Sediment pollution costs the United States $16 billion in environmental damage every year. Sediments in shallow, polymeric lakes tend to lack stratification due to continuous mixing throughout the water column. Lake Maumelle is a shallow lake in the Central Arkansas Maumelle foothills of the Ouachita Mountains that provides drinking water for over 450,000 customers. Raw water near Lake Maumelle’s distribution intake already experiences suspended sediment challenges, making additional sediment inputs potentially important. Previous studies suggest streambanks may substantially contribute to instream sediment loads. Despite Lake Maumelle’s importance as a Central Arkansas drinking water source, little is known about Reece Creek, the lake’s second largest tributary. We selected three reaches in the middle-course of Reece Creek: two meanders and one straight reach. Reach selection was intentionally biased towards locations expected to have a high frequency of “at-risk” banks. In addition to a fluvial geomorphological survey of these three reaches, we collected Total Suspended Solids (TSS) samples at each cross-section in the survey. Results suggest that steeper banks within Reece Creek contribute more sediment to the water column and reaches with higher “at-risk” bank frequencies contain higher TSS levels. This study generated baseline geomorphological and TSS measurements for Reece Creek to help Central Arkansas Water (CAW) monitor Lake Maumelle’s fine sediment inputs, and provided insights into the potential influence of streambank vulnerability on suspended sediment loads in low-order Ouachita streams.

### Objectives and Hypotheses

**Objectives:**
1. Assess the frequency of “at-risk” banks in Reece Creek (2) determine if “at-risk” banks could be contributing more suspended solids to the water column, and (3) Provide CAW with baseline geomorphological survey data on the middle course of Reece Creek.

**Hypotheses**
- Reaches with a meander bend will have a higher frequency of “at-risk” streambanks. 
- “At-risk” streambanks have a greater potential to fail and deposit sediment directly into the stream. 
- Reaches with more streambanks categorized as “at-risk” will have higher TSS levels.

**Rationale**
- Higher velocity and shear stress on outside of meander bends.
- “At-risk” streambanks have a higher TSS levels.

### Discussion & Conclusion

Frequency of “at-risk” banks
- “At-risk” banks were more frequent in meanders (Reach 1 & 2) than in the straight reach (Reach 3) which is characterized as “at-risk.”
- Contingency table analysis suggests the probability of a bank being “at-risk” is not independent from reach type (straight vs. meander) ($\chi^2 = 34.294, df = 2, p < 0.0001, p=0.42$).
- The sheer forces exerted on the outer banks of meander bends actively erode the bank and increase the likelihood of bank failure.

TSS and reach type
- Meander reaches (1 & 2) had significantly higher TSS values than the straight reach (Reach 3) (Figure 7).
- Land use most likely has little influence on TSS since the area is mostly forested and similar between reaches (Figure 9).
- Reach 2 and straight reach streams received sediment input directly from the adjacent hill slopes and streambanks.

Higher shear stress in meanders may be contributing to TSS, which increased with bank slope (Figure 8).
- The Ludlow-silt loam soil series comprising Reece Creek’s middle course (Figure 2-1) is friable and prone to erosion, so 10, and may have combined with meander shear stress to influence bank slope and TSS.

Future work
- Increase TSS replicates and collect at storm and base flows.
- Quantify Bank Erosion Hazard Index (BEHI) values for banks at each reach and calculate shear stress to determine its influence on TSS and frequency of “at-risk” banks.

### References

## Acknowledgments

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