Napa River Sediment TMDL and Habitat Enhancement Plan

As updated 3/2/18 from 2007 Goals for 2017

Background

The Napa River and its tributaries are listed as impaired because of too much sediment. The listing was made in response to concerns regarding adverse impacts to habitat for steelhead trout, chinook salmon, and other threatened species whose populations have declined substantially in recent decades. The Napa River Sediment TMDL and Habitat Enhancement Plan examines this water quality problem, identifies pollutant sources, and specifies actions that will restore a healthy fishery in this watershed.

Adopted TMDL and Supporting Documents

- Final Resolution R2-2009-0064
- Adopted Basin Plan Ammendment
- Staff Report
- Responses to Comments
- Written Comments
- Exhibits 1-8 (Living Rivers Council)*

* These exhibits are effectively summarized in other exhibits contained in Written Comments.

TMDL Implementation

General Waste Discharge Requirements for Vineyard Discharges in the Napa River and Sonoma

Creek Watersheds

Water Board staff is developing General Waste Discharge Requirements (General WDRs) for vineyard
River and Sonoma Creek watersheds. The purpose of the General WDRs is to
ff, and other pollutant contributions from vineyard properties.

More information on the General WDRs can be found on our Napa River and Sonoma Creek Vineyard Program page.

Napa River Basin Limiting Factors Analysis Final Report

- Executive Summary
- Technical Report
- Figures
- Appendices
- Maps 1-4
- Maps 5-8
- Maps 9-13
- Maps (zip)

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The following text will be inserted into Chapter 7, Water Quality Attainment Strategies including Total Maximum Daily Loads (TMDLs).

Napa River Sediment Reduction and Habitat Enhancement Plan

The goals of the Napa River Sediment Reduction and Habitat Enhancement Plan (Plan) are to:

- Conserve the steelhead trout population
- Establish a self-sustaining Chinook salmon population
- Enhance the overall health of the native fish community
- Enhance the aesthetic and recreational values of the river and its tributaries

To achieve these goals, specific actions are needed to:

- Attain and maintain suitable gravel quality and diverse streambed topography in freshwater reaches of Napa River and its tributaries
- Protect and/or enhance base flows in tributaries and the mainstem of the Napa River
- Reduce the number and significance of human-made structures in channels that block or impede fish passage
- Maintain and/or decrease summer water temperatures in tributaries to the Napa River

The following sections establish:

1. A sediment total maximum daily load (TMDL) defining the allowable amount of sediment that can be discharged into the Napa River, expressed as a percentage of the natural background sediment delivery rate to channels
2. An implementation plan to achieve the TMDL and related habitat enhancement goals

Problem Statement

Steelhead and salmon populations in the Napa River and its tributaries have declined substantially since the late 1940s. Results of recent analyses of fisheries and sediment sources indicate that:

1. **Spawning and juvenile rearing habitat for salmon and steelhead are adversely affected by high concentrations of fine sediment (primarily sand) deposited in the bed of the Napa River and its tributaries.**

   Successful reproduction by salmon and steelhead depends on adequate flow through streambed gravels (permeability) in order for eggs to hatch and larvae to grow. As the concentration of fine sediment (primarily sand) in the streambed increases, permeability decreases, which in turn increases egg and larval mortality, and ultimately causes a decrease in the number of young fish that emerge from the streambed. Similarly, as the concentration of sand in the streambed increases, the frequency and extent of streambed scour is intensified, further increasing mortality between spawning and emergence by washing eggs and/or larvae out of the bed during common high flow events.

Sources

Field inventories conducted throughout the watershed provide credible estimates of the rates and sizes of sediment delivered to Napa River watershed channels between 1994 and 2004. Based on this work, and application of channel and reservoir mapping, the Water Board concludes that:

1. More than half of fine sediment delivered to Napa River during the 1994–2004 period is associated with land use activities, including roads, human-caused channel incision, vineyards, intensive historical livestock grazing, and urban stormwater runoff.

2. In addition to its prominence in the sediment budget, channel incision is the primary agent for isolation of the channel from its flood plain and a reduction in the quantity and frequency of spawning and rearing habitat for salmon and steelhead in Napa River and the lower reaches of its tributaries.

3. Channel sediment loads vary greatly depending upon nature of underlying bedrock or sediment deposits, land use activities, and the location of dams.

4. Thirty percent of the watershed drains into reservoirs constructed in tributary channels. These reservoirs capture all of the gravel and sand, and most of the finer sediment input to upstream channels. Nonetheless, anthropogenic activities, downstream of dams, are contributing enough sediment such that the fine sediment load is substantially elevated in the Napa River downstream of the reservoirs.

Mean annual sediment delivery rate to channels is estimated to have been 272,000 metric tons per year during the period from 1994 to 2004, which when considered in relation to the land area draining into the Napa River at Soda Creek (e.g., 584 km^2), equals 466 metric tons per km^2 per year (Table 2). The natural background rate of sediment delivery during this period, absent dams and human-caused erosion is estimated to have been 252 metric tons per km^2 per year, which is calculated from Table 2 as follows:

48,000 metric tons/year–*sediment deposited in tributary reservoirs*
7,000 metric tons/year–*sediment discharged through dams on tributaries*
92,000 metric tons/year–*input to channels downstream of reservoirs*
147,000 metric tons/year

147,000 metric tons/584 km^2–*land area draining to Napa R. at Soda Creek*
=252 metric tons/km^2/year

Therefore total sediment load in the Napa River at Soda Creek is estimated to have been 185 percent of natural background (e.g., 466/252 = 185%) during 1994-2004. Table 2 breaks down the sediment sources to the Napa River, with annual average rate calculated at Soda Creek over the 10-year study period.

Table 2. Mean Annual Sediment Delivery to Napa River at Soda Creek (1994-2004)

Source	Estimated Mean Annual Delivery Rate (metric tons/yr)
Land areas upstream of dams (fine sediment discharged from reservoirs)	
▪ Natural Processes	7,000
▪ Human Actions	11,000
Land areas downstream of dams	
▪ Natural Processes:	92,000
▪ Human Actions:	
○ Channel incision and associated bank erosion	37,000
○ Road-related sediment delivery (all processes)	55,000
○ Surface erosion associated with vineyards and/or livestock grazing	37,000
○ Gullies and shallow landslides associated with vineyards, and/or intensive historical grazing	30,000
○ Urban stormwater runoff and wastewater discharges	2,500
TOTAL	272,000

Notes: Drainage area for Napa River at Soda Creek = 584 km^2. Estimates above do not include sediment deposited and retained in tributary reservoirs, which includes all gravel and sand, and most of the finer sediment input to channels located upstream of the reservoirs. Approximately 104,000 metric tons per year of sediment are deposited in tributary reservoirs, 48,000 metric tons per year of which is derived from natural processes (Above estimates are rounded to the nearest thousand).

Total Maximum Daily Load and Allocations

The Napa River sediment TMDL is established at 185,000 metric tons per year, which is approximately 125 percent of natural background load (based on sediment load estimates from the 1994-2004 period) calculated at Soda Creek. Natural background load depends upon natural processes, and varies significantly. Therefore, the TMDL and allocations are expressed both in terms of sediment mass and percent of natural background. The percentage based TMDL, 125% of natural background, applies throughout the watershed. In order to achieve the TMDL, controllable sediment delivery resulting from human actions needs to be reduced by approximately 50 percent from current proportion of the total load (Tables 3a and 3b). TMDL attainment will be evaluated at the confluence of Napa River with Soda Creek, which approximates the downstream boundary of freshwater habitat for salmon and steelhead. Attainment of the TMDL will be evaluated over a 5-to-10-year averaging period.

Because dams trap almost all upstream sediment inputs to channels, natural sediment input to channels downstream of dams equals only 62 percent of the total natural background load (e.g., amount that would have been input to Napa River absent dams and human caused erosion). Almost 50 percent of the TMDL can be allocated to human-caused sources. The TMDL equal to

125 percent of natural background load, can be achieved if human-related sources are reduced to the level of the allocations shown in Tables 3a and 3b).

Table 3a. Load Allocations

Source category	Load during 1994-2004		Estimated reductions needed (percentage)	Load allocations	
	Metric tons/year	Percentage of Natural Background		Metric tons/year	Percentage of Natural Background
Land areas upstream of dams					
▪ Natural processes	7,000	4.8	0	7,000	4.8
▪ Human actions	11,000	7.5	51	5,000	3.6
Land areas downstream of dams					
▪ Natural processes	92,000	63	0	92,000	63
▪ Human actions:					
○ Channel incision and associated bank erosion	37,000	25	51	18,000	12
○ Roads	55,000	38	51	27,000	18
○ Surface erosion associated with vineyards and grazing	37,000	25	51	18,000	12
○ Gullies and shallow landslides associated with vineyards, and/or intensive historical grazing	30,000	20	51	15,000	10
TOTAL	269,000			182,000	123

Note: Above estimates for loads, percent reductions, and allocations are rounded to two significant figures