

Denali National Park & Preserve Long Term Ecological Monitoring

Aquatic Macroinvertebrate Sampling - 1998 Fieldwork Summary

As a continuing part of the Denali National Park & Preserve (Denali NP & P) long term ecological monitoring (LTEM) program stream benthic macroinvertebrates were sampled at 14 sites in August of 1998. Earlier work in Denali has shown that samples collected at this time have the highest diversity and most closely match the overall, annual community composition (Roberts & Milner 1996; Conn & Milner 1998). At each site, quantitative samples of benthic invertebrates were collected using a modified Surber sampler with 345 μ m mesh size. Using the procedures followed in previous years (see Roberts & Milner 1995; 1996, and 1997).

Data from 1994 and 1995 identified 6 groups of stream and river types within Denali NP & P. These groups had substantial differences in both their physico-chemical characteristics and resulting benthic invertebrate communities. Data suggests that the community structure within each of these groups shows differing degrees of annual variation. The different groups may also respond to climatic and other natural changes differently, therefore, at this stage it is important to monitor as wide a range of sites as possible. In order to effectively monitor for long term changes in community structure, and be able to detect anthropogenic changes, it is essential that the extent of the annual variation be quantified and possible causative mechanisms identified. In order to address these questions it is necessary to develop a long term data set for a number of sites within Denali NP & P. These 14 sites selected represented all 6 of the identified TWINSPAN groups and several years of data had already been accumulated from the sites. Table 1 lists the sites sampled and the data which is available for them.

Data collected during 1994, 1995 and 1996 all indicated that the physical stability of the riverine habitat was a key variable in determining invertebrate community structure and it could be used to separate the groups from each other. It has been noted that physical disturbances have a tremendous influence on the community structure of rivers and streams (Resh et al. 1988). In a recent paper Death & Winterbourn (1995) examined the physical stability of the system in relation to invertebrate communities. They combined two major facets, the thermal regime and geomorphological variables to produce an overall habitat stability score and found that as the stability of the system decreased so the species richness of the benthic invertebrate community declined. Thermal regimes may also be a key variable in these sub-arctic aquatic systems.

Many aquatic invertebrate taxa reach the northern limit of their range in Alaska (Oswood 1997). This is related to their inability to withstand freezing, sustain growth, and reproduce in such low degree-day conditions (Oswood et al. 1995). Although the temperature of the water was one of the environmental variables measured as part of the 1994-1997 field work, these were point samples and did not indicate how stable the thermal regime of the site was, or assess if the different groups have different thermal regimes and over-winter temperatures which may account in part for the different benthic

invertebrate communities. In an effort to address this, 4 temperature data loggers were submerged in Moose Creek @ Bridge (Group 3), Highway Pass Creek @ Old (Group 5), Tattler Creek @ Old (Group 1) and S1 @ Old (Group 2). No attempt was made to install a data logger in a glacial fed river as a previous attempt had ended in the loss of the instrument due to channel erosion. Onset™ loggers were launched to record the temperature at a 75 minute intervals for 384 days and will be retrieved and downloaded in September 1999.

Table 1 - Sites sampled during 1998, their TWINSPAN grouping and years in which they have been previously sampled are also shown.

Site	Group	1995	1996	1998
<i>Tattler Creek @ Old</i>	1	Yes	Yes	Yes
<i>East Fork Tributary</i>	1	Yes	Yes	No
<i>S1 @ Old</i>	2	Yes	Yes	Yes
<i>Hogan Creek</i>	2	Yes	Yes	Yes
<i>Little Stony Creek East</i>	2	Yes	Yes	Yes
<i>Moose Creek @ Bridge</i>	3	Yes	Yes*	Yes
<i>Savage River</i>	4	Yes	Yes	No
<i>Sanctuary River</i>	4	Yes	Yes	No
<i>Igloo Creek @ Ranger Station</i>	4	Yes	Yes	Yes
<i>N4 @ Old</i>	5	Yes	Yes	Yes
<i>Highway Creek @ Old</i>	5	Yes	Yes	Yes
<i>East Fork Toklat</i>	6	Yes	Yes	No
<i>East Branch Toklat @ Old</i>	6	Yes	Yes	Yes
<i>Rock Creek Lower</i>	6	Yes	Yes#	Yes#

* Moose Creek @ Bridge was sampled during 1995 but only once and therefore it was not included in the overall TWINSPAN analysis and discriminant analysis predictive model.
 # 1995 & 1996 Rock Creek data from Lisa Popovics.

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