Focus on **Water Temperatures in the Lower Skagit River Tributaries**

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Northwest Regional Office -- Water Quality Program

Background

Many tributaries of the lower Skagit River exceed Washington's surface water quality standards for temperature. These tributaries, along with the mainstem river, sloughs, and estuaries serve as important migration corridors, spawning areas, and rearing areas for all five species of salmon (chinook, coho, pink, chum, and sockeye), as well as steelhead and cutthroat trout.

Water temperatures warm enough to cause thermal stress in salmonids have been measured in Nookachamps Creek, East Fork Nookachamps Creek, Carpenter Creek, Fisher Creek, Hansen Creek, Red Creek, Turner Creek, Lake Creek and Otter Pond Creek.

Stream Temperature Is An Important Part Of Water Quality. Here's why:

- Salmon and trout need cool waters for optimum health during various stages of their lives. When temperatures are above optimum levels, fish are physically stressed and more likely to get diseases and have difficulty breathing oxygen. If temperatures get above the lethal limit (77-78°F), most salmonids will die.
- Cold water holds more dissolved oxygen than warm water. As stream temperatures go up, the amount of dissolved oxygen available for fish and other aquatic organisms goes down. Oxygen is necessary for aquatic life, just as it is necessary for human life.
- Colder water slows the growth of bacteria and algae. Algae blooms can use up the water's dissolved oxygen and cause changes in stream pH levels.
- Many processes in the watershed affect stream temperature. Some of these factors are: 1) ambient air temperature, 2) stream flow rate, depth and volume of water, 3) solar heating (which itself is a function of latitude, time of year, and time of day), 4) how much shade is available to block the sun, and 5) influence of adjacent groundwater.

Stream Temperature Standards

Stream temperature standards are set by the Washington State Department of Ecology. The Environmental Protection Agency (EPA) reviews and approves the standards. The standards are meant to protect the most sensitive beneficial uses of the water body.

Red, Turner, Otter Pond, Carpenter, Fisher, Hansen, Nookachamps, Lake, and East Fork Nookachamps creeks are all designated as Class A waters. The temperature criteria for Class A waters are as follows:

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"Temperature shall not exceed 18.0°C (64.4°F)…due to human activities. When natural conditions exceed 18.0°C…, no temperature increases will be allowed which will raise the receiving water temperature by greater than 0.3° (.54°F)."

Causes Of Elevated Stream Temperatures

Elevated stream temperatures can result from both natural and human-caused events. Examples of *natural* causes of increased stream temperature include creeks and rivers heating when traveling long distances over exposed bedrock that cannot support streamside vegetation; or when fires or flooding remove significant portions of riparian vegetation.

In the lower Skagit, *human* land management activity can increase stream temperatures through:

- The removal of riparian (streamside) vegetation, which reduces the amount of shade over the water and makes it easier for the air and sun to heat the stream.
- Water withdrawals for various purposes, including irrigation, reduce the amount of water in the stream during the summer when streams are already low. Having less water in the stream can make it warmer.
- Erosion and sedimentation can make streams wider and shallower making them harder to shade and easier to heat.
- Lakes, whether man-made or natural, can also be areas of higher temperature.

Correcting The Problem

When a stream is considered too warm, Ecology first confirms the problem by collecting more data, then investigates ways to address the condition. When elevated temperature conditions were found in some lower Skagit tributaries, Ecology conducted a detailed monitoring program and analyzed the data. Ecology scientists developed a mathematical model that relates stream temperature to:

- streamside vegetation
- groundwater temperatures
- channel conditions such as width and depth
- stream flow (or discharge)
- ambient air temperatures
- geomorphic characteristics such as stream gradient & aspect, channel incision, & stream valley topography
- wind speed
- tributary inflow
- water withdrawals
- groundwater inflow
- tributary inflow
- relative humidity
- hyporheic flow

The results were used to develop recommendations to the local community for temperature-lowering measures to improve water quality and help prevent endangered-species listings of fish or other aquatic animals in these streams.

Recommended actions such as reducing erosion and sedimentation in the stream channels, and planting riparian vegetation along stream banks will be discussed and

coordinated with landowners and local officials. Ecology seeks help from the community and encourages voluntary participation in local projects and in the development and implementation of Action Plans. For some types of riparian protection measures, financial assistance may be available.

These plans are part of the federal process to address situations where water quality standards are exceeded (this is also called the Total Maximum Daily Load, or TMDL process required by the Clean Water Act).

How You Can Help Reduce Stream Temperatures

Tree Borders. Landowners with property bordering streams can plant trees that will increasingly provide stream shade as they mature. In addition to shading, a mature riparian zone can improve stream health by filtering excessive amounts of fertilizer or other nutrients from lawns and agricultural areas and can contribute woody debris to the stream channel.

Water Conservation. Practicing wise use of water near streams can help protect flows during late-summer, low-flow conditions. In some cases less-consumptive irrigation methods can be substituted for existing methods in order to leave more water in the stream.

Streamside Restoration. Streamside restoration projects can be designed to improve the condition of streams. Where streams have been straightened and channelized, restoration can be designed to help reach a variety of goals such as re-establishing connections with the natural floodplain and with groundwater (which can help reduce stream temperatures). Addressing problems such as erosion and sedimentation will help prevent stream shallowing and widening, two processes that result in greater exposure to heating from the sun.

To obtain a copy of the DRAFT Lower Skagit Tributaries Temperature Technical Report, or, for more information, please contact either:

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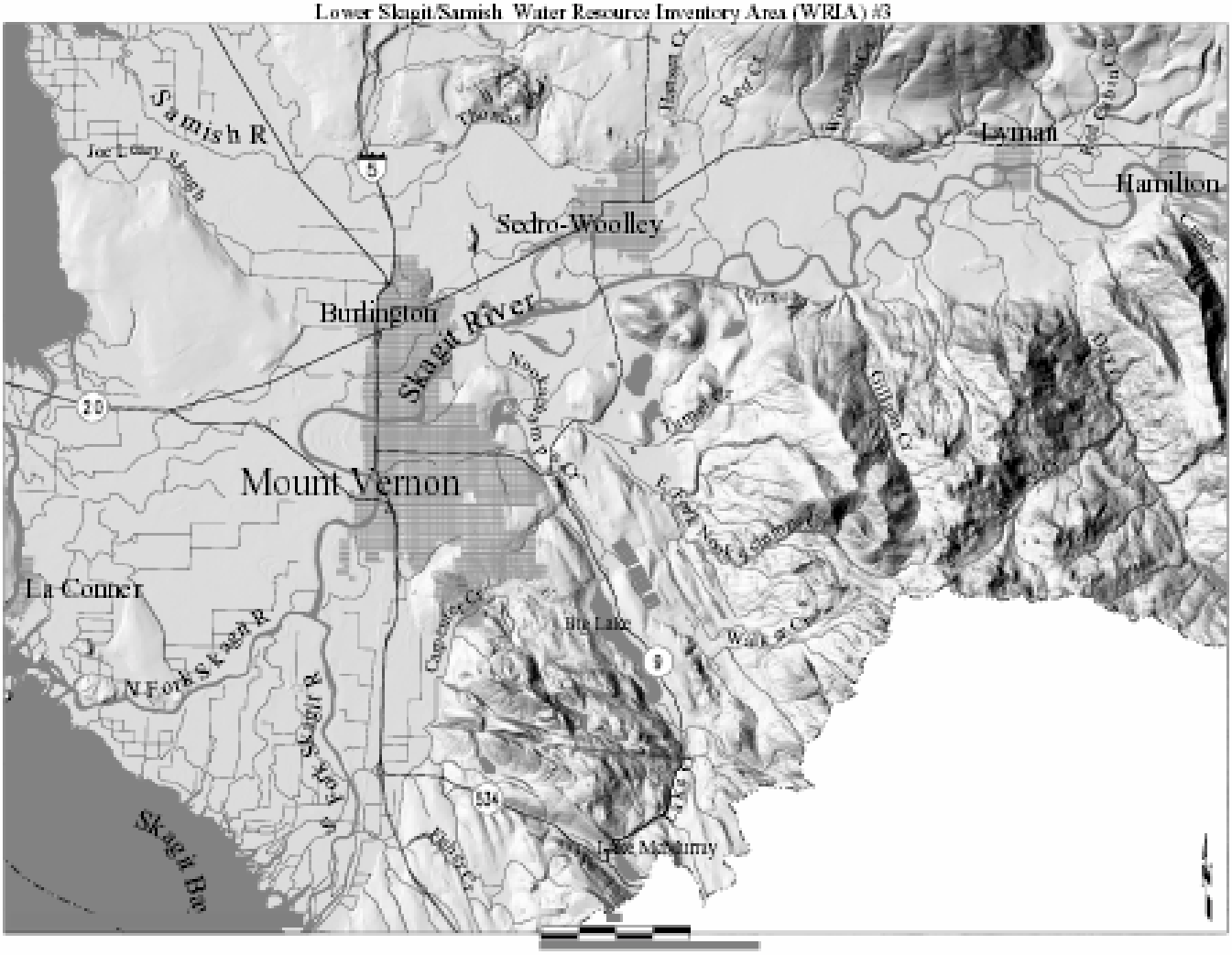
Lower Skagit/Samish Water Resource Inventory Area (WRIA) #3



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