Using Benthic Macroinvertebrates to Assess Freshwater Aquatic Habitat in Copeland Creek, an Urban Sonoma County Waterway

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Introduction

Benthic Macroinvertebrates (BMI) play crucial roles in establishing the trophic structure and function of aquatic ecosystems. Research has shown that natural creek structures significantly influence biodiversity within these ecosystems. Channelization of the creeks of Rohnert Park have prioritized drainage over preserving habitat quality and biodiversity. The extensive deterioration of local freshwater ecosystems highlights the urgent need for their evaluation and restoration. Instead of solely measuring the oxygen and pH levels of water, which only provide immediate reports on its quality, BMI uses the invertebrates' ability to tolerate pollution as a more comprehensive indicator of water quality. As a result, BMI provides a longer-term assessment of habitat quality.

Background

Copeland Creek follows an approximately 10-mile path from relatively pristine headwaters near the top of Sonoma Mountain to increasingly modified reaches as it passes through agricultural and urban landscapes. Channelization of Copeland Creek began in the late 19th C and intensified in the 1960s with incorporation of Rohnert Park. The resulting alteration of the creek has disrupted local aquatic habitats with negative impacts on biodiversity. Similar modifications are present in urbanized streams throughout the world.

Materials & Methods

The BMI field sample collection process involved a variety of tools (e.g., kicknets and dip nets) in several sites along Copeland Creek and nearby tributaries. Collected samples were sorted using trays, forceps, and pipettes to extract invertebrates (see figures). Collected samples were then preserved in 70% ethanol vials for identification in the laboratory. Overall creek and weather conditions were recorded each day of sampling. Collected specimens were preserved in 70% ethanol to prevent decomposition prior to laboratory identification to at least family level. The identified specimens were then cataloged and analyzed for relative abundance and diversity to evaluate the effects of urbanization on water quality using the widely employed EPT index (see nearby poster). Water samples were also collected for further analysis of physicochemical parameters.

Discussion

Sampling sites along the waterways were selected to represent reaches of the creeks that display a gradient of urbanization, from undisturbed to highly modified flood control channels. The degree of urban disturbance appears to influence the biotic community profile in these habitats, with increased disturbance resulting in fewer “pollution sensitive” taxa in affected areas. Continued sampling will be performed by the Geist lab to add further data to the profile of taxon richness of BMI within the Laguna de Santa Rosa Watershed.

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