

# Mercury Cycling in Honeysuckle Creek Watershed and Burt Lake: Northern Michigan

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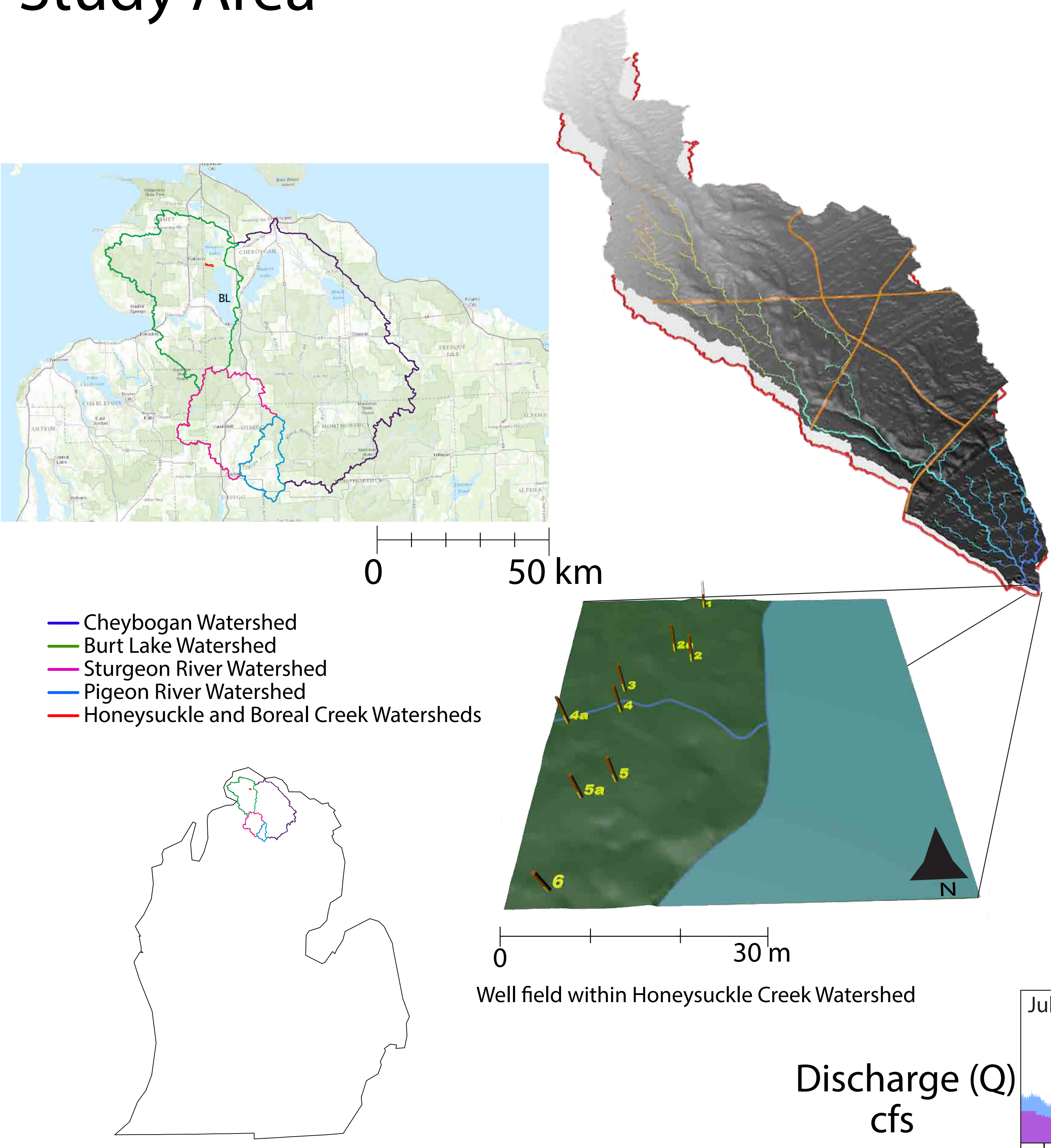
## Abstract

Mercury (Hg), a potent environmental toxicant, affects the cognition and health of both human and aquatic ecosystem populations. Despite regulation-driven decreases in atmospheric mercury, Burt Lake is among a long list of mercury-impaired lakes due to high concentrations of Hg in the lake's fish. Transport and sourcing of mercury to 17,120 acre Burt Lake were explored in Honeysuckle Creek watershed, a first order watershed in which the land is now largely undeveloped forest and peatland resting on roughly 100 meters of unconsolidated sediments. Water samples from Honeysuckle Creek watershed were collected from the lake, groundwater, and one stream input to the lake and analyzed for total Hg (THg), methylmercury (MeHg), dissolved organic carbon (DOC), carbon isotopes ( $\delta^{13}\text{C}$ ) along with other dissolved nutrients and elements. Conductivity, pH and temperature data were collected in the field. DOC levels in the lake and stream remain consistent at baseflow and lower than DOC levels in groundwater while  $\delta^{13}\text{C}$  values in the system are confined to a range of -22 to -28 ‰. With increased discharge, there is an increase of DOC flushed down the stream into the lake.

Surface water discharge and direct precipitation measurements, along with groundwater flow models have quantified the hydrologic budget for the watershed. Modeled groundwater flow was developed by measuring the water table from piezometers, along with analyzing sediment cores for the hydraulic conductivity of the sediments in the watershed.

Taking both aforementioned chemical and physical aspects, this study gives information regarding the water flow in the area, which is used to better understand the evolution of Hg in the small-scale watershed. From this, the area of Hg methylation may be located and mitigated. Such a study provides needed information for informed policy and land use decisions that are applicable to many small-scale watersheds in both Burt Lake and the Great Lakes region.

## Study Area



## Methodology and Results



Honeysuckle Creek

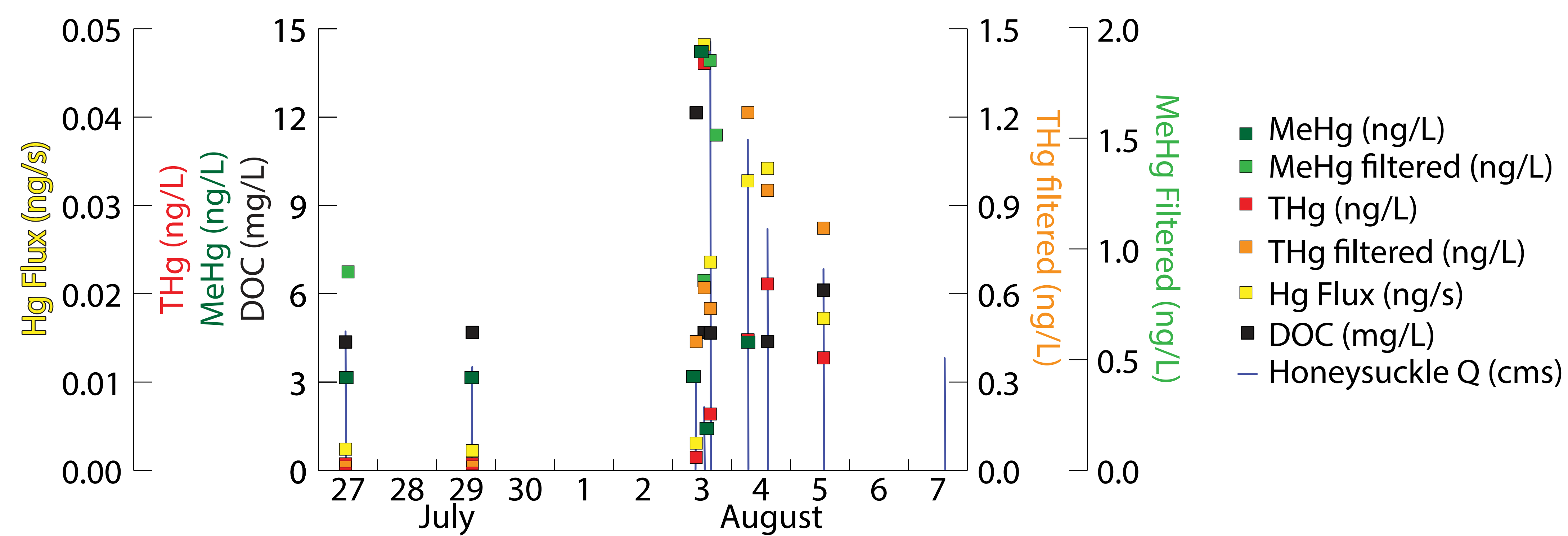
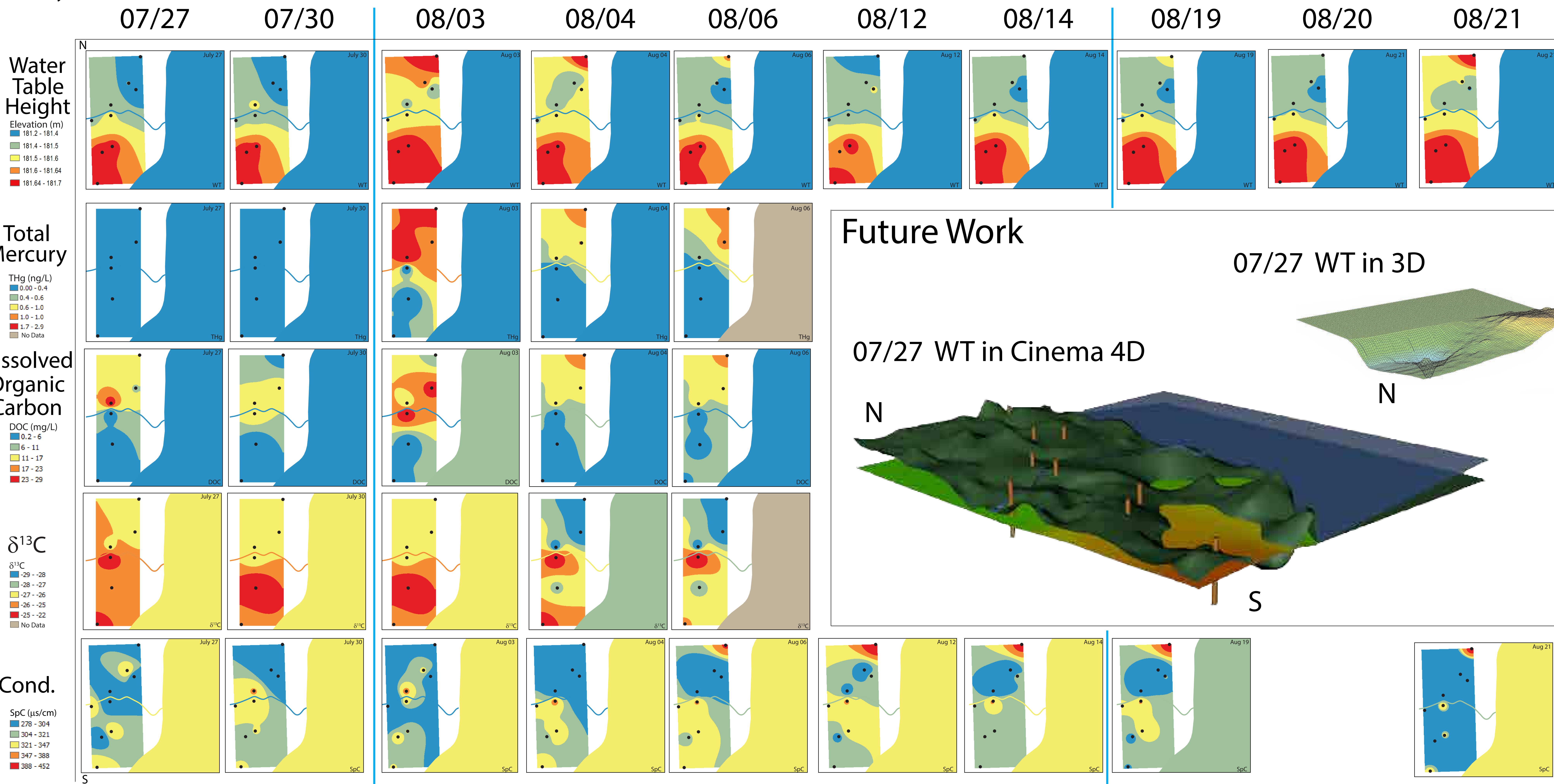


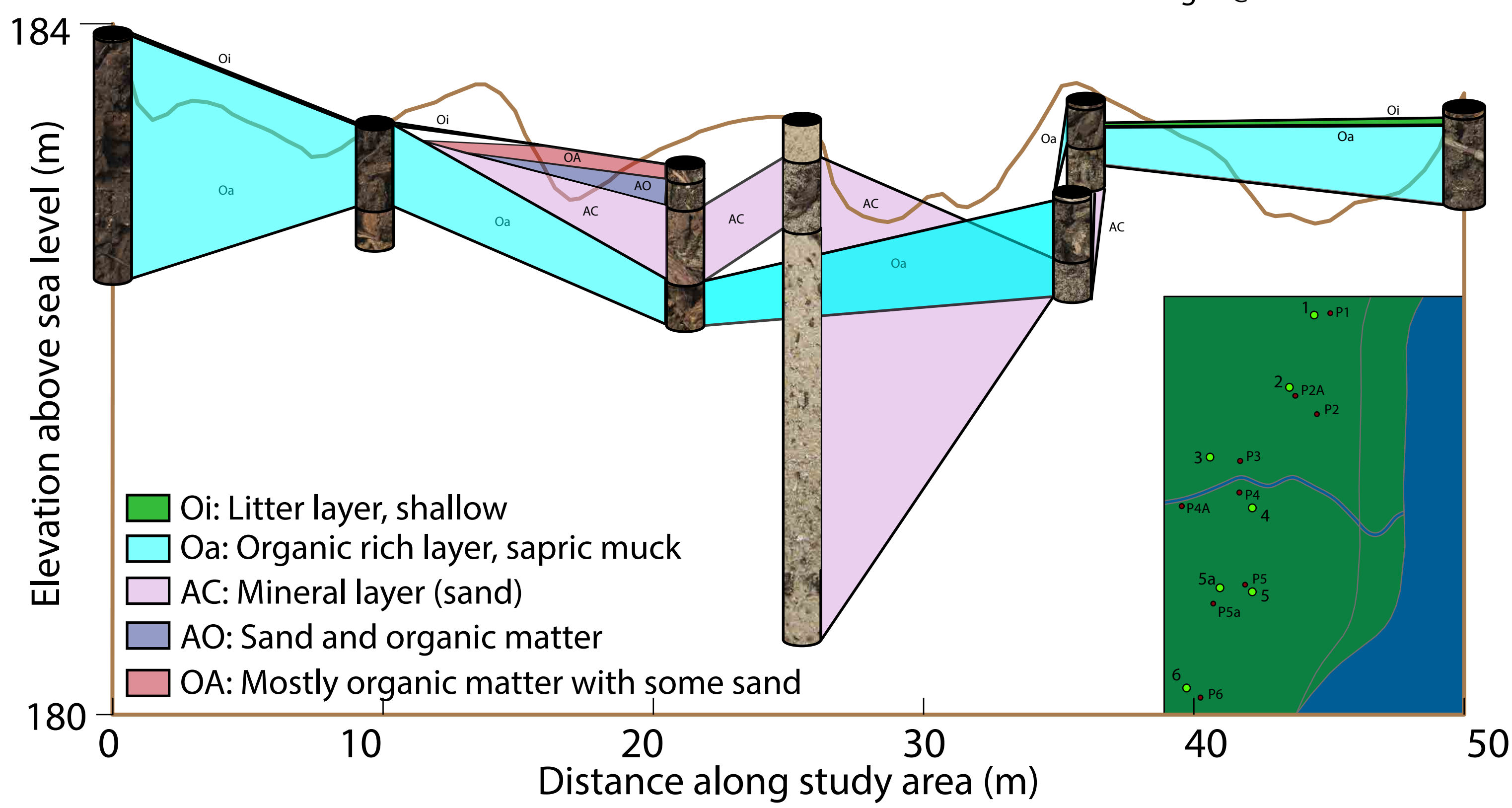
Figure 1: As discharge increases, so do measured concentrations (above). Pre and post storm conditions of shallow groundwater (below).



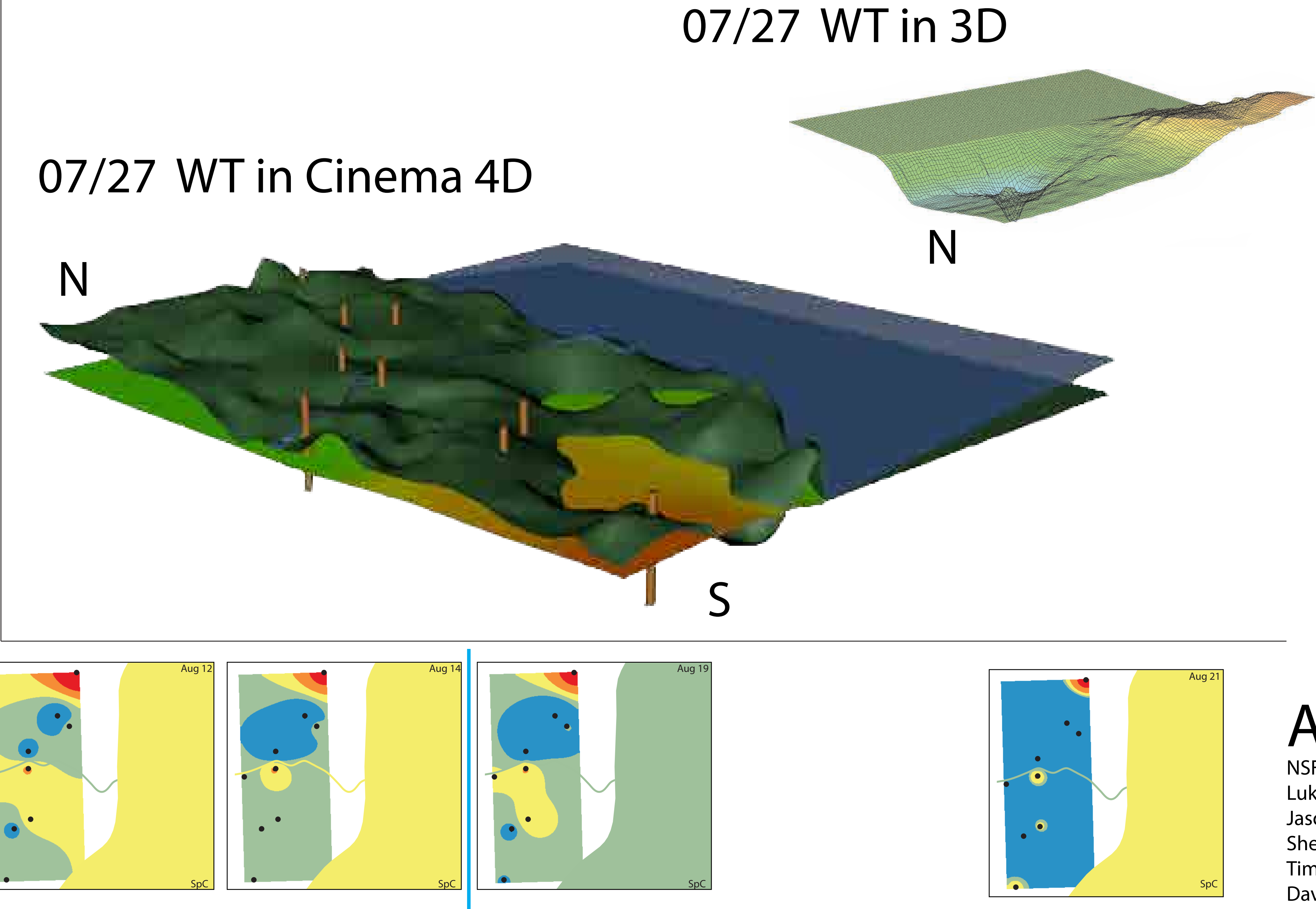
## Soil Heterogeneity



Soil Core



## Future Work



Burt Lake



Piezometers 3 and 4

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