

Identifying and comparing fecal contamination sources in three Utah watersheds

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Goals

- Develop a standard protocol for identifying and quantifying microbial fecal contamination in water using quantitative PCR (qPCR).
- Identify fecal contamination sources along urban gradients in the Logan, Red Butte, and Provo rivers.
- Create standard curves for qPCR.

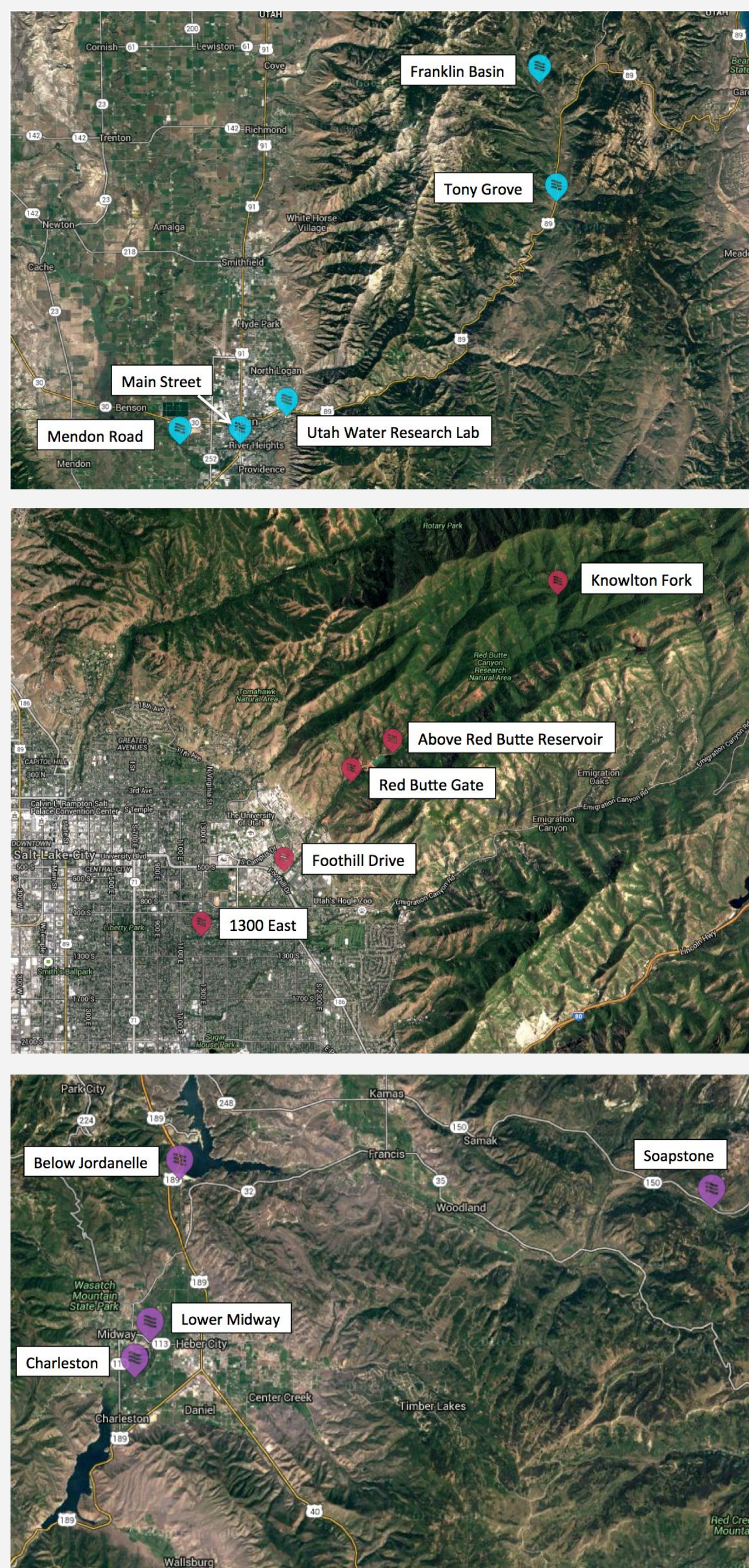
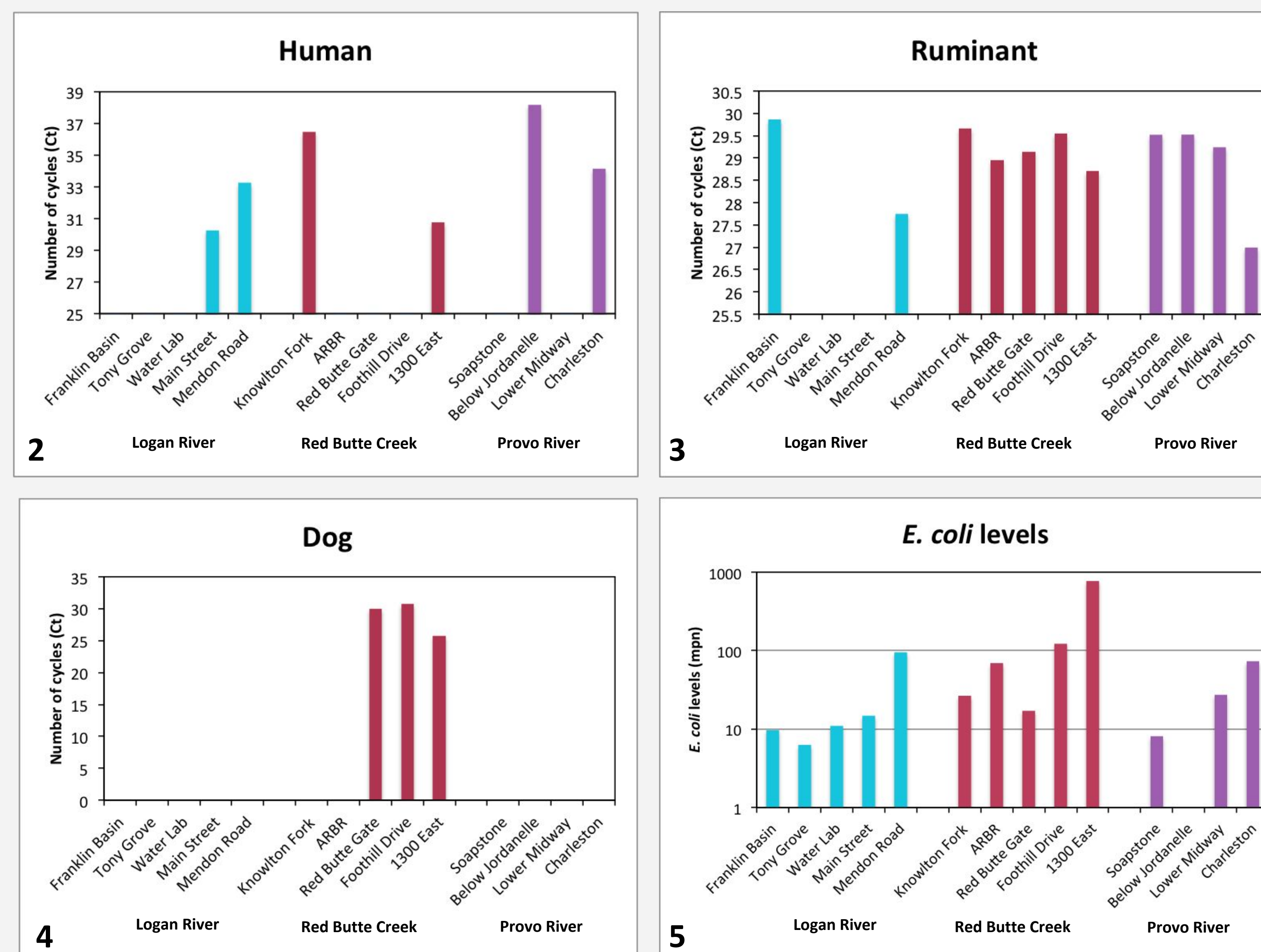


Figure 1: Maps of the Logan River, Red Butte Creek, and Provo River watersheds that were sampled.

Research Methods

- Collect water samples from fourteen sites along the Logan, Red Butte, and Provo watersheds and extract DNA from each sample.
- Perform qPCR on the DNA from each site to relatively quantify host-specific fecal bacteria from humans, ruminants, and dogs. Compare with the sites' *E. coli* levels, which indicate total fecal pollution.
- Use PCR and plasmid vectors to make qPCR standard curves for human, ruminant, and dog bacteria, which will allow us to absolutely quantify the fecal contamination from each source present in the samples.



Figures 2,3,4: These graphs show how many qPCR cycles each sample took to reach the threshold level. The number of cycles (Ct) is inversely correlated with the sample DNA concentration.

Figure 5: The *E. coli* levels are shown on a log scale. *E. coli* data was provided by bimonthly sampling for the iUTAH GAMUT network.

Why Does This Matter?

- Fecal contamination in water is correlated with pathogens that negatively affect human health. In addition, poor water quality affects recreation, business, and agriculture in Utah.
- If we can identify contamination sources in Utah watersheds, we can better mitigate pollution for improved water sustainability.

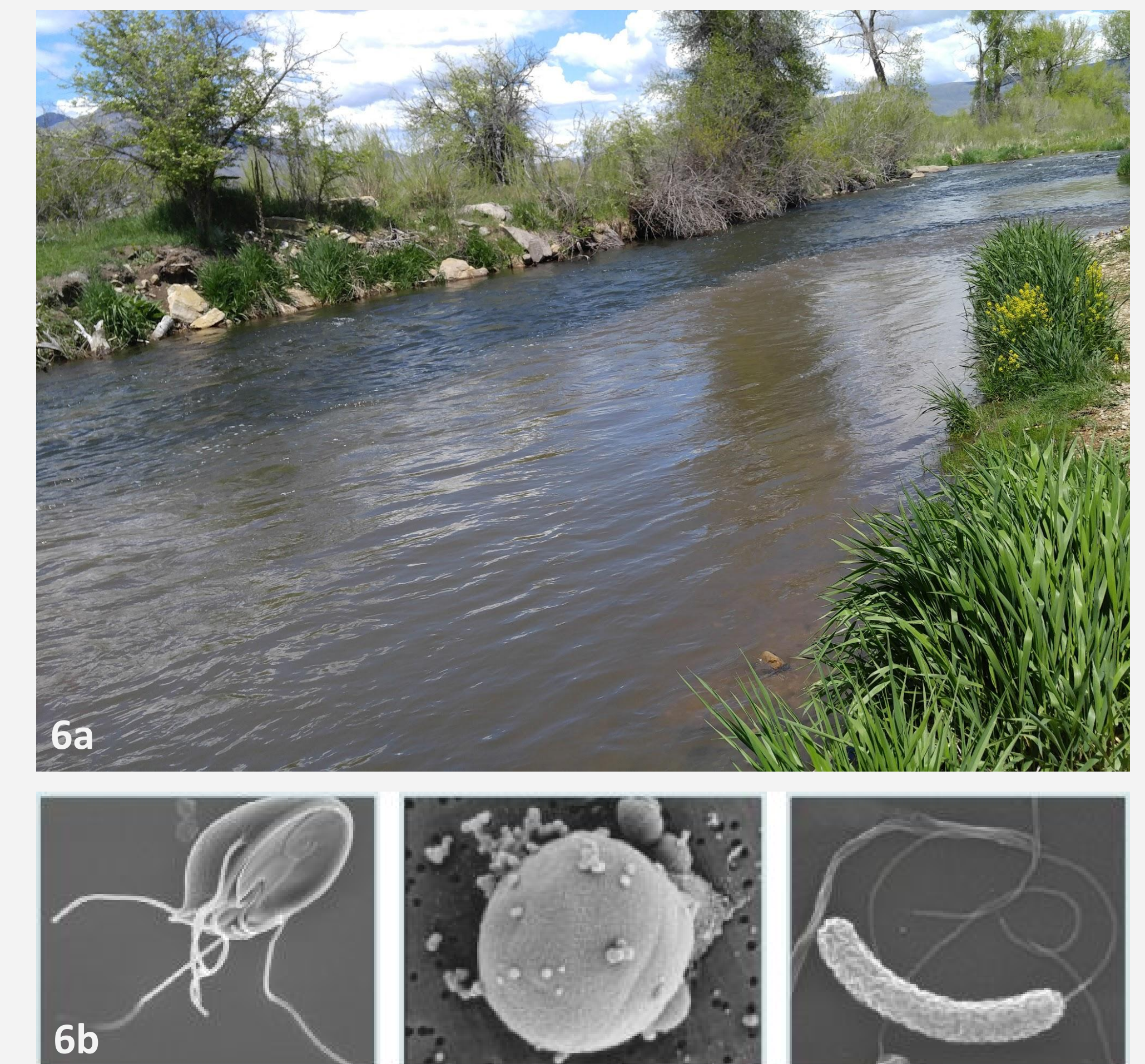


Figure 6a: Visible pollution in the Provo River.

Figure 6b: The fecal microbes that cause giardiasis, cryptosporidiosis, and cholera.



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