

EXETER RIVER STUDY, NEW HAMPSHIRE

Clients: Town of Exeter and Wright-Pierce Engineers

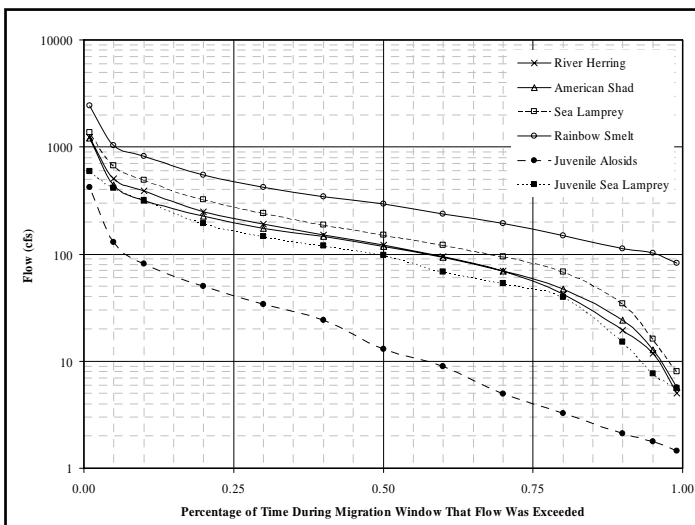
Woodlot was selected with Wright-Pierce by the Town of Exeter to evaluate water resource issues in the Exeter River system. The purpose of the study was to evaluate a variety of previously-identified issues associated with water resources in the riverine system, including dam operations, water quality, backwater limits, and fish passage. Woodlot's project work included project scope development, attending public hearings, detailed hydrologic and hydraulic modeling, evaluating dam operations, water quality monitoring and evaluation, and the development of information for the evaluation of existing fish passage facilities.



The project scope was developed to address a variety of needs identified by state regulatory agencies, including diminished water quality, potential flooding associated with dam operations, and fish passage. Woodlot developed the project's water quality sampling plan and installed in-situ water temperature monitoring equipment at five stations within the Exeter and Little Rivers in Exeter. Two of the sampling stations were comprised of arrays of temperature data logging devices to evaluate the presence of thermal stratification. Woodlot subsequently analyzed data obtained from the fixed stations with temperature and dissolved oxygen data collected at bi-weekly intervals, and documented the presence of thermal stratification, hypoxia, and Fall turnover in the impounded reach of the Exeter River upstream of the Great Dam.

Hydrologic and hydraulic studies performed by Woodlot included a qualitative backwater assessment on the Exeter and Little Rivers in the Great Dam impoundment, a review of peak flows at the Great Dam, development of a HEC-RAS hydraulic model encompassing the impoundment, the evaluation of spillway and low-level gate capacity and operations at the dam, and the development of flow-duration curves for adult and juvenile anadromous fish in the Exeter River.

The qualitative backwater assessment included a field study to observe indicators of the impoundment backwater limits under a variety of conditions. The review of peak flows included a delineation of the tributary watershed, and comparison of previously-reported peak flows calculated using the USGS PEAKFQ computer model with USGS data obtained on the Exeter River and peak flows calculated using regional regression equations. The project HEC-RAS hydraulic model was developed using geometric data from a HEC-2 model developed as part of a previous FEMA Flood Insurance Study. This model was subsequently used to evaluate spillway capacity at the Great Dam and effects resulting from a variety of operational regimes for the dam's low-level outlet.



Woodlot also developed flow duration statistics (shown at left) for six adult and juvenile life stages of target anadromous fish in the Exeter River system. These statistics were developed using daily-average flows recorded at a USGS stream gaging station on the river for adult and juvenile migration periods identified by the New Hampshire Fish & Game Department. This information will be used to evaluate and modify existing fish passage facilities on the River, including possible effects associated with the operation of outlets at the Great Dam.

Woodlot developed flow duration curves for anadromous fish