



Focus on **Water Temperatures and Oxygen in Green-Newaukum Basin**

Northwest Regional Office -- Water Quality Program

Streams in the Green-Newaukum Watershed need your help!

The Green River and its tributaries serve as important migration corridors and spawning and rearing areas for several salmon species. These species include Puget Sound Chinook and Bull Trout (both listed as threatened under the Endangered Species Act), coho, chum, pink, sockeye, and steelhead/rainbow and cutthroat trout. However, parts of the Green River and its tributaries, including Newaukum Creek, have too little oxygen (called dissolved oxygen) or are too warm. This causes thermal stress and harm to many resident fish that require cold waters for optimum health during various life stages. These unhealthy conditions also cause these streams to fail Washington's water quality standards.

~ We can take actions now to improve water quality in our streams! ~

Cool streams and dissolved oxygen are important for water quality

Just as it is necessary for human life, oxygen is essential for salmonids, which need cold, oxygen-rich waters to stay healthy during critical life stages. Cold water holds more dissolved oxygen than warm water, so warmer water results in less oxygen for fish and other aquatic organisms. Fish can then become physically stressed and are more likely to get diseases. If temperatures get above the lethal limit (77°-78°F), most salmonids will become dangerously stressed or die.

Stream temperature and dissolved oxygen standards are set by the Department of Ecology (Ecology) and are reviewed and approved by the federal Environmental Protection Agency. These standards are established to protect the most sensitive beneficial uses of local waters. In the Middle and Lower Green River Sub-Watersheds, the uses to be protected are salmon and trout spawning, rearing, and migration.

To determine what actions we all need to take to bring the quality of these waters up to Washington standards, Ecology and its partners are conducting a water quality study and clean-up project in the Green-Newaukum Watershed. The effort is operating on the timeline below:

- **Conduct a Water Quality Technical Study -- Summer '06**
- **Develop Computer Model and Analyze Water Quality Data -- Fall '06-Spring '07**
- **Produce Draft Water Quality Technical Study Report -- Fall '07**
- **Publish the Water Quality Improvement Plan -- Summer '08**
- **Implement Water Quality Improvement Actions! -- Ongoing**

What causes low dissolved oxygen?

Low dissolved oxygen in streams can occur naturally or be caused by human actions. Some areas, such as wetlands, are naturally low in dissolved oxygen; groundwater entering streams also typically has less oxygen than surface waters. Human actions can introduce nutrients in streams resulting in low dissolved oxygen levels. Failing on-site septic systems and stormwater rushing over areas of reduced vegetation can 'flush' human waste, soaps, domestic animal wastes, and poorly managed fertilizers into our waters. These sources of excess nutrients in streams provide 'food' for algae to grow into unwanted blooms over large areas. Although algae can contribute some oxygen when they are alive, the problem comes as these algae blooms die and become a food source for oxygen-consuming bacteria. These bacteria thrive on the decomposing algae and deplete dissolved oxygen in water.

Warmer water cannot hold as much oxygen as cold water and speeds growth of algae!

What causes high temperature streams?

Some factors that affect stream temperature can occur from both natural and human-causes in the watershed. These include: 1) stream depth, flow rate, and overall volume of water; 2) the influence of cooler groundwater flowing into streams; and 3) solar heating as related to latitude, time of year, time of day, and how much shade is available to block the sun. Natural causes, such as high air temperatures can warm creeks and rivers, as does stream water traveling long distances over exposed bedrock. Naturally occurring fires or floods can sometimes remove significant streamside vegetation and shade, but humans often cause these events as well.

Human choices about watershed land management activity often impact stream temperatures:

- **Removal of streamside vegetation** reduces the amount of shade over the water and makes it easier for the air and sun to heat the stream.
- **Erosion and sedimentation** from poorly-managed forest lands, agricultural areas, or construction sites can make streams shallower and wider. These characteristics make streams harder to shade and more susceptible to warming as these changes affect how well colder groundwater interacts with surface waters to cool streams..
- **Water withdrawals** for various purposes, including irrigation, reduce the amount of water in the stream during the summer when flows are already critically low. Less water in the stream makes it slower and shallower, thereby, allowing it to become warmer.
- **Expanded areas of impervious surfaces** (such as pavement) cause runoff water to heat up.

Understanding and correcting problems

When a stream is too warm or has too little dissolved oxygen, Ecology collects more water quality data to confirm the problem and collaborates with others on ways to address the conditions. To understand and improve the water quality in the Green River and its tributaries, Ecology and its community partners began a detailed monitoring program and data analysis in summer of 2006. Ecology scientists will develop a computer model to help us all understand how factors such as streamside vegetation, wind speed, and stream flow relate to the stream temperature and dissolved oxygen levels.

The computer model's results will guide the development of effective solutions that the local community can act on to lower stream temperatures and raise dissolved oxygen levels during critical periods. These water quality improvements can help prevent loss of threatened and endangered fish species and other sensitive organisms in these streams.

How can you help reduce stream temperatures and increase oxygen?

Citizens and organizations, including local governments, can take action now to help protect and restore water quality in the Green River Watershed. The following actions increase dissolved oxygen levels and reduce water temperatures in streams. By taking at least one of the following actions, we can all help improve our streams.

- ❖ **Restore Stream Channels.** Get involved in streamside restoration projects to help prevent stream shallowing and widening from erosion and sedimentation. Where streams have been straightened and channelized, restoration projects can help re-establish connections with the natural floodplain and with cool groundwater resources.
- ❖ **Conserve Water.** Practice wise use of water near streams to help protect flows during late-summer low-flow conditions. Reduce lawn areas for watering or use less-consumptive irrigation methods (soaker hoses or smart watering). Use deep soaks early in the morning or late in the evening to minimize evaporation and leave more water in the stream or in groundwater resources that 'recharge' stream flows.
- ❖ **Plant Tree Borders.** Streamside landowners can plant trees that provide stream shade and cooler temperatures as they mature; cooler water holds more oxygen. Woody debris and vegetative material that falls into streams from mature streambank plants can help filter excessive amounts of sediments, fertilizers, or other nutrients from lawns and agricultural areas. This prevents the growth of algae and other aquatic plants, thereby, preserving needed oxygen and increasing the ecological health.
- ❖ **Keep Nutrients and Organic Material Out of Streams.** Take these actions to prevent excessive nutrient levels in streams and stormwater runoff. By doing so, you will help streams maintain healthy levels of dissolved oxygen.
 - Routinely check on-site septic systems (every 2-3 years).
 - Keep all soaps out of streams. Use only bio-degradables when washing cars on lawns.
 - Prevent overuse and runoff of fertilizers. Use slow-release organic fertilizers if possible.
 - Carefully manage domestic animal wastes: pick-up, cover, and keep away from streams.
 - Keep grass clippings and other organic debris out of streams.

Ecology is collaborating with communities in the watershed to identify other ways to cool and provide more oxygen for the Green River and its tributaries. We invite citizens and local governments to help develop and implement Water Cleanup Plans for these important waters. Some types of streamside protection measures may also be eligible for financial assistance.

For more information about the Green-Newaukum Watershed:

http://www.ecy.wa.gov/programs/wq/tmdl/watershed/tmdl_info-nwro.html

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Thanks for YOUR HELP to improve Washington's aquatic treasures!

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