

Subsurface relationships of Albian–Cenomanian shallow marine to nonmarine topsets of the Nanushuk Formation, northwestern NPRA

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This poster provides regional stratigraphic and structural context for the Wainwright 1 and 1A wells drilled in 2007 by the U.S. Geological Survey in the northwestern National Petroleum Reserve–Alaska (NPRA). The Wainwright 1 well was continuously cored from 75 to 1,605 ft total depth, and a suite of high-resolution slim-hole well logs has been compiled from both holes, providing a unique dataset for interpreting the sedimentology, stratigraphic architecture, and reservoir quality of Lower Cretaceous Brookian topset strata of the middle and upper Nanushuk Formation.

The Wainwright 1/1A core and log data document the upward transition from predominantly marine to fully nonmarine depositional settings accompanying east–north-eastward progradation of topset strata during Albian to Cenomanian time. Tentative correlations with wells up to tens of kilometers away are possible with the benefit of seismic data. Intervals of fluvial sandstones up to 30 m (100 ft) thick that appear to correlate across these long distances are interpreted as probable mobile channel belt deposits; their continuity suggests that they are associated with sequence boundaries (regressive surfaces of erosion) that are otherwise difficult to interpret in nonmarine settings. Many coal-bearing intervals also appear to correlate across these long distances, but it is considered unlikely that individual coal seams or sandstone lithosomes are continuous among the widely separated wells. The plausible correlatability of coaly intervals (likely late transgressive to early highstand systems tracts) and mobile channel belts (likely falling stage to lowstand systems tracts) suggests that expansive areas of the Nanushuk coastal plain were simultaneously subject to changes in relative sea level, probably due to low relief.

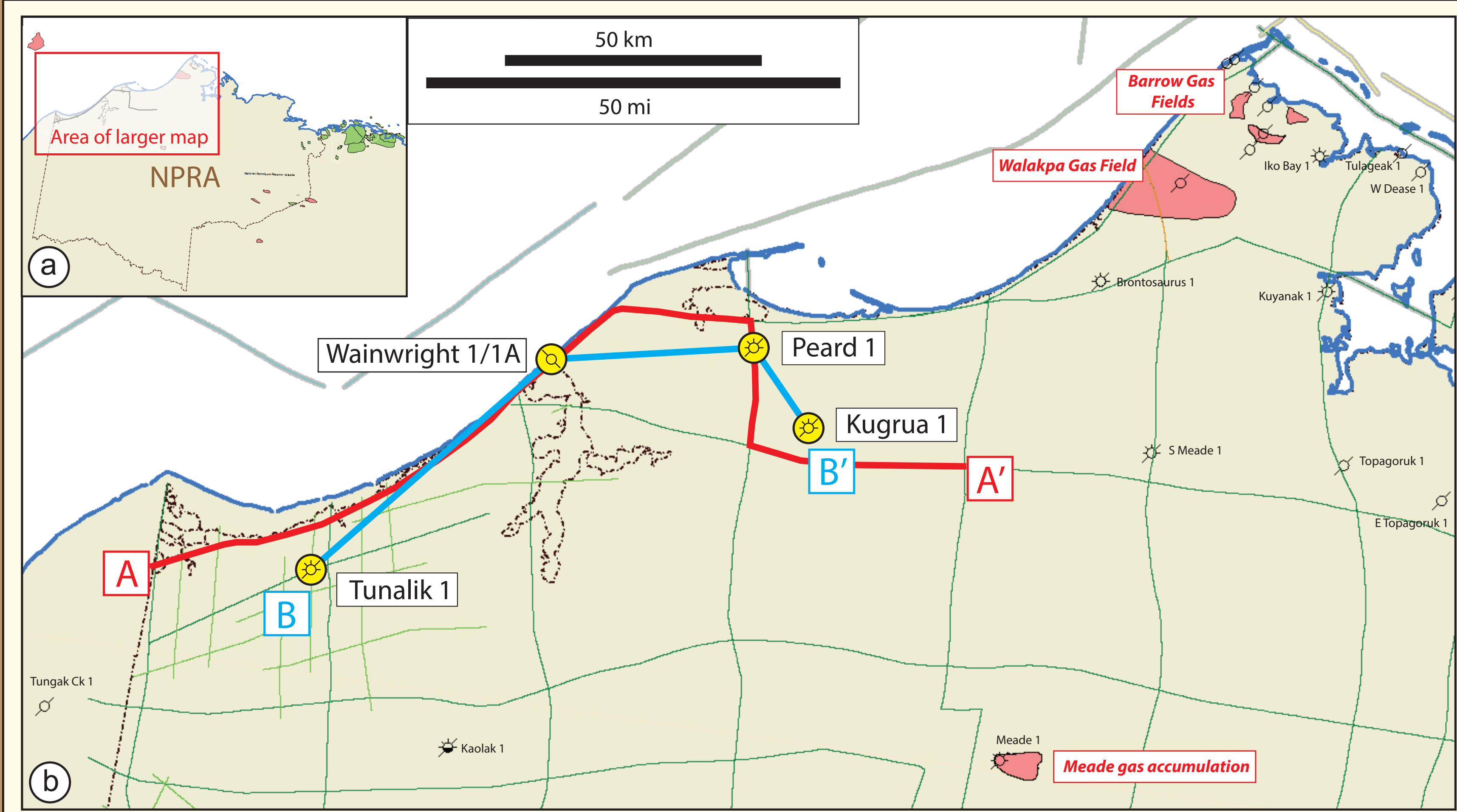


Figure 1-1. Location map for this study. Inset map (a) shows all of National Petroleum Reserve–Alaska (NPRA) relative to the major oil fields of the central North Slope. Main map (b) shows Wainwright 1/1A coal bed methane experimental boreholes relative to conventional oil and gas exploration wells and gas accumulations of northwestern NPRA. Line A–A' is the seismic transect shown in fig. 1-2; line B–B' is the well log cross section shown in fig. 1-3.

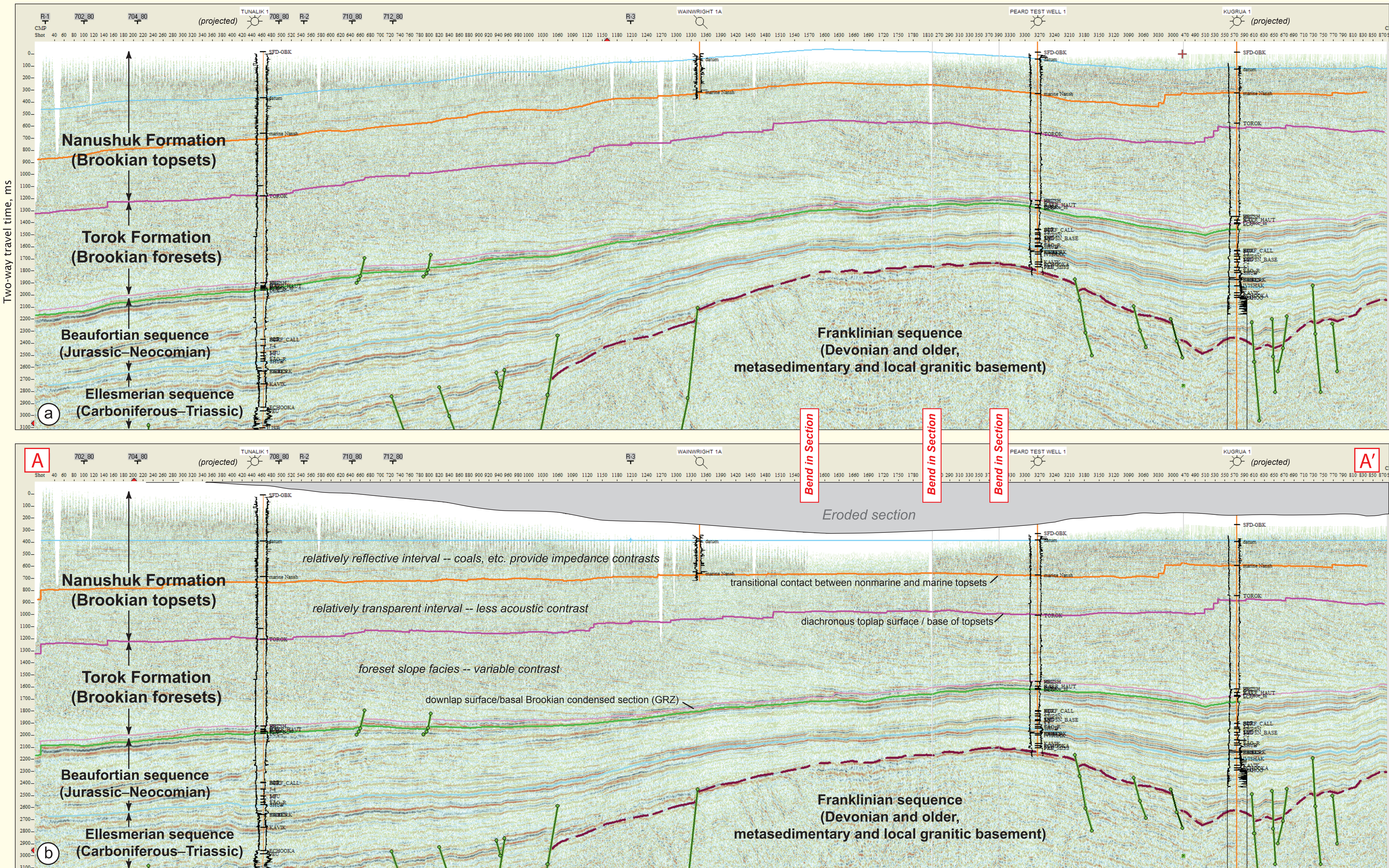


Figure 1-2. Two versions of the seismic transect A–A' using USGS reprocessed regional sections from northwestern NPRA. The data are displayed with a sea level datum (0 ms) in fig. 1-2a (upper), and flattened on the light blue horizon (locally phantom-picked) in fig. 1-2b. Note that major bends in section create the apparent structural high in the Wainwright 1–Peard 1 area; in reality, strata are dominantly homoclinal on the south flank of the Barrow Arch rift margin and north flank of the Colville foreland basin. Tunalik 1 well is projected onto line from ~8 km southeast; Peard 1 is projected from ~6.5 km north.

Topset stratigraphic correlation section, Wainwright area, northwestern NPRA

