

New Methods for Modeling Stream Temperature – Using High Resolution LiDAR, Solar Radiation Analysis and Flow Accumulated Values to Predict Stream Temperature

John Jereczek, (MN DNR, Division of Ecological and Water Resources)

Tom Hollenhorst, (USEPA, Office of Research and Development, Mid-Continent Ecology Division, Duluth, MN)

In-stream temperature directly effects a variety of biotic organisms, communities and processes. Changes in stream temperature can render formally suitable habitat unsuitable for aquatic organisms, particularly native cold water species that are not able to adjust. In order to anticipate changes in stream temperature we need a better understanding of riparian attributes (amount and height of vegetation, bank and gully shading), and watershed attributes (amount of impervious cover, open lands, ground water interactions, etc.) that might have the greatest effect on thermal “insolation” (i.e. the amount of solar radiation energy received at a given location) and the subsequent in-stream temperature downstream from those locations. To add to that understanding we analyzed high resolution LiDAR data, results from Solar Radiation Analyses and flow accumulated values compared to locations of measured stream temperature to predict stream temperature in unmeasured areas. We’ll present these data, demonstrate how they can be accumulated downstream for particular stream networks and compared to various in stream temperature metrics.