BEDROCK GEOLOGY OF WABASH ISLAND QUADRANGLE GALLATIN COUNTY, ILLINOIS AND POSEY COUNTY, INDIANA AND UNION COUNTY, KENTUCKY Prairie Research Institute STATEMAP Wabash Island-BG ILLINOIS STATE GEOLOGICAL SURVEY W. John Nelson 2019 37°52'30" **EXPLANATION Bond Formation** Missourian Patoka Formation Pennsylvanian Shelburn Formation Carbondale Formation Desmoinesian (column and cross section only) Tradewater Formation (column and cross section only) Point Symbols **Drill Holes** from which subsurface data were obtained Depths and log information omitted in densely drilled areas. Coal test boring Engineering test boring Dry oil-test hole Plugged oil well Water input well Numbers denote total depth in feet. Dot in center signifies hole is accurately located. Holes in Indiana and Kentucky are posted only for logs examined during this investigation. Types of logs: partial core description (c), continuous core description (cc), density log (d), electric log (e), driller's log (dr), gamma-ray log (g), neutron log (n), sample study (s). Other symbol: fault penetrated in wellbore (F). Line Symbols Contact, location accurate Contact, location approximate Contact, location concealed —A['] Line of cross section Normal fault, location accurate; bar and ball on downthrown side, number denotes throw in feet —— • (200) Normal fault, location approximate Normal fault, location concealed Structure contour on top of Springfield Coal, contour interval 25 feet, elevation MSL Note: Well and boring records are on file at the ISGS Geological Records Unit and are available online from the ISGS website. e 2086 ⁴¹84 e_---2838 -88°07'30" SCALE 1:24,000 Geology based on data analysis by John Nelson, 2018–2019. Base map compiled by Illinois State Geological Survey from digital data (2016 US Topo) provided by the United States Geological Survey. Shaded relief derived from 2011 Gallatin Digital cartography by Emily Bunse, Alan Myers, and Jennifer Obrad, Illinois State Geo-County, IL Lidar elevation data from ILHMP, 2013 Indiana Statewide Lidar from OpenTopography, and 2013 Kentucky Lidar Point Cloud Data from KYAPED. 1 KILOMETER North American Datum of 1983 (NAD 83) This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program under StateMap award number G18AC00290, 2018. The views and conclu-Projection: Transverse Mercator 1,000-meter ticks: Universal Transverse Mercator grid system, zone 16 sions contained in this document are those of the authors and should not be interpreted BASE MAP CONTOUR INTERVAL 10 FEET as necessarily representing the official policies, either expressed or implied, of the U.S. NATIONAL GEODETIC VERTICAL DATUM OF 1988 Recommended citation: This map has not undergone the formal Illinois Geologic Quadrangle map review pro-Nelson, W.J., 2019, Bedrock geology of Wabash Island Quadrangle, Gallatin County, Illinois cess. Whether or when this map will be formally reviewed and published depends on the and Posey County, Indiana and Union County, Kentucky: Illinois State Geological Sur-© 2019 University of Illinois Board of Trustees. All rights reserved. resources and priorities of the ISGS. vey, USGS-STATEMAP contract report, 2 sheets, 1:24,000, report, 5p. For permission information contact the Illinois State Geological Survey. The Illinois State Geological Survey and the University of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this document and accept no liability for the consequences of decisions made by others on the basis of the information presented here. The geologic interpretations are based on data that may vary with respect to the accuracy of geographic location, the type and quantity of data available at each location, and the scientific and technical qualifications of the data sources. Maps or cross sections in this document are not meant to be enlarged. **ADJOINING I**ILLINOIS QUADRANGLES ROAD CLASSIFICATION New Haven Illinois State Geological Survey 2 Emma 3 Mount Vernon 4 New Haven SW Prairie Research Institute

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and BED THICKNESS **GRAPHIC COLUMN** 14 Anna Shale and Herrin Coal The Anna Shale is black, hard, thinly Bond Formation Geophysical logs indicate shale, siltstone, sand-(Member unless (FEET) stone, mudstone, and coal as drafted in the graphic column. The regionfissile, phosphatic, and pyritic. Large septarian carbonate concretions are indicated otherwise) ally persistent Fairbanks Coal member occurs about 50 feet above the common. Gamma-ray signature is "hot". The fauna is sparse, comprising formation base. Orbiculoidea, Lingula, pectenoid bivalves, fish remains, and conodonts. The Herrin Coal is bright-banded, pyritic coal that contains several wide-2 Carthage Limestone Member A core description from Union Collierspread layers of claystone, most notably the basin-wide "blue band" that Fairbanks Coal ies test hole #83 near west ¼ corner of Sec. 4, T9S, R10E indicates limeoccurs 1 to 1½ feet above the base. Two core descriptions recorded the stone that is medium brownish-gray and largely massive, with argillaceous Herrin being largely canneloid coal. partings in the lower part. Crinoid fragments and brachiopods are present. 15 Clastic interval Beneath the underclay of the Herrin Coal is a shale, siltstone, and sandstone sequence that typically coarsens upward, al-Patoka Formation 5-10 Carthage Limestone though some logs indicate presence of sandstone that has an erosive Stark Shale **3 Shale and siltstone** The Stark Shale Member at the top produces a base. One core description reported limestone containing productid bra-20-30 "hot" spike on gamma-ray logs, and in cores from adjacent areas is black, chiopods near the top of the interval. The clastic interval generally thickhard, highly fissile, and phosphatic. The remainder of the interval, which ens toward the south. Parker Coal was not cored, probably consists of gray shale and siltstone. The Parker Coal Member at the base varies from a streak to about 1 foot thick. Ko-**16** Briar Hill Coal The Briar Hill is coal that varies from dull and shaly sanke (1950) named this unit the New Haven Coal, but the name Parker to bright-banded. Underclay typically is thin or absent; the coal rests on has priority of naming (Fuller and Clapp, 1904, p. 2-3). rooted siltstone or sandstone. 100-115 4 Shale, siltstone, and sandstone Geophysical logs indicate the upper 17 Clastic interval The interval between Briar Hill and Springfield Coals 15 to 25 feet of the interval to be siltstone and shale having an upwardis mostly shale and siltstone that coarsens upward, although some logs coarsening profile and a sharp lower contact. The remainder of the interindicate sandstone that fines upward from an erosive base. val, about 80 to 100 feet thick, is a second upward-coarsening interval having sandstone at the top, grading downward through siltstone and silty 18 Turner Mine Shale and Springfield Coal The Turner Mine is black, shale to silt-free shale in the lower portion. hard, highly fissile, phosphatic shale that contains large limestone concretions and produces "hot" readings on gamma-ray logs. A thin zone of Hushpuckney Shale 5 Black shale, limestone, and coal As shown by core descriptions and calcareous shale bearing broken fossils commonly occurs at the base Womac Coal geophysical logs, the Hushpuckney Shale Member is black, hard, thinly and burrowing occurs at the top. Overlying the black shale is the St. David fissile, and yields "hot" readings on gamma-ray logs. In some cored holes Limestone, which locally reaches 2 feet thick in cores. The limestone is 350 the Macoupin Limestone Member, less than one foot thick, overlies the argillaceous lime mudstone to wackestone that is massive to nodular and Hushpuckney and a second thin limestone, correlative with the Middle contains brachiopods, bivalves, foraminifera, corals, and crinoid colum-Creek Limestone Member of the Midcontinent, underlies the Hushpucknals. The Springfield Coal is dominantly bright-banded and lacks persis-120-140 ney. Both limestone units are argillaceous to silty and contain unspecified tent clastic layers. Lenses and laminae of fusain and pyrite and thin bands fossils. Ranging from a streak to about 1 foot thick, the Womac Coal Memof dull coal are present. In the Eagle No. 2 underground mine, cleat generber underlies the Middle Creek and/or Hushpuckney. The coal is brightally was not strongly developed, although no systematic measurements of banded in cores, but is generally too thin to register on wireline logs. cleat orientation were taken. 6 Shale, siltstone, sandstone, mudstone The interval is dominantly **19 Delafield Member** The Delafield is an upward-coarsening sequence shale, but grades upward to siltstone and sandstone near the top and is that grades from dark gray, sideritic, silt-free shale in the lower part Cramer Limestone, Mound capped by the underclay of the Womac Coal. As shown by cores, these through laminated, silty shale to siltstone and fine-grained shaly sand-City Shale, Chapel Coal rocks are light to dark gray and laminated. Shale in the lower part is dark stone in the upper part. Capping the Delafield is rooted underclay (paleogray, finely silty to silt-free, and contains siderite nodules. A few invertesol) of the Springfield Coal. brate fossils, including pectenoid bivalves and the brachiopod Marginifera sp., occur in the lower shale. 20 Excello Shale and Houchin Creek Coal Similar to the Anna and Turner Mine Shales, the Excello is black, hard, thinly fissile, phosphatic, 25-85 7 Limestone, black shale, and coal As shown by core descriptions, and produces a "hot" gamma-ray signature. Although seldom thick enough the Cramer Limestone Member at the top is dark gray, argillaceous, to be expressed in logs, the Hanover Limestone commonly overlies the micritic, and contains unspecified fossils. The limestone is 1 foot or thin-Excello. The Houchin Creek is bright-banded coal found directly below the ner and generally does not register on geophysical logs. The Mound City Exline Ls. Bed Excello Shale. Shale Member is dark gray to black and fissile and yields moderately "hot" Lonsdale Ls. Bed Attila Shale Bed readings on gamma-ray logs. The Chapel Coal Member is bright-banded 21 Clastic interval An upward-coarsening sequence of gray shale, Maria Creek Mudst Piasa Ls. Bed coal that varies from a few inches to about 2 feet thick. siltstone, and sandstone is topped by the rooted underclay of the Houchin Creek Coal. Some logs indicate the interval includes sandstone that fines Gimlet **8 Shale, siltstone, and mudstone** The interval coarsens upward from upward from an erosive base. This sandstone fills incised valleys that lo-Sandstone shale to siltstone and is capped by the underclay of the Chapel Coal. cally truncate the Survant Coal. Member Shale and siltstone are gray to greenish gray, laminated, sideritic, and contain common plant fossils. The underclay is several feet of greenish 22 Survant Coal Most logs indicate a single bed of coal that varies from gray, slickensided, rooted claystone to siltstone that contains small pyrite approximately 1 to 4 feet thick. Two coal layers are present in some drilling records, mainly in the northern part of the map area. The upper of the two nodules. The interval thins northward as the underlying Farmington Shale thickens. The lower contact is abrupt. coal layers is thicker and more continuous. Separating the two coal beds is shale and siltstone as thick as 15 feet. Here and elsewhere in the II-60–230 | 160– 9 Shale, siltstone, sandstone, and limestone The interval coarsens linois Basin, the two "benches" of Survant Coal represent separate cycles Farmingtor upward from dark gray, silt-free shale near the base to lighter gray silty of sedimentation and correspond to the Bevier (younger) and Wheeler Shale shale, siltstone, and fine-grained sandstone upward. Calcareous sand-Coals of the Midcontinent Basin. stone to sandy limestone containing marine fossils commonly is present at the top. The unnamed, localized limestone is interpreted to represent 23 Clastic interval In most of the map area a single upward-coarsening the abandonment of a delta lobe. The interval thins northward as the unsequence of shale, siltstone, and sandstone is present. One or more derlying West Franklin Limestone and Farmington Shale thicken. layers of limestone less than one foot thick may occur in the lower part. Some logs reveal sandstone that fills valleys, incised within 10 feet of the **Shelburn Formation** top of the Mecca Quarry Shale. 10 West Franklin Limestone Member This complex and highly vari-24 Mecca Quarry Shale Like the Anna, Turner Mine, and Excello, the able unit is discussed and diagrammed in greater detail in the pamphlet Mecca Quarry is black, hard, thinly fissile, and phosphatic. "Hot" gammathat accompanies this map. Briefly, the West Franklin comprises one to Bankston Fork Ls. ray readings are characteristic. The Colchester Coal is probably present four beds or "benches" of limestone separated by shale and mudstone. beneath the black shale, but the coal is too thin to register on geophysical 20-30 Where intervening clastic layers wedge out, two or more carbonate benches merge into a single unit. Claystone layers represent paleosols; the West Franklin contains three distinct cycles of sedimentation. Near **25** Clastic interval Except for the absence of limestone, this interval the northern edge of the Wabash Island quadrangle, most logs indicate a basically repeats Unit 23: overall upward coarsening, with local valleysingle bench of limestone that varies from 10 to more than 25 feet thick. This bench includes the Exline Limestone Bed and possibly the older Briar Hill Coal Lonsdale Limestone Bed. Southward the Exline thins and the Lonsdale, **26 Dekoven Coal** As mapped by Jacobson (1993), the Dekoven Memsporadically developed, separates from the Exline. In many cores in the ber comprises two "benches" of coal separated by shale and siltstone. southern part of the quadrangle, the Exline is reduced to fossiliferous The clastic "parting" thickens from zero in the southern part of the New shale less than 1 foot thick. The black, fissile, phosphatic Attila Shale Bed Haven SW quadrangle to about 15 feet near the northern border. Drill 45-70 beneath the Exline generates "hot" readings on gamma-ray logs. This unit cores in the adjacent New Haven SW quadrangle (Nelson, 2019) indicate is discontinuous and occurs only in the southern part of the map area. the Dekoven Coal is largely bright-banded and pyritic, but dull, shaly, and Also discontinuous, the Maria Creek Mudstone is non-fissile, soft, slickencanneloid coal also is present. Both coal "benches" rest on rooted, slicksided claystone that contains limestone nodules and is characterized by ensided underclay and both are overlain by clastic intervals that coarsen green and red mottling. The Piasa Limestone comprises one or two layers upward. Such a relationship implies that the two coal layers formed in of nodular to massive, argillaceous limestone separated by mudstone that separate cycles of sedimentation, that probably correspond to the Abingcontains limestone nodules. The Piasa is confined to the southern part of don (younger) and Greenbush cyclothems in western Illinois. Delafield Member the map area. 50-90 **27 Clastic interval** Shale in the lower part grades upward to siltstone 11 Farmington Shale Member The Farmington comprises a sequence and minor sandstone in the upper part, topped by the underclay of the of shale, siltstone, and minor sandstone that coarsens upward. On some Dekoven Coal. well logs, two or three upward-coarsening sequences can be detected. The Farmington is as thick as 230 feet in the northern part of the map 28 Will Scarlet Shale and Davis Coal The Will Scarlet is black shale area; close to a maximum for the Illinois Basin. A basal black shale bed, that yields "hot" readings on gamma-ray logs. The Davis Coal is about 3 40-60 one foot or thinner, contains abundant pyritized bivalves and brachiopods. to 6 feet thick, but it is 4 to 5 feet thick in most places within the map area Above this bed, shale in the lower Farmington is medium to dark gray, (Jacobson, 1993). finely silty to silt-free, and contains numerous siderite bands and nodules. Upward the shale grades to medium gray, massive to indistinctly laminat-**Tradewater Formation** Survant Coal ed siltstone that contains plant fragments and pectenoid pelecypods. In some wells, one or two thin beds of sandy limestone or calcareous sand-29 Clastic interval Gray shale, siltstone, and sandstone overall coarsen 45-65 stone occur in the middle to upper Farmington. The Gimlet Sandstone upward and are topped by rooted paleosol mudstone beneath the Davis Member fills incised valleys within the Farmington in the southern part of Coal. The interval thins markedly in the northern part of the map area. the study area. The Gimlet cuts down from the level of the Maria Creek Mudstone; sandstone is generally absent outside of incised valleys. **30 Carrier Mills Shale** The shale is black and fissile and yields "hot" readings on gamma-ray logs. A small, sharp inflection identifies this unit 12 Danville Coal and underlying strata Persistent throughout the on resistivity logs. Thin coal may occur below the black shale, but coal 50-75 map area, the Danville Coal is bright-banded and pyritic coal about 1 to does not register on geophysical logs. 3 feet thick. Beneath the coal is rooted claystone, then shale, siltstone, and sandstone. Near the base of the interval is the Baker Coal, which 31 Clastic interval Gray shale, siltstone, and sandstone overall coarsen comprises one or two layers of bright-banded coal to dull, shaly coal and upward and are topped by rooted paleosol mudstone beneath the Carrier **Dekoven Coal** carbonaceous shale, each less than one foot thick. The Baker rests on Mills Shale. claystone that is greenish gray, blocky, slickensided, and contains limestone nodules and root traces. 32 Stonefort Limestone and Veale Shale Members Sporadic in distri-Will Scarlet Shale bution, the Stonefort Limestone directly overlies shale that produces "hot" 13 Limestone sandstone, and shale The Bankston Fork and Breresignature on gamma-ray logs. ton Limestone Members sandwich clastic rocks of the Lawson Shale Carrier Mills Shale 10–40 and Anvil Rock Sandstone. The Bankston Fork typically is light yellowish 33 Shale, siltstone, and coal An upper coal layer less than 2 feet thick to brownish gray, micritic to bioclastic, massive to nodular, and contains near the base of the Veale Shale is presumed to be the Wise Ridge Coal 3–5 streaks of green clay. Fossils include crinoid fragments, bivalves, and Bed. About 15 to 25 feet below the Wise Ridge, one or two layers of coal 20-30 Stonefort Limestone brachiopods. The Anvil Rock and Lawson Members variably include shale each 1 to 3 feet thick are commonly accompanied by "hot" shale. These veale Shale 32 and sandstone that coarsen upward and sandstone that fines upward most likely represent the Mt. Rorah Coal and/or a slightly older coal bed. Wise Ridge Coal from an erosive base. A high gamma-ray inflection within this interval ap-15-30 0–3 parently corresponds with shale that is black but not highly fissile or phos-**34 Clastic rocks, coal, and limestone** Positive correlation of units Mt. Rorah Coal phatic, as described from drill cores. Also, some cores indicate presence within this part of the Tradewater is uncertain. A number of geophysical 15–25 showr of thin Conant Limestone and Jamestown Coal Members directly above logs and sample studies indicate a limestone bed a few feet thick and 20 0–5 Creal Springs Limestone the Brereton Limestone. The Conant is dark gray, argillaceous lime mudto 30 feet below the Mt. Rorah Coal. Most likely this is the Creal Springs 15-25 stone to wackestone that contains numerous large productid brachiopods. Limestone, and the next coal below would be the Murphysboro Coal. 0–3 The Jamestown consists of thin, shaly coal and dark gray to black shale Additional coal beds occur at greater depth on many logs, but much of that is calcareous and contains brachiopods together with plant remains. the interval below the Murphysboro is composed of sandstone that fills The Jamestown and Conant are generally too thin to register on geophysincised valleys. ical logs. The Brereton is limestone that is medium to dark gray, fossiliferous lime mudstone to wackestone that contains brachiopods, bivalves, crinoid fragments, fusulinids, and phylloid algae. East A'Inman East Wabash Island fault zone Elevation (meters) Duncan #1 Duncan Peabody Coal Union Colliery Styles #1 Cambron #1 Alvey #4 Lewis #1 Lewis #1 Agnew #1078 Clements ₽p

Bond Formation

MEMBER

Carbondale Formation

-Duncan #2 Pielemever Springfield Coal → ₽s ₽c Springfield Coal Pс ₽t -1000 Pcv Pennsylvanian Pcv Pcv Mississippian Mupu -500 Mupu Top of Glen Dean Limestone Top of Glen Dean Limestone Top Glen Dean -2000 Mlpu Mlpu Top of Ste. Genevieve Limestone Top of Ste. Genevieve Limestone Top Ste. Genevieve Msg Horizontal Scale: 1 inch = 2,000 feet Vertical Scale: 1 inch = 1.000 Feet Vertical Exaggeration: 2×

Lower portion of Pope Group

Ste. Genevieve LS and older units

Upper portion of Pope Group

Fault, arrows indicate direction of offset

Drill Hole

Qal Quaternary

Pb Bond Fm.

₽p Patoka Fm.

Shelburn Fm.

Carbondale Fm.

Tradewater Fm.

Casevville Fm

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Elevation

(feet)