Little is known about how local and global environmental changes affect the habitat of wild rice (Zizania aquatica). Using transects of sediment cores from wild rice lakes on the Fond du Lac Band of Lake Superior Chippewa Reservation (FDL) in Minnesota, undergraduate student researchers are working to reconstruct the lakes’ ecological history in order to better manage future change. Reservation Resource Management personnel and University science mentors work together to develop research questions and mentor small groups of college-age students during short (two-week) and long (ten-week) summer internships. Cores are collected during the winter from the frozen lake surface with “Lake Teams” of mainly Native junior high and high school students attending weekend science camps, who also visit LacCore (the National Lacustrine Core Facility) in Minneapolis to conduct initial core description and basic analyses. At the same time as the Fond du Lac Band gains information about the long-term history and variability of the Reservation’s lakes, young Native people are exposed to primary research, natural resources management and academic as occupations, and scientists as people. Scientific results, as well as the results of program evaluation, show clearly that this approach has so far been successful and eye-opening for both students and mentors.

Lead-210 dated records of the past ~150 years cover the period of European settlement, logging, and the massive draining of FDL lakes to convert wetlands to agricultural land. Phytolith, pollen, plant macrofossil, and diatom studies by interns, as well as sediment composition and mass accumulation rate data, show anthropogenic lake-level and vegetation fluctuations associated with these activities. Earlier in the record (~10,000 years to ~100 years before present), the natural and slow processes of lake inflowing and encroachment of shallow-water vegetation are the dominant processes controlling the ecology of the lakes. Wild rice macroremains are rare in the cores, and so we use phytoliths (silicified plant cells, some with diagnostic morphologies), which are better preserved, as a proxy for past manoomin abundance. We also test the relationship between the abundances of grass pollen (manoomin pollen cannot be distinguished from the pollen of other grasses by light microscopy) and wild rice phytoliths on splits of the same sample. This multiproxy approach is necessary for understanding the complex interactions between lake depth, nutrient levels, plant and diatom communities, sediment chemistry, land-use change, and wild rice growth; it also emphasizes the interrelationships of the different parts of the ecosystem that are sometimes treated separately in scientific studies.