



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: NJ Pineland Stream Geomorphology

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Federal Funds Requested: \$1000.00

Priority Issues Addressed by Research

The priorities addressed by this study include If. and Ic. Measurements of stream channel hydrology are taken to assess whether particular parts of stream channels are in equilibrium with the kinetic energy of streamflow. Disequilibrium suggests that stream erosion or deposition has or will alter ecosystem structure and function. This, in turn, suggests further alteration of ecosystem structure and function by changes in light level, temperature or dissolved oxygen. The end product of this analysis is to use "healthy" reaches of the stream to measure dysfunctional reaches and even provide means of remediation for these reaches.

Rosgen analysis is one of many methods used to assess stream or function. It has been used throughout the western United States but not in the New Jersey. This study will deal with how appropriate is this methods for New Jersey streams. In addition, this study will shed light on the history of Pineland stream development.

Objectives

The objectives of this study will be to map the depth and extent of peat as well as the water table in the type reaches established previously by Dr. Claude Epstein and his students on the Oswego River (1997-99). Moreover, additional "type reaches" will be established on the Oswego River and the peat and water table of these will be assessed. Finally, the relationship between water table depth, peat development, and stream geomorphology will be explored to develop a history of Pinelands stream development.

Research Methods and Experimental Design

The geomorphology of the Oswego River has been the source of investigation for Dr. Claude Epstein and his students. The Rosgen Method (D. Rosgen (1994, 1996) has been used to define those portions of streams that are normal and those which are degraded. This technique involves establishing "type reaches" through the use of field measurements, calculations, surveys and channel sediment characterizations. By so doing, environmental degradation can be assessed as departures from these type reaches. Rosgen analysis has been applied primarily west of the Mississippi River. Its application to the New Jersey Pinelands has recently been described by Epstein (1997). This research dealt with the Penn's Swamp Branch, a relatively small stream. A larger study by Epstein and his students started on the Oswego River last year. During the course of that effort, the role of peat on stream morphology was noted. (Peat lined streams are not taken into account in Rosgen analysis. Peat development alters, not only channel material, but suppresses the kind of meander development common to stream channels lined with non-organic sediments.) Further, the development of peat seems to be controlled by the emergence of the water table, at least during the spring. The hydroperiod involved increases downstream allowing for greater peat development.

The purpose of this study is to determine a.) the water table depth during the year, b.) its relationship to peat development, and c.) the developmental history of Pine Barrens streams and rivers.

The techniques involved in this study are simple and straightforward. Simple surveying and field measuring devices will be employed at each site to determine Rosgen stream types and soil augers will be used to determine water table depth and peat thickness. The field work for this study will begin in February and carry on to May and June. The localities along the Oswego River are mostly accessible by road. But in some cases hiking to the localities with field equipment will be necessary. The results of this study will be given at upcoming meetings of the National Water Works Association, the National Water Resources Association and the Environmental Protection Agency at its Fall meeting in Atlantic City. The results of this study will be applied to a larger study modeling the geomorphic development of Pineland rivers and streams.

8.) The prototype study of Penn's Swamp Branch was supported by the New Jersey Water Resources Research Institute in 1997. This result in student presentations at the National Water Well Association annual meeting and a publication by Claude Epstein (1999).

References:

C.Epstein, 1999. Rosgen Analysis of a New Jersey Pineland Stream. *Wetland Journal* 11(3): 4-9.

Dave Rosgen, 1994. A Classification of Natural Rivers. *Catena* 22:169-199.

Dave Rosgen, 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs. CO.