Introduction
Stream water temperature is a crucial controlling factor of stream ecosystem function. The mixing of surface water and groundwater underneath or next to the stream bed occurs in a process called hyporheic exchange and influences, or may regulate, stream temperature. Hyporheic exchange can cause ecologically and biogeochemically significant transfers of heat to the stream and may be enhanced by in-stream structures such as steps and log dams (Hester et al., 2009). Fiber-optic distributed temperature sensing (DTS) provides monitoring of water temperature at a high temporal and spatial scale and is useful for hydrologic applications. The DTS system uses a fiber-optic cable to pulse a laser, then measures the speed and dispersion of light, thus finding the average temperature along a 1-3 m length of cable (Tyler et al., 2009).

Salt tracers are also important for characterizing a stream and its processes. Chloride is often used as a conservative tracer at Reach 1 (51 m) and Reach 2 (79 m) on July 11. Independent temperature loggers, or HOBOs, were used in the baths, at three points in the stream, and in the air as temperature references.

DTS programmed to collect data at 1.0 m increments every 5 minutes: 2 minutes for channel 1, 2 minutes for channel 2, and 1 minute of rest.

Temperature data collected from July 1 to July 7 and from July 10 to July 24.

The USGS OTIS model was used to determine the hydrologic transient storage parameters.

Results

Temperature regime:
By contrast to our first hypothesis, the DTS results did not show distinct cool spots in Spring Brook, associated with large woody debris or otherwise, indicating that hyporheic exchange may be limited in both scope and thermal influence in this system.

The longitudinal downstream trend of increasing temperature can be attributed to distance from the channel head spring source and energy exchange with the atmosphere. The steady downstream trend suggests no substantial groundwater contributions to stream flow beyond the spring head.

Diurnal temperature changes in the stream are buffered compared to atmospheric diurnal patterns, as documented by DTS cable coils located outside the stream water.

Shallow water depth and debris in the substrate made it difficult to lay/secure the cable underwater for the stream’s entirety, so future work will include surveying the cable and noting these points.

Transient storage:
Reach 1 had greater transient storage properties than Reach 2, contrary to our second hypothesis. The abundant large wood obstacles in Reach 2 do not form substantial surface transient storage as documented by DTS cable coils located outside the stream water. Shallow water depth and debris in the substrate made it difficult to lay/secure the cable underwater for the stream’s entirety, so future work will include surveying the cable and noting these points.

Discussion and Conclusions
Our findings suggest that the influence of large wood obstacles in streams may be highly dependent on their specific hydraulic and geomorphic effect.