

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: 5

Subject: Update of Monitoring in Freshwater Creek and Elk River

Introduction

The purpose of this report is to provide an update to the North Coast Regional Water Quality Control Board (Regional Water Board) about ongoing monitoring activities in the Freshwater Creek and Elk River watersheds in Humboldt County. This report is presented in two sections; 1) a summary of the recently sponsored Elk River and Freshwater Creek Monitoring Summit, and 2) a brief summary of recent data collection and analyses in Elk River.

Elk River and Freshwater Creek Monitoring Summit

On July 17, 2008, Redwood Community Action Agency (RCAA) and Regional Water Board staff jointly coordinated and hosted the Elk River and Freshwater Creek Monitoring Summit at the Humboldt Area Foundation in Eureka. RCAA provided their support in part under a Proposition 50 grant awarded by the State Water Resources Control Board.

Goals and objectives of the all-day summit included:

1. Providing an overview of current monitoring efforts in Freshwater Creek and Elk River, including locations, parameters, methods, analyses.
2. Improving coordination and information sharing between various monitoring entities.
3. Building confidence (and understanding of limitations) in monitoring data to facilitate TMDL development and discussion.
4. Identifying needed improvements and revisions to the existing monitoring programs to develop a meaningful watershed monitoring program.
5. Exploring available methods that could be useful in identifying changing (dynamic) channel conditions and that could help predict river evolution over various time frames (e.g. the next 5-year, 20-year, 50-year)

The July 17, 2008 Monitoring Summit Agenda is included as Attachment A.

Presentations were made by several entities. Due to the ambitious agenda and follow up discussions, some topics were not discussed in depth; including issues related to bedload and the summary session. RCAA staff facilitated and recorded information about the major discussion topics.

In general, Regional Water Board staff received positive feedback from participants regarding the format and structure of the meeting, the topics discussed, and the caliber of the technical

expertise. Staff would like to use a similar structure for future technical workshops as they appear to provide a safe and transparent forum for vetting technical issues with various stakeholder groups. Staff will continue to work with RCAA and the technical advisory committee regarding suspended and bedload sediment issues in Elk River and Freshwater Creek.

Instream Sediment Conditions in the Elk River Watershed

Available data on instream sediment conditions for Elk River are derived from the following sources.

1. Pacific Lumber Company's Habitat Conservation Plan Trend Monitoring Program. Trend monitoring data provided herein are from PALCO's 2000, 2004 and 2006 Trend Monitoring Annual Reports.
2. Salmon Forever's turbidity threshold sampling (TTS) stations. Two stations have been operated in Elk River since 2003; SFM is located in lower South Fork Elk River and KRW is located in lower North Fork Elk River.
3. Green Diamond Resource Company (GDRCo) conducts TTS monitoring in McCloud Creek, tributary to South Fork Elk River. They conducted measurements in 2003, then resumed monitoring in 2007 and will be ongoing.

Pacific Lumber Company Trends Data

Trend monitoring has occurred at nine stations, including one on Mainstem Elk River, four on North Fork Elk River, and four on tributaries to Elk River (North Branch Elk River, South Branch North Fork Elk River, Bridge Creek and South Fork Elk River)¹. Station locations are provided in Figure 1 and the associated station codes are provided in Table 1. Discussion of the sediment-related parameters are provided in this report.

Table 1. Trend Monitoring Station Names

Station Number	Location
90	North Fork Elk River
91	North Branch Elk River
104	South Branch North Fork Elk River
167	North Fork Elk River
162	North Fork Elk River
168	Bridge Creek
14	North Fork Elk River
175	South Fork Elk River
166	Mainstem Elk River
214	North Fork Elk River
217	South Fork Elk River

¹ Two stations (station 214 on North Fork Elk River and station 217 on South Fork Elk River) were added in 2005 and only have two years of data. Data collection was discontinued after 2004 at stations 90 (North Fork Elk River), 91 (North Branch Elk River), 104 (South Branch North Fork Elk River) and 168 (Bridge Creek).

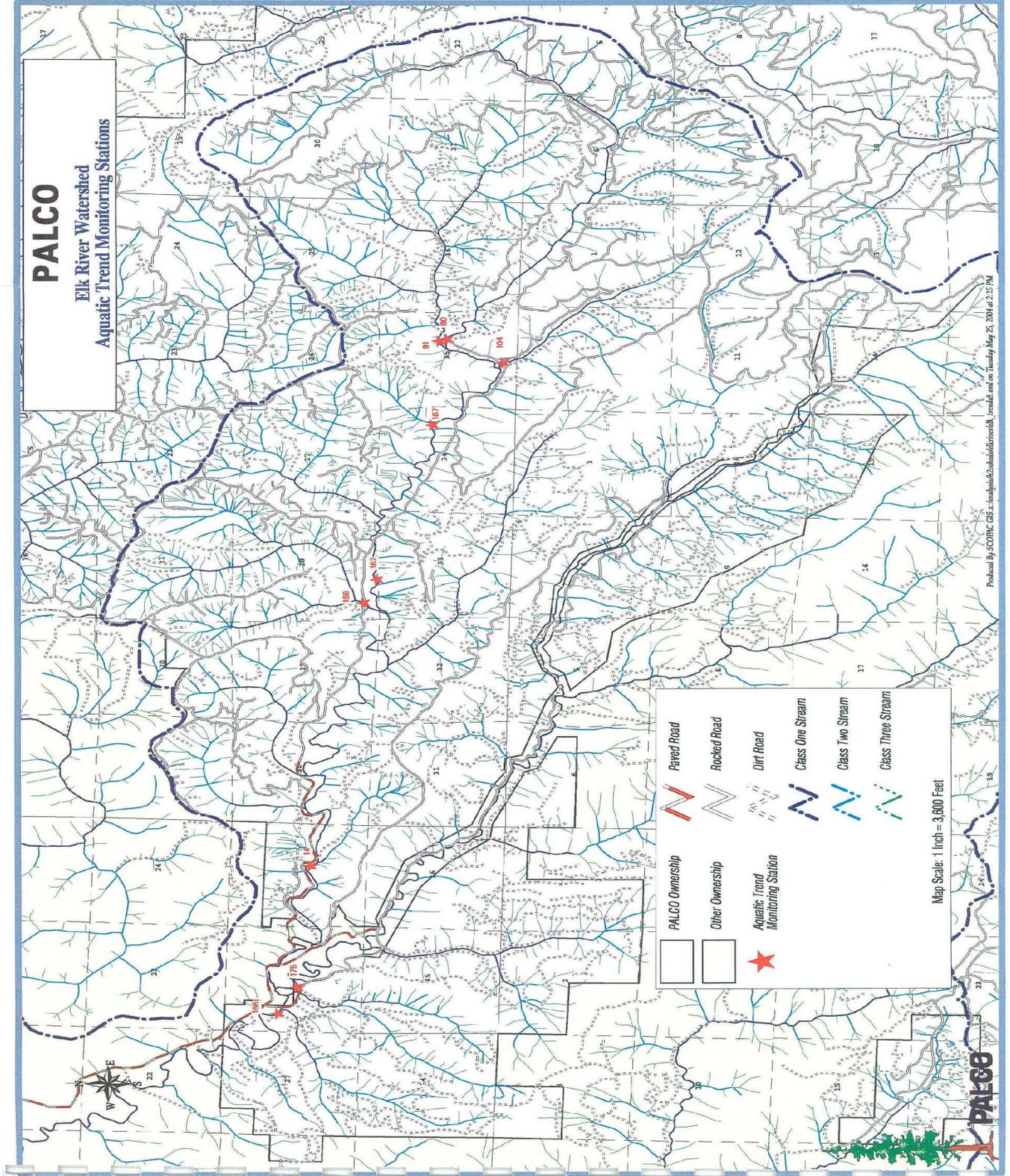


Figure 1. Pacific Lumber Company Trends Monitoring Stations in Elk River.

Pebble Count (D_{50}) Conditions

D_{50} is a measure of the particle size distribution of the surface of a streambed, specifically the particle size for which 50% of the sample has a diameter smaller than the D_{50} value. The channel bed surface layer is typically coarser than the underlying layers as the surface is often deficient of finer fractions present in the subsurface distributions, as fines are winnowed away by streamflow. It is helpful to understand channel material for interpreting biological function and channel stability. In some cases surface layers act as armor layers as they persist through transport events. As of the 2006 Annual Report, 100% of the measured stations did not meet the desired condition of 65-95 millimeters. In 2000-2001, one station (11%) met the target, and in 2002, three stations (33%) met the target. Otherwise, for all other years reported none of the stations met the target.

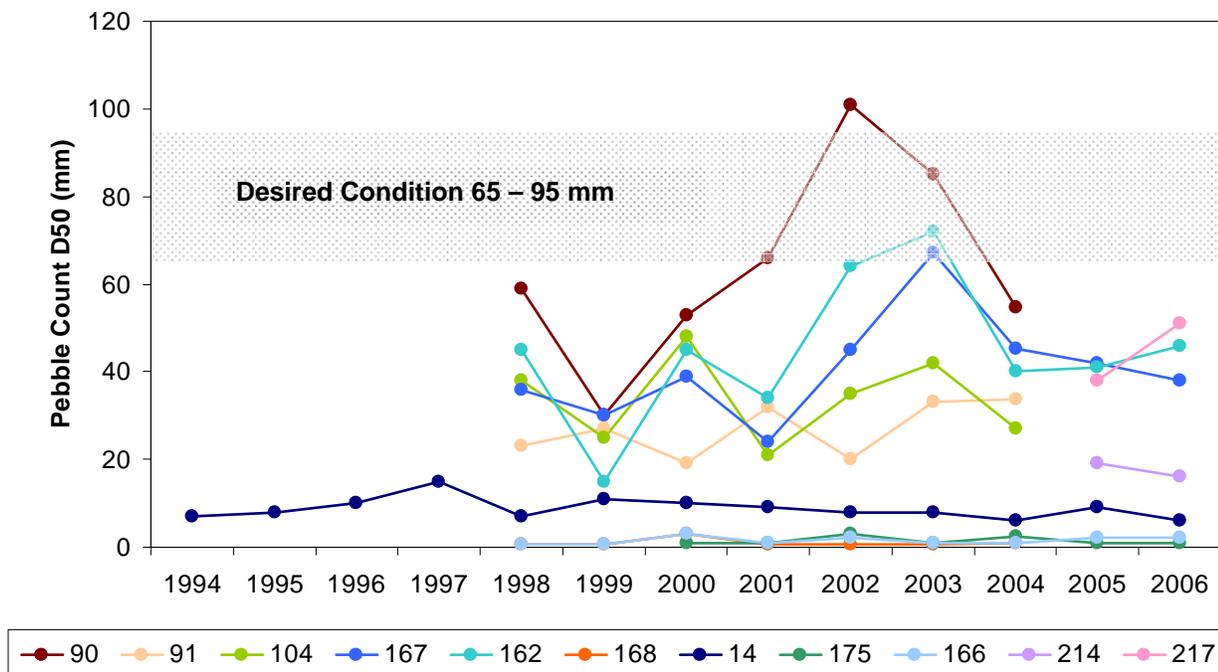


Figure 2. Pebble Count D_{50} Conditions in Elk River.

Percent Fines

Channel bed material is sampled for various purposes, including as a measure of gravel suitability for spawning salmonids and other aquatic organisms. In addition, these data can be used for inputs into sediment transport models, as they are indicative of a river's overall stability, including its ability to transport its sediment supply. Channel substrate is collected in bulk using shovel samples and sieved to determine the percent of the bed comprised of diameters less than a particular sieve size.

Percent Fines <0.85 mm

A grain size of 0.85 mm is indicative of coarse sand; particles finer than 0.85 mm can smother gravels, thus entombing fish eggs and aquatic insects. Figure 3 shows percent fines measured at Elk River stations. In 2006, 43% of the stations met the target of <14% for particles less than 0.85 mm. 57% of the stations demonstrated improvement as compared to the previous year and 43% became finer. None of the stations demonstrate steady trends of improvement over the period of record.

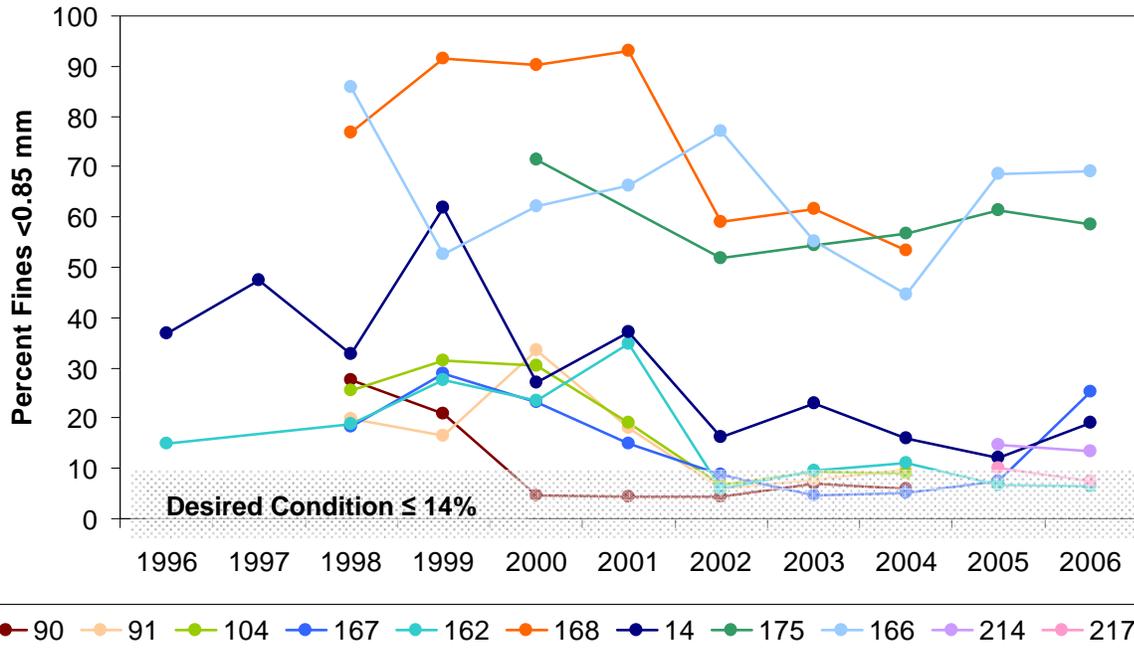


Figure 3. Percent Fines <0.85 mm Conditions in Elk River.

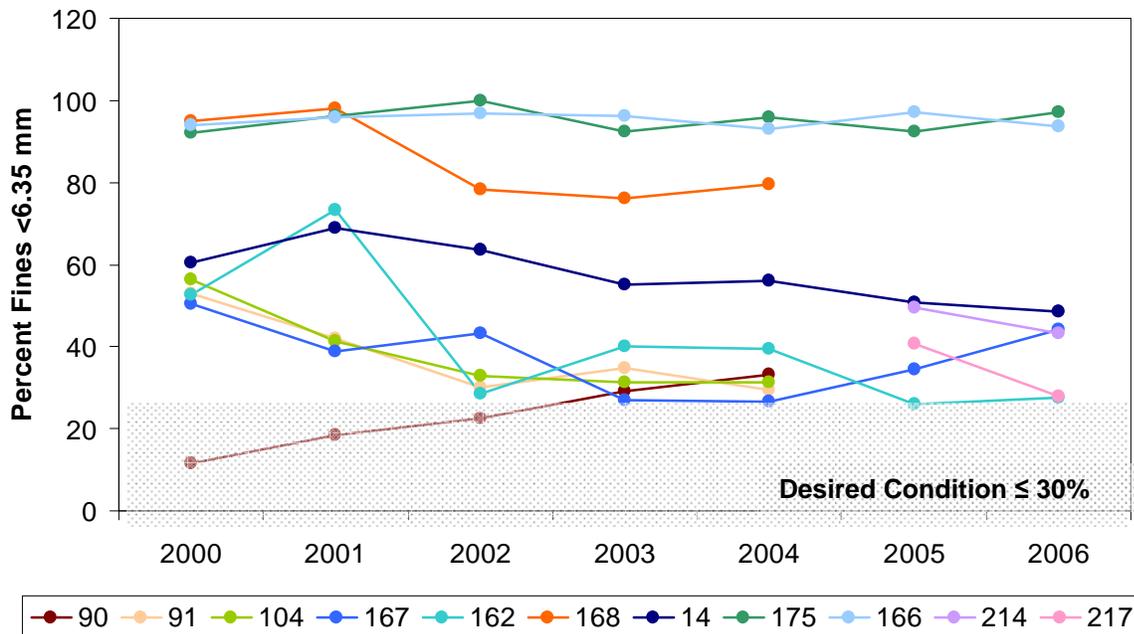


Figure 4. Percent fines <6.35 mm Conditions in Elk River.

Percent Fines <6.35 mm

A grain size of 6.35 mm is indicative of fine gravel, less than which may be too small for successful spawning because the particles can become mobilized in stream flows.

Figure 4 shows percent fines less than 6.35 mm for Elk River stations. 29% of the stations measured in 2006 met the target condition of <30% for this parameter, while 57% of the stations showed improvement. Only station 90 showed a steady trend, becoming finer each year until the station was dropped in 2004.

Pool Conditions: Average Residual Pool Depth

Pools of 3-feet and greater have been identified for fisheries needs, especially for coho salmon. Deep pools are necessary to meet temperature needs of salmonids as well as provide cover from predation. In Elk River, many residents have historically relied on surface water intakes for domestic and agricultural supply; thus pools are necessary to support these historic beneficial uses. Low pool depths are indicative of aggraded channel conditions. Generally, pool depths in the trend monitoring reaches are not supportive of fisheries habitat needs. Over the period of record, pool depths improved slightly in 2002 and 2003, with 67% and 44% showing improvement, respectively. In 2004, conditions worsened with 56% of the stations decreasing in pool depths. Slight improvement was detected from 2005 to 2006 at 71% of the stations, though no stations met the target of 3 feet.

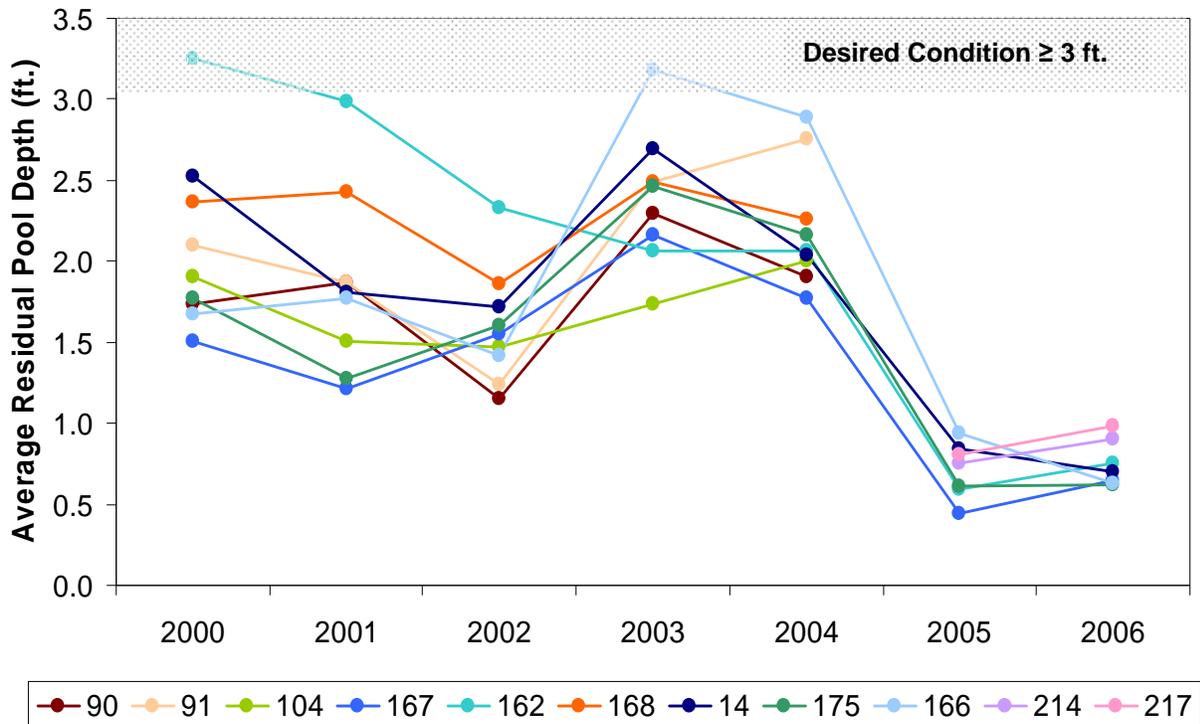


Figure 5. Average Residual Pool Depth Conditions in Elk River.

Water Quality Monitoring

Over the past several years, methods and equipment for monitoring instream turbidity and suspended sediment concentrations and suspended sediment loads have been refined to allow monitoring of remote locations, such as forested watersheds. These methods involve the use of automated in-situ equipment for measuring stage and turbidity. A pump sampler is triggered to collect a water sample which is then analyzed in a laboratory for turbidity verification and suspended sediment concentration. Field staff make observations and measurements of stage, streamflow, and collect depth-integrated samples over the cross-section depth and width for verification of the in-situ point measurements. Through a series of data relationships and transformations, the raw data is corrected and finalized to yield turbidity, stage, streamflow, and suspended sediment concentration at time steps of 10 to 15 minutes.

Beginning in 2003, PL, GDRCo, and Salmon Forever began monitoring for instream turbidity, suspended sediment concentration, and streamflow conditions. The TMDL analyses greatly benefit from the hard work of these groups. Figure 6 (adapted from a Pacific Lumber Company Map) demonstrates the locations of the monitoring stations in Elk River; Figure 7 shows the drainage area associated with each station, shown in ascending order and ranging from approximately 3 km² to 111 km².

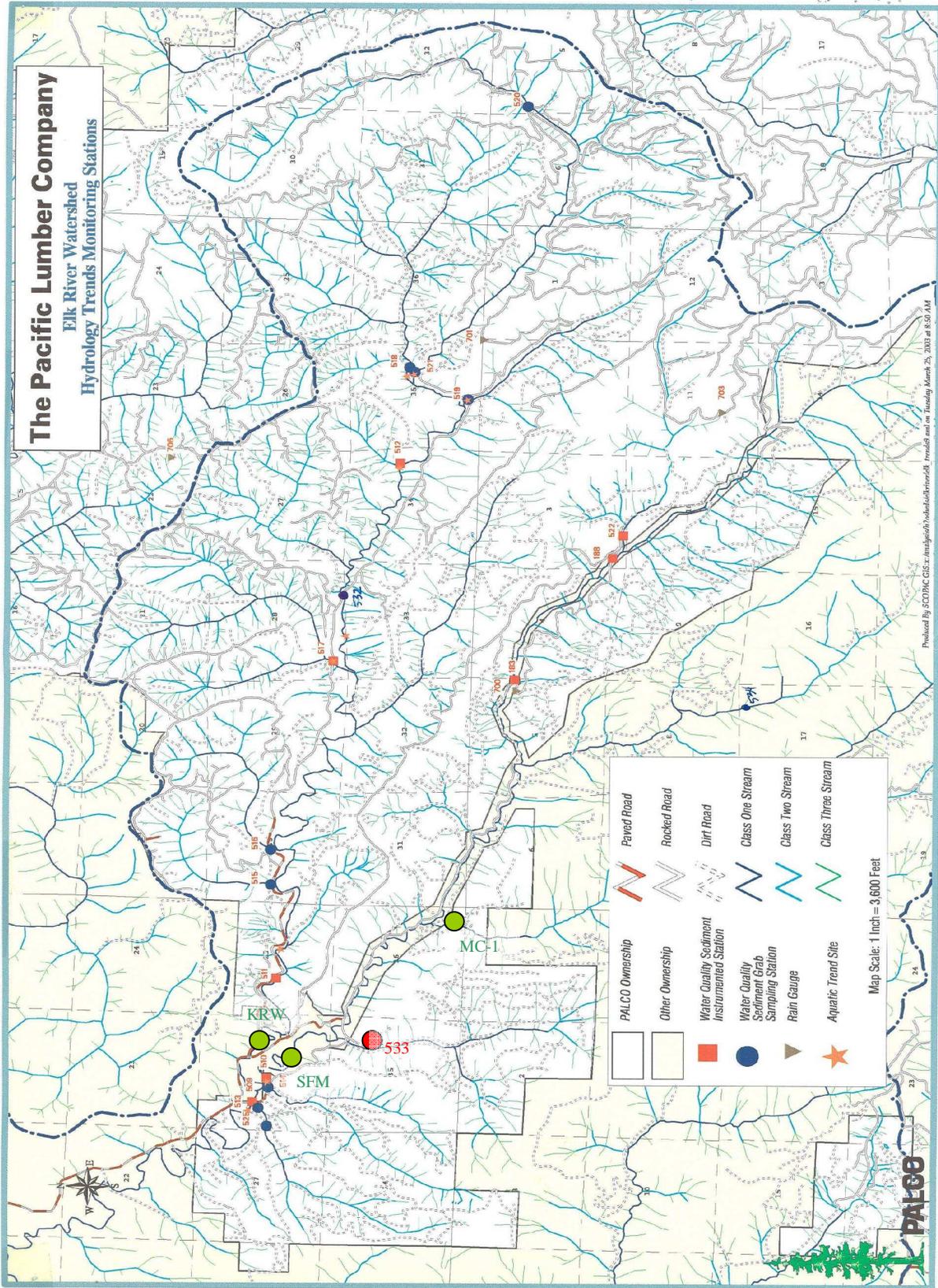


Figure 6. Water Quality Monitoring Stations in the Elk River watershed (map adapted from Pacific Lumber Company)

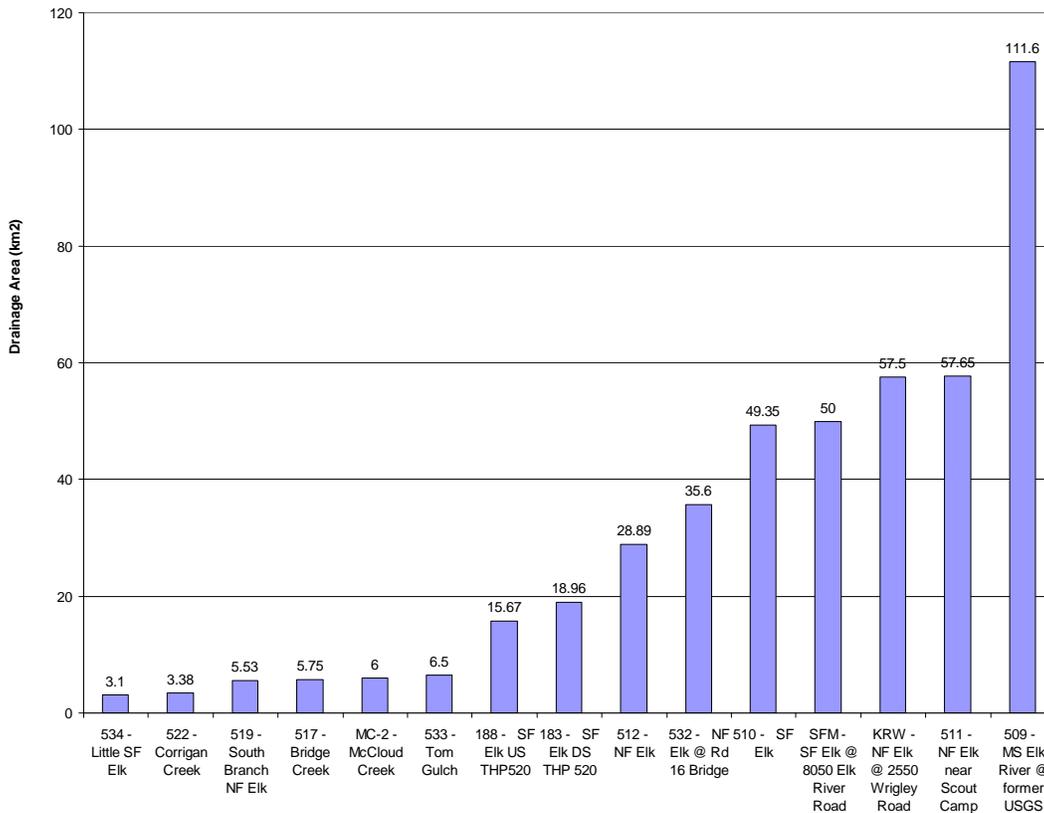


Figure 7. Station name and associated drainage area (km²).

Station 534 is located on Little South Fork Elk River within the Headwaters Forest Reserve and provides reference conditions of water quality for the Elk River watershed. It was initially monitored by Salmon Forever (beginning in approximately 2000), with Humboldt State University, under contract with the Regional Water Board, installing a full TTS station in 2003. In 2007, Pacific Lumber Company took over the monitoring. Data analysis has been done by all parties. Analyses of the sediment load data are ongoing. Staff is in the process of exploring appropriate means of detecting and expressing changes in sediment loads and turbidity conditions. As such, trends are not described in this report, however a couple of basic metrics are provided.

Figure 8 shows the measured cumulative suspended sediment loads, normalized for drainage area. Considering the broad range in drainage areas amongst the measured stations, normalizing (i.e., dividing) by drainage area allows for comparison.

Sediment load varies with climate conditions; at different runoff and streamflow rates, different erosional processes dominate. In wetter years (i.e. larger runoff years), it is expected that the sediment loads would be greater as well. However, isolating the effects of climate is complicated by management-related increases in runoff and sediment sources. One means of evaluating sediment loads over time is to normalize by cumulative streamflow, as shown in Figure 9.

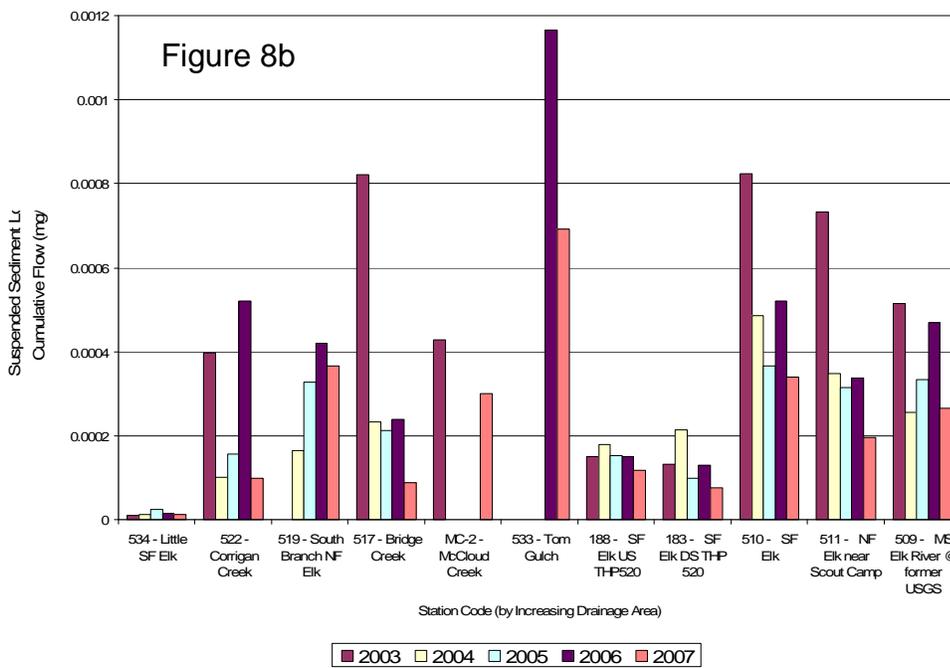
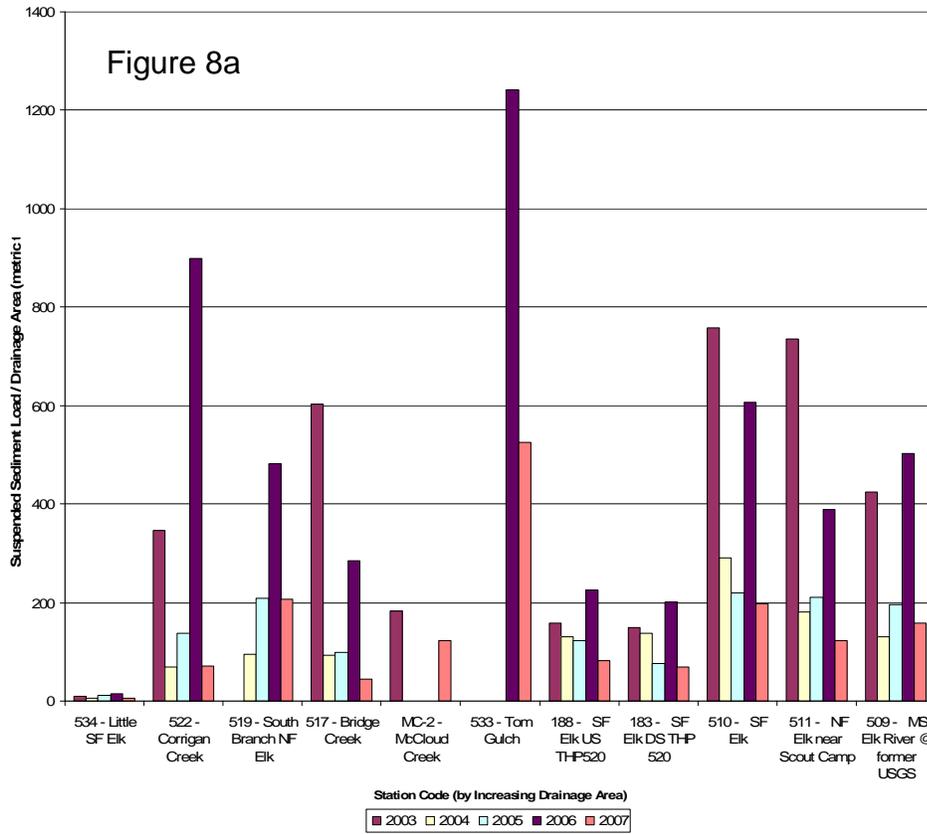


Figure 8. Preliminary suspended sediment load data for Elk River monitoring stations, 2003-2007. Please note data analysis is ongoing and these data are subject to change. a) Suspended sediment loads normalized by drainage area. b) Suspended sediment loads normalized by cumulative flow.

Overall, conditions in Elk River and Freshwater Creek indicate sediment impairment. Coordination and monitoring methods refinements are ongoing amongst the monitoring entities, including a quantification of the measurement variability. TMDL development staff is conducting data analyses and linkages, including changes in cross-sectional area; additional analysis will be available to the Board in the near future.

**PRELIMINARY STAFF
RECOMMENDATION:**

No formal Regional Water Board action is required for this item.