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

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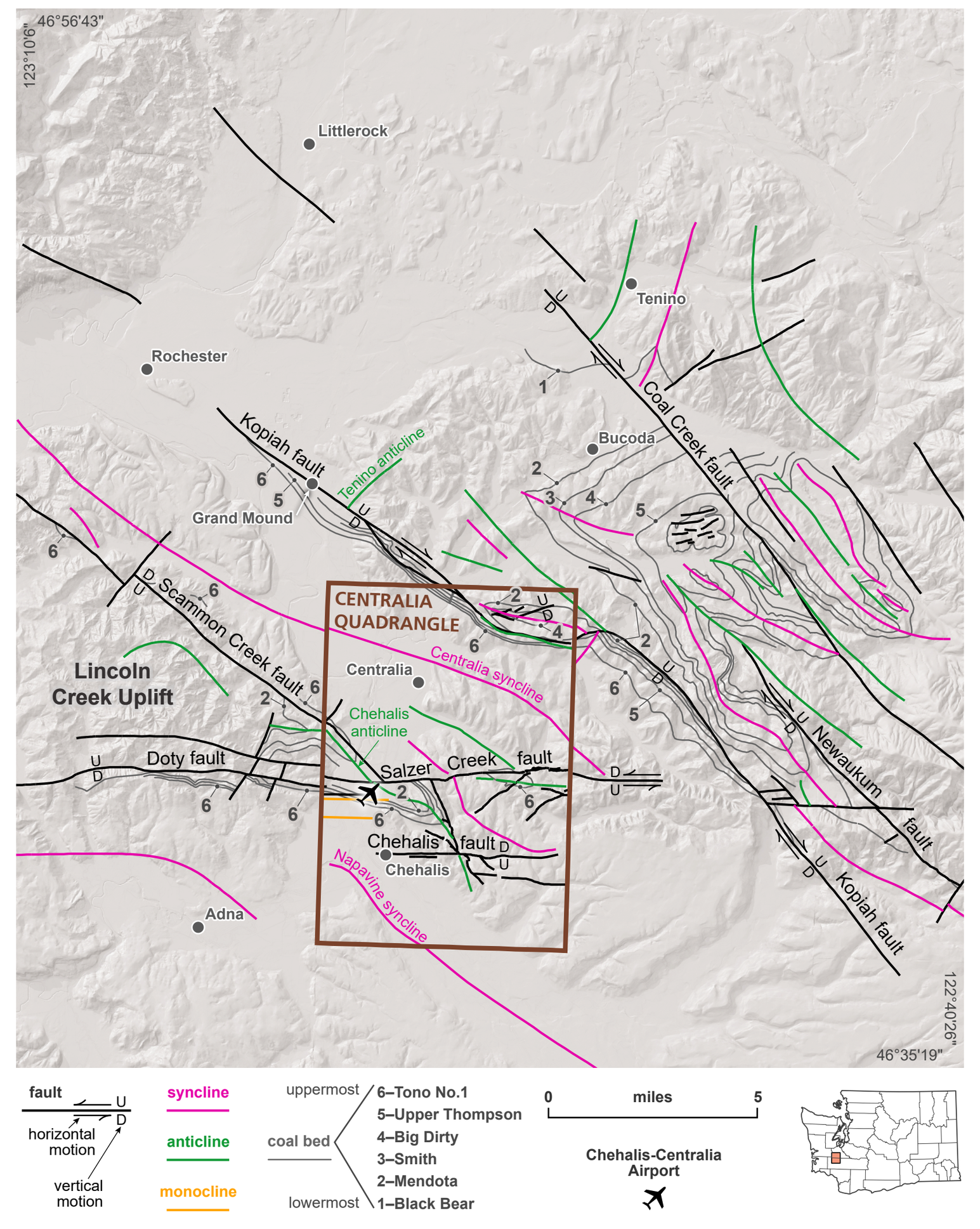
New 1:24,000-scale geologic mapping of the Centralia quadrangle focuses on improving geologic understanding of a populated area affected by natural hazards. Critical among these are potential seismic hazards related to the Doty–Salzer Creek fault system, which may pose a hazard to a proposed flood retention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

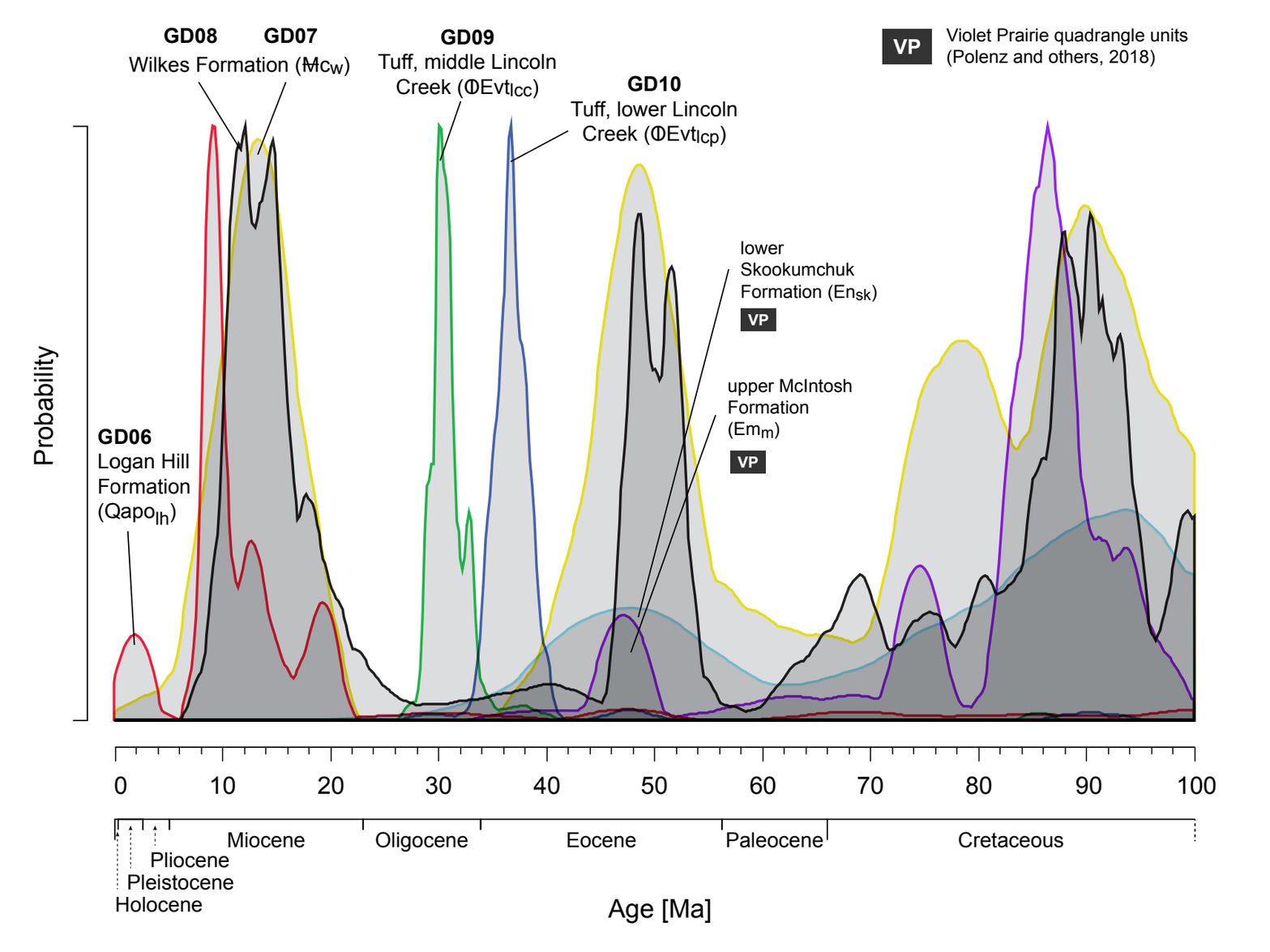
New mapping and geophysical data build on previous work by characterizing geologic structures in greater detail, refining fault locations, and updating structural interpretations. Northwest- and west-striking oblique faults in the quadrangle may be capable of producing damaging earthquakes and may be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

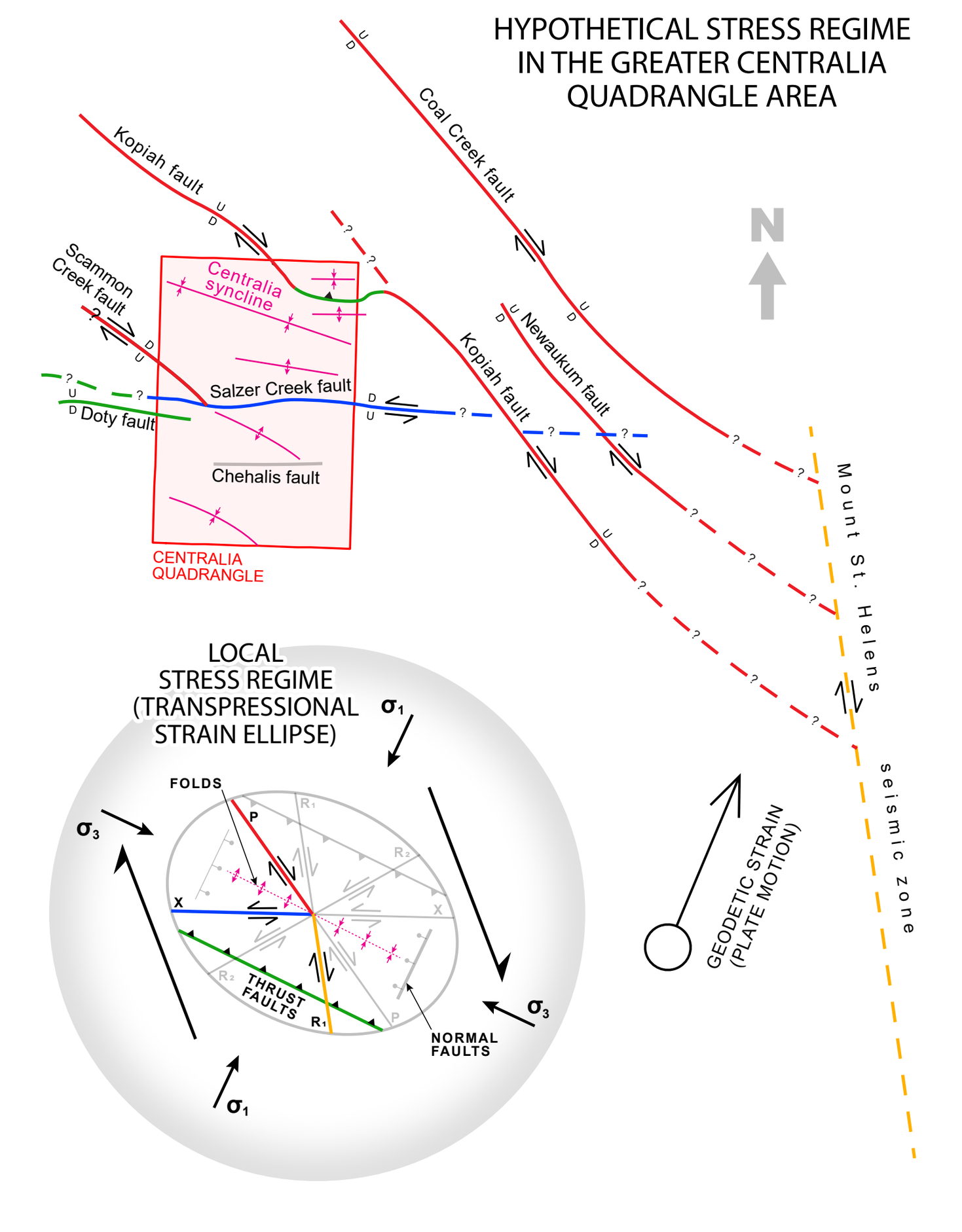
Numerous previously unrecognized landslides are identified from lidar and field mapping. The lower contact of the early Pleistocene Logan Hill Form tion is commonly concealed by landslides, which suggests that the base of this formation may form a slide plane for landslides and may warrant future geotechnical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



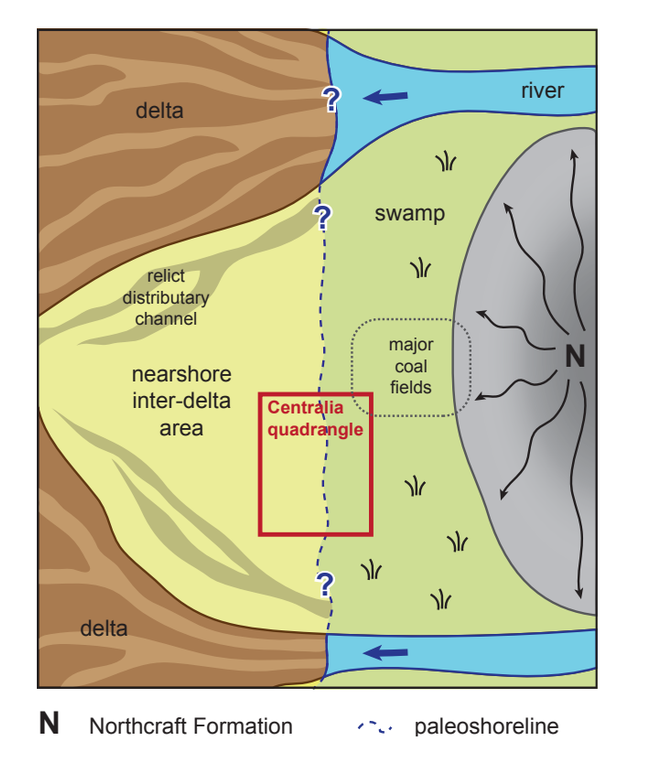
Structural map showing faults, folds, and coal beds. West- and northwest-striking oblique faults and similarly-trending folds show the prevailing structural fabric.



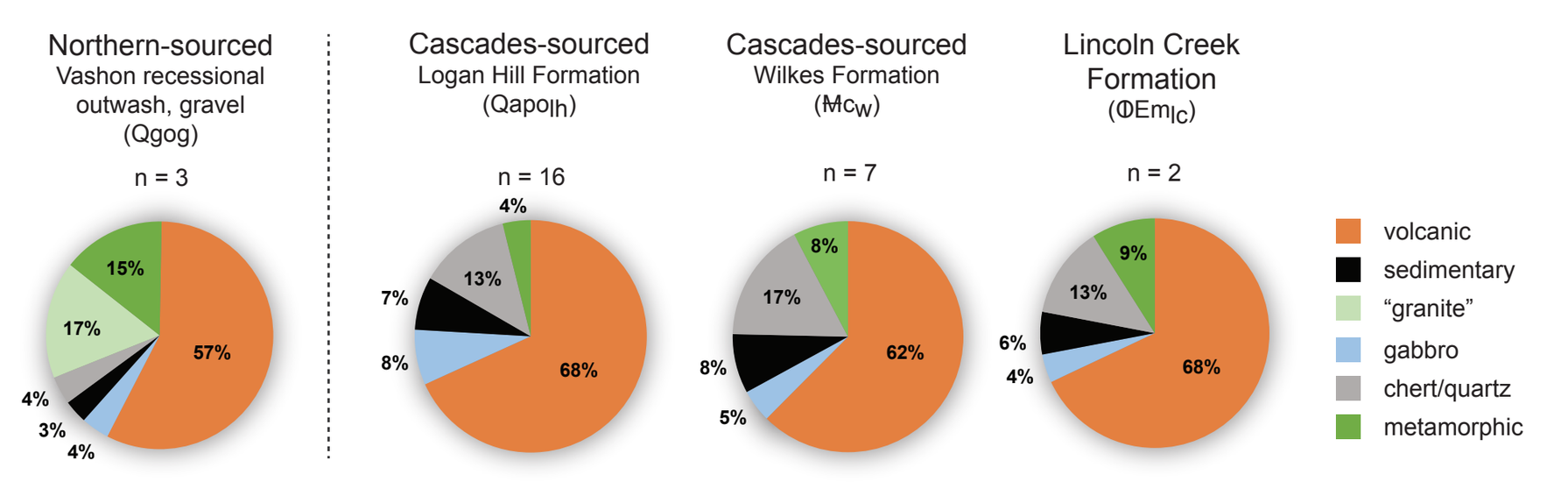
Compilation probability distribution plot of U-Pb analyses of detrital zircon grains.

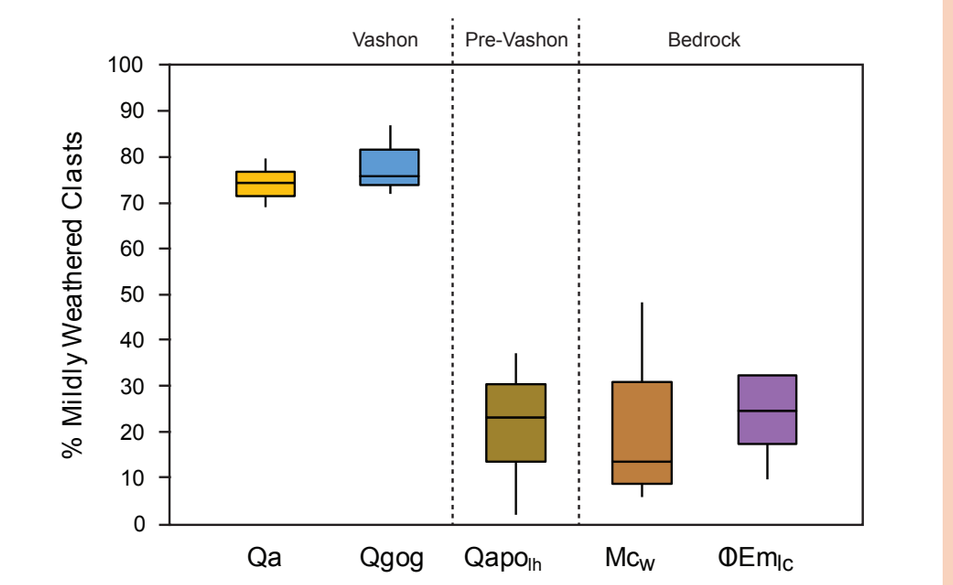


This model synthesizes structures into a transpressional stress regime within the broader compressional stress regime of the Cascadia forearc.


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 Washington [abstract]: American Association of Petroleum Geologists Bulletin, v. 79, no. 4, p. 584-585.


Clast composition.


Box and whisker plots showing ranges of clast weathering.


Severely weathered Logan Hill Formation.