Appendix E: Comment Letter from Dr. Sondra Miller

UPPER ELK RIVER SEDIMENT TMDL

PEER REVIEW PREPARED BY

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APRIL 2013

1. BACKGROUND

The purpose of this peer review is to provide a scientific assessment of the *Staff Report to Support the Technical Sediment Total Maximum Daily Load for the Upper Elk River* (Staff Report) prepared by the State of California, North Coast Regional Water Quality Control Board. The Elk River – which enters Humboldt Bay north of Eureka, California – was listed as impaired in 1998 due to excessive sediment concentrations negatively impacting the water quality for its designated uses which include: water supply, aquatic habitat, and recreation. Excessive sediment loading in the Elk River watershed has been attributed to industrial timber harvesting and management practices primarily in the Upper Elk River sub-basin where soils are highly erodible.

This peer review focuses on Chapter 3 – Problem Statement for the Upper Elk TMDL – of the Staff Report and is divided into three sections. First, overall water quality impacts in the Elk River will be discussed in relation to increased sediment loading. Second, the role suspended sediment plays in water quality will be assessed. Third, the use of turbidity to compare managed and referenced sub-basins will be discussed. Suggestions are provided in each section for additional scientific issues to be considered and not specifically addressed in the Staff Report.

2. WATER QUALITY

A list of eighteen beneficial uses of the Elk River was identified in the Staff Report. Three of these beneficial uses included water supply, aquatic habitat, and recreation. Water supply impairment was further sub-divided into municipal, domestic, and agricultural uses of the Elk River. It was clearly identified in the Staff Report that these beneficial uses of the Elk River have been impaired due to increased sediment loading. Clear evidence of water quality impairment presented in the Staff Report supports the need for remedial action in order to restore beneficial uses of the Elk River.

Impairment – and eventual loss – of domestic and agricultural water supplies is the most notable result of increased sediment loads in the Elk River. Suspended sediment was thoroughly monitored in both time and space throughout the Elk River. The predominant sediment size fraction – determined using standard, well-accepted methods – was classified as sand and silty-sand, both defined as being fine-grained. Residents and agricultural producers – for whom the Elk River is the primary water source – experienced water system pumping failure and clogging during periods of increased rainfall frequency and intensity. This resulted in the need to provide alternate water supplies until such time as this beneficial use can be restored. Residents identified offensive taste and odor problems in water supplies resulting from increased sediment loading. These nuisance problems are secondary when compared to potentially more significant health-related issues including increase loading of pathogenic organisms – e.g., *Giardia*, *Cryptosporidium*.

Fine sediment has also significantly reduced the aquatic habitat of the Elk River. The Elk River serves as an important freshwater habitat for several species of salmon and trout. These fish

require mainly gravel areas for effective spawning, which have been covered by fine sediment. The size of spawning pools has been significantly reduced due to sediment settling, further reducing aquatic habitat. Suspended sediment absorbs light energy and serves to increase water temperatures. This further affects migration and spawning of sensitive fish species.

Beneficial recreational uses of the Elk River include both contact – swimming, wading, and fishing – and non-contact – picnicking, hiking, camping, and boating – activities. As the size of spawning pools has been reduced by increased sediment load, so too has the size of similar swimming pools been reduced in the Elk River. Stagnant water flows due to stream channel size reduction promotes anaerobic degradation that can potentially result in offensive odors, further impairing beneficial recreational uses.

Increased sediment loads were shown in the Staff Report to be the driving cause of impairment to the Elk River. The potential effects of other parameters were not included or discussed to a large extent within the Staff Report. The primary source of sediment is non-point runoff, which could carry with it additional water quality stressors. For example, land use within the Upper Elk River sub-basin includes agriculture in which fertilizers and pesticides are commonly used. Excessive nutrients – primarily phosphorus – could equally be impairing water quality in the Elk River, which could be a significant source to Humboldt Bay. Similarly, their persistent and hydrophobic nature causes pesticide sorption to mineral and organic sediment surfaces, resulting in unaccounted loadings of contaminants with potentially deleterious health effects beyond those of suspended sediment.

The increased frequency of nuisance flooding presents the potential for unintentional discharges of fuel, household cleaners and solvents, and untreated municipal wastewater. The residential and agricultural land use within the Elk River watershed points to the potential for individually small – though collectively significant – sources of gasoline, diesel, and pesticide use and storage. The Staff Report does not mention any municipal wastewater treatment facilities located within the Elk River floodplain or address whether there exists adequate protection. These issues are an indirect consequence of nuisance flooding of the Elk River.

3. Suspended Solids

A solid record of suspended solids monitoring performed by stakeholders since 1998 was demonstrated in the Staff Report. Stakeholders included affected citizens, volunteer groups, involved industries, and water quality managers. Relevant water quality parameters – turbidity, suspended sediment, and stream flow – were rigorously monitored over time and space within the Elk River watershed.

The combination of quantitative – e.g., Figure 3.9 showing stream channel cross-sectional change – and qualitative – e.g., Figure 3.5 showing an apple tree buried in over 2 feet of sediment – measures demonstrate that increased suspended sediment in the Elk River has caused *nuisance or adversely affected beneficial uses*. This evidence further supports the Porter Cologne definition of nuisance.

4. TURBIDITY

Turbidity measurements were used to compare two sub-basins with managed timber harvesting practices in place – contributing to increased sediment loading – to another sub-basin without managed timber harvesting practices in place – i.e., Figure 3.31. A linear regression was used to fit data for the three sub-basins and determine relative impact of managed timber harvesting practices on turbidity in the Elk River. Despite the uncertainties associated with the reasonable assumption to use linear regression, the resulting impacts are significant for the two managed sub-basins. Assuming a 65 percent error in the linear fit, turbidity projections are increased significantly *more than 20 percent above naturally occurring background levels*.

5. CONCLUSION

Work over the last 15 years has resulted in the Staff Report herein peer-reviewed for its scientific basis. Care has been taken in preparation of the Staff Report to exhaustively evaluate the quantitative and qualitative measures of increased sediment loading in the Elk River. The methods used and their execution in developing the Staff Report is scientifically sound. Additional scientific issues not currently included have been identified and suggested for considered inclusion in the Staff Report.