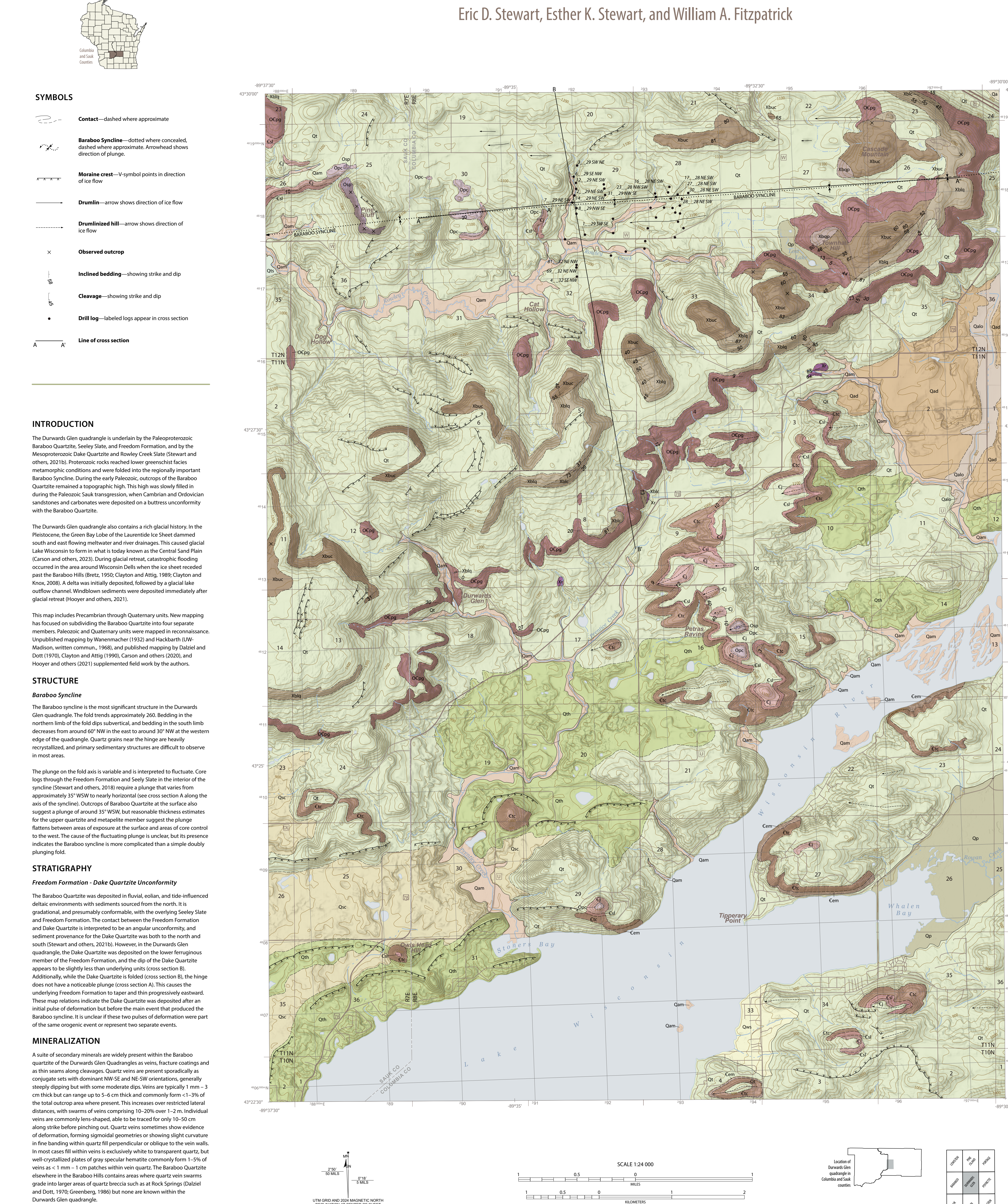


Geologic map of the Durwards Glen 7.5-minute quadrangle, Columbia and Sauk counties, Wisconsin

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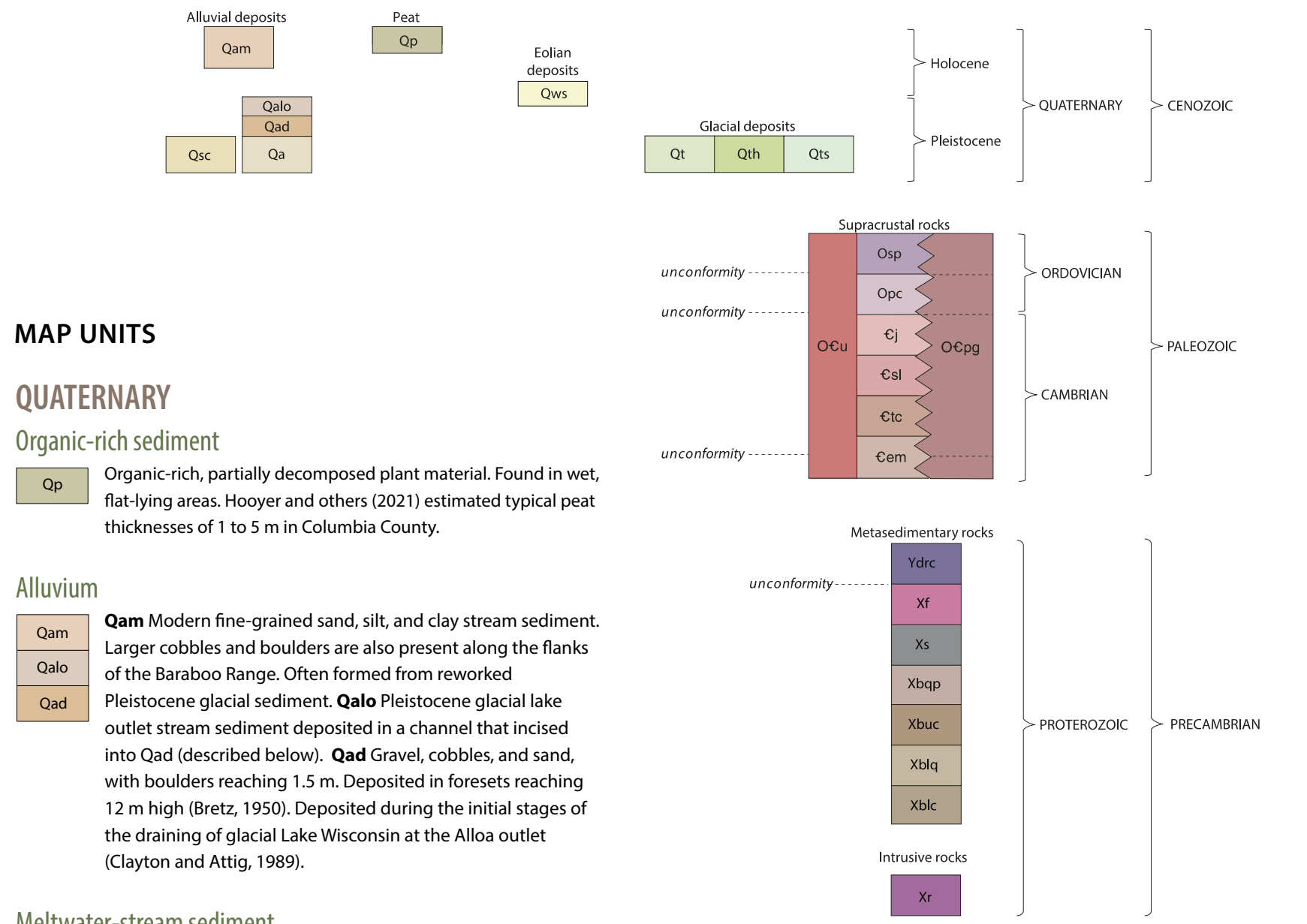


Fracture and cleavage coatings of white, very fine-grained, soapy kaolinite are abundant within the Baraboo Quartzite. A gradation is present from patches of kaolinite on fracture surfaces, to fracture coatings, with the thickest examples approaching 5 mm thickness forming thin veins. Kaolinite coating fractures commonly accompany quartz veins in outcrops, sometimes forming a thin centimeter fill in quartz veins.

Red, fine-grained hematite is another common cleavage coating in the Baraboo Quartzite. Occasionally red hematite cleavages also contain minor yellow-green epidote. At one location red fine-grained hematite and epidote were seen together with quartz filling veins.

One quartzite ridge in the NW 1/4 Sec. 4, T11N R8E was investigated in a detailed ~750 m traverse recording the presence and abundance of the various hydrothermal minerals through a zone of semi-continuous exposure perpendicular to bedding. Bedding on the ridge dips approximately 45° to the NNW exposing a total vertical section of roughly 500 m in observation. Through this traverse there was a change from hematite + epidote cleavage and fracture coating in the deepest (southernmost) portion grading to kaolinite fracture and cleavage fill, to quartz + specular hematite veins in the shallowest portion. All three mineral assemblages have gradational boundaries with one another and are present together through transitional zones.

CORRELATION OF MAP UNITS



MAP UNITS

QUATERNARY

Organic-rich sediment

Open-air-rich, partially decomposed plant material. Found in wet, flat-lying areas. Hooyer and others (2021) estimated typical peat thicknesses of 1 to 5 m in Columbia County.

Alluvium

Qam Modern fine-grained sand, silt, and clay stream sediment. Larger cobbles and boulders are also present along the flanks of the Baraboo Range. Often formed from reworked Pleistocene glacial sediment. **Qalo** Pleistocene glacial lake outlet stream sediment deposited in a channel that incised into Qad (described below). **Qad** Gravel, cobbles, and sand, with boulders reaching 1.5 m. Deposited in forests reaching 12 m high (Bretz, 1950). Deposited during the initial stages of the draining of glacial Lake Wisconsin at the Alloua outlet (Clayton and Attig, 1989).

Meltwater-stream sediment

Qa Late Pleistocene gravel and sand deposited by meltwater streams in the Wisconsin River valley, deposited distal from the ice margin. **Qsc** Gravel and sand deposited as meltwater stream sediment. Scattered glacial sediment within Qsc becomes more abundant eastward. The unit is generally located adjacent to prominent moraines and is found only in the southwestern portion of the quadrangle. In Sauk County, this unit was previously mapped as collapsed meltwater stream sediment (Clayton and Attig, 1990). In Columbia County, this unit was previously mapped as still of the Holy Hill Formation (Hooyer and others, 2021).

Windblown sediment

Qws Well sorted windblown sand deposited in sheets and 3D dunes with approximately 2.5 m of relief.

Glacial sediment

Composed of poorly sorted boulder, cobble, sand, silt, and clay deposited by the Green Bay Lobe of the Laurentide Ice Sheet near the end of the Pleistocene (Carson and others, 2020). Part of the Horizon member of the Holy Hill Formation (Syverson and others, 2011). **Qt** Topography is locally controlled by underlying bedrock. The unit contains numerous bedrock-cored and sediment-cored drumlins. **Qth** Hummocky topography with kettle lakes and ponds common. **Qts** Largely lake sediment deposited as part of the East Baraboo Basin of Glacial Lake Wisconsin (Clayton and Attig, 1990). The unit is only found adjacent to Rowley Creek at the western edge of the map area. May contain some till.

ORDOVICIAN

St. Peter Formation

Qsp White, tan, and orange, dominantly fine- to medium-grained sandstone with minor coarse sand grains. Moderately poor sorting. The St. Peter Formation is well exposed at Fine Bluff in the interior of the Baraboo Ranges. Quartz overgrowths are well developed at the top of the bluff, forming a resistant cap. Deformation bands are also abundant in the upper 3 m of exposure at Fine Bluff. On-scale, purple goethitic clusters and bands after iron sulfide are common, often at the boundaries of deformation band swarms. Approximately 50 m of section is exposed at Fine Bluff.

Prairie du Chien Group

Qpc Light-gray, coarse-grained crystalline dolomite to sandy dolomite. Chert is common. Bedding varies from laminated, to thin-bedded, to massive. Vugs are common. Stromatolites were observed in the interior of the Baraboo Ranges. The thickness of the unit is variable due to the unconformable contact with the St. Peter Formation.

ORDOVICIAN TO CAMBRIAN

Parfrey's Glen Formation

Qpcg Pink to tan conglomerate and fine- to medium-grained quartz sandstone. Baraboo Quartzite boulders, cobbles and pebbles are the primary clasts in conglomerate beds. Glaucanite and barrowes are present in some sandstone beds. The Parfrey's Glen Formation drapes Cambrian to Ordovician topographic highs. Its thickness is variable, and it laterally grades into typical Cambrian to Ordovician stratigraphic units.

Ordovician to Cambrian undivided sedimentary rocks

Qcu Cross section only. Undivided Ordovician to Cambrian dolomite, shale, and sandstone.

CAMBRIAN

Jordan Formation

Qj Tan to light brown, fine- to coarse-grained quartz arenite. The upper Jordan sometimes contains a dolomite cement (Wanemacher, 1932). Grains are generally well-rounded and well to moderately sorted. Crossbedding is common. Clay laminations and *Skeletites* trace fossils occur locally (Wanemacher, 1932). The unit is approximately 20 m thick.

St. Lawrence Formation

Qsl White to tan, fine-grained carbonate cemented sandstone. The St. Lawrence Formation is poorly exposed largely due to burial by glacial sediment. Southeast of the Durwards Glen quadrangle near Lodi, the St. Lawrence transitions into a purple to tan carbonate-cemented siltstone and gray dolomite. The unit is approximately 30 m thick.

Tunnel City Formation

Qtc White to light brown, fine- to medium-grained sandstone. Near the Baraboo Ranges, quartzite pebbles are common. The Tunnel City Formation contains carbonate-cemented sandstone, sometimes with trace glauconite, interbedded with clean quartz sandstone. Some beds also contain hematite cement. Crossbedding is common. Bedsets are typically tens of cm-thick. Crinoids were observed at the west end of Petra Road. The unit is approximately 30 to 45 m thick.

Elk Mound Group

Qem Tan to white, fine- to coarse-grained quartz arenite. The unit is poorly exposed. Most exposures are probably part of the Wonewoc Formation. Elsewhere in the Baraboo Ranges, quartz grains in the upper Elk Mound Group are typically moderately well sorted, and well rounded (Stewart and others, 2021a). The Elk Mound Group is absent from higher elevation portions of the Baraboo Ranges, but full thicknesses can be greater than 100 m in the interior. Outcrop of the Baraboo Ranges, the thickness of the Elk Mound Group increases rapidly. Original thicknesses of around 150 m are inferred near the town of Merrimac, but part of the section has been eroded away.

MESOPROTEROZOIC

Dake Quartzite and Rowley Creek Slate

Qdk Combined, cross section only. The Dake Quartzite is a white, fine-grained quartzite to red-brown pebble (meta) conglomerate. Red-brown, iron-rich conglomerate is focused near the base of the unit, which lies unconformably over the ferruginous member of the Freedom Formation. Greger (1986) reported kaolinite-rich clasts in core that were interpreted to represent weathered detrital feldspars. Outcrop exposure of the Dake Quartzite, however, shows no evidence of detrital feldspar. The thickness of the Dake Quartzite is estimated to be 65 m based on drill core.

The Rowley Creek Slate is a tan slate that overlies the Dake Quartzite. Drill core indicates a minimum thickness of 45 m.

PALEOPROTEROZOIC

Freedom Formation

Qf Cross section only. The Freedom Formation contains a lower ferruginous member and an upper dolomitic member. The ferruginous member contains interbedded iron-rich slate, chert, and minor dolomite. The upper member contains primarily dolomite with minor slate, but the upper member has probably been eroded away in the Durwards Glen quadrangle. The total thickness of the Freedom Formation is probably greater than 300 m, but most of that thickness has been eroded away.

Seelye Slate

Qs Cross section only. Gray to black slate with minor fine-grained quartzite near the top of the unit (Stewart and others, 2021a). The Seelye Slate is around 90 m thick in the Durwards Glen quadrangle.

Baraboo Quartzite

Upper quartzite and metapelite member

Qbzp Pink to purple, fine- to medium-grained quartzite. The member is poorly exposed in the Durwards Glen quadrangle. Elsewhere in the Baraboo Ranges, it typically contains interbedded black to gray metapelite and sandy metapelite that varies from 10 cm to 6 m in thickness. Metapelite typically becomes progressively more abundant stratigraphically higher in the unit. Quartzite is composed of clean quartz sand. Though crossbedding is common in the unit elsewhere, but the quartzite is heavily recrystallized in the map area and bedding is difficult to observe. Stewart and others (2021b) interpreted a fluvial, wave, and tide influenced medial to distal delta front depositional environment for the member. The full thickness of the unit not exposed, but cross sections suggest a thickness of around 275 to 335 m.

Lower quartzite member

Qbzlc Pink to purple, fine- to medium-grained quartzite. Isolated pebbles and one pebble-thick lags occur sporadically across the unit. Phylitic beds, less than 3 cm thick, were observed only. Composed of clean quartz sand. Quartz grains are strongly recrystallized in the Durwards Glen quadrangle, and primary sedimentary structures are difficult to observe. Stewart and others (2021b) interpreted an aeolian, ephemeral stream, and ephemeral pond environment for the lower quartzite member based on exposures in the North Freedom quadrangle. The estimated thickness of the member based on cross sections is in the range of 460 m to 580 m.

Lower conglomerate member

Qbzlc Pink to purple pebble conglomerate to coarse- to fine-grained quartzite. This member was mapped where conglomerate beds exceed 1 cm in thickness. Framework grains in quartzite beds are composed of pure quartz sand. Conglomerate bed sets are often lenticular in shape. Stewart and others (2021b) interpreted a fluvial braid plain to delta front depositional environment for the lower conglomerate member. The thinning of the member is interpreted to vary significantly. It is less than 80 m thick at Caledonia Church where rhyolite is exposed, but may be as much as 600 m thick based on isolated outcrops 3.5 km to the southwest. Interfingering of the conglomeratic fluvial facies of the lower conglomerate member with the fine-grained, fluvial to aeolian lower quartzite member is likely responsible for the thickness changes, but poor exposure due to glacial cover makes assessment of the dominant sedimentary facies uncertain. An overestimate of the thickness of the lower conglomerate member is possible, though relatively rapid thickness changes in the lower conglomerate member are suggested elsewhere in the South Range (Stewart and others, 2021a, Stewart and Stewart, 2021).

Rhyolite

Qr Gray to red, flow banded rhyolite. Exposures at Caledonia Church contain angular clasts of plagioclase feldspar and banded rhyolite set within a flow banded matrix. Stark (1932) interpreted the rhyolite as a flow breccia.

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