Figure 4. Interpretive Geologic Cross Sections Along Eastern Base of Bald Ridge at Northwestern Margin of Bighorn Basin, Park County, Wyoming

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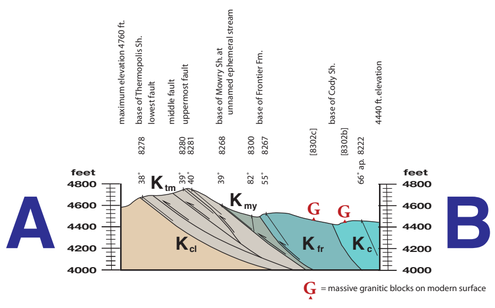
Rocky Mountain Geology, v. 54, no. 2, 2019

All cross sections are in T. 56 N., R. 103 W.

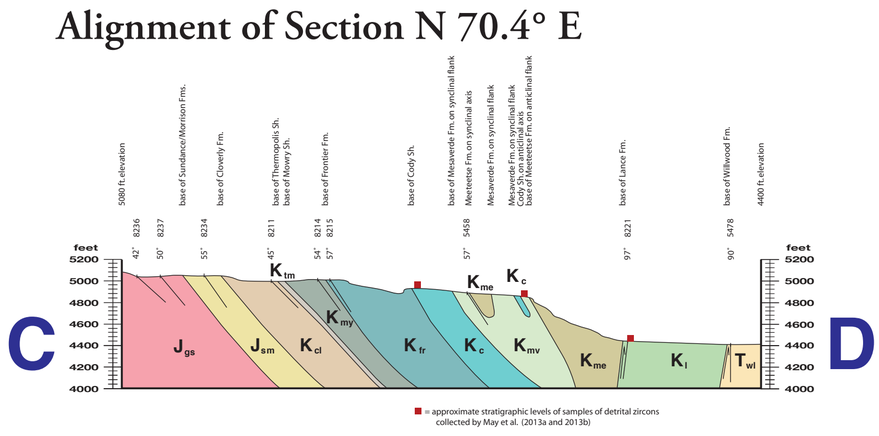
Section A–B (North-central part of Section 21)

Alignment of Section N 69.6° W



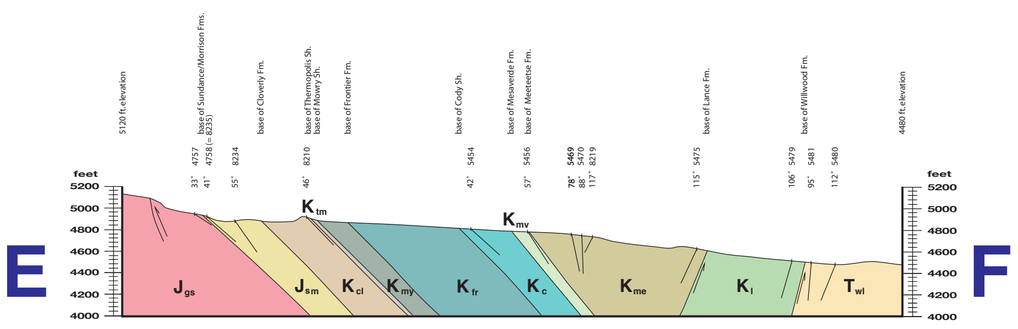
Section C–D (Southern half of Section 21)

Alignment of Section N 70.4° E



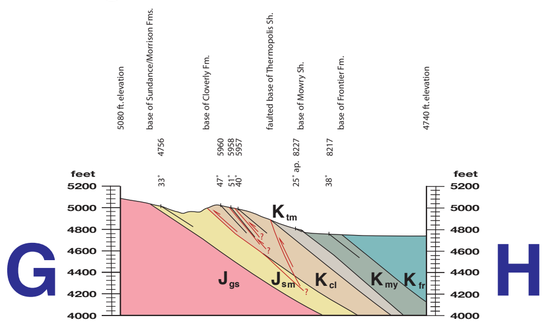
Section E–F (Northwestern corner of Section 28 into southwestern quarter of Section 22)

Alignment of Section N 75.9° E



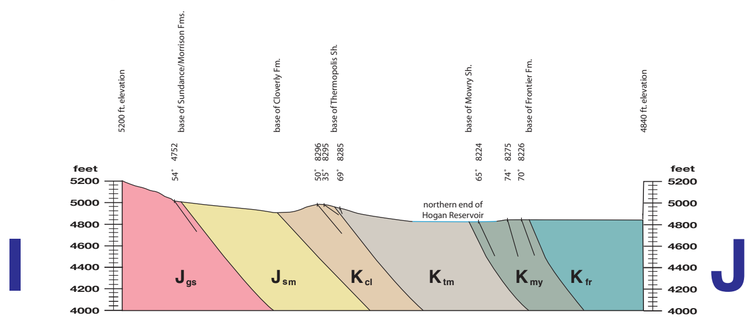
Section G–H (Just north of center of Section 28)

Alignment of Section N 77.1° W



Section I–J (Across most of central Section 33 into west-central edge of Section 34)

Alignment of Section N 89.7° W



Section K–L (Across southern parts of southeastern quarter of Section 33 into southwestern quarter of Section 34)

Alignment of Section N 80.4° E

Cross-sectional Scale = 1:12,000 Vertical Exaggeration = 0

Excerpt from Lillegraven (2009, fig. 3):

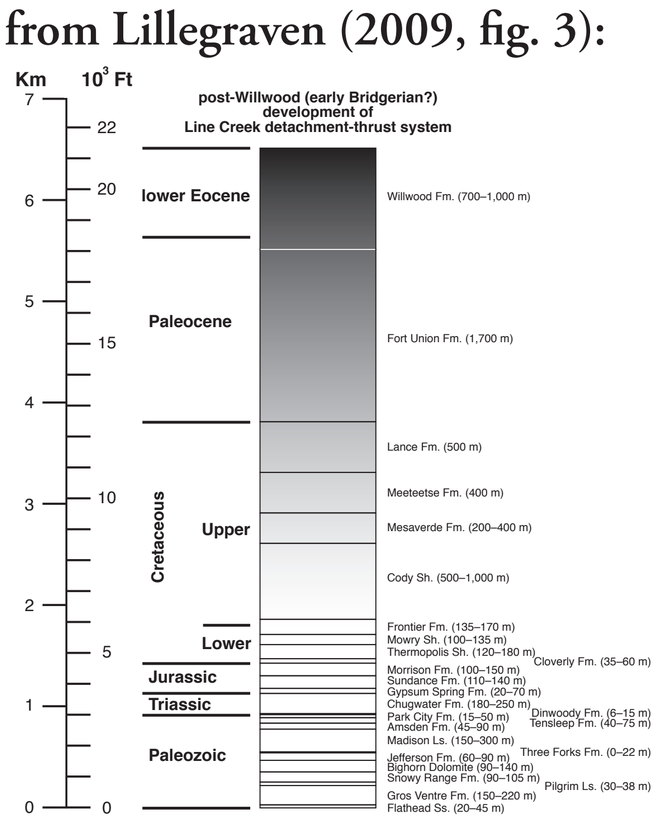


Figure 3. Principal Phanerozoic rock units in vicinity of northwestern Bighorn Basin (exclusive of several post-Willwood formations). Values for most thicknesses are from Pierce (1978). Note that more than two-thirds of total package was deposited during latter half of Cretaceous, Paleocene, and early Eocene; entire Paleozoic sequence constitutes little more than a cratonic veneer (see Boyd, 1993). Upward-darkening shades of grey (not intended to imply quantitative scaling) symbolize progressively increasing intensity of localized contractional deformation related to Laramide orogeny. Increasing rates of subsidence became obvious with deposition of Cody Shale. Line Creek detachment-thrust system (main subject of present study) occurred after deposition of Willwood Formation, tentatively estimated at early Bridgerian.

Excerpt from Lillegraven (2009, fig. 10):

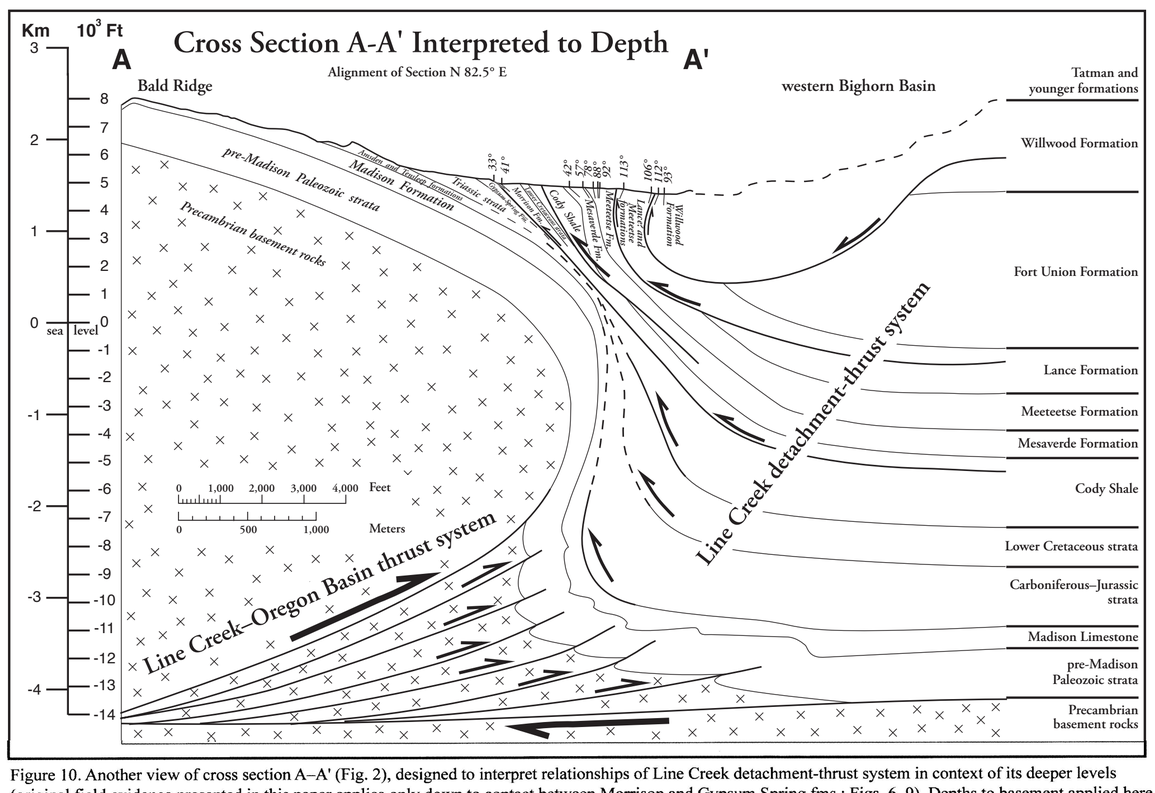


Figure 10. Another view of cross section A–A' (Fig. 2), designed to interpret relationships of Line Creek detachment-thrust system in context of its deeper levels (original field evidence presented in this paper applies only down to contact between Morrison and Gypsum Spring fms.; Figs. 6, 9). Depths to basement applied here follow minimal estimates provided by Blackstone (1993) and Wise (2000). Note, as drawn, that tectonically active components were basement-involved, east-vergent fault zones, and almost all fault relationships within stratigraphic column were passive responses to basement faulting associated with physical stratigraphic crowding, out-of-the-basin to west, and resulted in putting younger strata onto older. Uplift of Bald Ridge via development of Line Creek–Oregon Basin thrust system post-dated deposition of (now locally overturned) Willwood Formation. Apparent 'downhill' translation of uppermost-indicated detachment thrust, as plotted against present-day elevations, is an artifact of asymmetrical, late-Laramide basement uplift of northeastern Bighorn Basin (see Blackstone, 1993).

Excerpt from Lillegraven (2009, fig. 11):

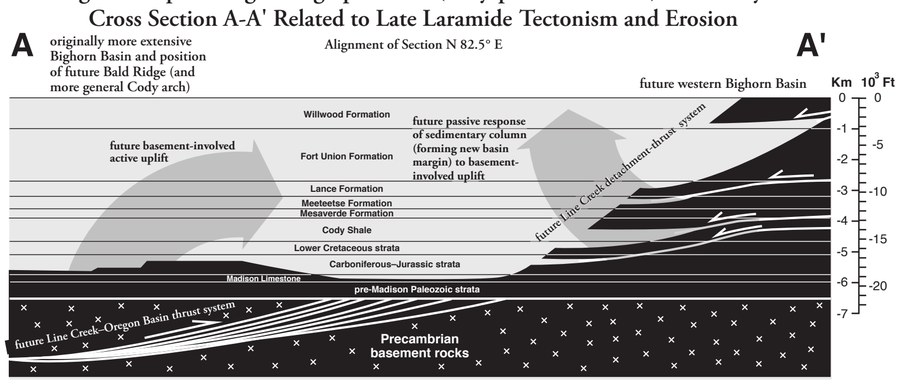


Figure 11. Diagrammatic, palinspastic interpretation of cross section A-A' (as presented in Figs. 2, 6, 9–10) prior to deformation. Black pattern (including Precambrian basement and Phanerozoic sedimentary column) represents rocks that still exist, and grey pattern represents strata secondarily lost through Laramide faulting and erosion. Broad grey arrow on left indicates direction of future active, basement-involved faulting opposed to (broad arrow on right) future passive response in forming Line Creek detachment-thrust system. Note reality (on right) of dominantly 'down-section' cutting among out-of-the-basin detachment thrusts. Also note illusion of 'down-hill' (relative to land surface) cutting by same thrusts; however, all would become physically 'up-hill' following initiation of uplift caused by development of Line Creek–Oregon Basin thrust system. Importantly, note via this model how little of original stratigraphic section has been retained following late-Laramide uplift.

Excerpt from Lillegraven (2009, fig. 32):

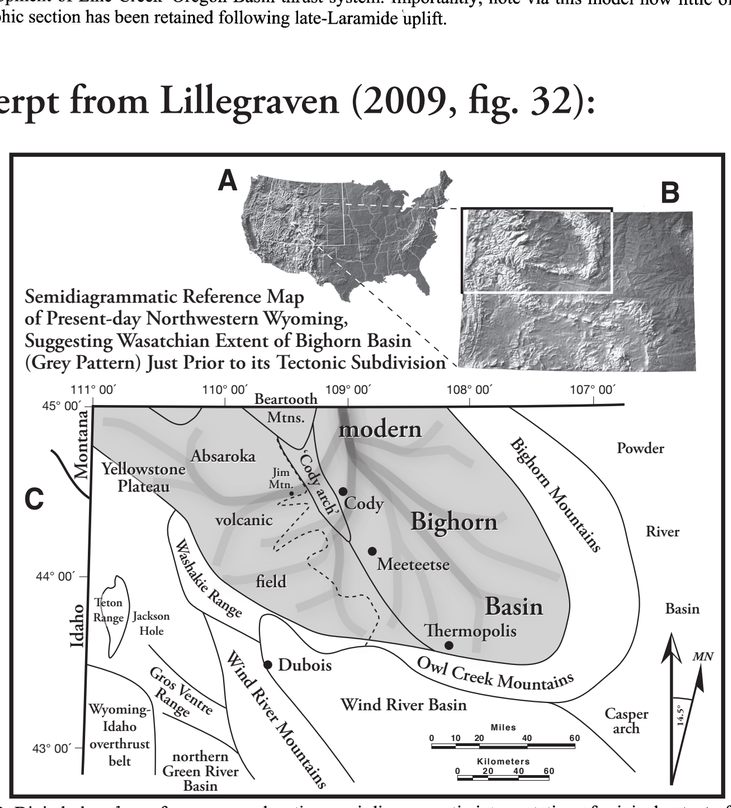


Figure 32. Digital-elevation reference maps locating semi-diagrammatic interpretation of original extent of Bighorn Basin late in early Eocene time. **A**, contiguous United States; **B**, state of Wyoming (inset box indicates northwestern part of state expanded in 'C'); **C**, paleogeographic map of northwestern Wyoming during Wasatchian time, late in depositional history of Willwood Formation (modeled after Lillegraven and Ostresh, 1988, fig. 9). Prior to basement-involved uplift of 'Cody arch' (i.e., combination of Bald Ridge anticline, tectonically displaced Pat O'Hara Mountain, Rattlesnake Mountain anticline, Cedar Mountain, and continuation of several anticlinal uplifts to the southeast; Figs. 2, 10) and during deposition of Willwood Formation, original west–east extent of late Laramide Bighorn Basin was roughly twice the breadth as recognized today.