

Lower Deschutes Temperature Questions and Answers (Bill Bakke and Tom Davis)

Native Fish Society - July 22, 2010

This answers questions on the issue of high lower Deschutes water temperatures in July 2010.

Q - What is the structure at Pelton Round Butte (PRB) for?

A – The new structure is to balance upper Deschutes anadromous fish reintroduction with restoring historic water quality downstream. Restoring fish to historic habitat in the upper basin involves using the surface withdrawal to lure smolts down to the forebay for capture. At the same time, the new structure is intended to balance surface and bottom withdrawals to mimic the temperatures that our native Deschutes anadromous fish evolved under. This is a pilot year for water quality and fish collection. The facility-fish managers don't have all the answers. They're trying to do what's right for fish with current information.

Q - Given that warmer temperatures are being released from the Pelton Round Butte Project this spring at RM 100, are the temperatures at Mack's Canyon (RM 25) and Moody (RM 0.25) warmer than previous years? Some fishermen have reported 69°F degrees on July 8, 2010.

A – Professional opinions and data indicate that natural Deschutes water temperatures in the lower reach before PRB construction were similar to 2010 during the hot summer months. PGE is attempting to re-create water temperatures in the lower Deschutes that are as close to pre-PRB temperatures as possible to restore natural conditions for anadromous fish.

The two graphs below explain that 1) the actual recorded temperatures at Mack's Canyon from 2000-2008 show that temperatures in the past 9 years are comparable to what is happening now, indicating a fair amount of attenuation of any thermal plume from Billy Chinook releases to the mouth of the Deschutes, and 2) a Moody temperature graph that shows 2010 temperatures relative to the actual data from the 2000-2008 period. This indicates that temperatures at the mouth are not significantly different than temperatures from the previous 9 years. A regression analysis of the Mack's Canyon 2010 data was used to generate for 2010 what would have come from the missing Moody gage.

A report by Huntington (1999) showed that pre-project temperatures in 1953-1955 actually exceeded current temperatures and ranged from 18-20°C. While current July temperatures released from Round Butte are higher compared to the 1964-2009 temperatures, actual temperatures at the Moody gage are comparable to those seen from 2000-2008.

Q - What is causing the low water visibility on July 8, 2010 at Mack's Canyon? There were suspended particles in the water that looked like green algae. Visibility was 3 feet or less. That has not been a normal condition on the river and unless the White River is running hard has not been normal for decades.

A - It probably was algae, which isn't automatically bad. It may be fortunate that it was green. There's a white algae like growth starting in some streams that is a big problem, i.e. didymo (see below).

Q - What impact will the higher temps have on steelhead? Do higher temperatures bring increased risk from bacteria, low oxygen levels in the river and other problems like increased growth of algae? Did they make a mistake in developing the PRB release schedule? Do they need to make any adjustments?

A - The responsible entities did a lot of "studies" but nature is complex and they'll undoubtedly need to do more. The knowledgeable fish biologists have always stated that adaptive management will be essential. Contingency variations will probably be needed for the flow release protocols like Blend 17, the one they're using now. Most of the involved professionals don't believe we'll see reintroduction "success" even with the essential adaptations, in less than a decade. We're three or four years into the program now, starting with juvenile releases into the rivers and creeks. According to Blend 17, temperatures should decline at the compliance point at River Mile 100 below the Reregulating Dam immediately following the prescribed shift

from 15 to 30% release of bottom water withdrawal, as required by the 401 certification by ODEQ. However, it appears that temperatures at Moody, where any temperature benefit would become apparent, 5-6 days later, may only decline up to 1-2°C. This is because the temperature attenuates by Mack's Canyon and may not even be apparent at the mouth of the river.

Q - What work has been done with the public and the Oregon Guides and Outfitters to prepare them to answer questions from the many people they will be seeing in the next few months? If a guide loses the month of August because of river temps it will have an impact.

A - The public information programs on reintroduction began 5 or 6 years ago. ODFW for example had at least one major presentation on it then. The release of steelhead and Chinook into Whychus, Crooked and the Metolius began in 2007. All of the releases were widely advertised and participants could and did ask questions. Many of the participants assisted with fish releases in the 3 tributary streams above the Project. Individuals and organizations had opportunities to become informed.

Q – Are the "at or below" normal temperatures the professionals talk about from actual data, their modeling or historical? If historical are they pre-dam or post-dam or a blending of both?

A – From actual data except for the missing Moody gage data for 2010. The Moody data was developed using a regression from the Macks Canyon gage. They're trying to restore pre-PRB flows and temperatures, which is what they should be shooting for to reestablish natural runs of anadromous fish.

Q – Will the warmer river temperatures damage the runs of steelhead and salmon?

A – If the "natural" temperatures are restored and strays, particularly hatchery strays, are discouraged from entering the Deschutes that would be a big step toward achieving natural runs of wild, native salmonids. In years past when the Columbia has been colder, like 2008, upriver fish did not stop in the Deschutes compared to years when the Deschutes is colder. In the future with the proposed releases, it may be less likely that we see upriver hatchery fish straying into the Deschutes. The increased steelhead, Chinook and reverted sockeye moving into and through the river because of reintroduction above PRB will likely make up for any losses, and probably add more fish to the lower Deschutes.

The hatchery component from upper Columbia River basin streams probably has exceeded 30,000 in some years. We may never have that increase in wild fish, but in the past hatchery strays sometimes comprised up to 65-70% of the spawning fish, affecting productivity and survival of wild fish. Reducing the stray component spawning with wild fish, especially out of basin strays, will benefit wild fish.

Q – Why does Lake Billy Chinook have such warm water?

A – Over 700 miles of upper Deschutes rivers and creeks are on the Oregon Department of Environmental Quality's list of waters that fail to meet the Oregon water quality criteria for temperature. The map below shows these waters. The reasons are primarily the historical removal of riparian shading, extreme diversion and lowering of flows during the summer for irrigation, mitigating new well withdrawals of cold groundwater that recharged streams with warm surface water, and reservoirs that act as heat sinks and raise water temperatures. Also, Lake Billy Chinook, like all reservoirs, is a heat sink and creates thermal loading by holding water in the reservoir longer than flowing rivers. The intent of the PRB structure is to balance capturing juveniles with surface withdrawal and re-create the natural, pre-PRB thermal temperatures of the Lower Deschutes River.

Q – Is any progress being made on restoring riparian cover and natural flows in the upper Deschutes?

A – Yes – through projects by the Deschutes River Conservancy and the Upper Deschutes Watershed Council, but progress is slow.

Questions, Answers and Recommendations for Deschutes River Management

Q – Have the temperature changes using blend 17 at the mouth, 100.1 miles downstream been modeled?

A – According to the PGE fish biologist the temperature changes have not been modeled at the mouth using blend 17. However, the work of Chuck Huntington on temperature changes in the lower river have been used to estimate the effect of these changes.

R – Using the existing or a new river model temperature must be modeled on a periodic basis and three to five new water quality monitoring stations are needed to support and calibrate the model.

Q – Have the effects of temperature changes in the lower river on resident trout, steelhead, and fall chinook been modeled?

A – The effect on salmonids because of temperature changes in the lower river, primarily below Sherars Falls to the mouth, have not been determined.

R – Salmonid effects must be analysed and the analysis supported by annual salmonid surveys.

Q – Has the bass breeding response in the lower river due to temperature changes been modeled?

A – The improved spawning and rearing conditions for small mouth bass in the lower Deschutes River below Sherars Falls due to temperature modification have not been evaluated.

R – This must be part of a comprehensive analysis and survey of salmonid and non-salmonid effects.

Q – Can adjustments be made in outflow temperature to deal with high ambient temperatures in the lower canyon and its affect on water temperatures?

A – Water temperatures in the lower Deschutes will be cooler due to releases at the dam in August and September, but it would be difficult to make adjustments in releases of water to adjust for hot ambient temperatures affecting the river in July. A concern regarding the flexibility to adjust temperature to meet environmental hot spells in the lower river is unclear because of existing regulations.

R – Use of a critical periods operations model and regulatory flexibility are essential.

Q – Is funding available to monitor the temperature effects on fish below the dams?

A – There is no funding available from PGE to monitor temperature effects on fish below the dam. This would have an impact on adaptive management for temperature in the lower river. Monitoring funds are directed at re-establishing salmon and steelhead above the dam.

R – Temperature, water quality and fish conditions must be monitored at three to five additional stations and an operations model linked to regulatory flexibility is essential.

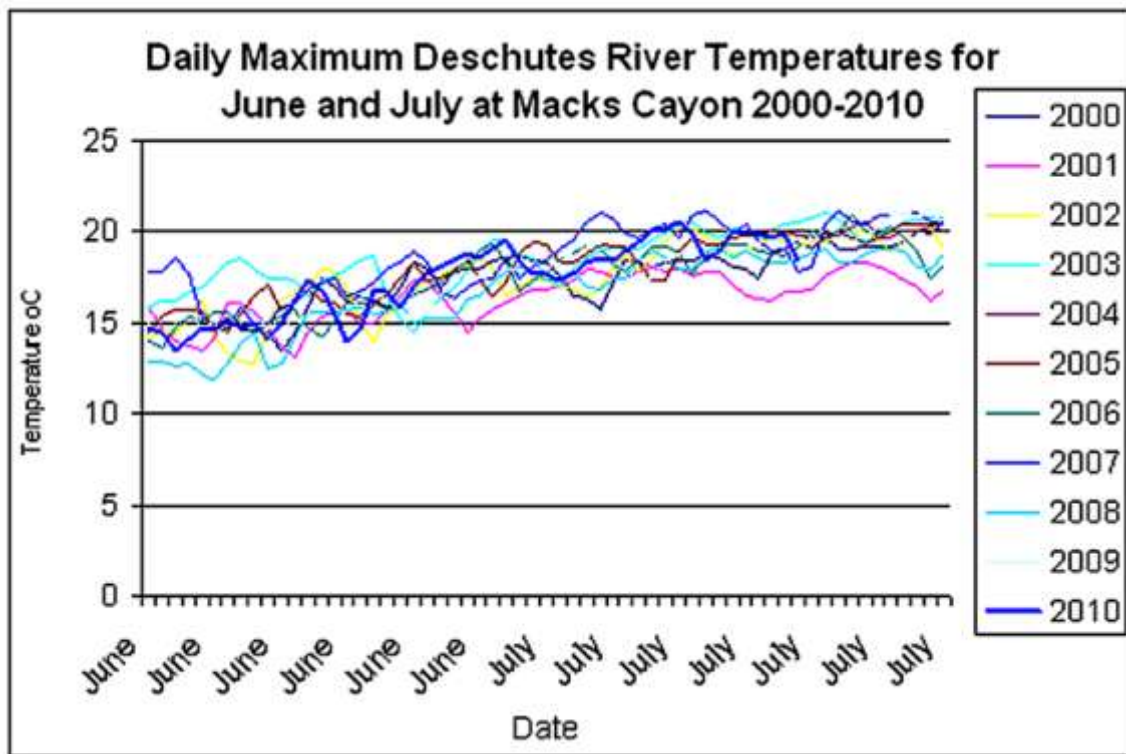


Bill Bakke
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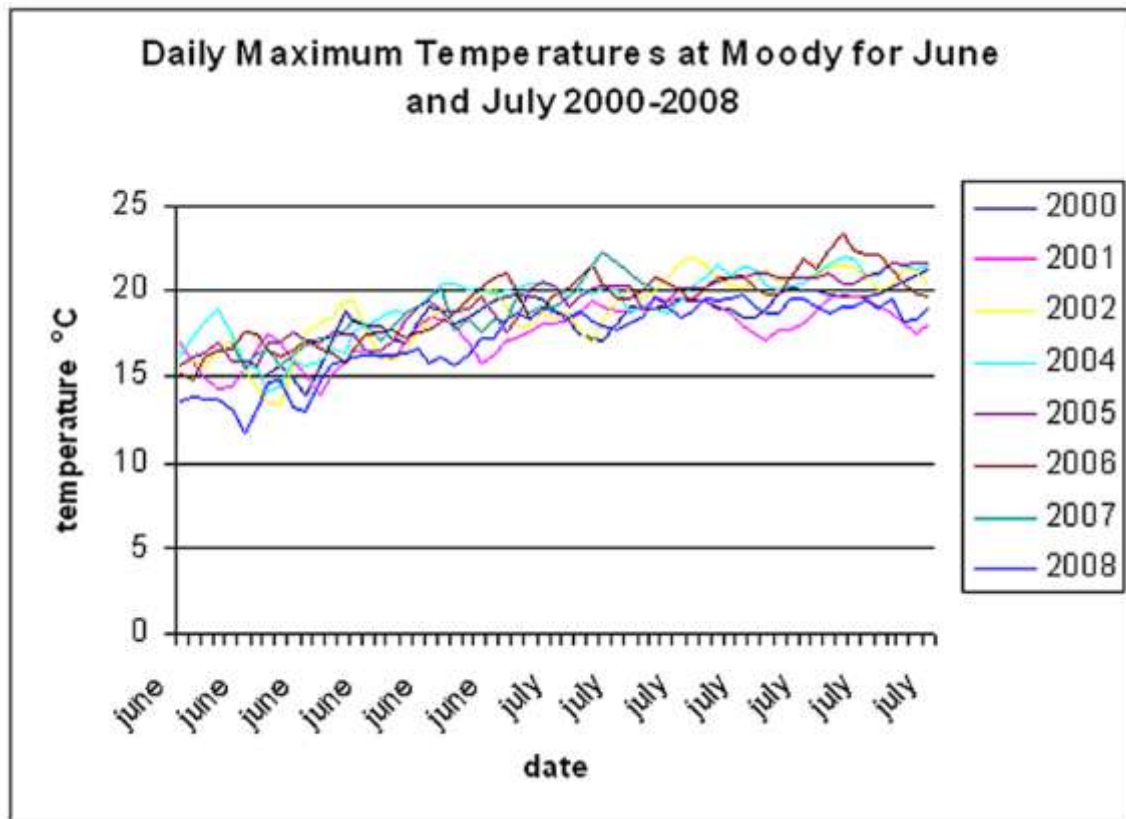


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Supporting Information

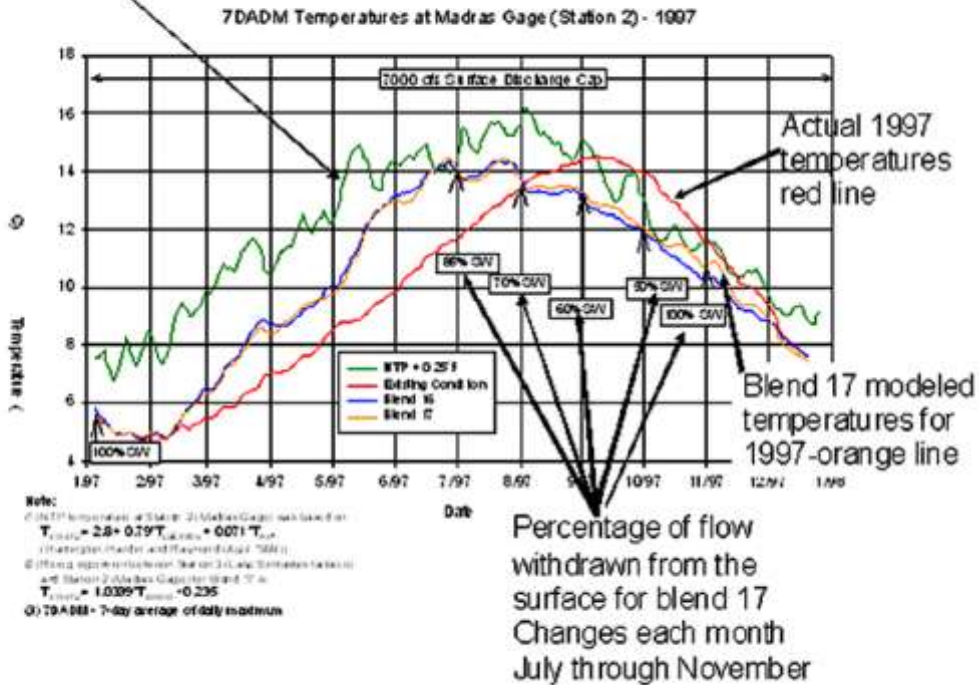


Graph 1 – Source PGE

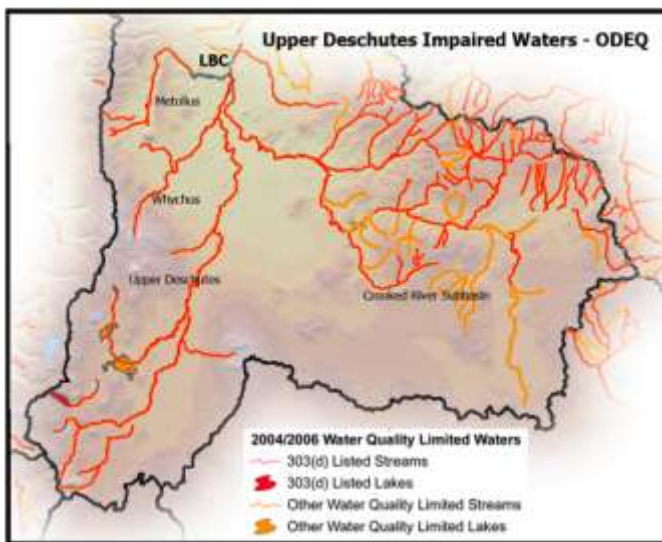


Graph 2 – Source PGE

Natural Thermal Potential +0.25°F –the temperature requirement-green line



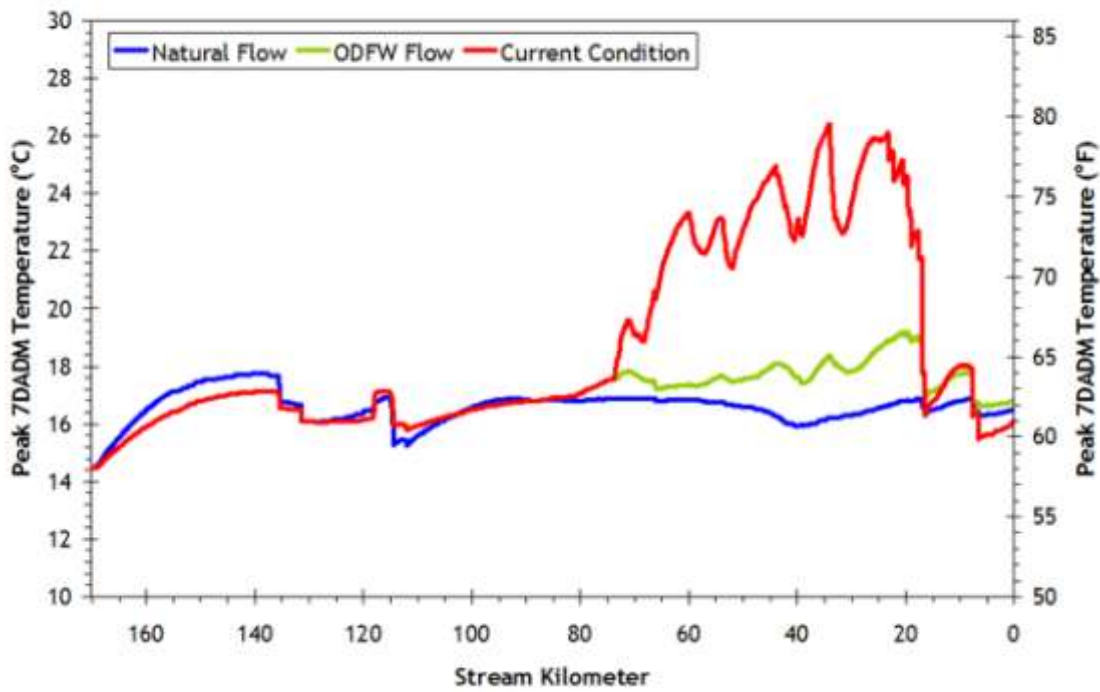
Blend 17



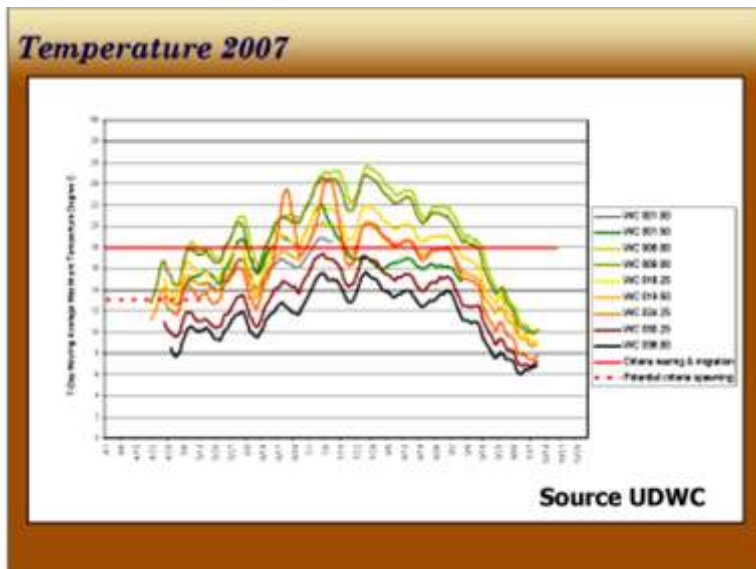
Upper Deschutes water quality limited streams; primarily for high water temperatures.

Didymosphenia geminata, commonly referred to as "didymo", is a freshwater microscopic diatom. It is found in streams and rivers in much of North America. Didymo increasingly poses a threat to aquatic ecosystems because it forms extensive mats on stream beds. Didymo attaches to the streambed by a stalk. These stalks have a rough texture similar to wet wool and mimic strands of toilet paper, as opposed to other algal species which feel "slimy"

<http://www.epa.gov/region8/water/didymosphenia/>



ODEQ water temperature graph in the Bend reach showing the effects if irrigation diversions.



2007 Whychus water temperature showing the 18 C criteria for trout (solid red line) and the 13 C spawning criteria for steelhead (dashed red line).

