

Introduction

- Little Long Pond (LLP) is a 0.15 km² (~37-acre) pond located at the end of a small, post-glacial watershed on Mount Desert Island, Maine, USA.
- With growing concerns about the pond rapidly filling up with sediments, in addition to interest in local paleoecology, we collect a lake sediment core to study the factors that caused those changes.



Fig. 1: Core extraction with a Livingston Piston 2" barrel

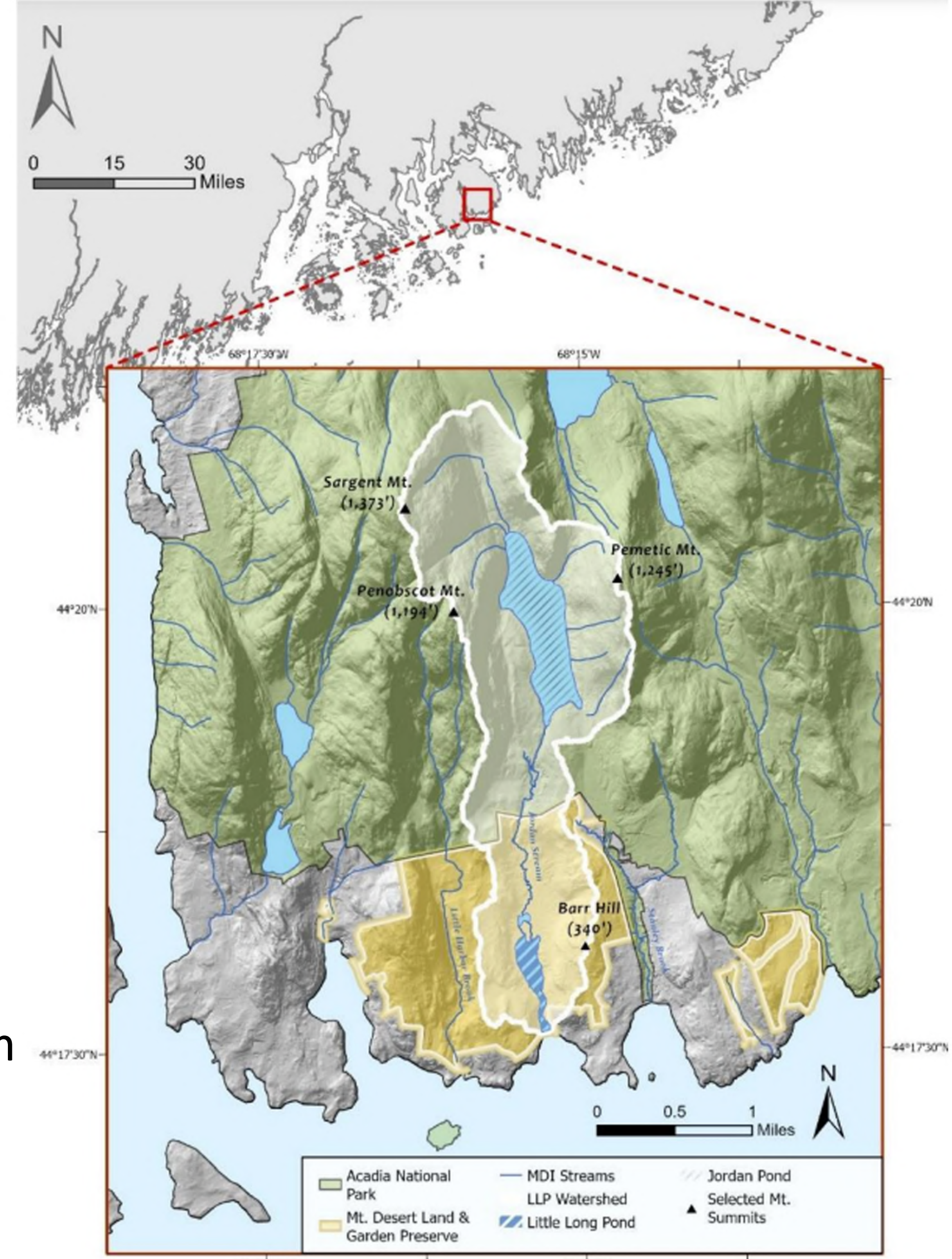


Fig. 2: Location of Little Long Pond within the Jordan Stream watershed on the southeast side of MDI

Methodology

- We excavated a 146-cm long core from Little Long Pond in August 2021
- We subsampled the column at 1-cm intervals to analyze each centimeter for heavy metals, charcoal and loss ignition (%Organic Content).
- We selected 4 macrofossils to perform ¹⁴C dating on them, this helped us construct a linear-interpolated Age-Depth Model. With data from the Age-Depth Model, we determined sediment accumulation rates throughout the core.

Acknowledgments

This research was possible thanks to all the help of Land & Garden Preserve and other students who participated in laboratory work.

References:

Schauffler, M., Nelson, S. J., Kahl, J. S., Jacobson, G. L., Haines, T. A., Patterson, W. A., & Johnson, K. B. (2006). Paleocological assessment of Watershed History in prinenet watersheds at Acadia National Park, USA. *Environmental Monitoring and Assessment*, 126(1-3), 39–53. <https://doi.org/10.1007/s10661-006-9330-6>

Schmitt, C. (2015). *How Changing Climate Created Mount Desert Island*. Maine Sea Grant Publications, 12–23.

Cunningham, J. M., Calhoun, A. J., & Glanz, W. E. (2006). Patterns of beaver colonization and wetland change in Acadia National Park. *Northeastern Naturalist*, 13(4), 583–596. [https://doi.org/10.1656/1092-6194\(2006\)13\[583:pobcaw\]2.0.co;2](https://doi.org/10.1656/1092-6194(2006)13[583:pobcaw]2.0.co;2)

Butler, D. R., & Malanson, G. P. (2005). The geomorphic influences of beaver dams and failures of Beaver Dams. *Geomorphology*, 71(1-2), 48–60. <https://doi.org/10.1016/j.geomorph.2004.08.016>

Results

- The core shows a record of the last ~4300 years of the pond's life.
- Sediment accumulation rate is high between 2000-3000 Years Before Present.
- Sediment accumulation rate drops at ~1500 Years BP
- % of Organic Content drops at ~1500 BP

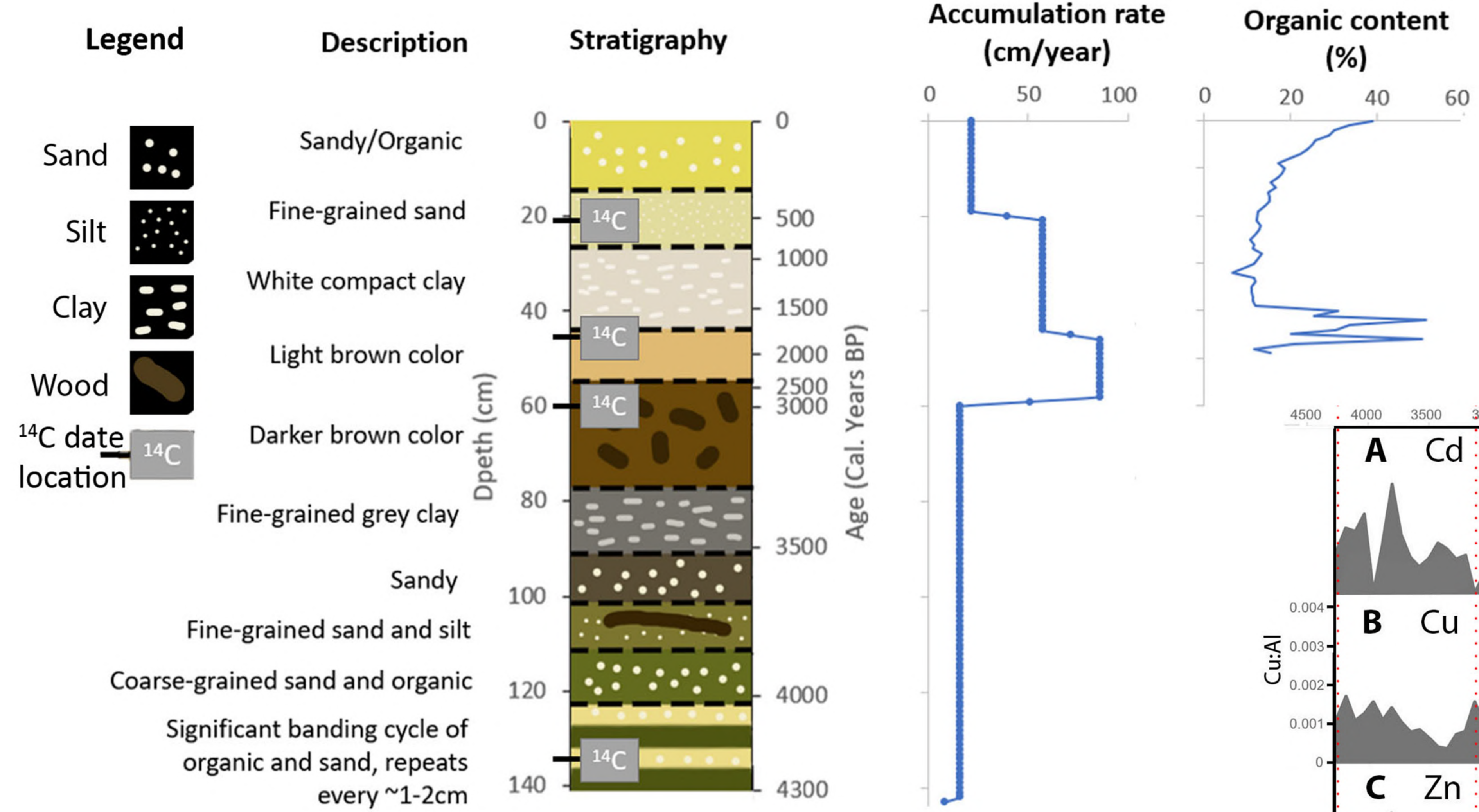


Fig. 3: Stratigraphy and description of the core; accumulation rate and %Organic Content of the core. All matched with depth and hence age.

Discussion

- The formation of the seawall ~3000 years ago at the south end of the pond likely impacted the sediment circulation in the pond.
- Environmental factors such as fires, floods and beaver dam ruptures cause erosion, and likely impacted sediment accumulation in the pond (Schauffler et al., 2006; Schmitt, 2015; Cunningham et al., 2006; Butler & Malanson, 2005).
- Human activities dating back ~1500 likely caused changes in organic content of the pond.

Conclusion

- Sediment accumulation rate changes are due to combination of both geological and human factors.
- Further research on human activities around the pond will be carried out to understand the extent of human impact on the pond.

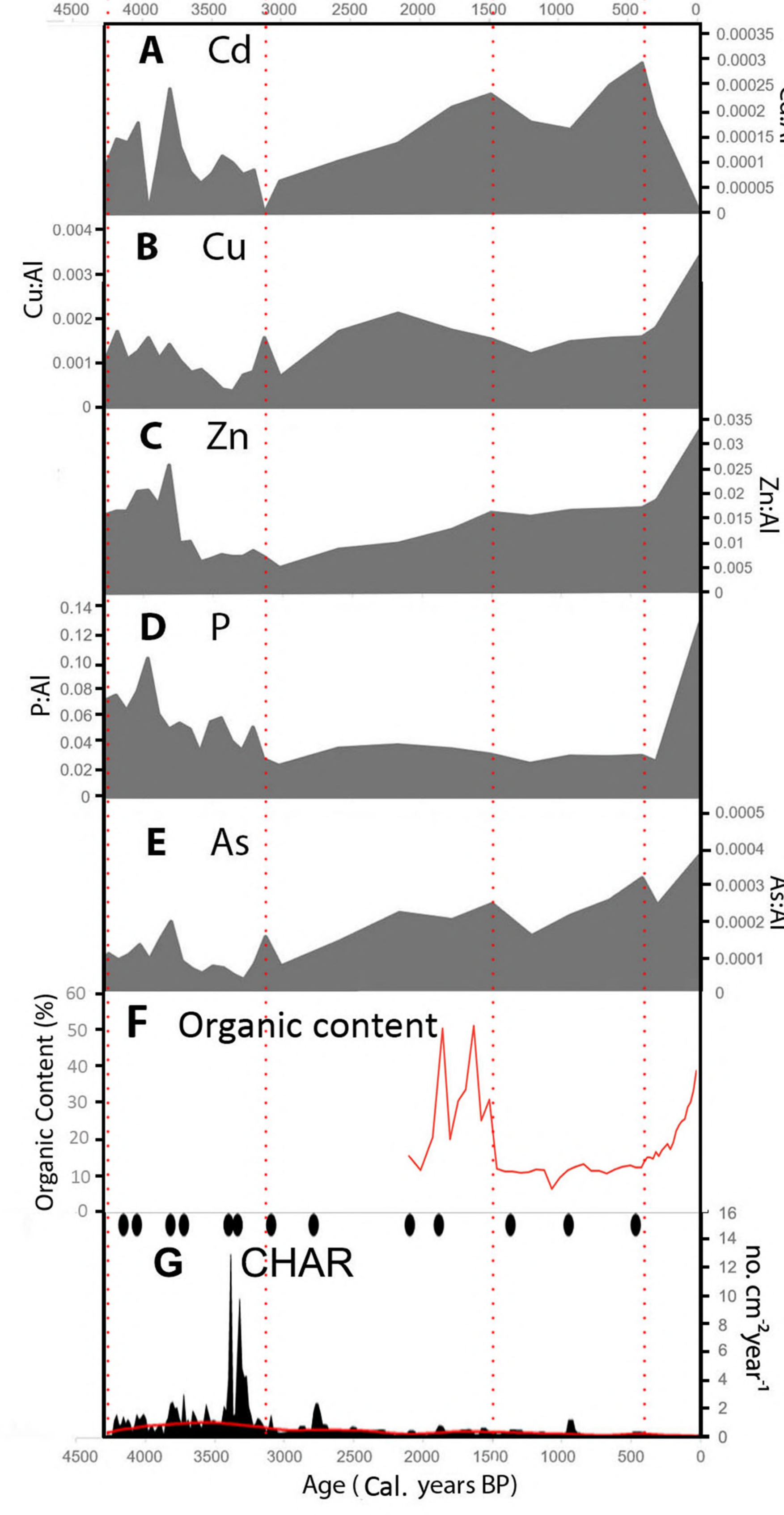


Fig. 4: Heavy metal analysis, percentage of organic content, and charcoal counting, throughout the core corresponding to age.