Prepared in cooperation with the
Green County Soil and Water Conservation District
Prepared in collaboration with the
Rochester Institute of Technology

Identifying Thermal Refuges in the Schoharie Watershed

Coldwater fish species such as trout need sufficient thermal refuges to insure that their economically and ecologically important populations can be sustained within warming rivers across the northeastern United States.

Problem

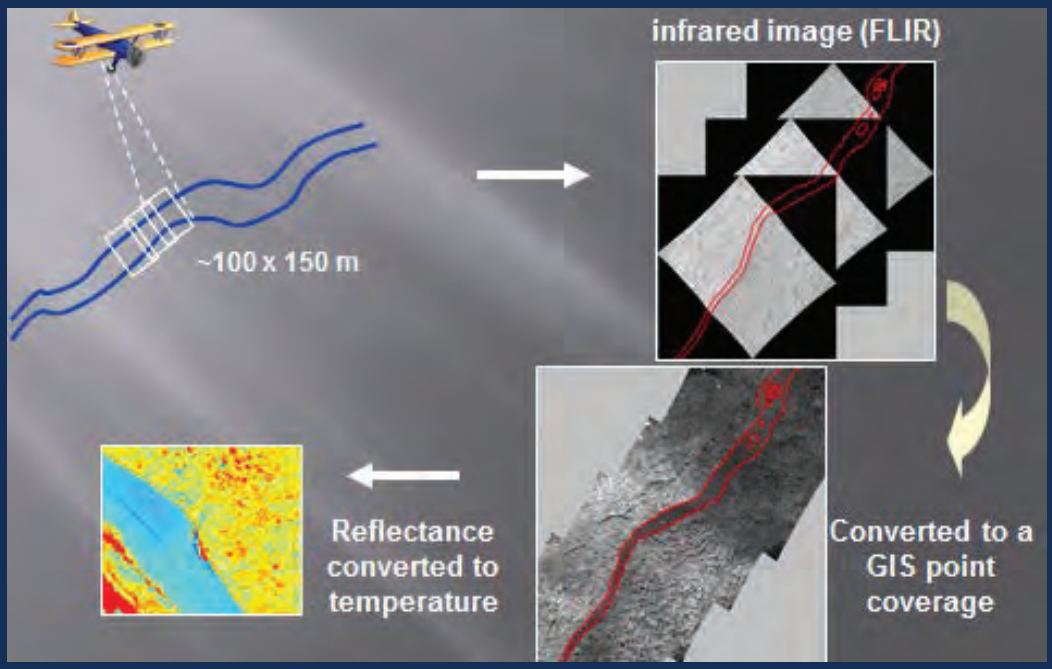
Water temperature is a critical component of trout habitat. Stream temperatures not only affect the distribution, behavior, and survival of trout (and other species), but also compel these species to move toward small areas of preferred temperatures, known as refuges, to maximize growth, survival, and fitness. The Schoharie watershed in the Catskill Mountains, including East Kill, West Kill, and Batavia Kill tributaries as well as the main-stem Schoharie river, supports small or transient populations of wild brook trout as well as naturalized and hatchery brown trout and rainbow trout. Water temperatures in parts of these rivers typically exceed lethal thresholds for these species for several weeks each summer. Managing agencies within the Schoharie watershed are often confronted with decisions that impact the thermal profile of the stream, such as permitting new discharges or other watershed alterations. Assessing the effects that these alterations may have on local trout populations, and ensuring that the alterations do not inadvertently destroy potential thermal refuge, requires data on the size, location, and number of thermal refuges within the watershed.

Objectives

Primary objectives of the study are to:

• assess the thermal profile of the main-stem Schoharie Creek and one of

Airborne Thermal Remote Sensing



Water-surface temps were mapped by Rochester Institute of Technology with an airplane equipped with a visible camera and forward-looking infrared sensor (FLIR). The sensor detects thermal radiation from top 0.1 mm of water surface. Each image is about 100 x 150 m, and has a spatial resolution of about 1 m2 per pixel.

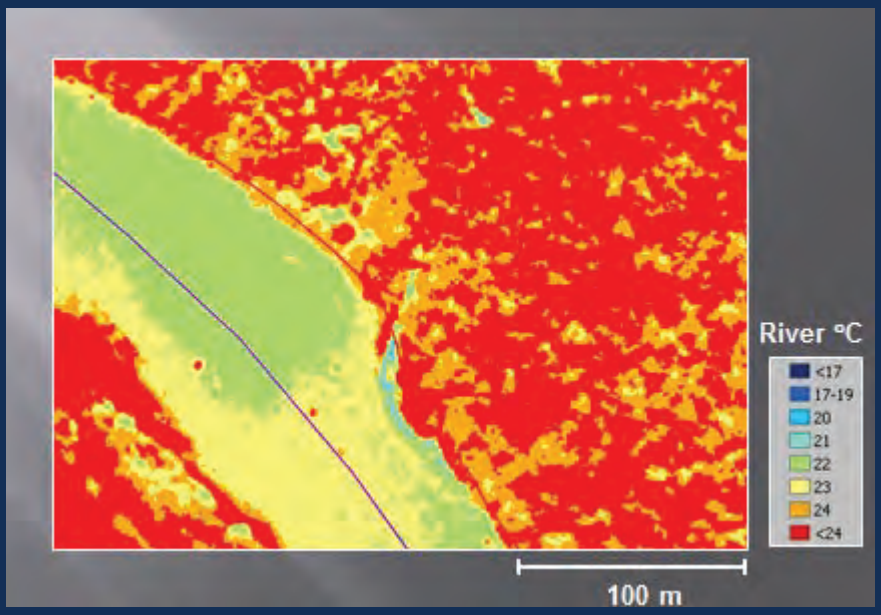
its tributaries, West Kill, using airborne thermal remote sensing,

- provide a baseline characterization of resources within these sections of the watershed, and
- determine the spatial extent of cool-thermal refuges and harmful (warm) surface waters.

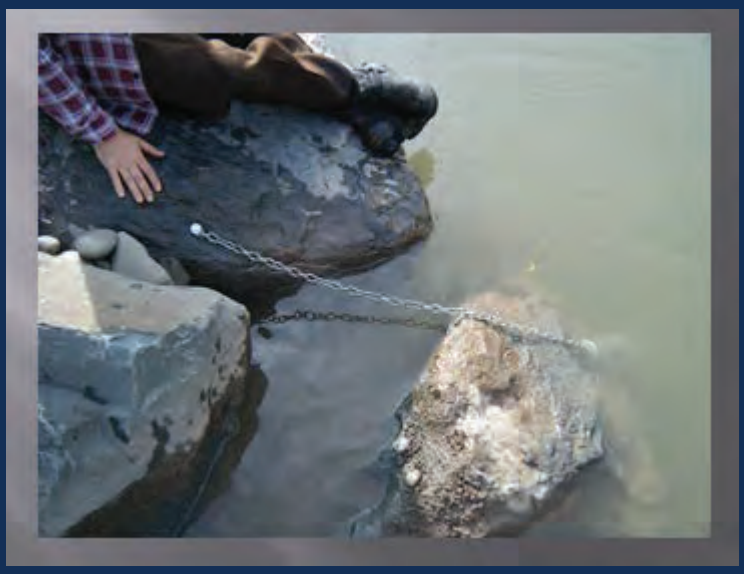
Approach

The U.S. Geological Survey (USGS), in collaboration with the Rochester Institute of Technology, will map surface water temperatures along the West Kill and main-stem of the Schoharie River using airborne thermal infrared (TIR) photography. The TIR data will be supplemented with 6-8 temperature loggers placed in the water along the study reach, which will record water temperatures in 15-minute increments to provide daily and seasonal in-stream temperature fluctuations, and can be used to calibrate TIR data. Logger locations will be selected to target areas suspected to act as thermal refuges, in order to measure temporal fluctuations in water temperature (that is, do thermal refuges identified by TIR data always serve as a refuge?). Results from the study will be summarized in one or more reports or refereed journal articles and will be available at http://ny.usgs.gov.

Infrared Image of River Temperatures



Temperature Sensor in Schoharie Creek



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