State of California
Regional Water Quality Control Board
North Coast Region

Matt St. John
September 2, 2008

Executive Officer's Summary Report
8:30 a.m., September 11, 2008
North Coast Regional Water Board
Hearing Room
5550 Skylane Blvd., Suite A
Santa Rosa, California

Item: 7

Subject: Administrative Draft Klamath River Total Maximum Daily Loads – Tributary Flow Analysis Results

## Introduction

Regional Water Board staff have completed an administrative draft of the Klamath River Total Maximum Daily Load (TMDL) Staff Report addressing temperature, dissolved oxygen, and nutrient water quality impairments. The Administrative Draft of the Klamath River TMDL Staff Report has been submitted to key agencies including US EPA, US Fish & Wildlife Service, National Marine Fisheries Service, State Water Resources Control Board staff, and the Hoopa Valley Tribe, Yurok Tribe, Karuk Tribe, Quartz Valley Rancheria, and Resighini Rancheria. All comments on the administrative draft will be considered for incorporation in the public review draft along with comments from the SWRCB selected peer reviewers. The Public Review Draft will be available in late April 2009.

The goal of the Klamath River TMDL is to develop and implement a program that will attain and maintain the water quality standards of the Klamath River. To achieve this goal, the objectives in developing the Klamath River TMDL are:

1. To identify the sources and factors that contribute to temperature, dissolved oxygen, and nutrient water quality impairment;
2. To quantify the current discrete loading contribution from each of the identified sources;
3. To quantify the cumulative loading from all sources that the river can assimilate and meet water quality standards;
4. To assign allowable load allocations to the various sources; and
5. To develop a strategy to achieve the assigned load allocations.

To date, the analysis supporting objectives 1 to 4 has been completed. With respect to temperature impairment, the draft Klamath River TMDL analysis demonstrates that the following sources (or factors) affect Klamath River watershed stream temperatures:

- Copco 1 and 2 and Iron Gate Reservoirs;
- Iron Gate Hatchery discharge;
- Riparian shade;
- Sediment-related channel alteration; and
- Flow

The administrative draft TMDL Staff Report includes load allocations to each of these sources/factors, except flow. The purpose of this Board item is to present the approach and results of the analysis of how tributary flows effect Klamath River stream temperatures.

## Background

The starting point for development of a TMDL is definition of the applicable water quality objectives and beneficial uses in order to establish what constitutes compliance with these water quality standards. The beneficial uses of the Klamath River that are most sensitive to stream temperature conditions include those associated with salmonids: Cold freshwater habitat (COLD); Rare, threatened, or endangered species (RARE); Migration of aquatic organisms (MIGR); and Spawning, reproduction, and/or early development (SPWN).

The *Water Quality Control Plan for the North Coast Region* (Basin Plan) contains two temperature water quality objectives applicable to the Klamath River. The intrastate temperature objective, a narrative objective that applies to all waters of the state, reads:

> The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses.
>
> At no time or place shall the temperature of any COLD water be increased by more than 5°F above natural receiving water temperature.
>
> At no time or place shall the temperature of WARM intrastate waters be increased more than 5°F above natural receiving water temperatures.

The second water quality objective for temperature that applies to the Klamath River is the interstate temperature objective contained in the state wide *Water Quality Control Plan for Control of Temperature In the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan). The Thermal Plan, as adopted by the California State Water Board, is incorporated by reference in the Basin Plan (see Appendix 3 of the Basin Plan). The plan designates the Klamath River as a "Cold Interstate Water". The interstate temperature objective augments, but does not supersede, the intrastate temperature objective. The "Cold Interstate Waters" objective is as follows:

> Elevated temperature waste discharges into cold interstate waters are prohibited.

"Elevated Temperature Waste" is defined as:

> Liquid, solid, or gaseous material including thermal waste discharged at a temperature higher than the natural temperature of receiving water. Irrigation

return water is not considered elevated temperature waste for the purpose of this plan.

A challenge in developing the Klamath River temperature TMDL involves quantifying "natural receiving water temperatures" in accordance with the intrastate temperature objective. To do so, Regional Water Board staff, working with our cooperators at Oregon Department of Environmental Quality and US EPA Regions 9 and 10, and with technical support from Tetra Tech, Inc., developed and applied the numerical water quality modeling tools RMA-2 & 11 to the Klamath River for the year 2000 (a.k.a. the Klamath River TMDL models). Following completion of water quality model calibration and validation exercises, the Klamath River TMDL models were applied to represent our best understanding of natural baseline conditions within the Klamath River watershed (i.e. the Natural Baseline Condition Scenario).

With respect to temperature, the factors considered for the Natural Baseline Condition Scenario include: 1) representing the Klamath River with no dams; 2) removing point source discharges; and 3) representing full site potential riparian vegetation (and therefore shade) conditions. Different assumptions were applied with respect to how flows were represented in the natural baseline condition scenario. Current flows (year 2000) were applied within Oregon, and therefore in the Klamath River at Stateline. This decision was reached after evaluating the difference in temperatures at Stateline under current and full natural flows within Oregon. The results of that comparison, which indicated a negligible difference in temperature, and the need to be able to compare dams in versus dams out scenarios under the same flow conditions, led to staffs decision to use current flows at Stateline. Estimates of natural flows were applied for the California tributaries to the Klamath River. A number of key assumptions were made in estimating natural flows from the California tributaries. Current flows from the Salmon River and all of the creek tributaries were considered as the natural flows, as these tributaries have minimal consumptive use. For the Shasta, Scott, and Trinity Rivers full natural, or unimpaired, flows were estimated. Natural flow estimates for the Shasta River were developed from historic water master records and other reported flow measurements. Natural flow estimates for the Scott River were developed based on estimates of crop consumption. Estimates of natural flows in the Trinity River were developed from stream gauge data above and below the reservoirs.

In order to further assess the affects of Shasta, Scott, and Trinity River flows on Klamath River mainstem stream temperatures, an additional water quality scenario was run: the California Compliance Scenario. The California Compliance Scenario flows are consistent with the Shasta and Scott TMDLs and the Trinity River Record of Decision, as described below.

Temperature TMDLs have been approved for the Shasta and Scott Rivers. Both the Shasta and Scott River temperature TMDL analyses evaluated the affects of flow on stream temperature of the respective rivers. The Shasta River TMDL included a "goal" of increasing dedicated cold water instream flow by 45 cubic feet per second (cfs). Accordingly, in the California Compliance Scenario the flows from the Shasta River are

current (year 2000) flows plus 45 cfs. The Scott River TMDL documented that Scott River summer flows are supported by groundwater discharges to the river, and demonstrated that Scott River temperatures are sensitive to the amount of groundwater entering the river. The Scott River TMDL requested Siskiyou County to develop a groundwater study plan in order to better understand the linkages between groundwater pumping rates and Scott River flow rates. Therefore, in the California Compliance Scenario the flows from the Scott River are current (year 2000) flows. The South Fork of the Trinity River is considered temperature impaired, but no temperature TMDL has yet been completed for the Trinity River. However, flows in the Trinity River are regulated based on a Record of Decision. The Trinity Record of Decision prescribes a variable annual flow regime, based on the water year classification.

## Discussion

Results of the Natural Baseline Condition and California Compliance Scenarios will be presented in comparison to modeled current condition temperatures at the September 11, 2008 Board meeting. The following are staffs key findings based on the results of these water quality model scenarios:

- The Shasta and Scott Rivers could measurably decrease Klamath River temperatures downstream of these tributaries under a full natural flow condition.
- There is minimal additional temperature reduction that can be achieved in the Klamath River downstream of the Trinity River associated with increasing Trinity River flows from the California Compliance Scenario flows to the Natural Baseline Condition Scenario flows.

The predicted Klamath River stream temperatures under both the Natural Baseline Condition and California Compliance Scenarios exceed the biological temperature requirements for most of the life stages of salmonids for most of the year. These water quality model scenario results demonstrate that generally the mainstem Klamath River was naturally warm, and from the standpoint of stream temperature was probably not *fully* supportive of the beneficial uses applicable to salmonids (i.e. COLD, RARE, MIGR, and SPWN). Therefore, staff have determined that the temperature loading capacity is zero temperature increase above natural stream temperatures.

Historically both small and large tributaries to the Klamath River provided critical thermal refugia for salmonids, as they do to a lesser extent today. The mainstem Klamath River likely has always been used primarily as a migration corridor for salmonids, while the tributaries provide critical habitat for spawning and rearing. Consequently, protection and restoration of thermal refugia and optimizing temperature conditions to the extent feasible, both in the mainstem Klamath River and in the tributaries, is fundamental to support of the beneficial uses applicable to salmonids. Staff will review access and structural issues as the TMDL moves forward.

The model shows that additional temperature reductions are possible by increasing flow from the Shasta and Scott Rivers, however, as currently drafted, the TMDL does not

assign any load allocations for flow. Pursuant to the federal Clean Water Act requirements, TMDLs are to address point and non-point sources of pollutants in order to achieve water quality standards. However, it is recognized that in some cases water quality standards can not be met by only controlling discharges of pollutants. Flow is a controllable water quality factor, and the identification of its benefits to water quality may provide options for alternative methods of compliance, and at the very least, support voluntary actions occurring in the water user community in the Shasta and Scott River watersheds.

Staff will consider the information provided by the Natural Baseline Condition and California Compliance Scenarios, and will evaluate the range of regulatory and other options to encourage additional flows as the TMDL moves forward.

PRELIMINARY STAFF RECOMMENDATION: Informational Item Only.