ESTIMATION OF FLOW-DURATION CURVES AT UNGAGED STREAM REACHES IN NEW HAMPSHIRE AND VERMONT

Principal Investigators: Dr. S. Lawrence Dingman

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Problem and Research Objectives:

Magnitude and frequency of streamflow are two of the components of flow regime that together determine the integrity of aquatic ecosystems through their on impact water quality, energy sources for stream biota, the physical parameters of aquatic habitat, and biotic interactions. As all withdrawal uses of water affect the magnitude and frequency of downstream flows, the problem of instream flows has emerged as one of the region's major water-resource management issues. It has been a central issue in most hydropower dam licensing and relicensing proceedings for the last two decades. New developments such as snow-making threaten to alter stream regimes in pristine upland watersheds. The State of New Hampshire has recognized the severity and widespread nature of these impacts and has been developing an instream-flow program to develop guidelines and rules for protecting instream flows threatened by withdrawal uses and flow regulation.

Flow-duration curves (FDCs) are cumulative-frequency plots of mean daily discharge, hence they depict the magnitude and frequency of streamflow at a stream reach. They can be readily constructed for stream reaches which have been gaged continuously for a suitable period. However, magnitude-frequency information is usually required for reaches that have not been gaged.

The objective of the research proposed here is to develop improved techniques for estimating natural FDCs (FDCs unaffected by withdrawal or regulation) at ungaged stream reaches in New Hampshire and Vermont . Such curves would provide a baseline against which to evaluate the effects of proposed water-use, flow-regulation, or land-use developments on streamflow magnitude and frequency.

Principal Findings and Significance:

Records from 44 gaging stations in NH and VT fit our criteria of having no significant regulation and at least 10 yr of daily streamflow records. To facilitate comparison among drainage basins of varying size, we divided the actual measured flows at these stations by drainage area to give the specific discharge, q . We then constructed median-annual FDCs for the specific discharges at each station.