

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 Paulin—Instituto de Geografia, Universidad Nacional Autónoma de México

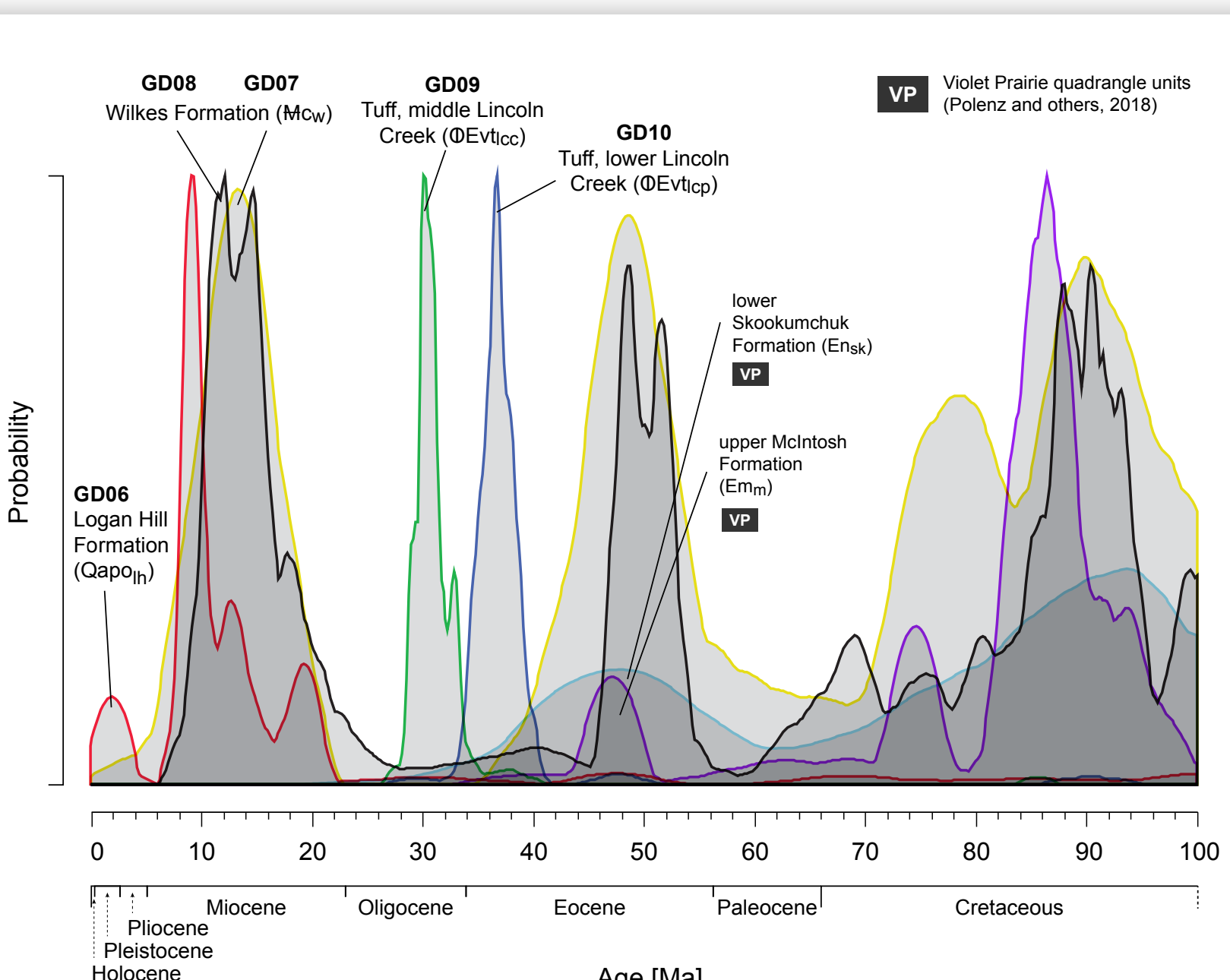
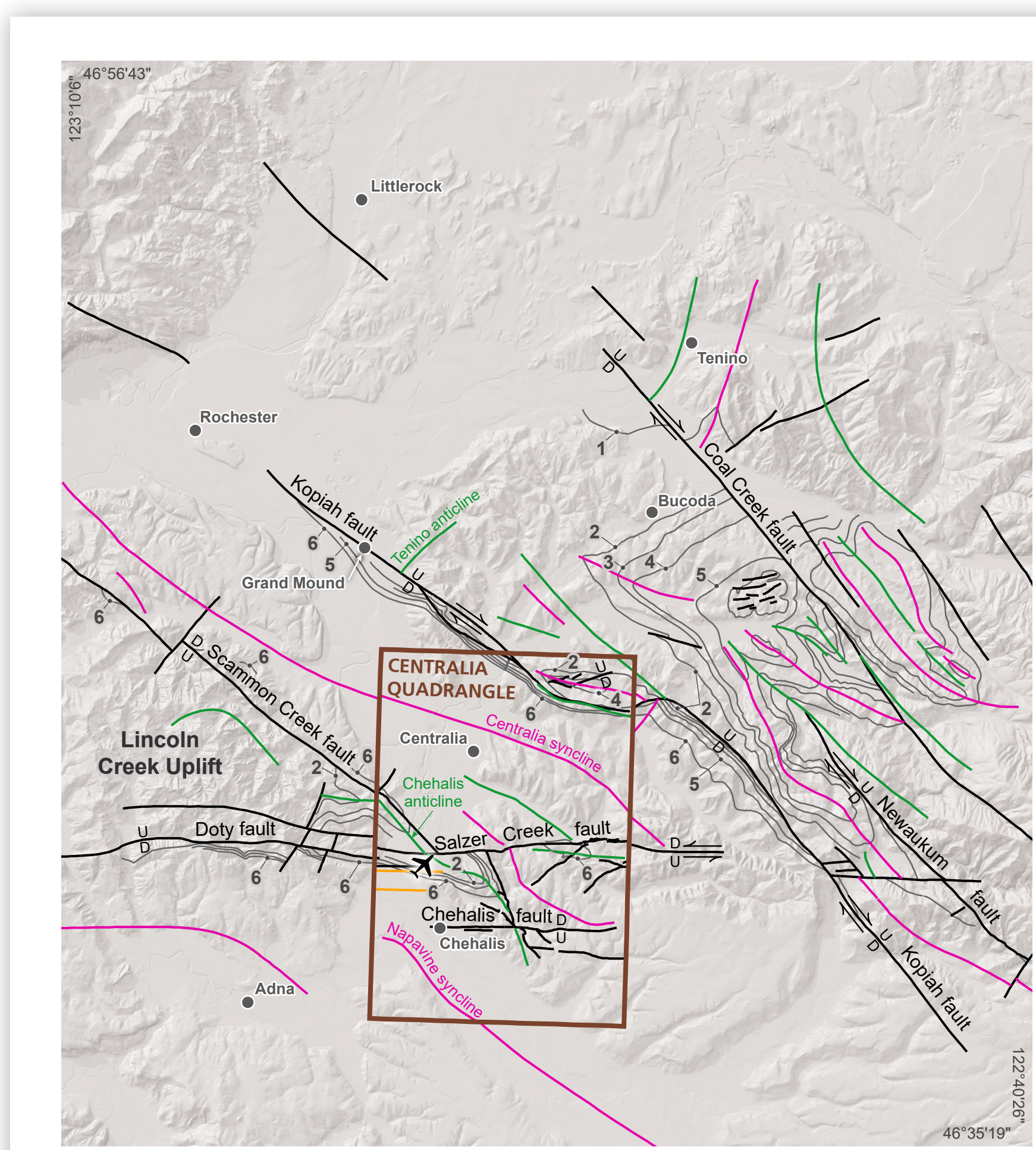
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New 1:24,000-scale geologic mapping of the Centralia quadrangle focuses on improving geologic understanding of a populated area affected by natural hazards. Critical among these are potential seismic hazards related to the Doty–Salzer Creek fault system,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

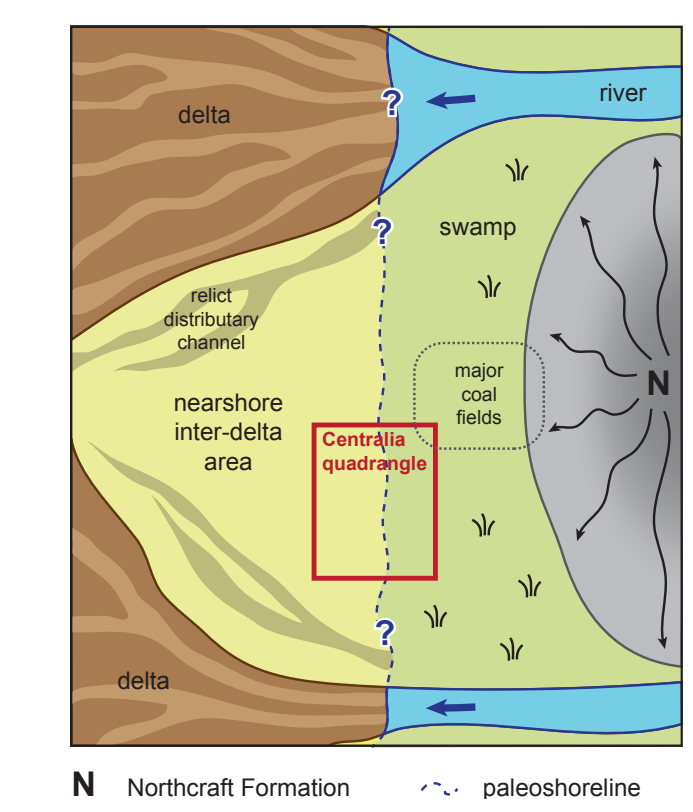
New mapping and geophysical data build on previous work by characterizing geologic structures in greater detail, refining fault locations, and updating structural interpretations. Northwest- and west-striking oblique faults in the quadrangle may be capable of producing damaging earthquakes and may be 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 ± 0.92 Ma and 7.54 ± 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 geotechnical work.

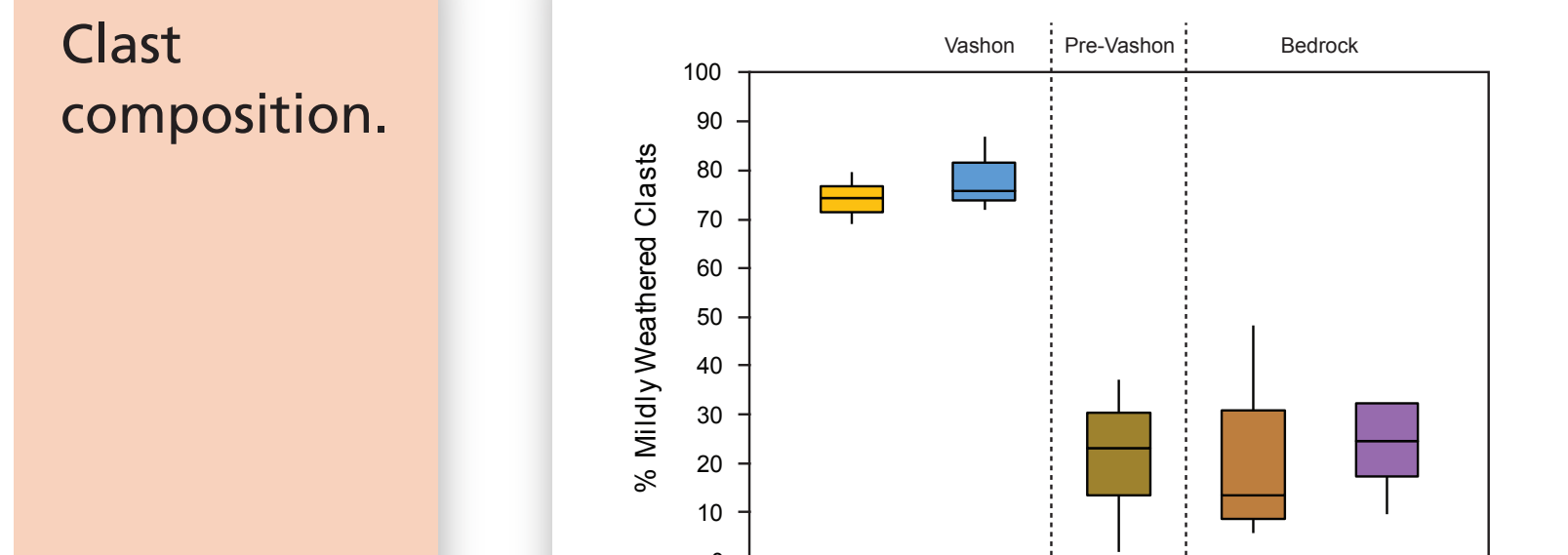
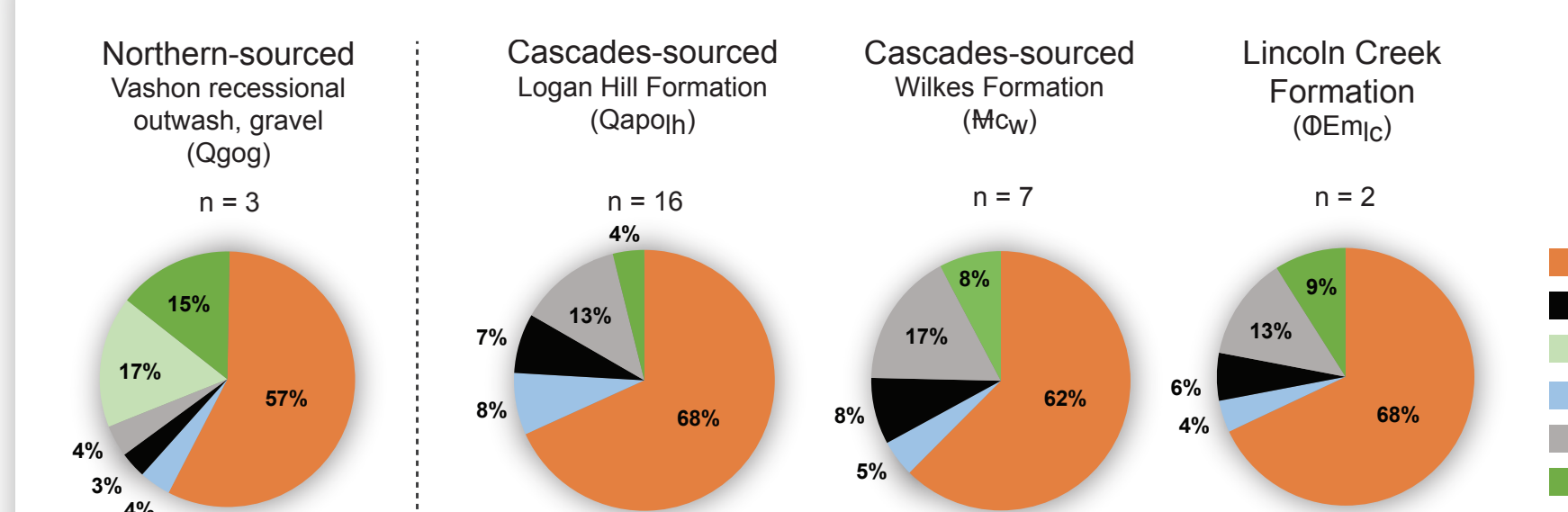


Compilation probability distribution plot of U–Pb analyses of detrital zircon grains.



Schematic map showing inferred paleogeography of the Centralia area during the middle to late Eocene. Modified from Flores and Johnson (1995).

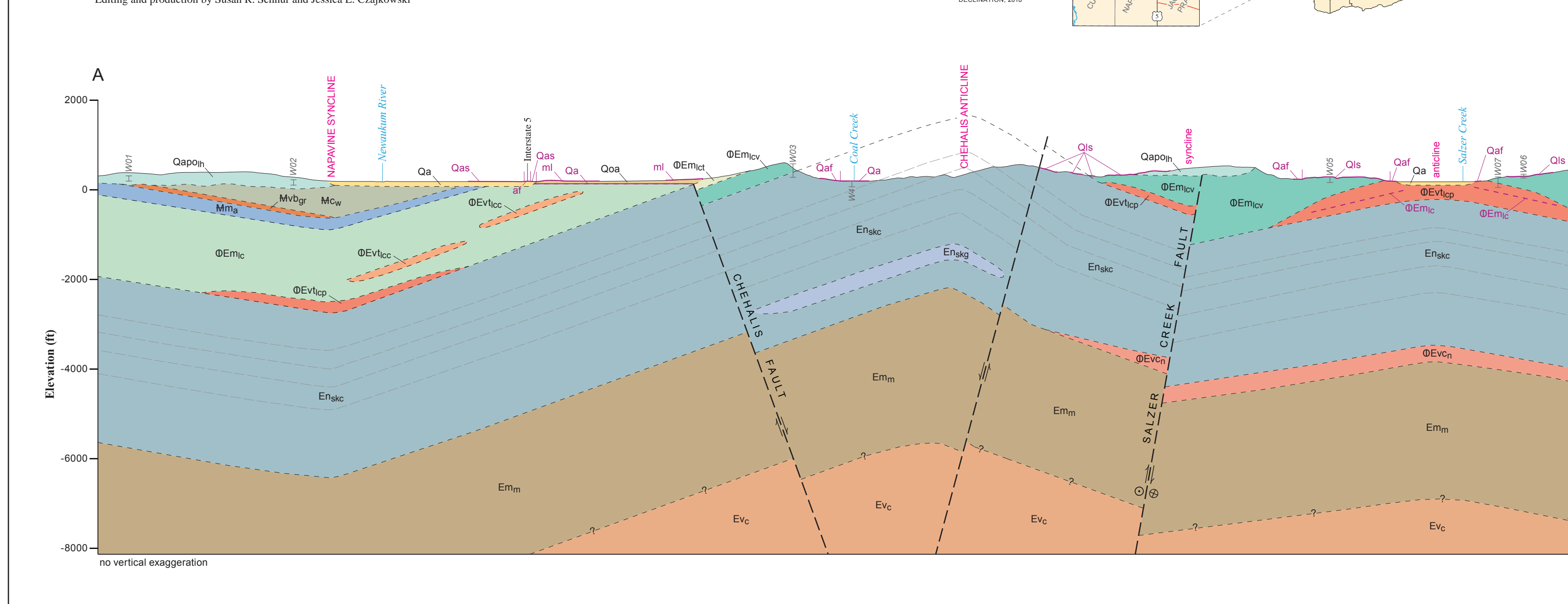
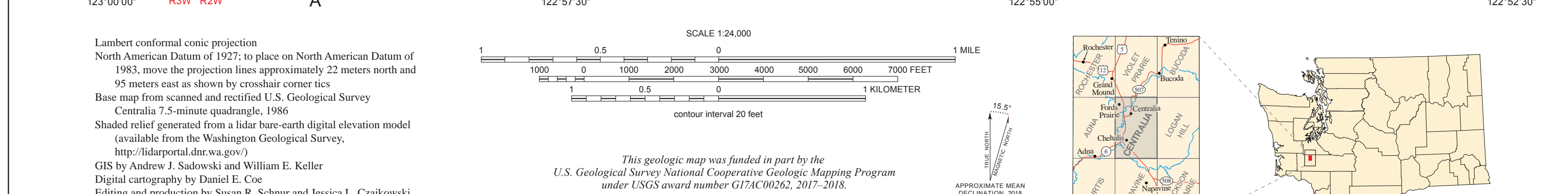
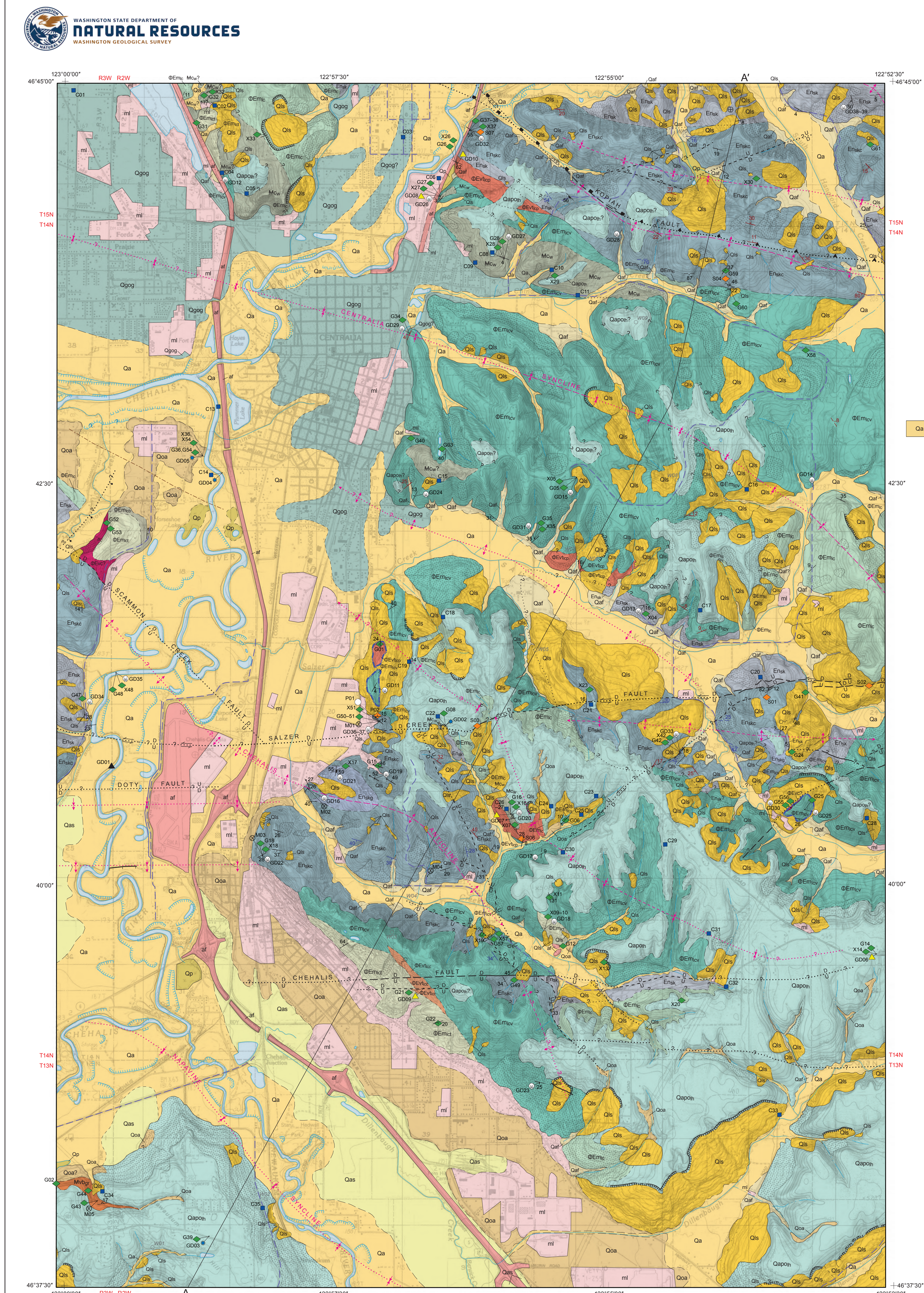
Flores, R. M., Johnson, S. V., 1995. Sedimentology and lithofacies of the Eocene Skookumchuk Formation in the Centralia coal mine, southwest Washington [abstract]. American Association of Petroleum Geologists Bulletin, v. 79, no. 4, p. 584–585.



Box and whisker plots showing ranges of clast weathering.



Severely weathered Logan Hill Formation.



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

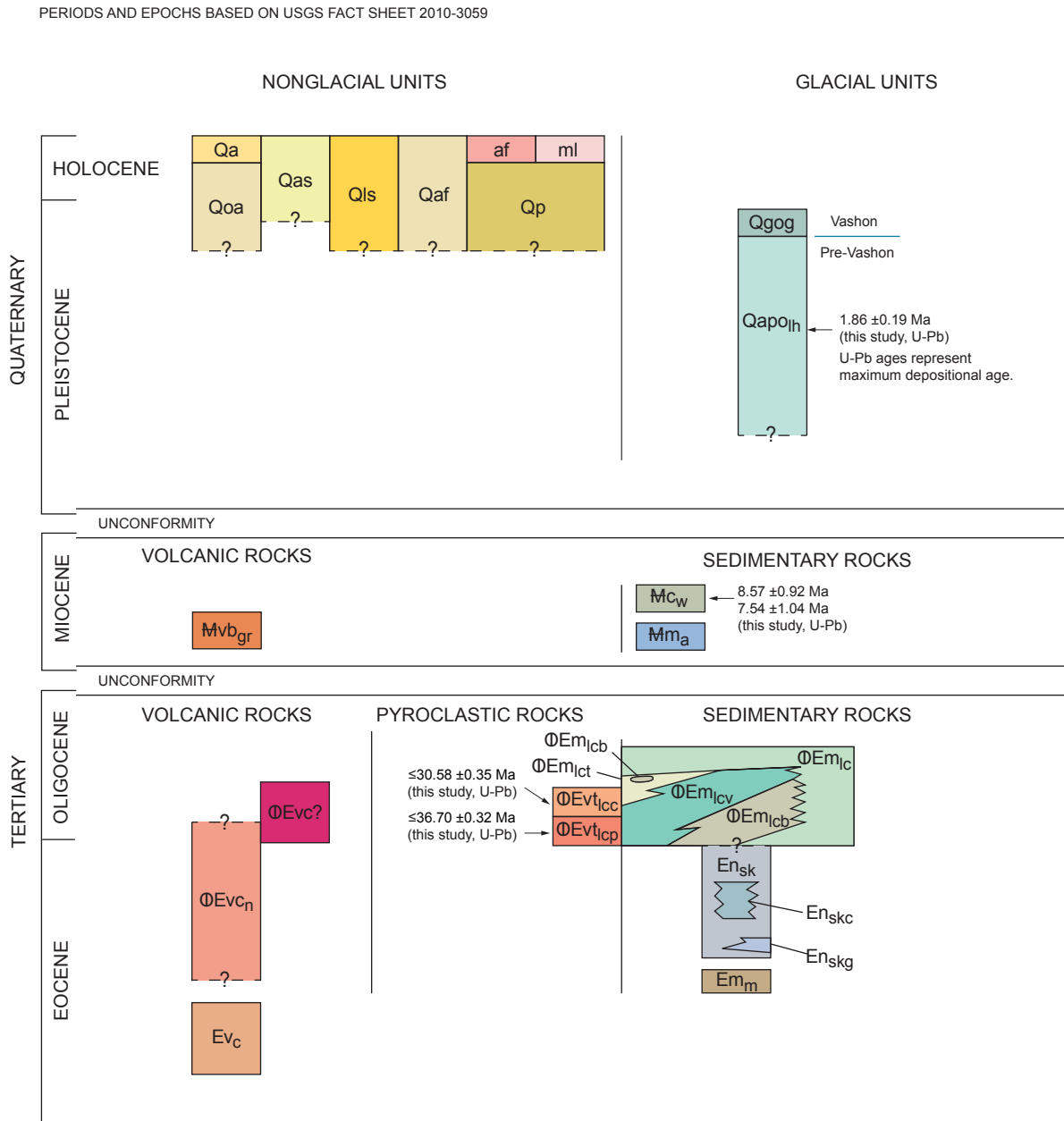
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November 2018

GEOLOGIC SYMBOLS

- Mass-wasting landforms (overly pattern)—Landforms that suggest mass movement on unstable slopes; the evidence for landslide deposits is inconclusive.
- Conceal—Solid where location accurate; long-dashed where inferred; short-dashed where inferred, dated where concealed; queried where identity or existence questionable.
- Fault, unknown offset—Solid where location accurate; long-dashed where approximate; short-dashed where inferred, dated where concealed; queried where identity or existence questionable.
- Normal fault—Concealed identity or existence questionable; bar and ball on downthrow block.
- Thrust fault—Concealed; identity or existence questionable; sawtooth on upper plate.
- Oblique-slip fault, reverse right-lateral offset—Identity or existence certain; long-dashed where approximate; dashed where concealed; arrows show relative motion shown by U and D, queried where identity or existence questionable.
- Oblique-slip fault, high-angle left-lateral offset—Long-dashed where approximate; short-dashed where inferred, dated where concealed; relative horizontal motion shown by arrows; relative vertical motion shown by U and D, queried where identity or existence questionable.
- Artificial—Long-dashed where approximate; short-dashed where inferred, dated where concealed; queried where identity or existence questionable.
- Syncline—Long-dashed where approximate; short-dashed where inferred, dated where concealed.
- Monocline, synclinal bend—Concealed; arrows show direction of dip; shorter arrow on deeper limb.
- Monocline, artificial bend—Queried; arrows show direction of dip; shorter arrow on deeper limb; queried where identity or existence questionable.
- Cross section line—Potential strain.
- Intersecting stream.
- Partial terrace—Solid where location accurate; short-dashed where inferred; queried where identity or existence questionable; hachures point down slope.
- Landslide scarp—Long-dashed where approximate; short-dashed where inferred, dated where concealed; queried where identity or existence questionable; hachures on down slope side.
- Fault scarp—Location accurate; identity or existence questionable; hachures point down slope.
- Scarp of unknown origin—Identity or existence certain; location accurate; hachures point down slope.
- Geophysical data collection line—Solid for seismic reflection profile; long-dashed for magnetics.
- Geophysical lineament.
- Questionable, inferred base of intact block resting on a landslide.

- Black structural symbols indicate surface data collected by Washington Geological Survey, and symbols indicate approximately located surface data compiled from Seavey and others (1988); blue symbols indicate subsurface data inferred or derived from existing maps.
- Included bedding—showing strike and dip.
- Approximate orientation of inclined bedding in unconsolidated deposits or bedrock—showing approximate strike and dip.
- Overturned bedding—showing strike and dip.
- Horizontal bedding.
- Inclined bedding, where top of direction of beds is known from local features—showing strike and dip.
- Small, minor inclined joint—showing strike and dip.
- Inclined fold hanging, laminar, layering, or foliation in igneous rock—showing strike and dip.
- Shear—showing strike and dip.
- Springs—uphill indicates down-slope direction.
- Age site, from.
- Age site, L.P.R. station/road.
- Location of photograph.
- Age site, ¹⁴C, carbon-14.
- Paleomagnetic sample—magnetite magnetization.
- Geochronology sample location.
- Water well.

CORRELATION OF MAP UNITS



CROSS SECTION EXPLANATION

- Geologic units not shown as polygons at the scale of the cross section; solid where location accurate; short-dashed where inferred; vertical lines mark approximate units.
- Bidding inferred from coal beds shown in Seavey and others (1988).
- Arrows show relative fault movement toward the viewer; arrow hachures show fault movement away from the viewer.
- Water well or boring.

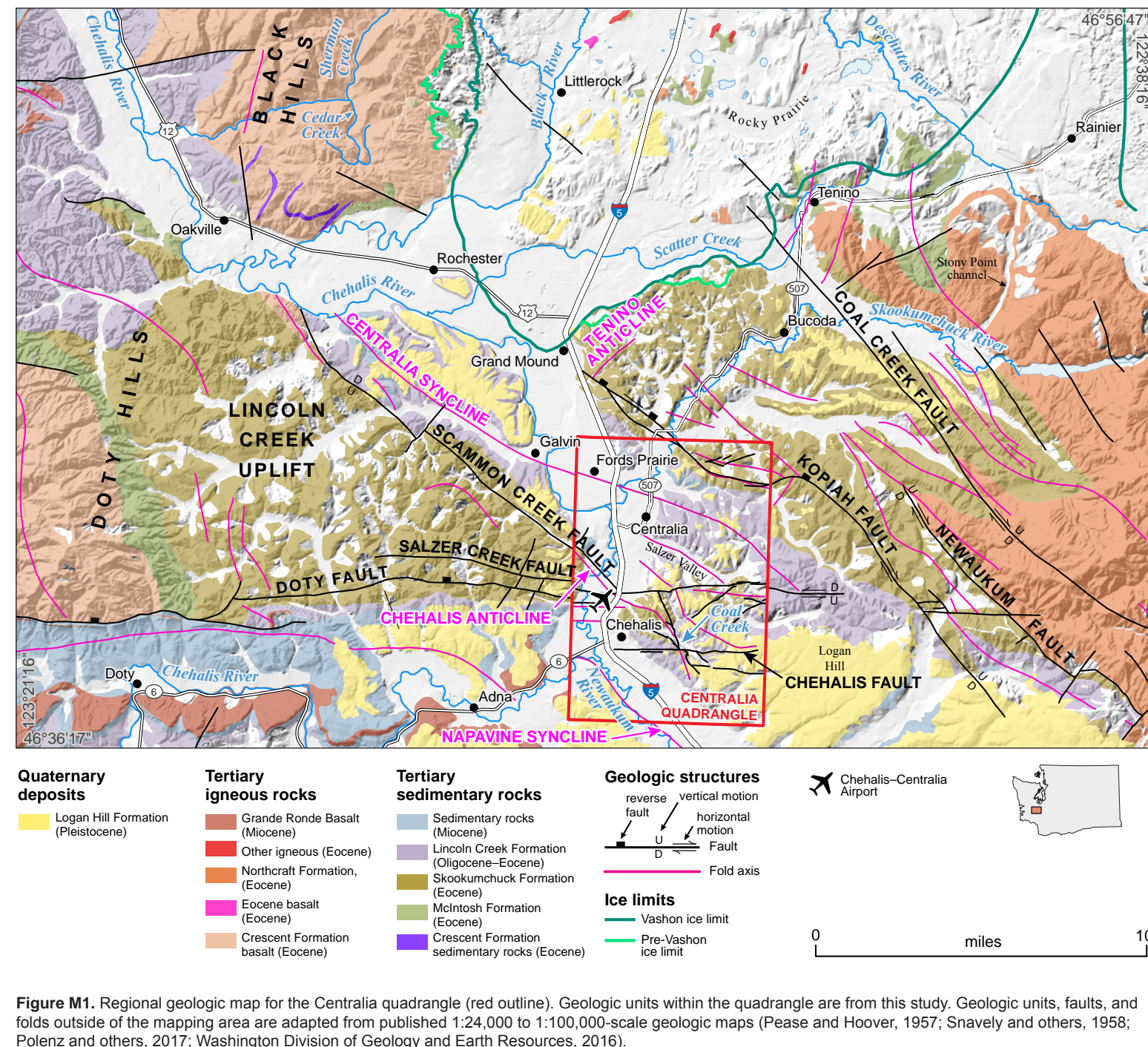


Figure M1. Regional geologic map for the Centralia quadrangle and vicinity. Geologic units within the quadrangle are from this study. Geologic units, faults, and landslides of the mapping area are compiled from published 1:24,000- and 1:50,000-scale geologic maps. Phase and Towner, 1957; Seavey and others, 1988; Flores and others, 2017; Washington Division of Geology and Earth Resources, 2015.

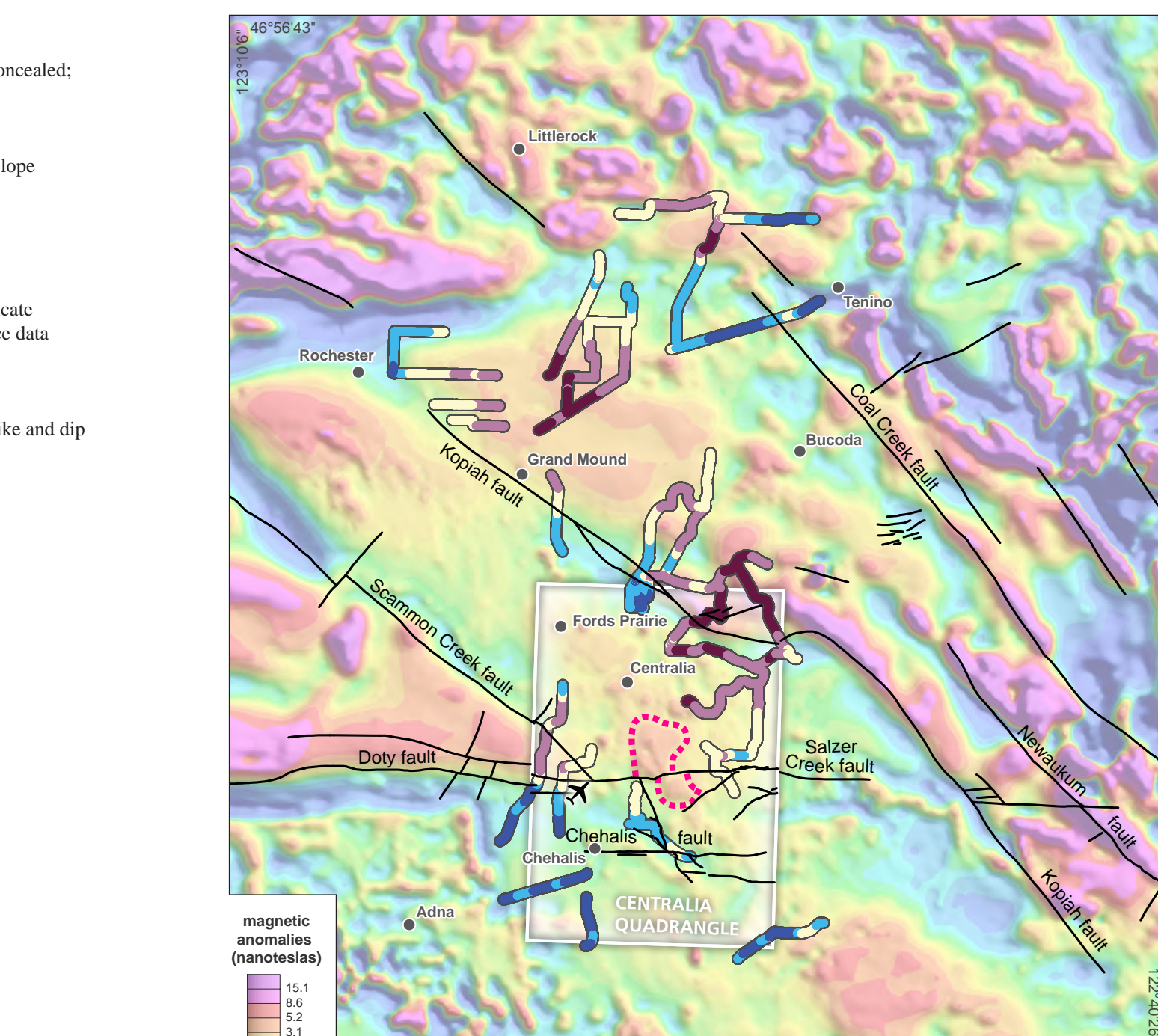


Figure M2. Regional geologic map for the Centralia quadrangle and vicinity. Geologic units within the quadrangle are from this study. Geologic units, faults, and landslides of the mapping area are compiled from published 1:24,000- and 1:50,000-scale geologic maps. Phase and Towner, 1957; Seavey and others, 1988; Flores and others, 2017; Washington Division of Geology and Earth Resources, 2015.

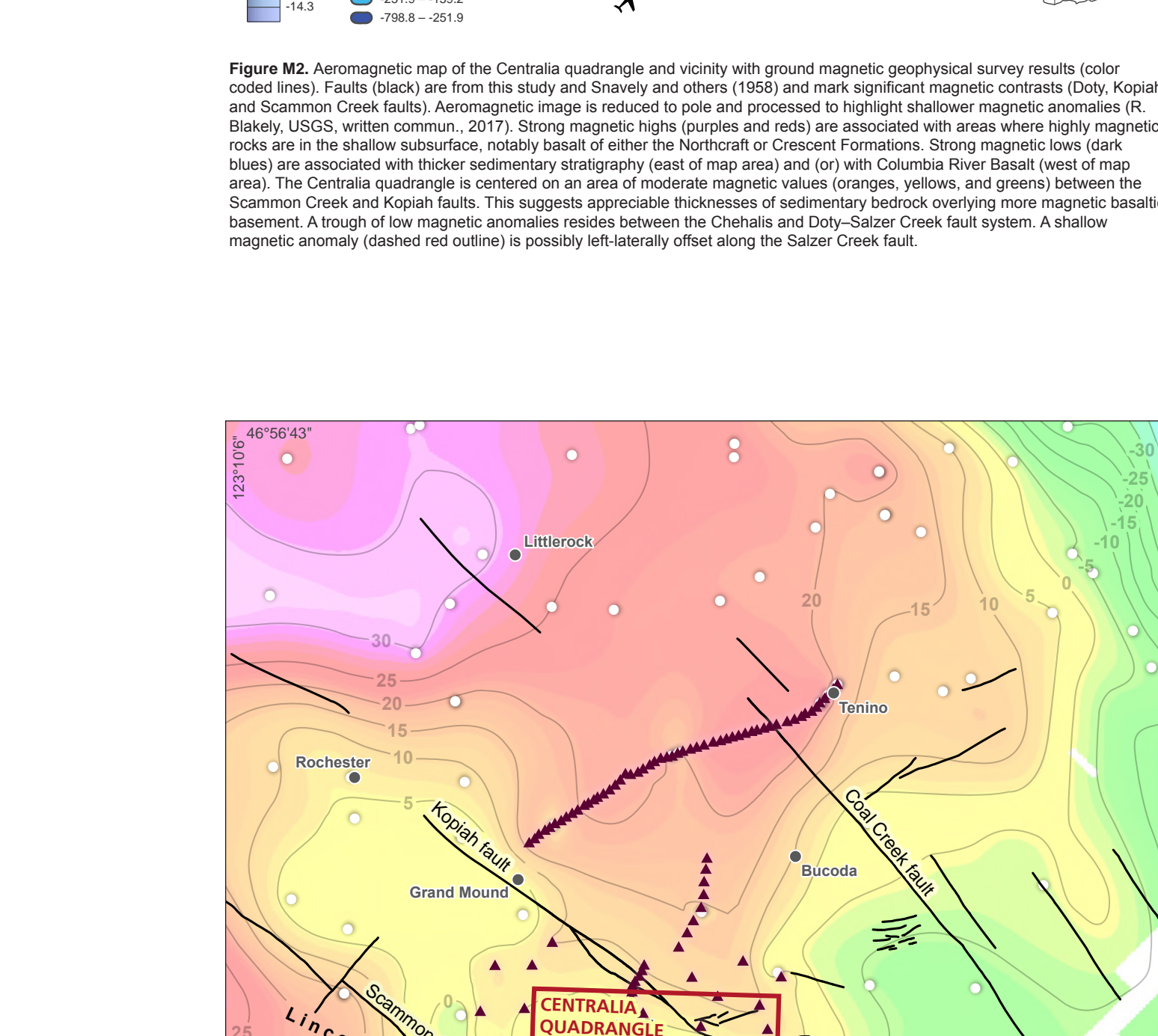


Figure M3. Regional geologic map for the Centralia quadrangle and vicinity. Geologic units within the quadrangle are from this study. Geologic units, faults, and landslides of the mapping area are compiled from published 1:24,000- and 1:50,000-scale geologic maps. Phase and Towner, 1957; Seavey and others, 1988; Flores and others, 2017; Washington Division of Geology and Earth Resources, 2015.

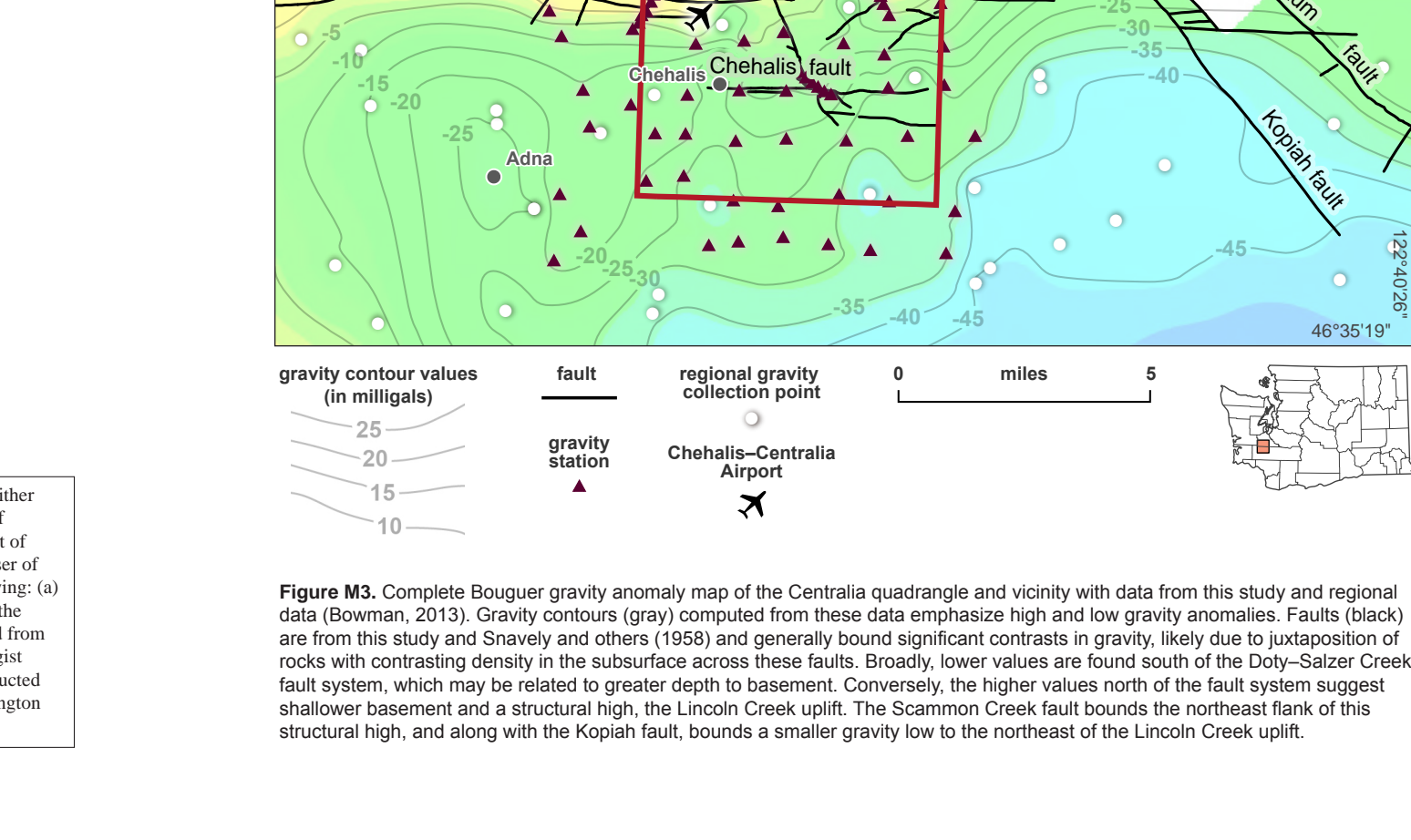


Figure M4. Regional geologic map for the Centralia quadrangle and vicinity. Geologic units within the quadrangle are from this study. Geologic units, faults, and landslides of the mapping area are compiled from published 1:24,000- and 1:50,000-scale geologic maps. Phase and Towner, 1957; Seavey and others, 1988; Flores and others, 2017; Washington Division of Geology and Earth Resources, 2015.