# Physical, biological, chemical, and hydrologic characteristics of a subarctic stream system.

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Baseline stream system quality is monitored in the 110 $KM^2$ Caribou-Poker Creeks Research Watershed, in the Interior Alaska taiga. The multi-disciplinary program is providing comprehensive data on baseline conditions prior to planned experimental landscape treatments (streamside clearing, logging, fires). Based on one season's data, 50% of annual surface water yield from a permafrost-dominated first-order basin is produced during the spring melt period, compared to 7% during the winter and 43% during the ice-free season. Spring runoff is thus a determinant factor in calculating sediment and chemical loadings in the subarctic. Summer streamflow data from a paired set of basins show that a first-order stream draining a basin dominated (53% of area) by underlying permafrost has a more pronounced hydrologic response to storm events and a corresponding greater sediment and turbidity load than does a similar-sized first-order stream draining a basin with comparatively little (3% of area) permafrost.

Physical, chemical, and biological data confirm that water quality characteristics such as turbidity, element and nutrient concentration, and stream biota are affected by permafrost occurrence and respond in a manner consistant with a hypothetical stream continuum. Species composition, periphyton standing crop biomass and accumulation rates on natural and artificial substrates are related to stream order, while species diversity apparently does not change from low to higher order sites. Benthic invertebrates have been collected to provide an indication of the faunal characteristics of the stream prior to landscape manipulations. Post-treatment studies of the biota will emphasize identification of possible changes which may be of use in recognizing indicator taxa for various stages of stream system responses to impacts from logging, riparian clearing, and fire in the subarctic.