CGU HS Committee on River Ice Processes and the Environment
14th Workshop on the Hydraulics of Ice Covered Rivers
Quebec City, June 19 - 22, 2007

Estimating Dam Removal Impacts on River Ice Jams Using HEC-RAS

Carrie M. Vuyovich
ERDC Cold Regions Research and Engineering Laboratory
Hanover, NH 03755

Abstract:
The impacts of the Merrimack Village Dam removal on the formation of potentially damaging ice jams in the Souhegan River downstream of the dam were investigated. The Souhegan River is located in central New Hampshire and is a major tributary of the Merrimack River. HEC-RAS geometry was developed for existing and post-dam-removal channel conditions. The formation of breakup jams in the study reach with and without the dam in place was simulated using HEC-RAS. In applying HEC-RAS the following issues were addressed: first, the cross sectional geometry was geo-referenced to existing digital elevation models (DEM) in order to display the ice jam extents and flooded areas included in topographic maps and digital aerial photo. It is expected that this will be an effective means of presenting the ice jam analysis. Second, the issue of the maximum under ice flow velocity allowed in HEC-RAS was investigated. HEC-RAS includes an option to set the maximum mean flow velocity under a wide river jam. This option is intended to limit the ice jam thickness so that the entire flow area of the channel does not become blocked. To investigate the impact of this velocity maximum on ice jam formation in the Souhegan River, the under-ice water velocity limit varied up to 15 ft/s. Third, the volume of ice included in the jam was examined to assure that the jams simulated by HEC-RAS matched the expected contribution from upstream reaches reduced by the expected losses of transported ice due to stranding and other processes. In general, ice jams formed at higher discharges will be thicker and shorter in length than jams formed at lower discharges.