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Buildup and Infill Rates of Sediment Behind Cedarcliff Falls Dam

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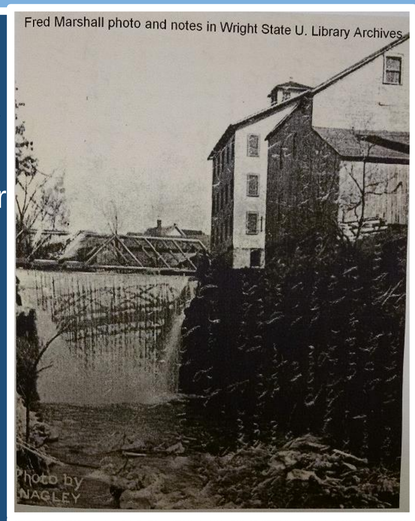
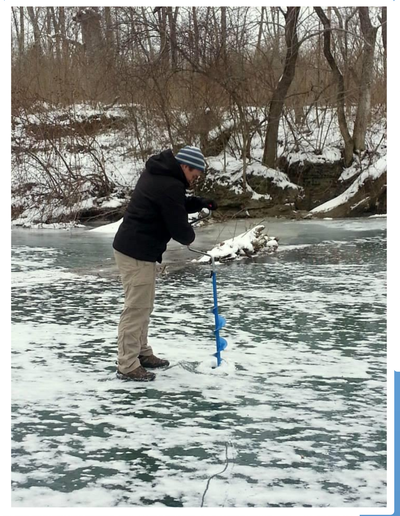
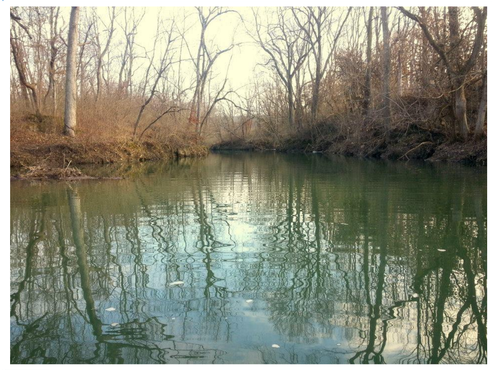
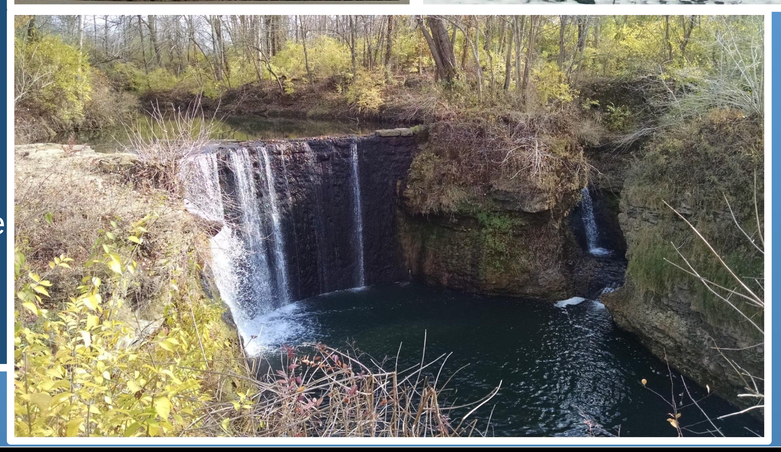
Abstract:

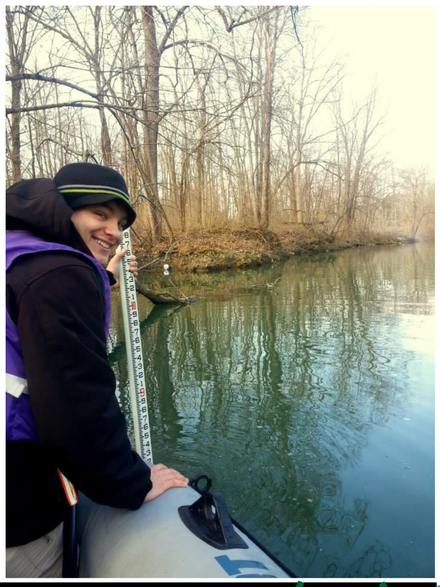
Cedarcliff Falls Dam is a small man-made masonry dam that was constructed around 1869. The dam impounds a pool of water that is a half-mile long on Massie's Creek near Cedarville, Ohio. This project's goal was to ascertain the infill rate and character of the sediment that had built up since 1869. The field work involved the measurement of water depth through the length of the pool in order to create a bottom-contour map. In addition, the sediment type was examined throughout the pool. This work was accomplished by use of a boat, stadia rod, handheld GPS unit, and a Ponar grab sampler. The contour map was created, and the volume of water in the pool was calculated, using Surfer 8 software. Sediment type was determined by "feel" with the stadia rod and by collecting samples with the Ponar grab sampler. Historical information is lacking for determining sediment influx from significant past hydrologic events. Potential sediment sources feeding the pool include agricultural and construction derived materials, and normal-natural and flood-natural materials. The bottom of the pool has an undulating character along its course and varying sediment types. The deepest area found was twenty-three feet and the shallowest was five feet. The upstream lithology is predominantly dolomite, but the entire area is overlain by glacial drift. The irregular distribution of sediment types seems to be associated with the nature of the creek bank at any particular location. Depth variation within the pool appears to be associated with the width of the channel, with depth being inversely correlated to width. Results from this study could affect land use planning around the creek and could also influence the assessment of the long-term viability of the dam.



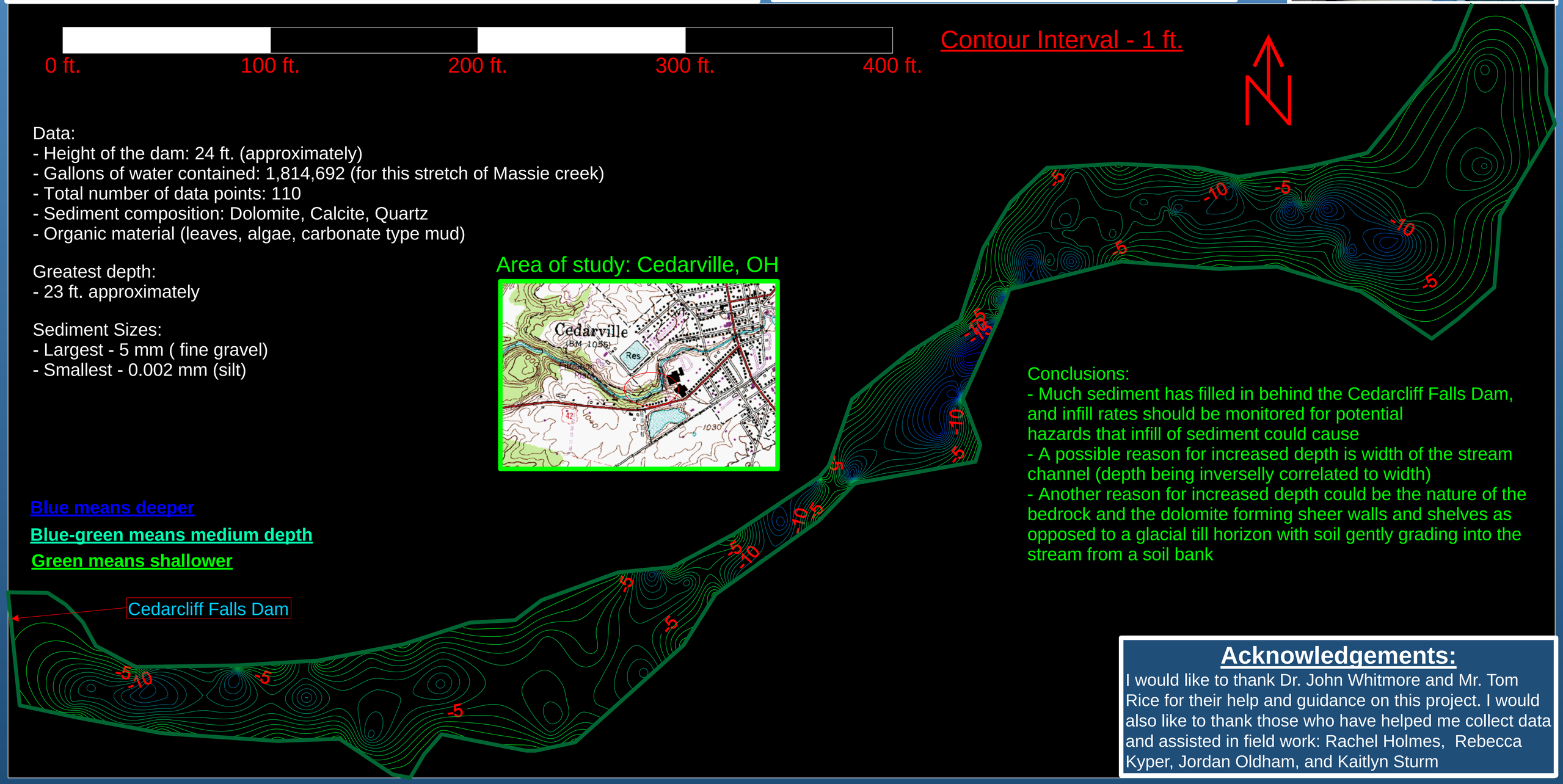








Golden Software Surfer 8 Bottom Contour Map:



Data:
- Height of the dam: 24 ft. (approximately)
- Gallons of water contained: 1,814,692 (for this stretch of Massie creek)
- Total number of data points: 110
- Sediment composition: Dolomite, Calcite, Quartz
- Organic material (leaves, algae, carbonate type mud)

Greatest depth:
- 23 ft. approximately

Sediment Sizes:
- Largest - 5 mm (fine gravel)
- Smallest - 0.002 mm (silt)

Area of study: Cedarville, OH

Blue means deeper

Blue-green means medium depth

Green means shallower

Conclusions:
- Much sediment has filled in behind the Cedarcliff Falls Dam, and infill rates should be monitored for potential hazards that infill of sediment could cause
- A possible reason for increased depth is width of the stream channel (depth being inversely correlated to width)
- Another reason for increased depth could be the nature of the bedrock and the dolomite forming sheer walls and shelves as opposed to a glacial till horizon with soil gently grading into the stream from a soil bank

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