene)

Genetic Description: Filled land and land that is extensively modified by human activities. Generic Description: Mixed natural and man-made materials, and areas changed primarily by excavation. This map unit includes data from Kay and others (1997). Generic Description: Mixed natural and man-made materials, and areas changed primarily by excavation. This map unit includes data from Kay and others (1997).

Qlma1 - Channel and floodplain (Holocene)

Genetic Description: Modern stream sediment deposited in floodplains and channel bottoms. Generic Description: Stratified clay, silt, sand, and gravel with variable thicknesses of interbedded and overlying organic matter.

Qlma2 - Channel and floodplain over older valley fill (Holocene)

Genetic Description: Modern stream sediment overlying older estuarine, lagoonal, and alluvial sediment. Generic Description: Stratified marl, fossiliferous silt to fine-grained sand, organic sediment, and poorly sorted sand to clay.

Qlmts - Strandplain (Holocene)

Genetic Description: Beach ridges, spits, and swales of the Tolleston Beach. Accumulated as nearshore and onshore sediment from the Nipissing phase of ancestral Lake Michigan to the present. Generic Description: Very fine grained sand and silt to gravel overlain by fine- to medium-grained sand. Stratification variable based on coastal facies.

Qlmt d - Dunes (Holocene)

Genetic Description: Large (5- to 50-m-high) parabolic dunes associated with the Tolleston Beach. Formed during the Nipissing phase of ancestral Lake Michigan to the present. Generic Description: Well-sorted fine- to medium-grained sand overlying Tolleston strandplain (Qlmts) sediment. Cross and horizontal stratification but may appear unstratified because of uniform grain size and composition.

Qlmtl - Lagoon (Holocene)

Genetic Description: Lacustrine, palustrine, and minor eolian sediment that accumulated landward of the

Tolleston Beach as washover fans, marl and clay ponds, and wetlands. Primarily accumulated during the Nipissing phase of ancestral Lake Michigan but accumulation continues today in wetland areas. Generic Description: Stratified peat, marl, calcareous clay, silt, and sand. The unit generally fines upward from sand interbedded with calcareous clay and silt to isolated marl lenses surrounded by peat. In places, overlies Calumet nearshore (Qlmcn) along its southern margin and interfingers with Tolleston dune (QlmtD) deposits along its northern margin.

Qlmcn - Nearshore (late Wisconsin (Pleistocene))

Genetic Description: Nearshore sediment of the Calumet Beach that forms a flat platform lakeward of Calumet Beach dunes (QlmcD). Accumulated during the Calumet phase of ancestral Lake Michigan. Lakeward margin of this deposit is scarped west of Deep River and overlapped by a small Algonquin-phase beach ridge east of Deep River. Generic Description: Stratified very fine grained sand to sandy gravel that generally coarsens upward. Stratification variable based on coastal facies.

QlmcD - Dunes (late Wisconsin (Pleistocene))

Genetic Description: Dune deposits capping the landward part of the Calumet Beach. Accumulated during the Calumet phase of ancestral Lake Michigan. Generic Description: Well-sorted fine- to medium-grained sand overlying Calumet nearshore (Qlmcn) sediment. Cross and horizontal stratification but may appear unstratified because of uniform grain size and composition.

QlmcI - Lagoon (late Wisconsin (Pleistocene))

Genetic Description: Lacustrine, palustrine, and eolian sediment that accumulated landward of the Calumet Beach. Primarily accumulated during the Calumet phase of ancestral Lake Michigan but accumulation continues today in wetland areas. Generic Description: Stratified peat, marl, sandy marl, fine- to medium-grained sand, and marly sand.

QlmgD - Nearshore, dunes (late Wisconsin, Pleistocene))

Genetic Description: Nearshore and dune deposits of the mainland-attached Glenwood Beach. Accumulated during the Glenwood phase of ancestral Lake Michigan. Nearshore deposits overlap the lakeward margin and accumulated lakeward of wave-cut scarps of the Lake Border Moraine (QlBm1). These sediments are truncated westward by the Calumet Beach. Generic Description: Well- to poorly sorted fine-grained sand to sandy gravel. Stratification variable based on coastal facies.

QlmgS - Spit (late Wisconsin (Pleistocene))

Genetic Description: Spit of nearshore and onshore deposits that accumulated during the Glenwood phase of ancestral Lake Michigan. Spit formed westward of the Lake Border Moraine (QlBm1) and extends to the northwestern edge of the Glenwood spit platform (Qlmgp). Generic Description: Well- to

moderately sorted fine- to medium-grained sand with some coarse-grained sand and sandy gravel. Variable stratification based on coastal facies. Overlies and intercalates with Glenwood spit platform (Qlmgp) and Glenwood embayment fill (Qlb1) deposits.

Qlmgp - Spit platform (late Wisconsin (Pleistocene))

Genetic Description: Nearshore deposits of the Glenwood phase of ancestral Lake Michigan. Form a level platform on which the Glenwood spit (Qlmgs) was deposited. Generic Description: Moderately sorted fine- to medium-grained sand. Stratification variable based on coastal facies. Fills depressions in the underlying Lake Border Sequence.

Qlb1 - Glenwood embayment fill (late Wisconsin (Pleistocene))

Genetic Description: Proglacial and back-barrier lacustrine sediment that accumulated during the advance to and development of the Lake Border Moraine. Also formed as lagoonal deposits landward of the Glenwood Griffith spit (Qlmgs). Generic Description: Stratified coarsening-upward sequence from sand to silt and capped by clay.

Qlb2 - Beach, colluvial slope, and fan delta complex (late Wisconsin (Pleistocene))

Genetic Description: Nearshore, colluvium, and deltaic sediment associated with the wave-washed lakeward edge of the Tinley and Valparaiso Moraines and discharge from ancestral Deep River, Salt Creek, and Trail Creek. Forms an indistinct boundary between the Glenwood embayment fill (Qlb1) and landward moraines. Generic Description: Clay, silt, and fine sand that abuts and onlaps diamicton, and fan-shaped sand and gravel. Variable stratification associated with coastal and deltaic facies.

Qlb3 - Ice-marginal lake complex (late Wisconsin (Pleistocene))

Genetic Description: Proglacial lacustrine and subaqueous debris flow sediment deposited in an isolated lake in northern Porter County. Overlies fan deposits of the Valparaiso Megasequence. Genetic Description: Proglacial lacustrine and debris flow sediment, and subglacial deposits forming subdued to hummocky, elongated northeast to southwest, and east-to-west ridges known as the Lake Border Moraine. Associated with a single glacial advance and retreat. Generic Description: Stratified sand, silt, and clay with some diamicton.

Qlbm1 - Lake border ridges (late Wisconsin (Pleistocene))

Genetic Description: Proglacial lacustrine and debris flow sediment, and subglacial deposits forming subdued to hummocky, elongated northeast to southwest, and east-to-west ridges known as the Lake Border Moraine. Associated with a single glacial advance and retreat. Generic Description: Stratified and contorted clay loam, silty clay loam, and silty clay diamicton with some stratified clay, silt, and

sand and gravel deposits.

Qlbr1 - Tinley inner ramp (late Wisconsin (Pleistocene))

Genetic Description: Proglacial, subglacial, and supraglacial sediments forming a north- and northwestward-sloping surface that rises south- and southeastward to the crest of the Tinley Moraine.

Generic Description: Clay loam, silty clay loam, and silty clay diamicton that overlies Valparaiso Megasequence and other older glacial deposits.

Qlbr2 - Tinley collapsed ramp (late Wisconsin, Pleistocene))

Genetic Description: Proglacial, subglacial, and supraglacial sediments forming a northward-sloping surface that rises southward to the crest of the Tinley Moraine, marked with ice-block depressions.

Generic Description: Clay loam, silty clay loam, and silty clay diamicton that overlies Valparaiso Megasequence and other older glacial deposits.

Qlbrm2 - Tinley ridge (late Wisconsin, Pleistocene))

Genetic Description: Proglacial, subglacial, and supraglacial sediment that form the east-to-west and northeast-to-southwest crest of the Tinley Moraine. Associated with a single glacial advance and retreat.

Generic Description: Stratified and massive clay loam, silty clay loam, and silty clay diamicton with pockets of silt, sand, and gravel within the diamicton. Overlies Valparaiso Megasequence fan deposits in the western part of the area and older proglacial lacustrine deposits in the eastern part of the area.

Qlbrm3 - Tinley outer fringe (late Wisconsin, Pleistocene))

Genetic Description: Proglacial sediment forming a southward-sloping surface away from the Tinley ridge (Qlbrm2). Generic Description: Silty clay and silty clay-loam diamicton, and sand overlying diamicton of the Valparaiso Megasequence

Qlbrm4 - Ice-marginal drainage trough (late Wisconsin (Pleistocene))

Genetic Description: Eroded proglacial sediment forming an east-to-west-oriented trough south of the Tinley ridge (Qlbrm2) and outer fringe (Qlbrm3). Originally routed meltwater away from the Tinley ice margin. Generic Description: Silty clay and silty clay-loam diamicton, and sand overlying diamicton of the Valparaiso Megasequence.

Qvr1 - Inner ramp (late Wisconsin (Pleistocene))

Genetic Description: Subglacial sediments that form a wide, gently northward-sloping surface with low to moderate relief that grades southward into the hummocky Valparaiso Moraine core. Generic Description:

Uniformly textured silty clay diamicton similar to the moraine core (Qvm2a, Qvm2b). Overlies fan sediments of the Valparaiso Megasequence.

Qvr2 - Hummocky inner ramp (late Wisconsin (Pleistocene))

Genetic Description: Subglacial sediment forming a narrow, northwestward-sloping surface that rises to an abrupt southeastern terminus at the Valparaiso Moraine's inner edge. Generic Description: Fine-grained diamicton of variable texture; is laterally discontinuous.

Qvr3 - Dissected ramp (late Wisconsin, Pleistocene))

Genetic Description: Subglacial sediments forming a rugged, northward-sloping surface dissected by northwest-trending streams flowing from the moraine crest to Deep River. Generic Description: Uniform to highly variable textured diamicton similar to adjacent ramp deposits (Qvr1 or Qvr2).

Qvm1 - Collapsed head-of-fan (late Wisconsin, Pleistocene))

Genetic Description: Supraglacial debris flows and proximal fan sediments forming an irregular, moderate- to high-relief hummocky topography in the eastern part of the map area. A steep, north-facing hill marks the ice-contact position (southern position of the glacier edge). High relief associated with incised north-draining valleys and kettles. Generic Description: Thin to locally absent diamicton interbedded with discontinuous sand. Overlies a thick sequence of clay and sandy shale-rich gravel.

Qvm2a - Broad upland (late Wisconsin, Pleistocene))

Genetic Description: Ice-marginal and supraglacial debris flow sediments, and subglacial diamicton forming a broad, moderate-relief hummocky topography upland of the Valparaiso Moraine in the western part of the map area. Generic Description: Uniform silty clay to silty clay loam to loam diamicton. Overlies a coarsening-upward sequence of proximal fan deposits of the Valparaiso Megasequence.

Qvm2b - Core upland (late Wisconsin, Pleistocene))

Genetic Description: Ice-marginal and supraglacial debris flow sediments forming a narrow, moderately hummocky topography upland of the Valparaiso Moraine in the eastern part of the map area. Generic Description: Variable textured silty clay-loam diamicton. Overlies a coarsening-upward sequence of proximal fan deposits of the Valparaiso Megasequence.

Qvm3 - Inner fringe (late Wisconsin, Pleistocene))

Genetic Description: Ice marginal debris flow sediments forming a southward-sloping and southward-thinning cap over distal fan sediments of the Valparaiso Megasequence. Creates the gently rolling

topography of the southern slope of the Valparaiso Moraine. Dissected by tunnel channels and valleys extending from the broad upland (Qvm2a) and core upland (Qvm2b). Generic Description: Multiple thin beds of diamicton that thin collectively southward. Grades into the outer fringe (Qvm4). Units Qvm3, Qvm4, and Qvm5 are composed of the same material, and are differentiated only by an overall gradual decrease in thickness and increase in dissection by gullies.

Qvm4 - Outer fringe (late Wisconsin, Pleistocene)

Genetic Description: Ice marginal debris flow sediments forming a southward-sloping and southward-thinning cap over distal fan sediments of the Valparaiso Megasequence. Creates the gently rolling topography of the southern slope of the Valparaiso Moraine. Dissected by tunnel channels and valleys extending from the broad upland (Qvm2a) and core upland (Qvm2b). Generic Description: Multiple thin beds of diamicton that thin collectively southward. Grades from the inner fringe (Qvm3) into the outermost fringe (Qvm5). Units Qvm3, Qvm4, and Qvm5 are composed of the same material, and are differentiated only by an overall gradual decrease in thickness and increase in dissection by gullies.

Qvm5 - Outermost fringe (late Wisconsin, Pleistocene)

Genetic Description: Ice marginal debris flow sediments forming a southward-sloping and southward-thinning cap over distal fan sediments of the Valparaiso Megasequence. Creates the gently rolling topography of the southern slope of the Valparaiso Moraine. Dissected by tunnel channels and valleys extending from the broad upland (Qvm2a) and core upland (Qvm2b). Generic Description: Multiple thin beds of diamicton that thin collectively southward. Grades from the outer fringe (Qvm4) and terminates southward. Units Qvm3, Qvm4, and Qvm5 are composed of the same material, and are differentiated only by an overall gradual decrease in thickness and increase in dissection by gullies.

Qvm6 - Meltwater-scoured core (late Wisconsin (Pleistocene))

Genetic Description: North-to-south-oriented linear depressions of pockmarked topography crossing the broad upland (Qvm2a) and inner fringe (Qvm3) of the Valparaiso Moraine. Generic Description: Eroded ice marginal and debris flow sediment forming north-to-south-oriented linear tracks crossing the broad upland (Qvm2a) in the western part of the map area. Represents incipient tunnel channels carved by subglacial meltwater. Generic Description: Silty clay to silty clay-loam diamicton similar to Qvm2a.

Qvm7 - Intra-channel low (late Wisconsin (Pleistocene))

Genetic Description: Eroded ice marginal and debris flow sediment, and subglacial diamicton, forming north-to-south-oriented linear tracks crossing the broad upland (Qvm2a) and fringe areas (Qvm3, Qvm4, and Qvm5) in the western part of the map area. Occurs as low areas between tunnel channels that were eroded by proglacial meltwater. Generic Description: Silty clay to silty clay-loam diamicton similar to Qvm2a.

Qvm8 - Intra-channel low/collapsed drainage (late Wisconsin (Pleistocene))

Genetic Description: Supraglacial sediments forming northwest-to-southeast-oriented low-elevation hummocky, collapsed topography crossing the core upland (Qvm2b) and fringe areas (Qvm3, Qvm4) in the west-central part of the map area associated with the meltout of buried stagnant ice. Generic Description: Silty clay to silty clay-loam diamicton similar to Qvm2a.

Qvt1 - Collapsed channel (late Wisconsin (Pleistocene))

Genetic Description: Eroded sediment of the Valparaiso Megasequence resulting in north-to-south-oriented and northwest-to-southeast-oriented discontinuous valleys of chaotic to linear topography with discontinuous linear depressions that may extend from the Tinley Moraine or the more upland areas of the Valparaiso Moraine across the Valparaiso Moraine to the outwash fan south and southeast of the Valparaiso Moraine. Generic Description: Sediment of variable texture and thickness consisting of all lithologies (Qvr1, Qvr2, Qvr3, Qvm1, Qvm2a, Qvm2b, Qvm3, Qvm4, and Qvm5) cut by the channel and exposed fan sediment. May also contain supraglacial sediment from the collapse of overlying ice..

Qvt2 - Filled channel (late Wisconsin (Pleistocene))

Genetic Description: North-to-south-oriented linear depressions of pockmarked topography crossing the broad upland (Qvm2a) and inner fringe (Qvm3) of the Valparaiso Moraine. Generic Description: Sediment of variable texture and thickness but consisting primarily of silty clay to silty clay-loam diamicton.

Qvt3 - Dissected channel walls (late Wisconsin (Pleistocene))

Genetic Description: Gullied valley walls along West Creek in Lake County. Generic Description: Sediment of variable texture and thickness but consisting primarily of silty clay to silty clay-loam diamicton.

Qvf1 - Upper fan surface (late Wisconsin (Pleistocene))

Genetic Description: Proglacial fan-delta sediments forming a southward-sloping, multi-lobe surface extending from the base of the Valparaiso Moraine to the lower fan's surface (Qvf5) and the Kankakee River valley (Qvk). Generic Description: Coarsening-upward sequence from stratified silt and clay to stratified diamicton, medium- to coarse-grained sand, and uppermost granule to pebble gravel.

Qvf2 - Collapsed fan (late Wisconsin (Pleistocene))

Genetic Description: Proglacial fan sediments forming an irregular southward-sloping surface with closed depressions related to the meltout of buried stagnant ice. Generic Description: Coarsening-upward sequence from stratified silt and clay to stratified diamicton, medium- to coarse-grained sand, and uppermost granule to pebble gravel.

Qvf3 - Mixed fan (late Wisconsin (Pleistocene))

Genetic Description: Proglacial fan sediments forming an irregular southward-sloping surface with closed depressions proximal to the Valparaiso Moraines outer fringe (Qvm4). Relief is related to the collapse of sediment over melting stagnant ice and deposition of debris flow sediments into ice-block depressions. Generic Description: Coarsening-upward sequence from stratified silt and clay to stratified diamicton, medium- to coarse-grained sand, and uppermost granule to pebble gravel. Isolated and discontinuous silt and clay.

Qvf4 - Open fan channels (late Wisconsin (Pleistocene))

Genetic Description: Eroded fringe area sediment (Qvm3, Qvm4, Qvm5) of the Valparaiso Moraine and outwash fan area (Qvf1, Qvf2, Qvf3) sediment that form southward- and southeastward-sloping open fluvial channels that grade to the lower fan surface. Discharge occurred in these channels during the late stages of moraine, tunnel channel, and fan deposition. Generic Description: Meltwater-deposited silt, sand, and gravel.

Qvf5 - Lower fan surface (late Wisconsin (Pleistocene))

Genetic Description: Proglacial fan deposits forming a gentle southward-sloping surface extending from the higher-elevation fan areas (Qvf1, Qvf2) to the Kankakee River; associated with late-stage entrenchment of the upper outwash fan surface (Qvf1, Qvf2, Qvf3) and southward fan building by meltwater discharge from the Valparaiso Moraine tunnel channels. Areas of the lower fan were scoured by later catastrophic discharge through the Kankakee valley. Generic Description: Coarsening-upward sequence from stratified silt and clay to stratified till-like sediment, medium- to coarse-grained sand, and uppermost granule shale-rich gravel.

Qvs - Dunes (late Wisconsin (Pleistocene))

Genetic Description: Isolated and coalesced parabolic dunes. Generic Description: Stratified and nonstratified medium- to fine-grained sand that overlies lower fan surface deposits (Qvf5).

Qvk - Kankakee River floodplain (late Wisconsin (Pleistocene))

Genetic Description: Fluvial and palustrine deposits of the Kankakee River valley. Generic Description: Stratified clay, silt, sand, and gravel with variable thicknesses of organic matter.

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This document was developed and completed by Georgia Hybels (NPS GRD) for the NPS Geologic Resources Division (GRD) Geologic Resources Inventory(GRI) Program. Quality control of this document by Stephanie O'Meara (Colorado State University).

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