Macroinvertebrate Assemblages in Selected New Jersey Springs

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Macroinvertebrates are important biological indicators for assessing the health of aquatic systems, like springs, due to their sensitivity to pollution. Springs serve as unique aquatic habitats for macroinvertebrates due to their nearly constant annual temperature; however, very little information is available on macroinvertebrate community assemblages in springs and how they relate to hydrogeological components. The spring sites varied in rock types (four carbonate and two unconsolidated) based on their locations. The objective of this study was to investigate macroinvertebrate assemblages of New Jersey springs and to detect the effects of hydrogeologic variables on macroinvertebrate community assemblages. We hypothesized that carbonate springs will have a greater biodiversity and bioassessment ratings than unconsolidated springs.

Macroinvertebrate assemblages of six springs in New Jersey were collected seasonally from August 2014 to March 2015. Samples were collected with a Hess sampler. Six transects were distributed evenly along the total sample length. Within each site, all samples were combined into a single composite sample and transferred back to MSU laboratories. Specimens were identified to the lowest taxonomic level possible. Water chemistry data such as dissolved oxygen, pH, conductivity and temperature was collected per site. Periphyton was collected for five of the six sites using artificial substrata. A total of 1,497 macroinvertebrate individuals were collected, of which Chironomidae (Diptera) was the most abundant. Other dominant taxa included Coleoptera, Gammarus fasciatus (Amphipoda) and Caecidotea spp. (Asellidae). Nine metrics were calculated in order to evaluate spring macroinvertebrate assemblages as well as quality conditions. Springs that were composed of carbonate rock had higher macroinvertebrate diversities and better water quality conditions. Shurts Road had high EPT richness (2-4) and low HBI (4.82-5.28). Results for Valley Crest showed high taxa richness (14-23), and high %EPT (10.75-24%). Dingman’s Ferry had high taxa richness (10-16), high EPT richness (4-6), and high Shannon Wiener Diversity Index (SWDI) (1.41-1.91). In contrast, springs composed of unconsolidated material such as sand, clay, and silt were found to have lower diversities and less water quality conditions. Indian Lady had low taxa richness (9-11), and high %Chironomidae (50.51-62%). Paint Island had low taxa richness (7-11), and no EPT species. Crystal Springs showed no EPT species, low SWDI (1.02-1.61), and high HBI (6.03-6.41). This study suggested that spring geology affected macroinvertebrate assemblages. The benthic macroinvertebrate assemblage results from this study are important as they serve as a basis for future spring biota studies and monitoring in New Jersey.