



# Humptulips River Temperature Monitoring 2010

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## Abstract

The Humptulips River is located in the southwestern portion of the Olympic Peninsula in Water Resource Inventory Area 22. The river is the western most tributary in the Chehalis River system. The objective for this study was to conduct continuous temperature monitoring during the critical summer 2010 season to determine if temperatures met the state's water quality standards. Monitoring was limited to the West Fork Humptulips River and the East Fork Humptulips River. Sites were selected from the Washington State's list of impaired water bodies (303(d) list). Five stations were sampled: three stations on the West Fork Humptulips River and two stations on the East Fork Humptulips River. Two sites met the water quality criteria. One monitoring site, located high in the West Fork watershed met the temperature criterion of the seven-day average daily maximum (7-DADMax) not exceeding 12°C. Another site in the East Fork Humptulips met its temperature criterion of 7-DADMax not exceeding 16°C. The supplemental water quality criterion of 13°C from September 15 through July 1 was not addressed in this study. It is recommended that monitoring be conducted at the *Downstream of GoForth Creek* and *Near Campbell Tree Grove Campground* site locations. Discussions should be initiated with USFS and the Chehalis Basin Partnership regarding plans for continued implementation of best management practices and plans for future monitoring efforts in the watershed.

## Publication Information

This report is available on the Department of Ecology's website at <http://www.ecy.wa.gov/biblio/1110045.html>

Data for this project are available at Ecology's Environmental Information Management (EIM) website [www.ecy.wa.gov/eim/index.htm](http://www.ecy.wa.gov/eim/index.htm). Search User Study ID BEDI0017.

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# Background

The Humptulips River lies in the southwestern portion of the Olympic Peninsula in Water Resource Inventory Area 22 (Figure 1). The Humptulips River is considered the western most tributary of the Chehalis River system even though it does not flow directly into the Chehalis River but joins the waters of Grays Harbor on the North Bay side. The Department of Ecology's (Ecology) 2008 Water Quality Assessment has ten Humptulips River segments listed as water quality impaired for temperature (303(d)). Seven of these are on the mainstems of the West and East Forks of the Humptulips River. The listings were based on data collected primarily from the United States Forest Service Olympic National Forest (USFS).

The West and East Forks of the Humptulips River watershed originate in the steep Olympic Mountains in the USFS. The streams then flow into gradually broadening glaciated river valleys. Land use is primarily silviculture, however in the lower watershed there are small farms. The USFS manages approximately 65 percent of the land base with the remainder being state, county, and private ownership (Graber, et al., 2003).

Ecology conducted a total maximum daily load (TMDL) study for temperature in the Upper Humptulips River watershed (Peredney, et al, 2001). The data used for the TMDL were data collected by the USFS in 1998. The exceedances were detected during the East/West Humptulips Watershed Analysis. The Watershed Analysis was a joint resource and water quality investigation conducted by the USFS, Rayonier Timber Company and the Washington Department of Natural Resources; it was conducted concurrent with the TMDL. Based on the findings from the TMDL, and its expectations for adaptive management, the upper basin is not expected to achieve water quality standards before 2052 (Peredney, et al, 2001).

Excessive water temperatures in the river may reduce the quality of habitat for native chinook, chum and coho salmon, as well as steelhead, cutthroat trout and other aquatic life. Temperature varies naturally over the landscape as a function of geology, topography climate and time. The influence of heat as a pollutant can also be affected by land use (Peredney, et al, 2001). The primary watershed disturbance activities that contribute to increases in surface water temperature include forest management within riparian areas, timber harvest in sensitive areas outside the riparian zone, and road construction and maintenance (Graber, et al., 2003)

During 2007-2009, the Chehalis Basin Partnership collected monthly temperature measurements with a thermometer in the East and West Fork Humptulips River basins. The data suggested that some of the 303(d)-listed sites might be cool enough to meet water quality standards.

This 2010 Ecology study focused on those 303(d)-listed reaches on the West and East Forks of the Humptulips River. The objective for this study was to conduct continuous temperature monitoring during the critical summer season (July – August) to determine if water quality temperatures achieved the state's water quality standards.

## Water Quality Standards

The appropriate water quality standards for the monitoring sites are those found in Chapter 173-201A WAC (Ecology, 2006). All sites were within the USFS boundary.

### West Fork Humptulips River

The criteria that apply to the West Fork Humptulips are:

- The Humptulips River and tributaries from the Olympic National Forest boundary to its headwaters is 16°C for Core Summer Salmonid Habitat, except for the waters (including tributaries) above Pete's Creek where the standard changes to 12°C for Char Spawning and Rearing. Additionally, there is a supplemental water quality criterion of 13°C from February 15 through July 1. This supplemental criterion does not apply to the waters above Pete's Creek, however. Where multiple criteria for the same water quality parameter are assigned to a water body to protect different uses, the most stringent criterion is applied. Therefore, the water quality standard above Pete's Creek is always 12°C.

The sites *Downstream of Rainbow Creek* and *Upstream of the Highbridge Gorge* must meet the 16°C for Core Summer Salmonid Habitat. The supplemental water quality criterion of 13°C from February 15 through July 1 was not within the time period reviewed for this study. The site *Near Campbell Tree Grove Campground* is above Pete's Creek and must meet 12°C for Char Spawning and Rearing.

### East Fork Humptulips River

The criteria that apply to the East Fork Humptulips are:

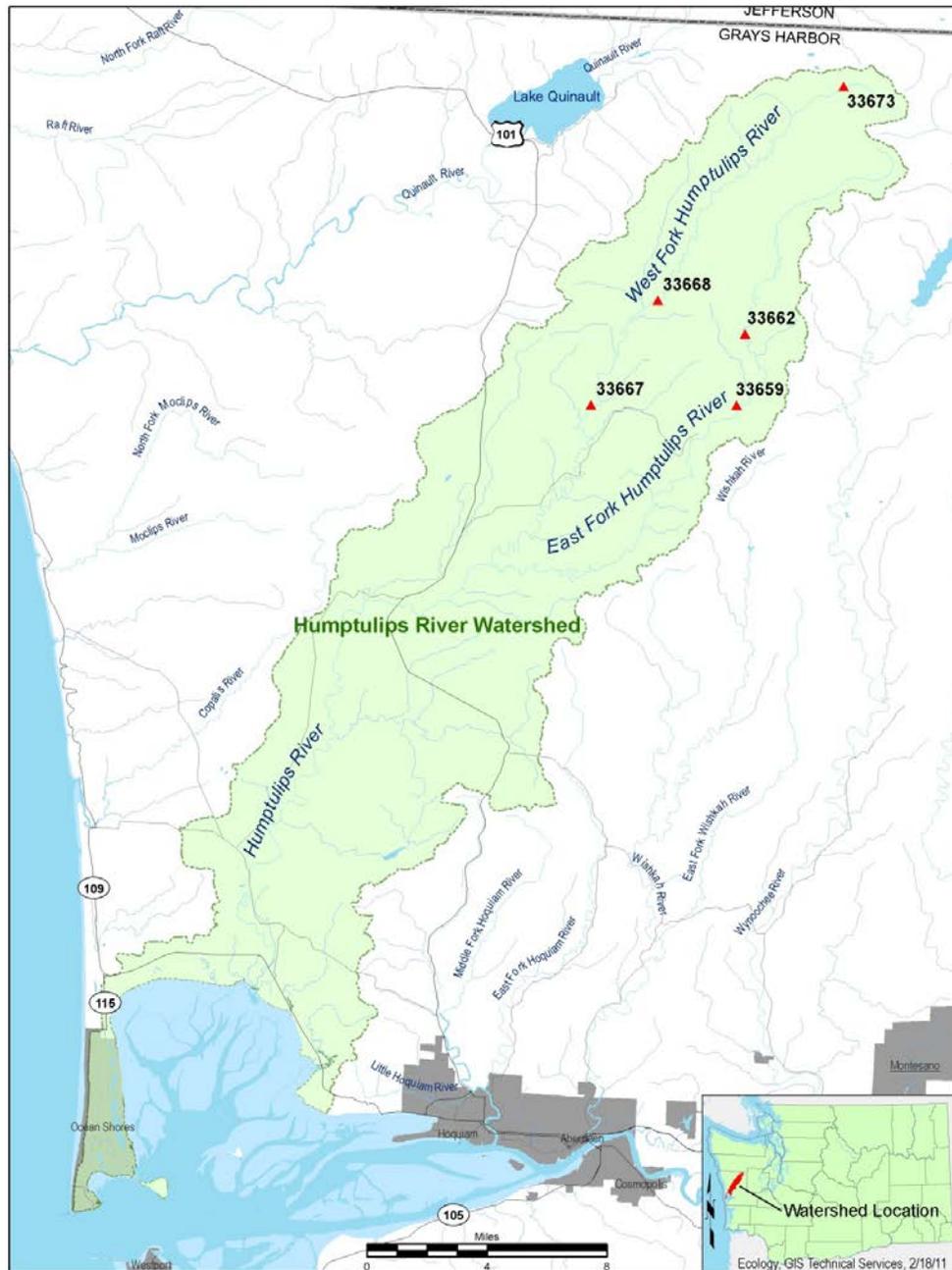
- The Humptulips River and tributaries from the Olympic National Forest boundary to its headwaters is 16°C for Core Summer Salmonid Habitat, except for the waters (including tributaries) above the unnamed tributary at latitude 47.3821 and longitude -123.7163. All waters above this junction are protective of Char Spawning and Rearing and thus have the criterion of 12°C. Additionally, there is a supplemental water quality criterion of 13°C from February 15 through July 1. However, this supplemental criterion does not apply to the waters above the unnamed tributary. Where multiple criteria for the same water quality parameter are assigned to a water body to protect different uses, the most stringent criterion is applied. Therefore, the water quality standard above the unnamed tributary is always 12°C.

Both sites sampled in the East Fork Humptulips must meet the 16°C for Core Summer Salmonid Habitat. The supplemental water quality criterion of 13°C from February 15 through July 1 was not within the time period reviewed for this study.

## Methods

Field sampling and measurement protocols followed those in Schuett-Hames, et al., 1999, and Ward, 2003. Continuous air and water temperature records were taken every 30 minutes with Onset® Tidbit v2 temperature loggers (temperature logger) from July through August 2010 to determine the highest 7-DADMax value.

Originally, the plan for sampling was to monitor temperature at all listed sites in the Humptulips River (Dickes, 2010). However, due to logistics, the monitoring was limited to the basin above the Highway 101 Bridge. There were seven 303(d)-listed reaches planned for monitoring in the upper basin but two sites in the upper reaches of the East Fork Humptulips River were inaccessible due to a road closure. Therefore, Ecology had temperature loggers at five sites in 2010 – three in the West Fork Humptulips River and two in the East Fork (Figure 1, Table 1).



**Figure 1. Temperature monitoring sites for Ecology’s 2010 temperature study.**  
*The number associated with the site location is the 303(d) listing identification number.*

**Table 1. Description and location of Ecology’s temperature monitoring sites on the Humptulips River during the summer of 2010. Sites are listed downstream to upstream.**

Listing ID	Site description	Field GPS Location	
<b>East Fork Humptulips River</b>			
33659	Downstream of GoForth Creek	47° 20' 00.5"	-123° 43' 35.6"
33662	Upstream of Flatbottom Creek	47° 21' 32.5"	-123° 42' 12.0"
<b>West Fork Humptulips River</b>			
33667	Downstream of Rainbow Creek	47° 19' 47.7"	-123° 49' 32.4"
33668	Upstream of the High Bridge gorge	47° 23' 06.2"	-123° 46' 52.5"
33673	Near Campbell Tree Grove Campground	47° 28' 54.8"	-123° 40' 56.8"

## Quality Assurance

Pre- and post-deployment calibration checks met the quality assurance criterion of 0.2°C for the instruments (Ward, 2003). The temperature loggers were calibrated before deployment and after recovery according to the Timber Fish and Wildlife stream temperature protocols (Schuett-Hames et al., 1999). A *National Institute of Standards and Technology* (NIST) certified reference thermometer was used for the calibration. Field sampling variation was addressed by field checks of the instruments with a NIST verified, hand-held thermometer upon deployment, mid-season, and retrieval. Data met quality control objectives.

- 303(d)-listed site 33667: *West Fork Humptulips River Downstream of Rainbow Creek* was previously described as *WF Humptulips River near Newbury and Rainbow Creeks* (Dickes, 2010). This site was just upstream of the 303(d)-listed reach. This year the river shifted to the left bank leaving the temperature logger in a pool, with only very shallow water moving into and out of the pool. It is not clear if the data are representative of the main river conditions or affected by other influences due to the shallow depth.
- 303(d)-listed site 33668: This site on the West Fork Humptulips River was relocated for ease of access. In the original sampling plan (Dickes, 2010) this site was identified as *West Fork Humptulips River just upstream from Elk Creek*. But, instead, it was located upstream of both Elk Creek and the High Bridge Gorge, thus being renamed to *West Fork Humptulips River upstream of the High Bridge gorge*.

# Results

The daily minimum, maximum, and mean data are available in Ecology’s Environmental and Information Management System user study identification BEDI0017. A data summary is provided in Table 2 for comparison with the water quality standard for temperature.

**Table 2. The 7-DADMax temperatures (July – August 2010) compared to the temperature water quality standard at Ecology’s monitoring sites.**

Listing ID	Site description	7-DADMax (°C)	Date (2010) Mid 7-day sequence	7-DADMax Water Quality Criterion (°C)	Met Criterion ?
<b>East Fork Humptulips River</b>					
33659	Downstream of GoForth Creek	15.9	August 15	16	Yes
33662	Upstream of Flatbottom Creek	17.9	July 26	16	No
<b>West Fork Humptulips River</b>					
33667	Downstream of Rainbow Creek	17.0	July 9	16	No
33668	Upstream of the High Bridge gorge	19.1	August 14	16	No
33673	Near Campbell Tree Grove Campground	11.0	August 18	12	Yes

Two monitoring sites met the water quality criterion. One monitoring site, *Near Campbell Tree Grove Campground*, located high in the West Fork watershed, met the temperature criterion of the 7-DADMax not exceeding 12°C. Another site in the East Fork Humptulips, *Downstream of GoForth Creek*, met its temperature criterion of 7-DADMax not exceeding 16°C.

## Conclusions and Recommendations

- West Fork Humptulips River *Near Campbell Tree Grove Campground*, 303(d)-listed site 33673, met water quality standards (7-DADMax not to exceed 12°C). The 7-DADMax temperature at this site was 11.0°C. The low temperatures may be the result of groundwater influence in the upper basin as well as the influence of the riparian old-growth forest.
- Water quality standards were met at 303(d)-listed site 33659 *Downstream of GoForth Creek* in the East Fork of the river at 15.9°C. The water quality criterion here is 7-DADMax not to exceed 16°C.
- It takes two consecutive years of monitoring, meeting the temperature water quality criterion during the critical season both years, in order to get a water body off the 303(d) list. Therefore, it

is being recommended that monitoring be conducted at the *Downstream of GoForth Creek* and *Near Campbell Tree Grove Campground* site locations. Discussions should be initiated with USFS and the Chehalis Basin Partnership regarding plans for continued implementation of best management practices and plans for future monitoring efforts in the watershed.

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