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Predicting Deep-Water Sand Deposition from Shelf-Edge Trajectory in the Latest Cretaceous, Lance-Fox Hills-Lewis Depositional System, Washakie Basin, Wyoming

Successive shelf-edge positions form the shelf-edge trajectory, which is a predictor of deep-water sand deposition. Hypothetically, during times and/or in places where the "rise angle" involved in the shelf-edge trajectory increases, the amount of sandy sediment positioned on the time-equivalent deep-water slope and basin floor decreases. A low-angle trajectory implies much shelf-slope by-pass of sediment, whereas a high-angle trajectory involves major storage of sediment on the shelf and coastal plain, with little delivery to deepwater areas.

The regressive, fluvial-shelf-deepwater depositional system of the Lance, Fox Hills and Lewis Shale Formations in the Washakie Basin offers an excellent opportunity to test this concept. In the southern Rock Springs Uplift (western of the basin), the exposed Lewis Shale contains little amount of sand. In contrast, overlying the Lewis, the shelf Fox Hills Formation reaches up to at least 60 m thick of sandstone that is commonly amalgamated, and hummocky and swaley cross-stratified suggesting deposition in the shoreface. The uppermost sandstone unit, however, is cross-stratified with abundant organic drapes, and plant remains evidencing a tidally influenced coastline with access to land derived plants. Capping the section are very thick shale, coal and sandstone beds of the Lance Formation.

Overall, thus, in this area, the Lewis, Fox Hills and Lance Formations are aggradationally stacked, suggesting an overall, high-angle shelf-edge trajectory and therefore minor deep-water sand accumulation. However, a locally flat shelf-trajectory in this area, or dominantly flat in other areas of the basin would result in deposition of deep-water sand.