GEOLOGIC MAP OF THE CENTRALIA 7.5-MINUTE QUADRANGLE, LEWIS COUNTY, WASHINGTON

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Andrew J. Sadowski—Washington Geological Survey, Department of Natural Resources William E. Keller—Washington Geological Survey, Department of Natural Resources Michael Polenz—Washington Geological Survey, Department of Natural Resources Todd R. Lau—Washington Geological Survey, Department of Natural Resources

Recep Cakir—Washington Geological Survey, Department of Natural Resources Elizabeth Nesbitt—The Burke Museum of Natural History, University of Washington

Jeffrey H. Tepper—Geology Department, University of Puget Sound

S. Andrew DuFrane—Department of Earth and Atmospheric Sciences, University of Alberta Gabriel Legorreta Paulín—Instituto de Geografia, Universidad Nacional Autónoma de México

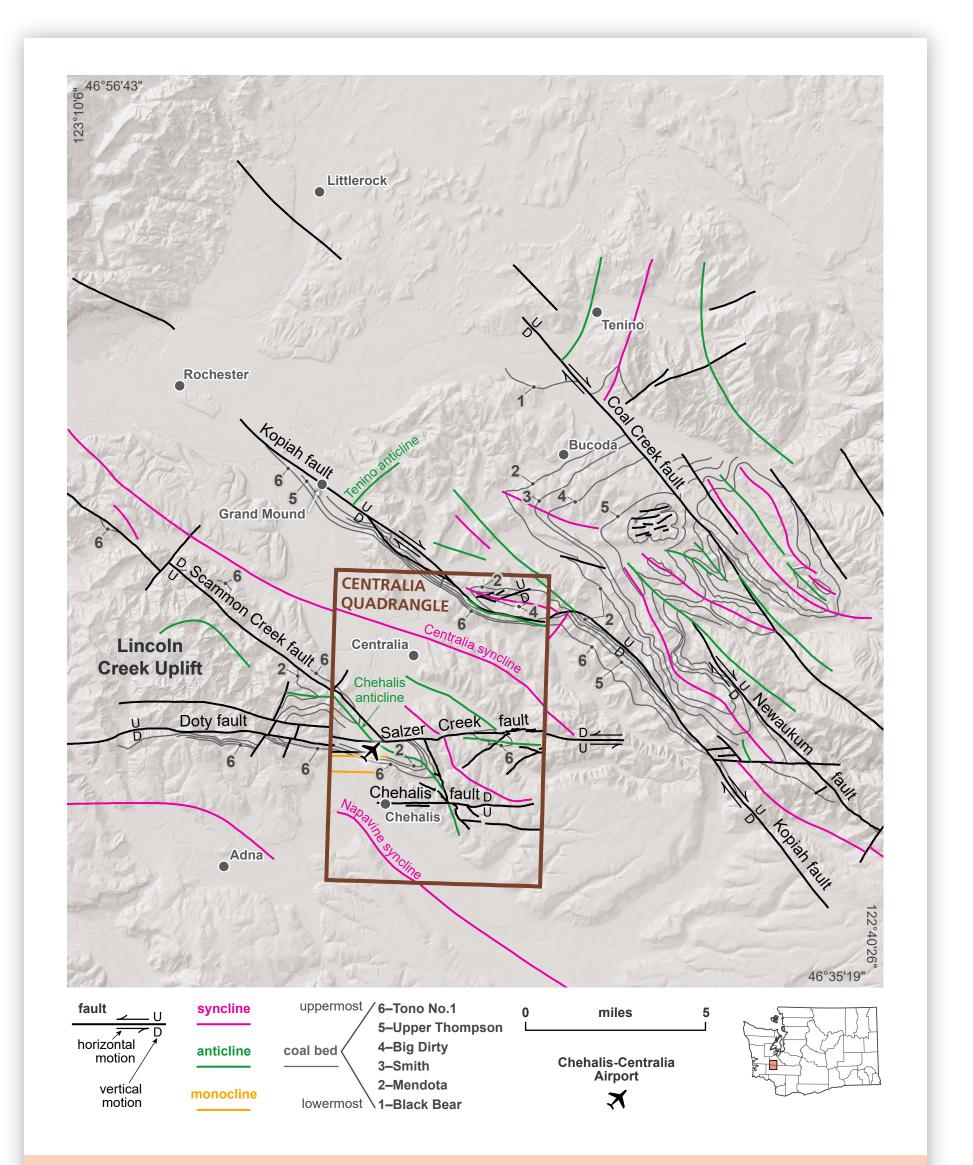
GSA Cordilleran Section Meeting 2019—Abstract No. 328980

New 1:24,000-scale geologic mapping of the Centralia quadrangle focuses on improving geologic understanding of a populated area affected by natural hazards. Critical among these are potential seismic hazards related to the Doty-Salzer Creek fault system, which may pose a hazard to a proposed flood retention dam near Pe Ell, WA.

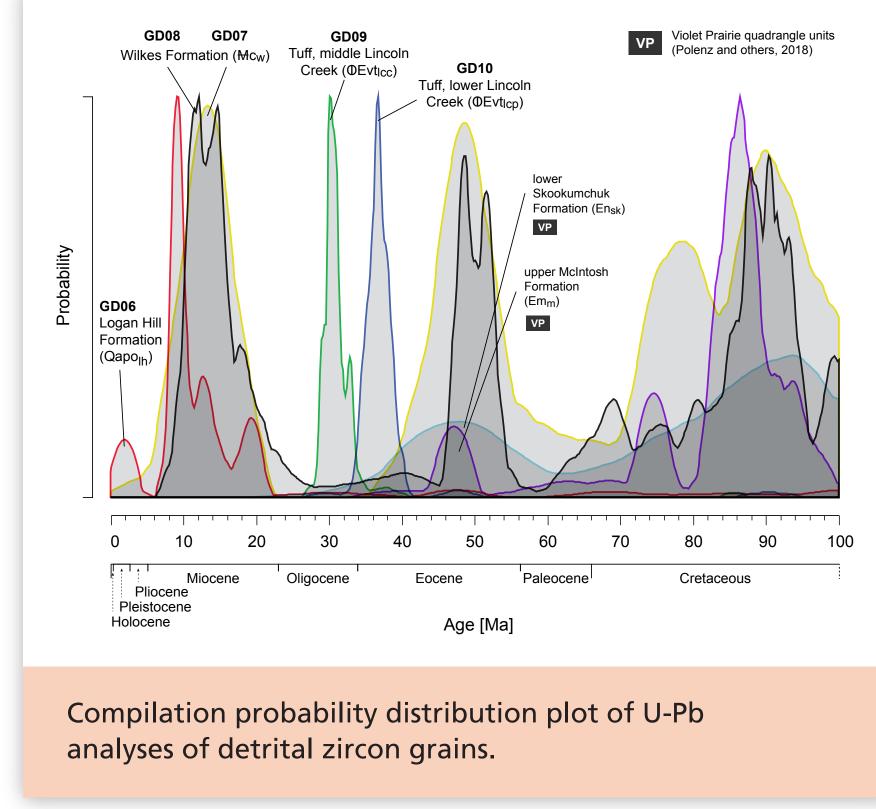
New mapping and geophysical data build on previous work by characterizing geologic structures in greater detail, refining fault locations, and updating structural interpretations. Northwest- and west-striking oblique faults in the quadrangle may be capable of producing damaging earthquakes and may be responding to a local transpressive stress regime. Newly acquired gravity, ground magnetic, and passive seismic geophysical data constrain the locations of several concealed fault strands, and strongly suggest a structural high—the Lincoln Creek uplift—underlies the Chehalis River valley from Chehalis to Fords Prairie, WA.

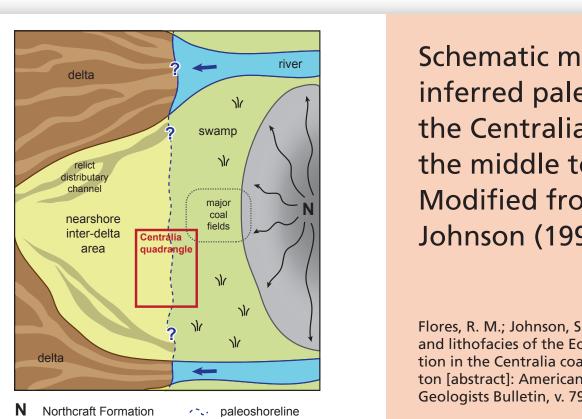
Radiometric dating (U-Pb) of detrital zircons also refines the stratigraphic framework for southwest Washington. Analyses reveal new maximum depositional ages for the base and middle of the Lincoln Creek Formation (36.70 ±0.32 Ma and 30.58 ±0.35 Ma, respectively), the previously unrecognized Wilkes Formation (8.57 \pm 0.92 Ma and 7.54 \pm 1.04 Ma), and the Logan Hill Formation (1.68 ±0.97 Ma youngest age).

Numerous previously unrecognized landslides are identified from lidar and field mapping. The lower contact of the early Pleistocene Logan Hill Form tion is commonly concealed by landslides, which suggests that the base of this formation may form a slide plane for landslides and may warrant future geotech-

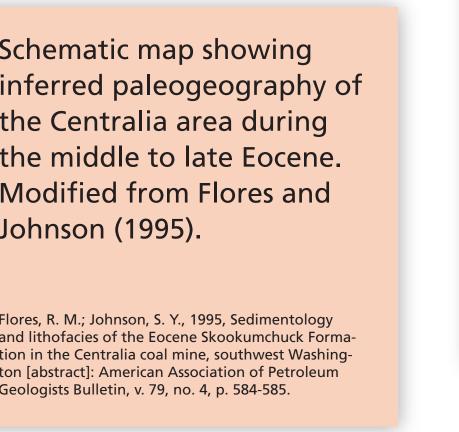


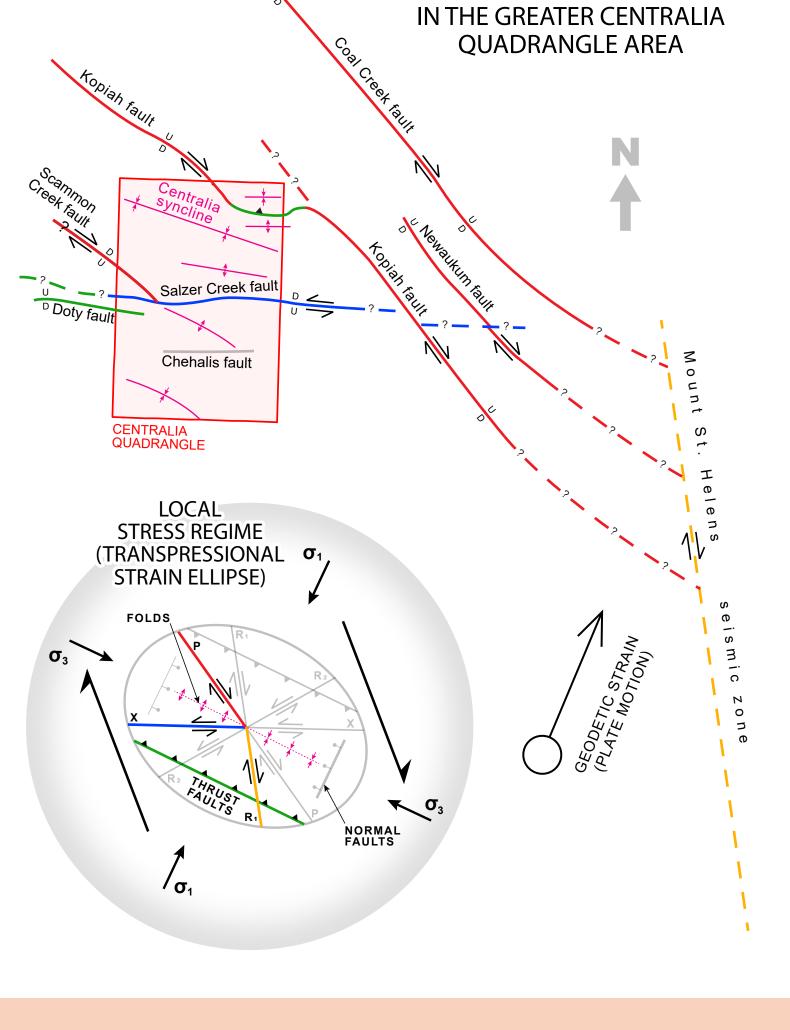
Structural map showing faults, folds, and coal beds. West- and northwest-striking oblique faults and similarly-trending folds show the prevailing structural fabric.





Schematic map showing inferred paleogeography of the Centralia area during the middle to late Eocene. Modified from Flores and Johnson (1995). Flores, R. M.; Johnson, S. Y., 1995, Sedimentology and lithofacies of the Eocene Skookumchuck Formation in the Centralia coal mine, southwest Washing-





HYPOTHETICAL STRESS REGIME

Lambert conformal conic projection

http://lidarportal.dnr.wa.gov/)

Digital cartography by Daniel E. Coe

North American Datum of 1927; to place on North American Datum of

Shaded relief generated from a lidar bare-earth digital elevation mode

Editing and production by Susan R. Schnur and Jessica L. Czajkowski

95 meters east as shown by crosshair corner tics

Centralia 7.5-minute quadrangle, 1986

GIS by Andrew J. Sadowski and William E. Keller

Base map from scanned and rectified U.S. Geological Survey

(available from the Washington Geological Survey,

1983, move the projection lines approximately 22 meters north and

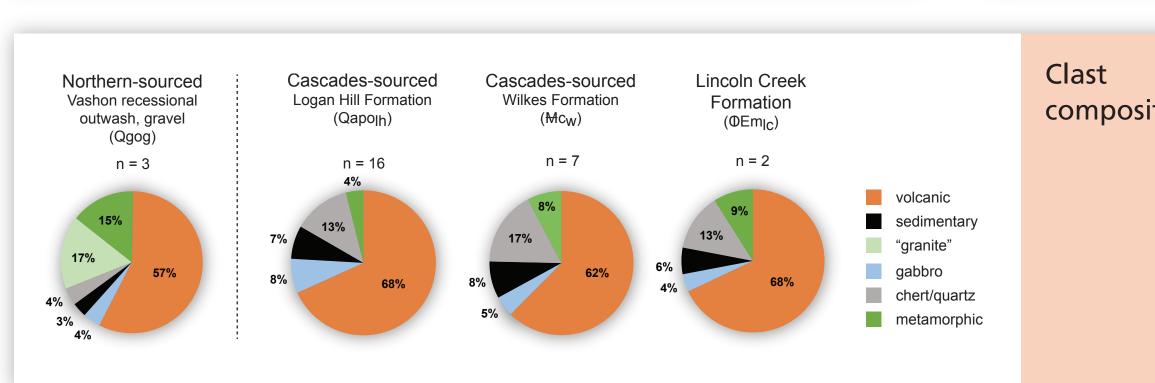
contour interval 20 feet

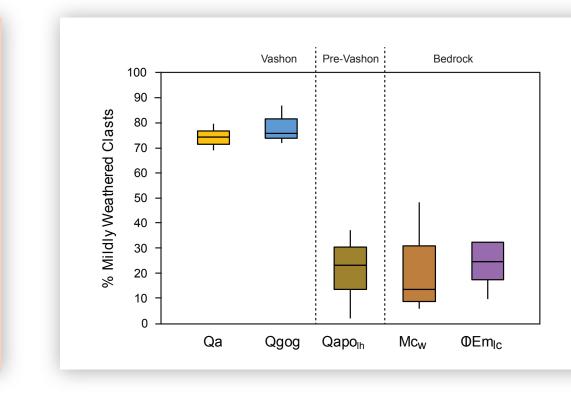
This geologic map was funded in part by the

U.S. Geological Survey National Cooperative Geologic Mapping Program

under USGS award number G17AC00262, 2017–2018.

This model synthesizes structures into a transpressional stress regime within the broader compressional stress regime of the Cascadia forearc.

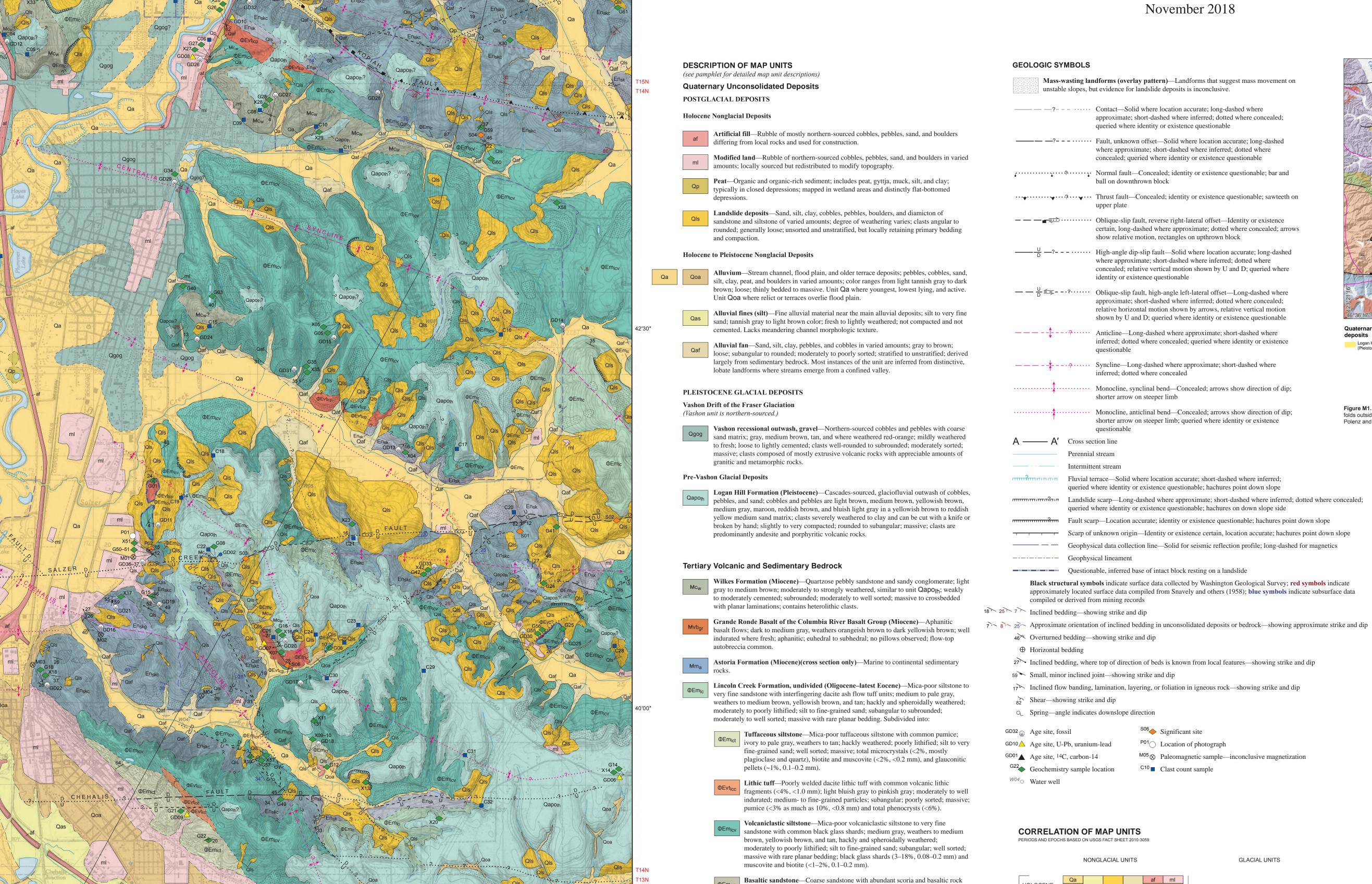






Geologic Map of the Centralia 7.5-minute Quadrangle, Lewis County, Washington

Andrew J. Sadowski, William E. Keller, Michael Polenz, Todd R. Lau, Recep Cakir, Elizabeth Nesbitt, Jeffrey H. Tepper, S. Andrew DuFrane, and Gabriel Legorreta Paulín



to moderately sorted; massive.

muscovite and biotite (1–6%, 0.05–0.4 mm). Subdivided into:

volcaniclastic debris flows, and volcanic breccia.

mudstone with volcanic and pyroclastic interlayers.

laminations; otherwise similar to undivided unit.

lithified; medium-grained; subangular; well sorted; massive.

Northcraft Formation (Oligocene–Eocene)(cross section only)—Basalt to andesite,

McIntosh Formation (middle Eocene)(cross section only)—Marine sandstone to

Crescent Formation (Eocene)(cross section only)—Submarine basalt flows with thin

sedimentary interlayers associated with the Siletzia terrane (basement).

fragments and lesser pumice, tuff(?), and siltstone fragments; medium brown with multicolored rock fragments of light brown, light orange, light red, maroon, red, pinkish brown, and light to dark gray; mildly indurated; moderately cemented; medium- to very coarse-grained sand to granules; subangular; poorly **Lapilli tuff**—Unwelded, dacite lapilli tuff; light bluish gray with 0.5–5.0 mm diameter, subangular lapilli (~10%); mildly to moderately weathered; moderately indurated; angular/anhedral; massive; dominantly ash with <2% total microphenocrysts and trace, <1 mm volcanic rock fragments. VOLCANIC ROCKS Skookumchuck Formation, undivided (late-middle Eocene)—Micaceous, arkosic sandstone to siltstone, uncommonly tuffaceous; light gray to medium brown, weathers multi-colored; highly friable, weakly lithified; medium-grained; subrounded; well sorted; massive to medium bedded to thinly laminated with common trough crossbedding; Carbonaceous sandstone—Micaceous, arkosic sandstone to siltstone that enske contains coal beds of Snavely and others (1958), which include ash layers within coal (tonsteins); where fresh and carbonaceous, color is bluish medium gray and contains dark gray to black coal beds with sulfurous smell and micaceous Glauconitic sandstone—Micaceous sandstone containing glauconitic pellets (coprolites); light brown to yellowish brown speckled with dark greenish to brownish gray, medium- to fine-grained glauconite particles; friable, weakly

CROSS SECTION EXPLANATION

vertical tics mark separate units.

Snavely and others (1958).

` plane of the cross section.

away from the viewer.

Water well or boring

Geologic units too thin to show as polygons at

location accurate; short-dashed where inferred

the scale of the cross section; solid where

Bedding inferred from coal beds shown in

Arrows show relative fault movement in the

○ Arrow point shows fault movement toward the

Geologic Mapping Program, under USGS award number G17AC0020

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The views and conclusions contained in this document are those of the

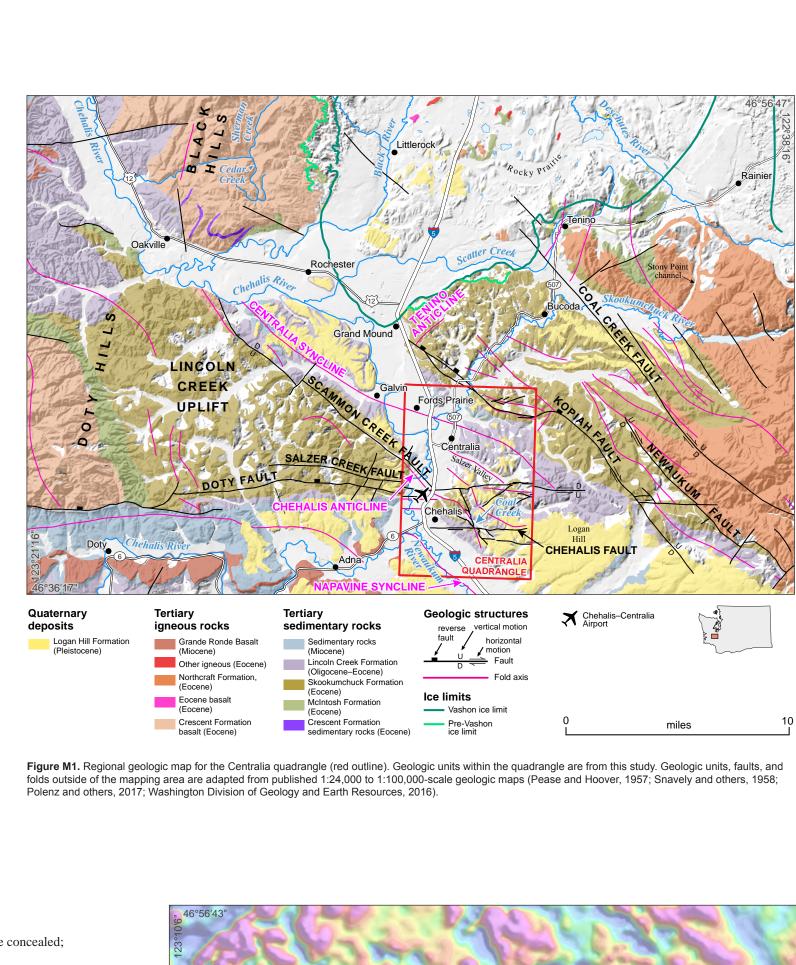
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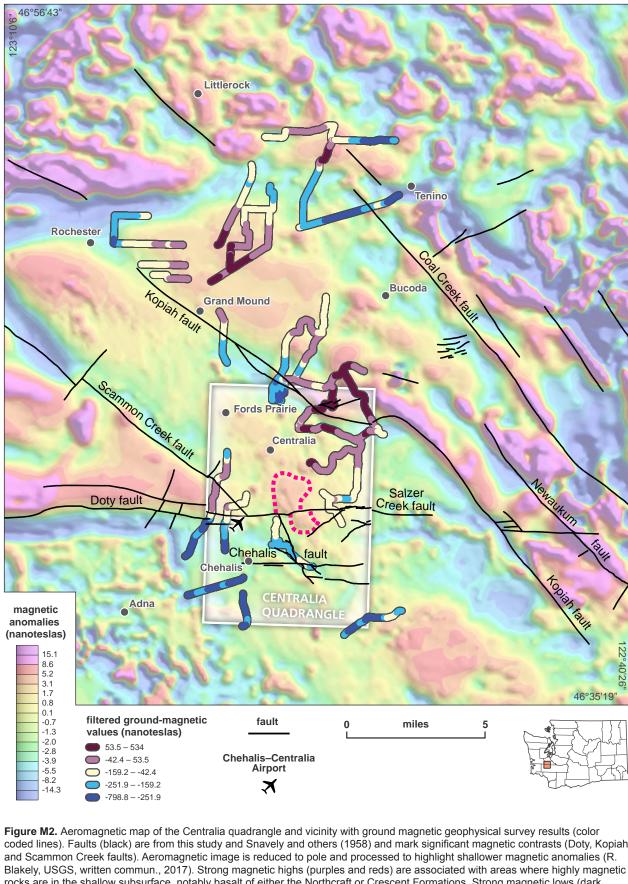
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viewer; arrow feathers show fault movement





ocks are in the shallow subsurface, notably basalt of either the Northcraft or Crescent Formations. Strong magnetic lows (dark ues) are associated with thicker sedimentary stratigraphy (east of map area) and (or) with Columbia River Basalt (west of map asement. A trough of low magnetic anomalies resides between the Chehalis and Doty-Salzer Creek fault system. A shallow nagnetic anomaly (dashed red outline) is possibly left-laterally offset along the Salzer Creek fault.

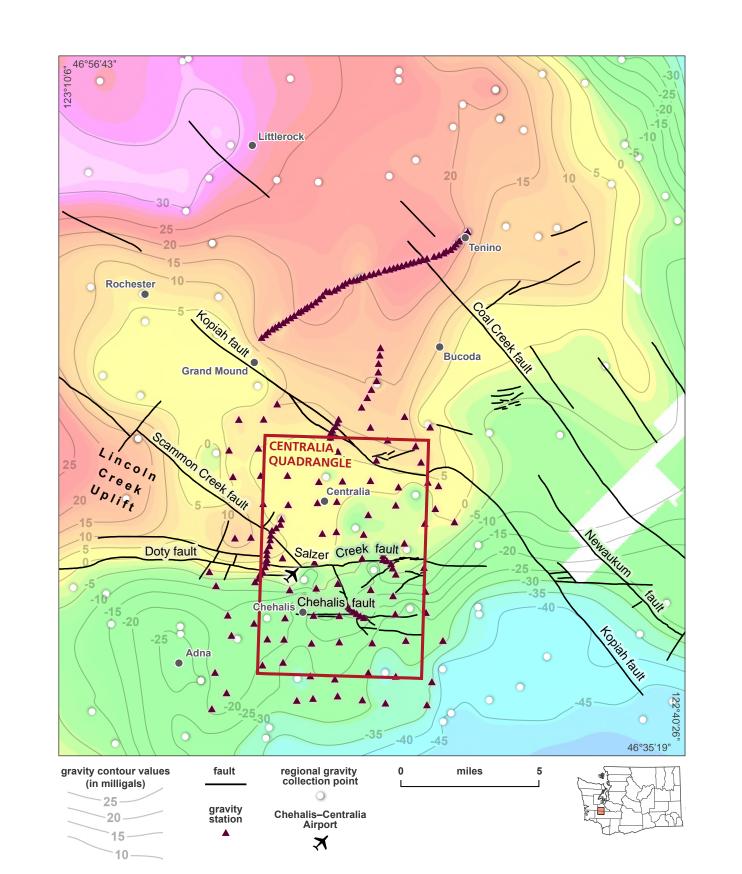


Figure M3. Complete Bouguer gravity anomaly map of the Centralia quadrangle and vicinity with data from this study and regional ta (Bowman, 2013). Gravity contours (gray) computed from these data emphasize high and low gravity anomalies. Faults (black) e from this study and Snavely and others (1958) and generally bound significant contrasts in gravity, likely due to juxtaposition of ks with contrasting density in the subsurface across these faults. Broadly, lower values are found south of the Doty–Salzer Cree ault system, which may be related to greater depth to basement. Conversely, the higher values north of the fault system suggest shallower basement and a structural high, the Lincoln Creek uplift. The Scammon Creek fault bounds the northeast flank of this structural high, and along with the Kopiah fault, bounds a smaller gravity low to the northeast of the Lincoln Creek uplift.