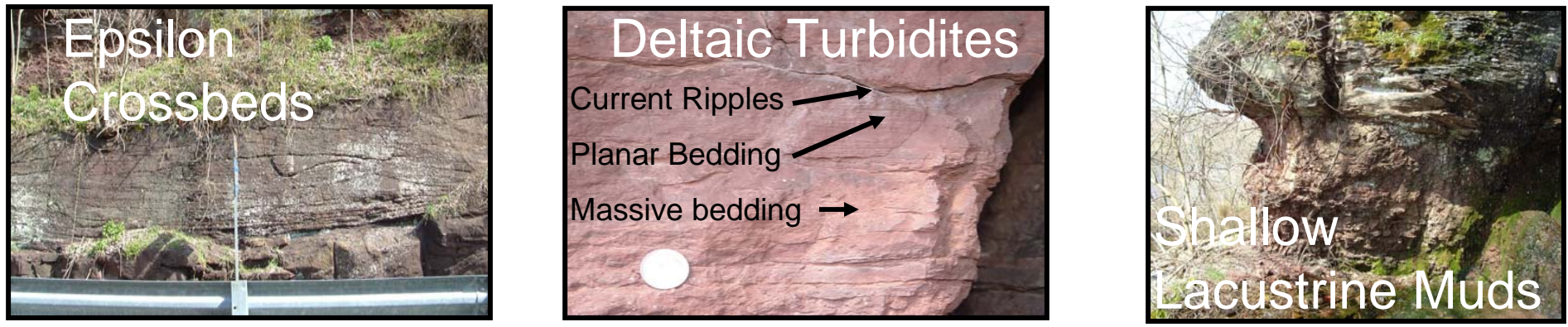


Fluvial Depositional Styles and Fluvial→ Lacustrine Transition Zones of the Passaic Formation, Newark Basin. Joshua H. Long, Dr. S.J. Friedmann



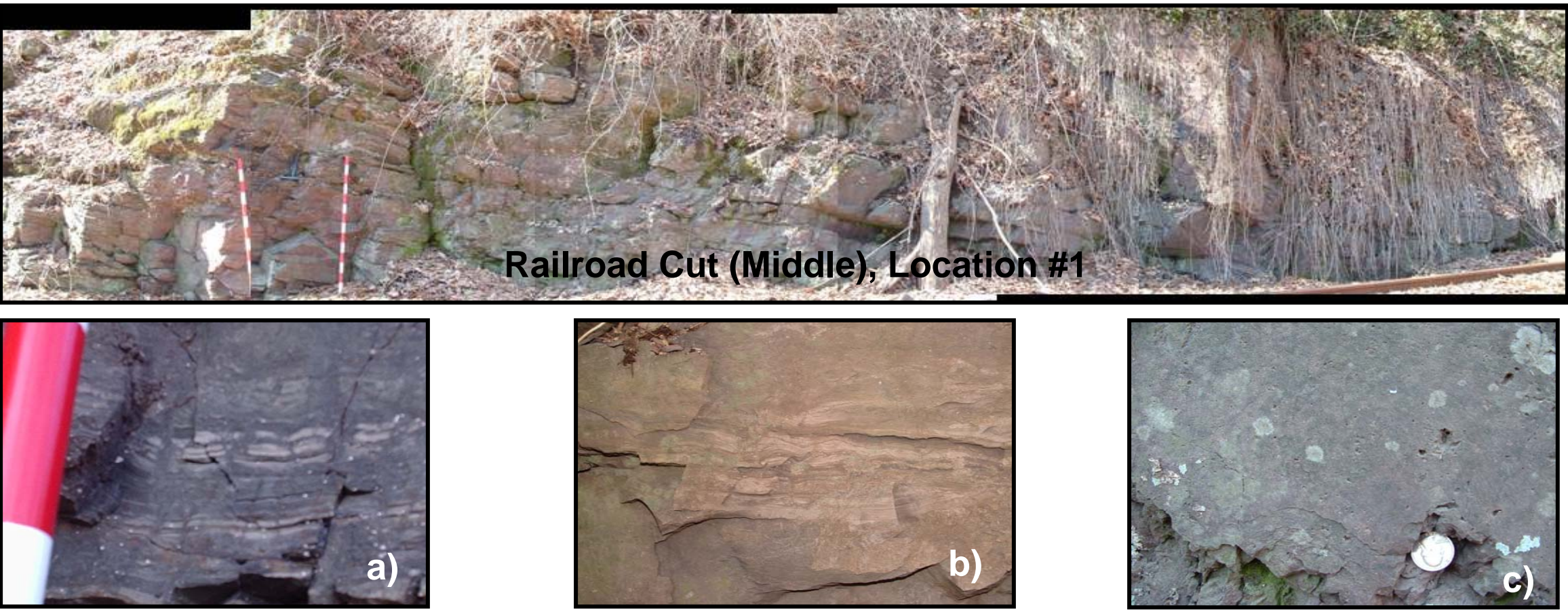
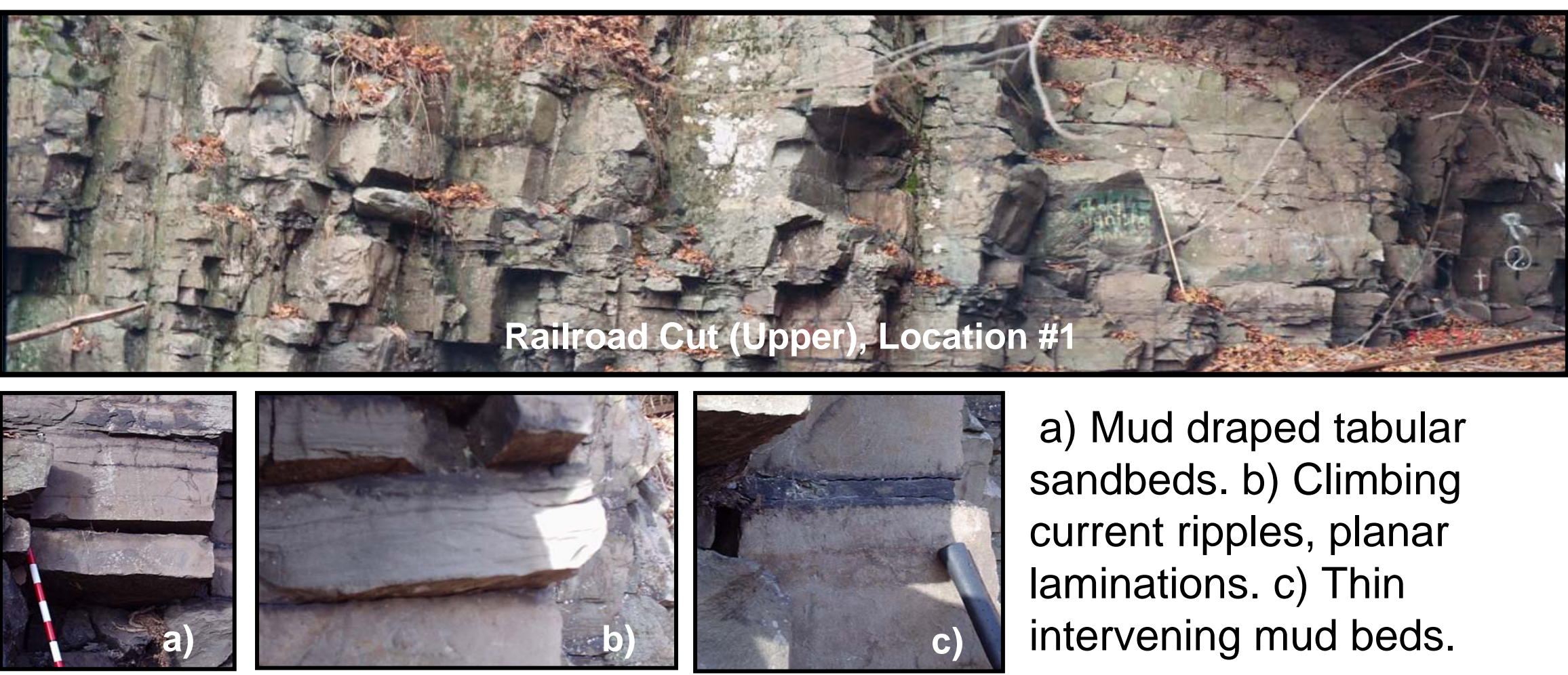
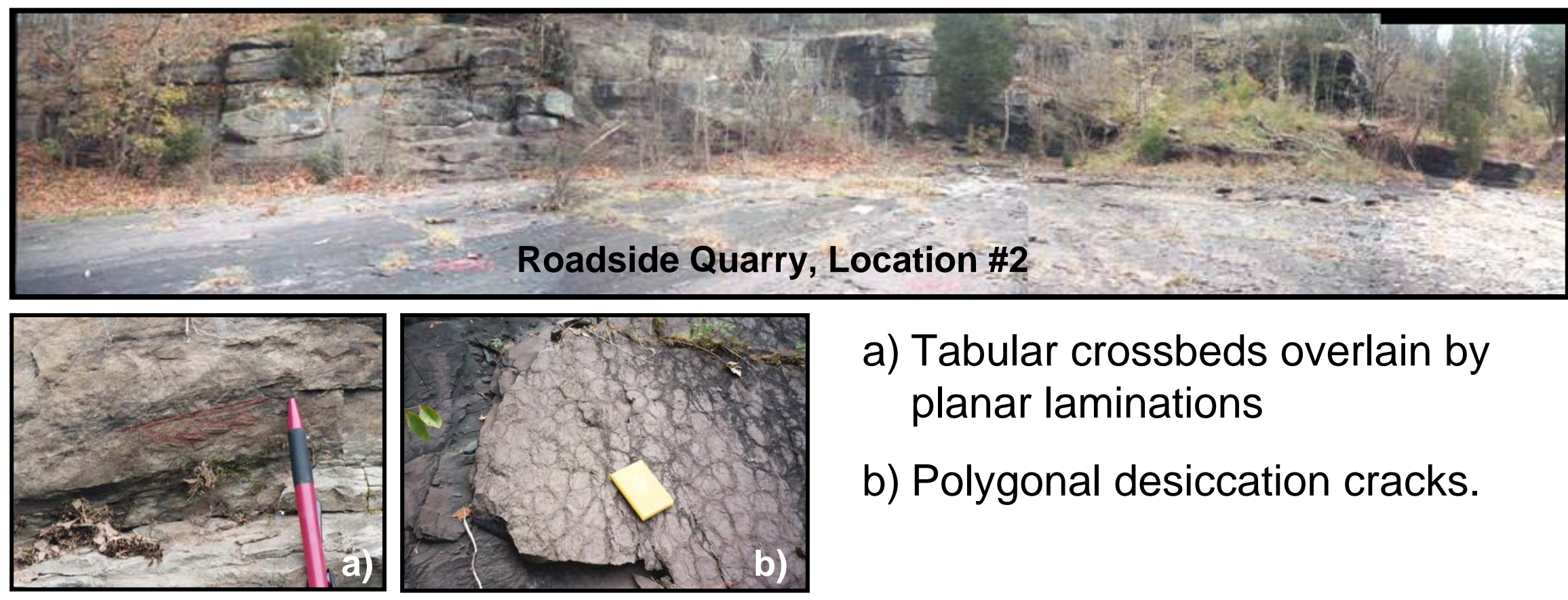
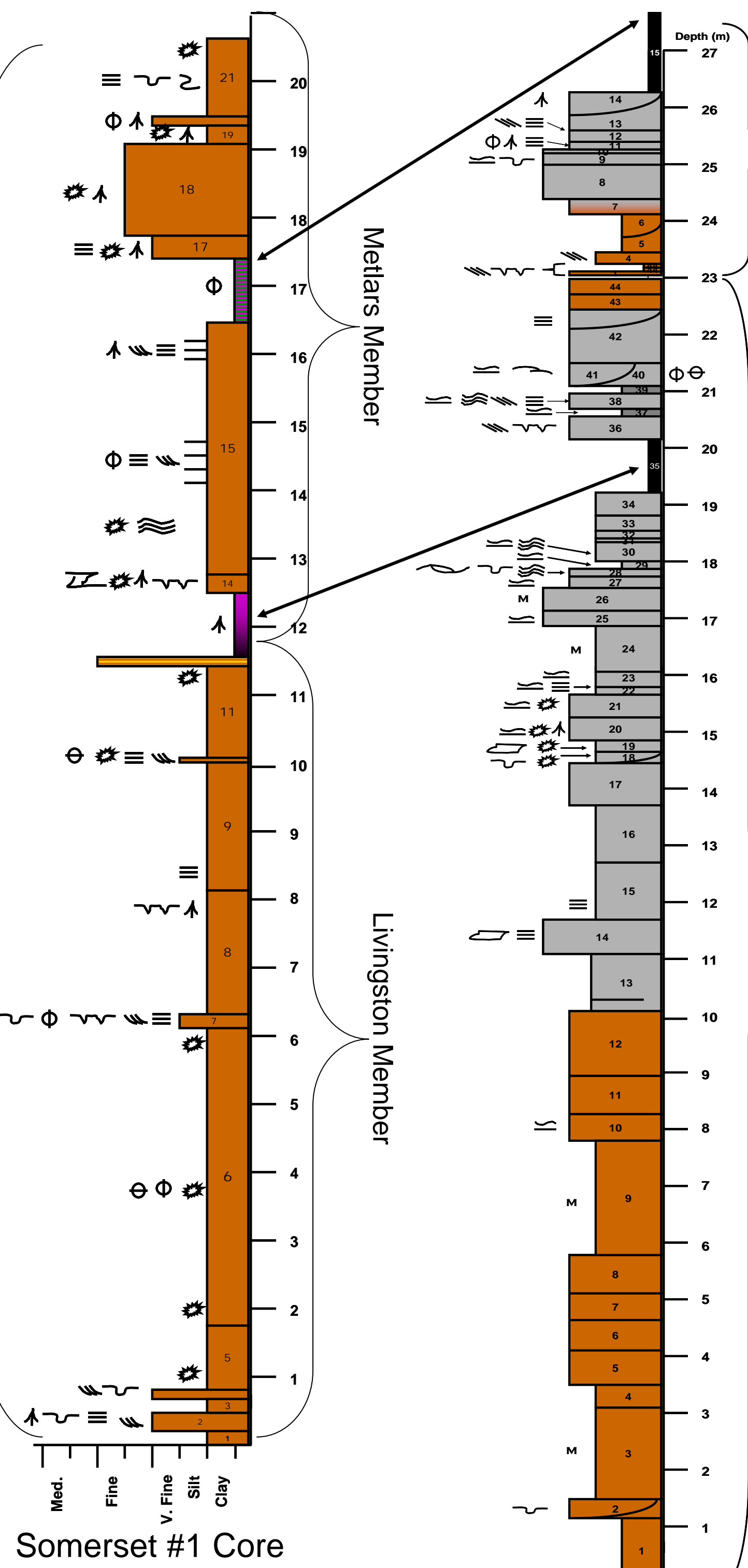
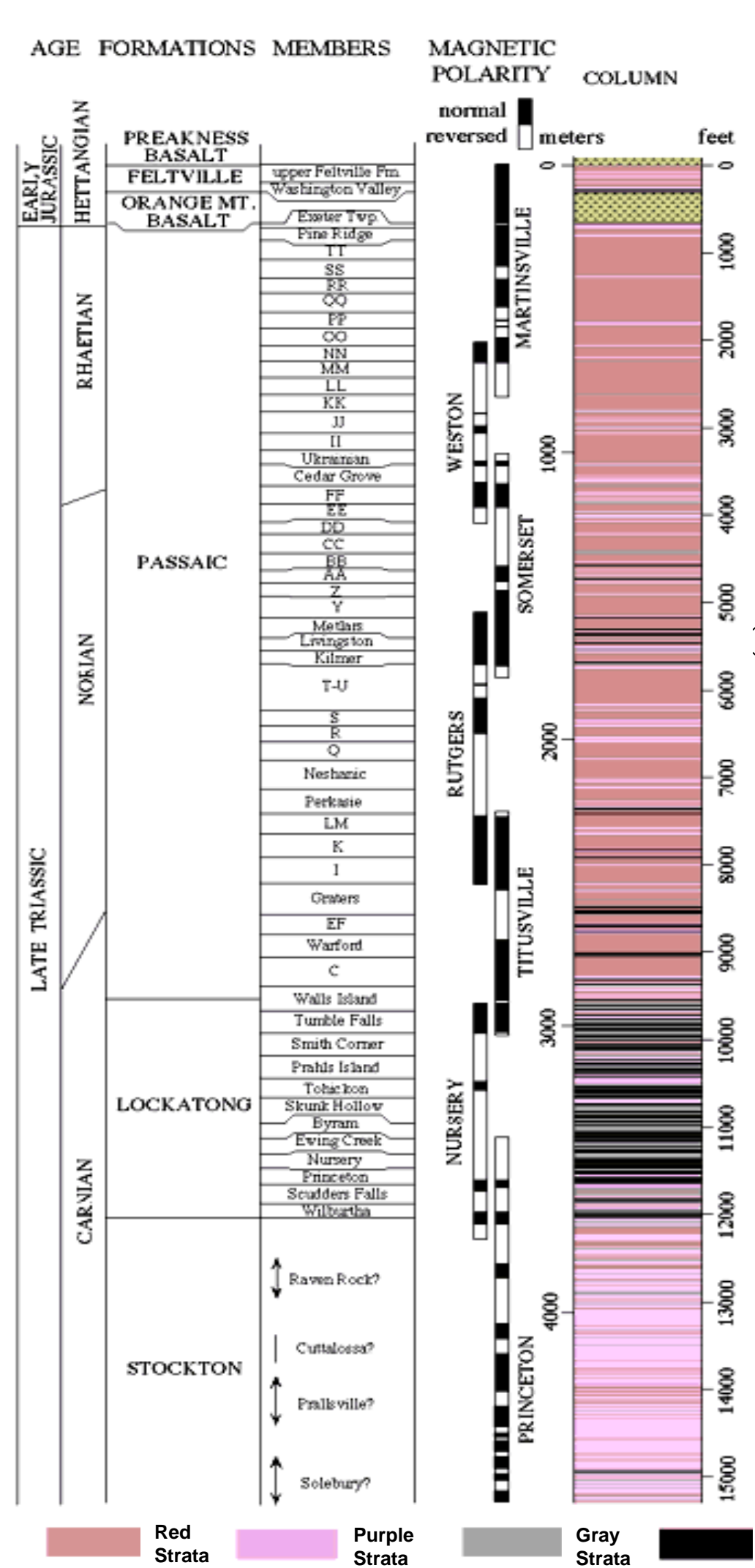
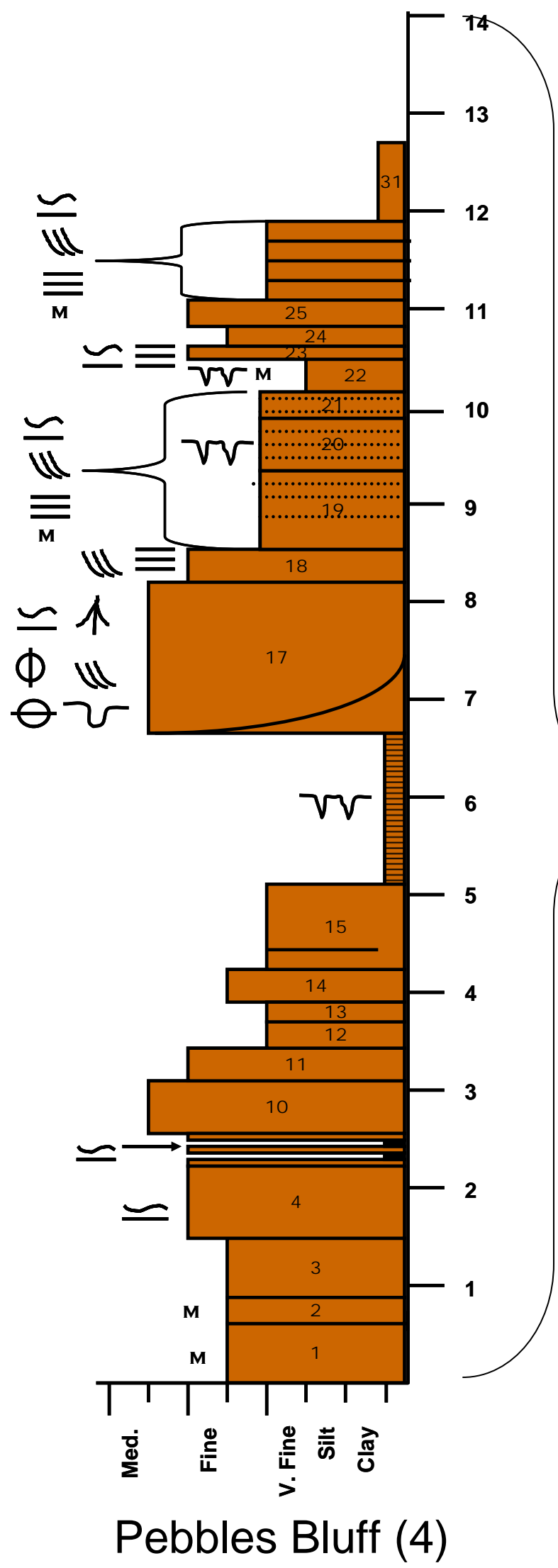
Abstract The sediments within the Newark Basin contain a record of cyclic deposition at multiple frequencies. Due to their pronounced cyclicity and climatic sensitivity the lacustrine deposits within the basin have been the focus of many basin studies. While the lake deposits are well documented, relatively little is known about the fluvial systems that carried water and sediments to these ancient lakes. Locally, fluvial sediments can be coarse-grained and channelized, and are believed to represent deposition in coarse-grained braided systems, notably in the Stockton and Passaic. Such deposits can be limited to areas proximal to the main border fault system and were noted for this project in the Pebbles Bluff exposure of the LM Member of the Passaic Formation. However, there are many relatively fine-grained, thin-bedded sandy fluvial deposits that show little evidence for channeling and amalgamation. The system evolves through nodal avulsion and the construction of crevasse and terminal splays. Outcrop observations of the Metlars and Livingston Members of the Passaic Formation show that the non-lacustrine, relatively coarser grained facies are dominated by extensive tabular sand sheets whose geometries, structures and range of grain sizes are consistent with deposition in anastomosed fluvial networks, similar to those of the Okavango Delta in Botswana. The Okavango lies within a half-graben in the southernmost extension of the East African Rift system. Paleogeographic reconstructions, using paleomagnetic and paleoclimatic data taken from lacustrine deposits, have placed the Newark Basin at roughly 20° north latitude during the late Triassic and early Jurassic, which is similar in climate to the 20° south latitude position of the present-day Okavango. As such, the Okavango may serve as a general analog for the fluvial members of the Passaic Formation in terms of hydrology and architectural evolution.



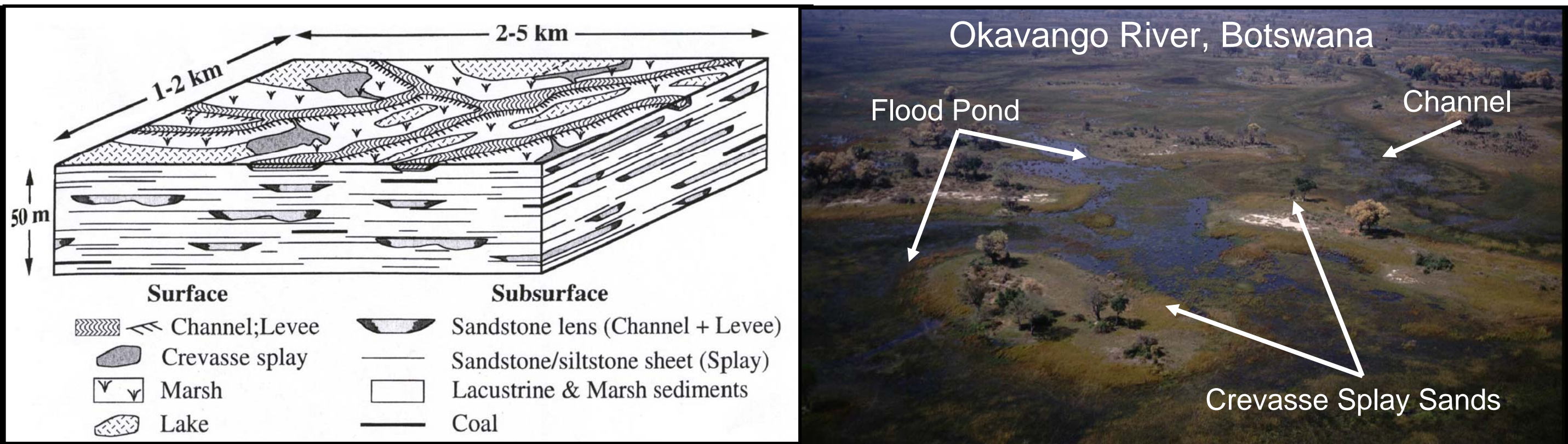
- Hypotheses**
- Coarse grained facies within the Passaic Formation are:
- Dominated by braided streams
 - Dominated by anastomosed streams
 - Exhibit characteristics of both braided and anastomosed streams

- Methods**
- Data collected in the field compiled in the form of measured sections.
 - Photopan analyses.
 - Core observations

- Interpretations**
- Locations 1 & 2:** Proximal & Distal Lacustrine Deltaic → Deep, Perennial Lacustrine → Missing Interval (?) → Anastomosed Crevasse Splay Deposits → Shallow, Ephemeral Lacustrine → Lacustrine Deltaic → Deep, Perennial Lacustrine.
 - Location 4:** Meandering Fluvial → Shallow, Ephemeral Lacustrine → Lacustrine Deltaic

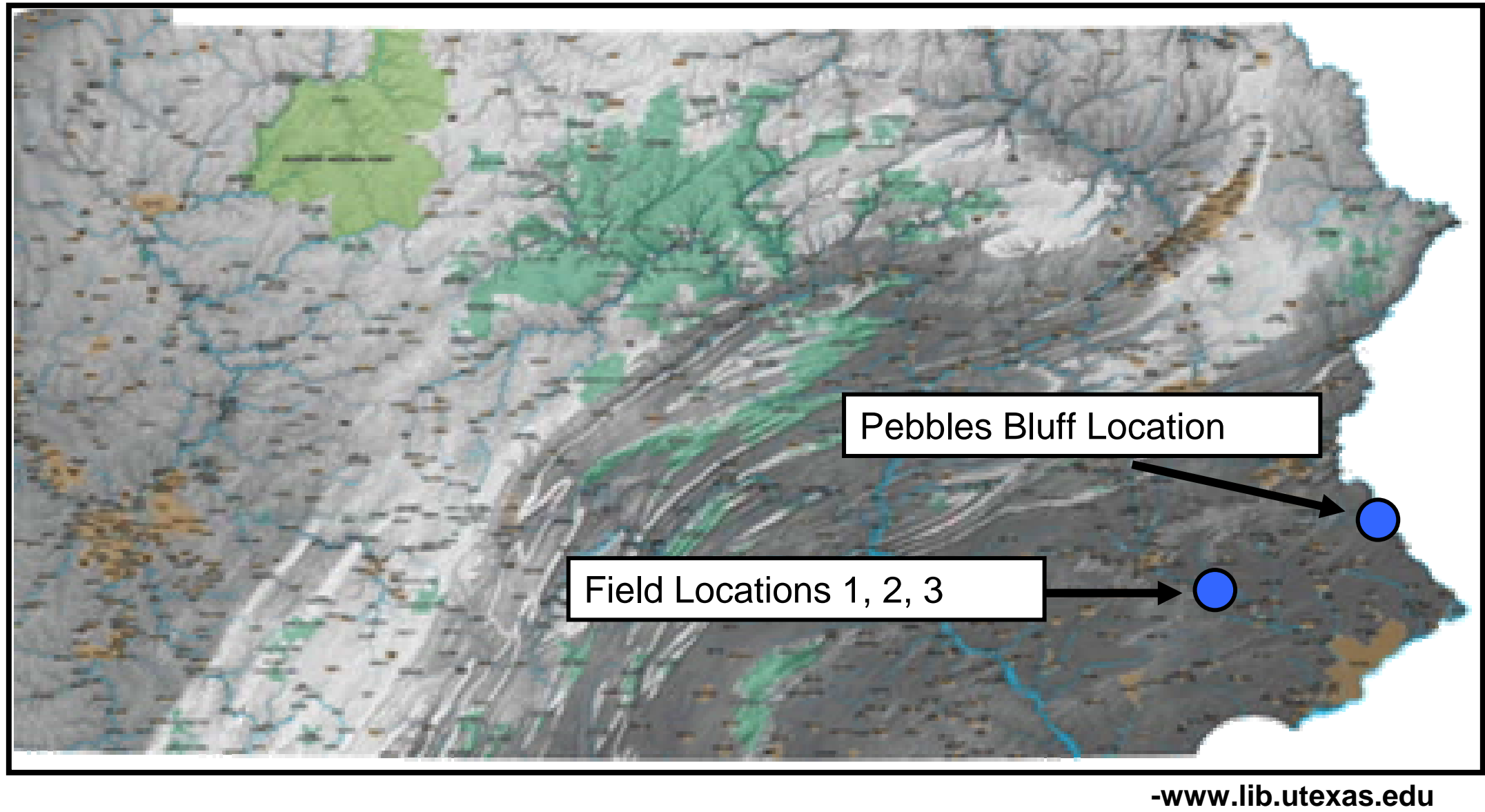
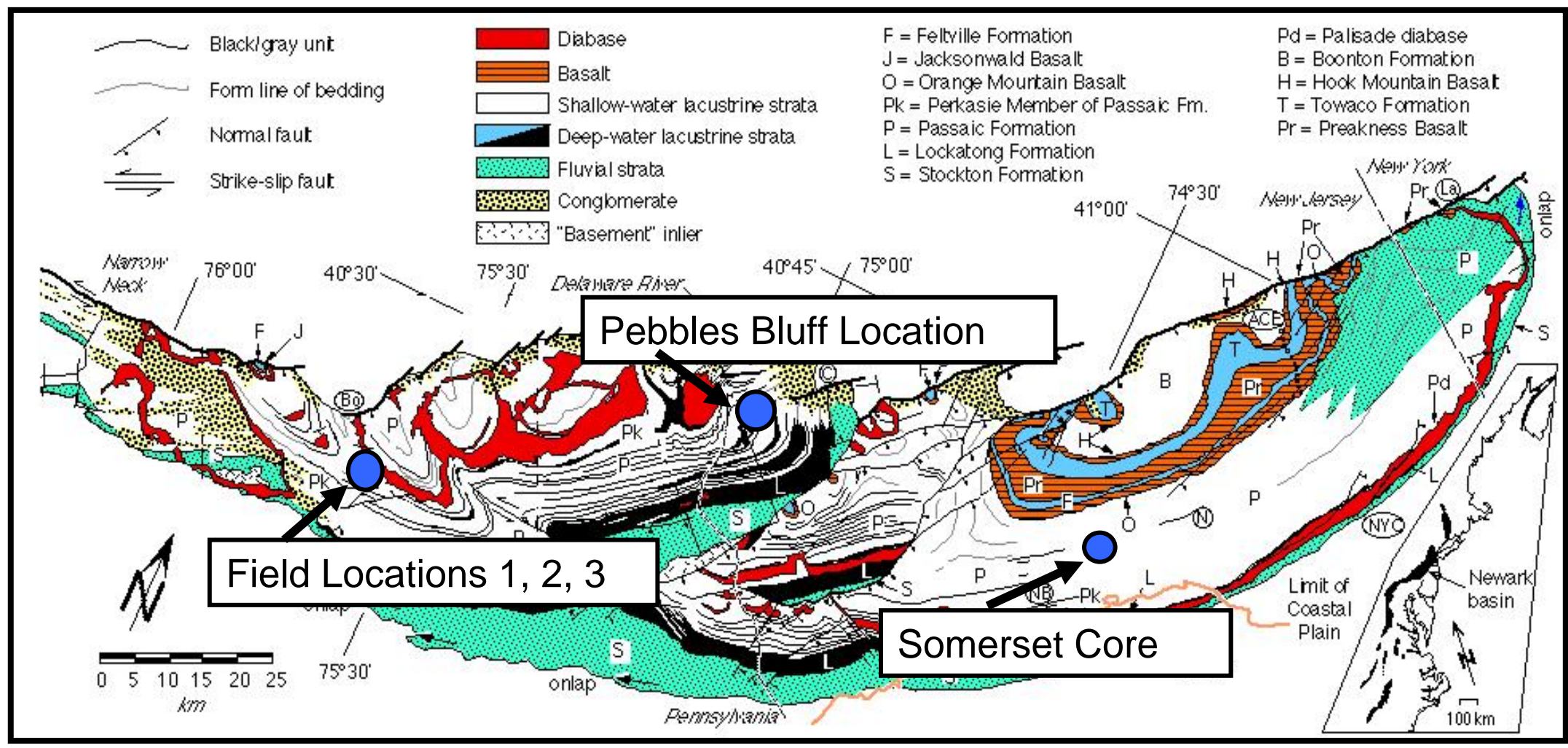
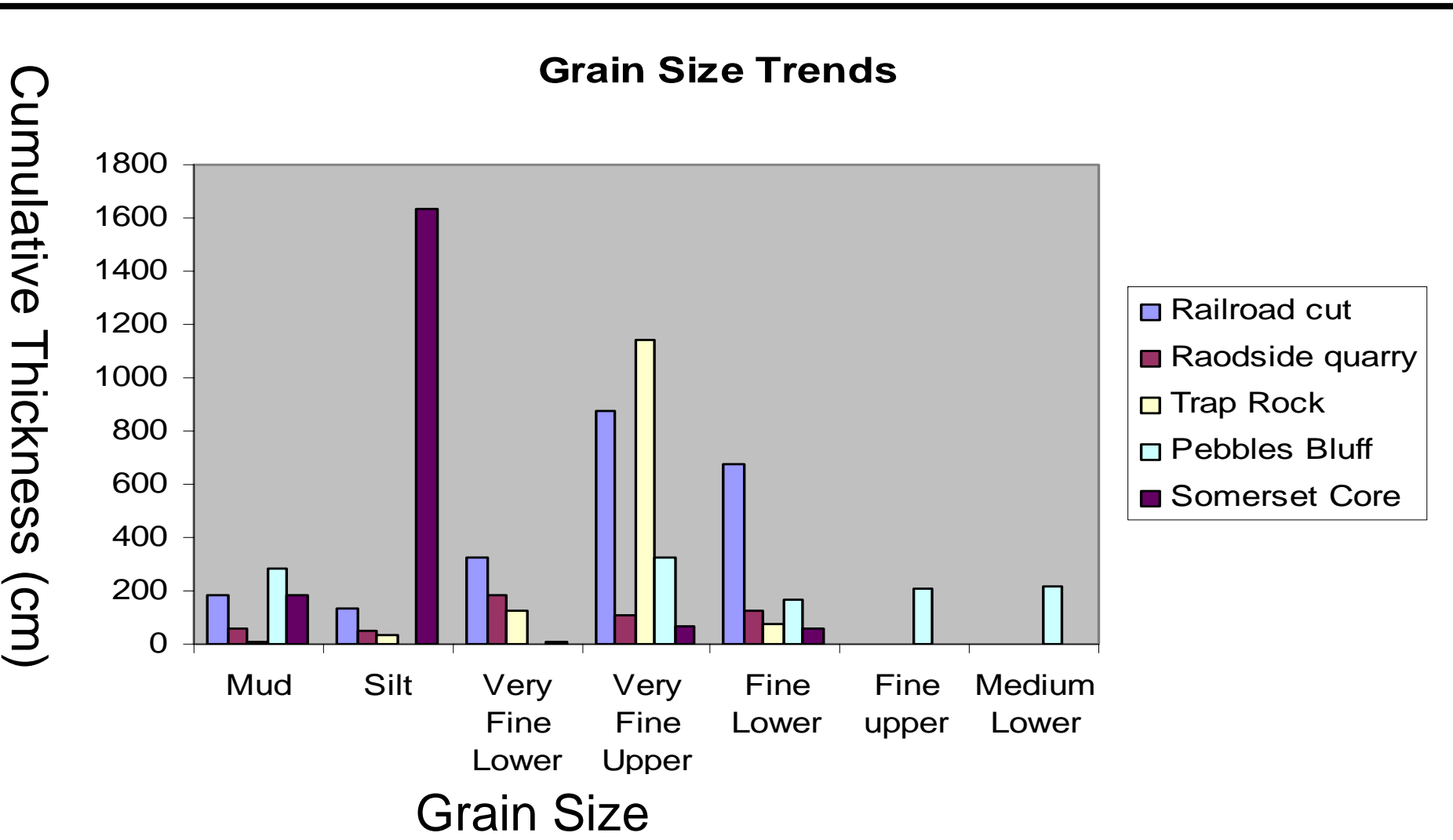


a) Desiccation cracks b) Soft sediment deformation c) Root casts



- Six sub environments of anastomosed systems (Smith & Putnam, 1980):
1. **Backswamp:** Organic silty mud.
 2. **Peat Bog:** Variable amounts of organic debris.
 3. **Ephemeral Floodpond:** Very fine grained laminated and wave rippled lacustrine sediments with Mudcracked exposure surfaces.
 4. **Channel:** Shallow, low relief sand lenses. Often contain climbing ripples and planar-crossbeds.
 5. **Levee systems:** Variable amounts of organic material.
 6. **Crevasse:** Laterally extensive, tabular sand sheets up to 1 meter thick. Constitute the bulk of the silt → sand size component of anastomosed systems. Structures include, climbing current ripples, planar bedding/laminations and wave rippled mud surfaces indicating submergence in shallow water after deposition in decelerative flow (Naydon, 1994)..

- Conclusions**
- Fluvial deposits within the Passaic exhibit structures, geometries and characteristics of meandering, braided and anastomosed fluvial depositional systems.



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