Innovative Use of Multispectral Multibeam Surveying (MMBES) for Characterizing Benthic Conditions at the River Raisin Area

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Introduction

The River Raisin's industrial legacy left behind a complex cleanup challenge that called for innovative monitoring solutions.

The River Raisin Area of Concern in Monroe County, Michigan, represents a critical environmental remediation site where traditional monitoring methods proved insufficient to ensure long-term remedy success. Historical industrial contamination, primarily PCBs and heavy metals, required extensive dredging and capping operations starting in 2016.





Innovation in Monitoring

Effective Multibeam Surveys

Integrating geophysical data, enhanced multispectral backscatter, and ground truth imagery substantially increases the rate and quality of quantitative sediment characterization.

- Multispectral multibeam mapping acquires multiple acoustic frequencies in a single pass
- Combined backscatter data reveals seabed features not visible in single frequency industry standard surveys
- Surveys can be performed with readily available equipment and at regional scales globally



Methods and Implementation

Seven years of systematic monitoring reveals both challenges and successes in maintaining remedy integrity.

Jun. 2016 Pre-Dredge



Oct. 2016 Post-Dredge



Nov. 2016 As Built













(•) Apr. 2021 Year 5



Aug. 2023 Year 7



Aug. 2023 Year 7 Multifrequency Backscatter





Conclusion

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MMBES proves to be a powerful tool for ensuring the resilience and success of sediment remediation projects.

- Demonstrated successful mapping of cap material distribution and sediment composition
- Enhanced sampling efficiency through guided coring
- Identified potential hazards including sediment removal in central area of the remedy
- Optimized monitoring efficiency while reducing costs

River Raisin highlights MMBES's value for postremediation monitoring, delivering comprehensive data while minimizing physical intervention.

J.F. Brennan conducted the survey that enabled this study.

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