Strategies for Thermal Restoration of a Chinook Salmon Spawning and Rearing Stream Using a Heat Transport Model

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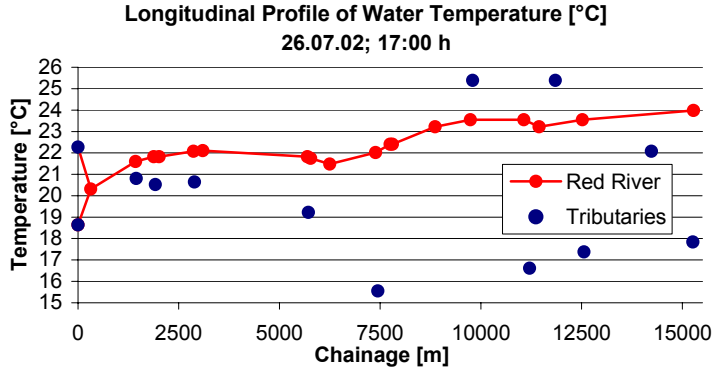
Environmental Setting:

Red River, a tributary to the South Fork Clearwater River is located in north-central Idaho. Historically, Red River provided spawning and rearing habitat for a large diversity of native anadromous and resident salmonid species, including Chinook salmon. Between 1890 and 1960, agricultural practices and hydraulic mining have impacted portions of the channel. The physical changes caused subsequent biological impacts on resident and anadromous fish species including loss of streamside vegetation, increased stream temperature, and decreased habitat diversity. From 1996-2000, four phases of restoration work were completed in the lower Red River meadow.

Post-restoration analyses have shown that in general the habitat situation has improved. However, warm summer water temperatures may be still the primary factor limiting Chinook salmon and resident salmonids at the lower meadow. Past observations also have shown that water entering the lower meadow area is often already above optimal temperatures.



Project Objectives:

The objective of this project is to assess and demonstrate the possibility of improvements in the Chinook thermal habitat throughout the project reach based on potential changes at the reach scale and the watershed scale which controls the upstream boundary conditions

Methods:

A heat transport model, a combination of a hydraulic and a heat balance model, implemented in the computer program AQUASIM, will be used to investigate the effects of different scenarios in stream temperature behavior. Therefore, it is not only necessary to monitor stream temperature and meteorological parameters, but also to survey hydraulic parameters and streambed geometry. The results of the modeling work will be used to develop strategies for thermal stream restoration.