1. Background

- Torch Lake is located in Michigan’s Keweenaw Peninsula where Copper Mining was common from 1850 until 1970.
- In the early 1900s stamp mills were built along the West shore of Torch Lake to allow the waste tailings to be deposited into the lake.
- Figure 1: Industry Developed on the Western Shoreline of Torch Lake
- The two main companies were The Calumet & Hecla Mining Company (C&H) and The Quincy Mining Company. C&H claimed the North end in Lake Linden while Quincy went to the south in Mason.
- Figure 2: The C&H Mining Company in Lake Linden
- Figure 3: The Quincy Mining Company in Mason
- C&H began experimenting in reclamation processes in the 1920s in order to reclaim the lost copper in their tailings which were deposited into the lake. Quincy started reclamation much later in the 1940s.
- Both companies also started to recycle copper from scrap metal, but only C&H was successful in making it a long-term sustainable operation.
- Reclamation plants were built along the western shore to join the already existing stamp mills. These mills were eventually replaced by the reclamation plants where they recycled the tailings from the mills.
- By the 1970s the mining operations in the Keweenaw had closed, leaving the waste materials on the landscape to contribute to the pollution of Torch Lake and the surrounding areas.
- Using archival material we were able to map out the waterfront looking at all buildings in operation after 1930 and compare it with the PCB sampling data collected by federal and state agencies.

2. Research Question

- Where are the possible sources of the polychlorinated biphenyl (PCB) contamination and around Torch Lake and how does this relate to the industrial buildings which were once there?

3. Research Methods

- The first step was to identify the buildings on the Torch Lake industrial waterfront from archival maps.
- The second step was to research each building to find out when they opened and closed and also during which years they were operational using the C&H and Quincy Annual Reports.
- By narrowing the dates of the buildings we were able to focus on specific ones in operation between 1930 and 1970 when PCBs were being used in transformers and other machinery.

4. Interdisciplinary Collaboration

- By combining archival research with sampling data collected by federal and state agencies we have been able to compare the modern distribution of PCB contamination to the mining company maps to helps us picture how the pollution may have gotten to its current location, either through ground water movement or direct deposition from the waste into the lake.
- The benefit of combining these two different fields shows how the entire waterfront is interrelated and how the land and the water are both affected by the human developments and the changes in the mining process over time.

5. Tentative Results

- We will be able to link the areas which show elevated concentrations of PCBs with specific locations and buildings on the shoreline such as the C&H Powerhouse in Lake Linden and the C&H Smelter in Hubbell.
- From this research we will be able to give presentations to the Environmental Protection Agency and the Michigan Department of Environmental Quality as well as a written integrated assessment.
- Another benefit will be allowing the Superfund and Area of Concern programs to use this information for future research and testing in the Torch Lake area.
- The local community members need to be made aware of the issues of the Torch Lake waterfront and through this project we will bring the maps and data collected into the communities to help inform them about the pollution issues and how it affects them.
- This will also bring awareness to the issue of PCB pollution in the Great Lakes region which will lead to further research about the potential clean-up capabilities and how we can reduce further contamination.

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Figure 2: The C&H Mining Company in Lake Linden
Figure 3: The Quincy Mining Company in Mason
Figure 4: C&H Buildings in Operation: 1930-1970
Figure 5: Quincy Buildings in Operation: 1930-1970
Figure 6: Map made by Ankita Mandelia and Emma Schwaiger showing the areas with elevated concentrations of PCBs with respect to the buildings in operation between 1930 and 1970.

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