Toward a Working TMDL: A Watershed Plan for The Van Duzen River Basin

Agreement # 06-149-551-0

Final Report

September 2010

Van Duzen Watershed (Planning) Project

Project Director _____ **Date**_____

Grant Manager _____ **Date**_____

Funded by the California Water Quality Control Board in the Amount of $340,200. Additional Matching Funds from the Environmental Sciences Research Institute (ESRI), Adopt-a-Watershed Project, Science in the Schools Project, Van Duzen Firesafe Council, and Staff and Contractor Contributions, for a total budget of $472,030.

GRANT SUMMARY

Date filled out: **September 30, 2010**

Grant Information: Please use complete phrases/sentences. Fields will expand as you type.

1. **Grant Agreement Number:** 06-149-551-0
2. **Project Title:** Toward a Working TMDL: A Watershed Management Plan for the Van Duzen River Basin
3. **Project Purpose – Problem Being Addressed:** Turbidity/sedimentation in the Van Duzen River and its tributaries
4. **Project Goals**
   a. **Short-term Goals:** Provide baseline data on turbidity and sediment in the main stem Van Duzen & important tributaries, involve the local community in water quality issues & activities, and develop a management plan for watershed recovery.
   b. **Long-term Goals:** Implementation of watershed management plan recommendations including activities that will lead to improved water quality in the Lower VDR and its tributaries, improved watershed and instream habitat, and a return of native salmonid species to historic numbers.
5. **Project Location:** (lat/longs, watershed, etc.) Lower Van Duzen River Basin (Bridgeville to the Mouth, at the convergence with the Eel River near Alton, CA), including the Yager Creek drainage area.
   a. **Physical Size of Project:** (miles, acres, sq. ft., etc.) 244 square miles, 155,989.5 acres, 631.3 sq. kilometers
   b. **Counties Included in the Project:** Humboldt County
   c. **Legislative Districts:** (Assembly and Senate) Assembly District 1, State Senate District 2
6. **Which SWRCB program is funding this grant?** Please "X" box that applies.

☐ Prop 13 ☒ Prop 40 ☐ Prop 50 ☐ EPA 319(h) ☐ Other

Grant Contact: Refers to Grant Project Director.

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Grant Time Frame: Refers to the implementation period of the grant.

From: November 15, 2006 **To:** October0 31, 2009

Project Partner Information: Name all agencies/groups involved with project. Salmon Forever, Sediment Analysis Lab (Humboldt State University), CA Department of Fish & Game, Van Duzen Firesafe Council

Nutrient and Sediment Load Reduction Projection: (If applicable) N.A.

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IV. Executive Summary

The Van Duzen Watershed Project was developed in response to the progressive impairment of the streams and watersheds within the Lower Van Duzen River Basin, as observed by residents, fisheries and watershed scientists, and other members of the local community. Within the last forty years, a number of reports have addressed watershed conditions of Van Duzen River Basin (Mensch et. al. 1977, Kelsey 1977, Kelsey 1980, US Forest Service 1998b, Pacific Lumber Company 1999, Pacific Watershed Associates 1999, USEPA 1999, Natural Resources Conservation Service 1999, Tetra Tech 2002a, 2002b, Humboldt County Resource Conservation District 2002b). Some of the information presented in this report cites these other documents.

The intricate relationships between geology, vegetation, climate, hydrology, terrestrial and aquatic organisms, and human activities make it very difficult to understand the mechanisms of impairment within the lower basin and why the system behaves as it does. Factors affecting watershed conditions are extremely important because they directly affect the reproduction and survival of native cold water salmonid species including coho and Chinook salmon and Steelhead Trout that are of fundamental importance to life in this area. Our project was an effort to extend our knowledge of the Van Duzen River and its tributaries, and to develop and support ways in which this ecosystem can be restored and maintained.

While individual salmonid populations in isolated stream systems may have experienced dramatic fluctuations in numbers (even near extinctions) resulting from natural cataclysmic events throughout geologic time (e.g., geologic uplifting, glaciers, etc.), never has there been such large scale demise of these species (especially coho salmon) across such an extensive area (i.e., nearly the entire Pacific Northwest). The Van Duzen River Basin embodies a diverse array of biotic and abiotic interactions that before the intervention of European Americans had remained relatively unchanged for thousands of years.

Water quality, in the Van Duzen River and its tributaries, is especially important as it relates to what is now only historic, but was once a vibrant cold water fishery, more specifically, extraordinary runs of salmon and steelhead. Huge populations of these anadromous fish undoubtedly have existed throughout the early evolution of this region for over tens of thousands of years. Therefore, the question becomes, why and how is it that we have witnessed the decline of these species to the brink of extinction within a single human lifetime? Most experts on the subject agree that the predominant reason for the loss of these populations was due to the loss of required freshwater habitat, resulting in reduced reproduction and survival of these animals.

It is well acknowledged that the flood of 1955 and especially the flood of 1964 caused catastrophic amounts of sediment to be deposited in the Van Duzen River and its tributaries (Kelsey 1977, Pacific Watershed Associates 1999). The results of this inundation of sediment from those two years can still be seen today in the choked and sediment-filled streams within the lower basin. However, it must be reasonably assumed that storm events of equal or greater magnitude must have occurred throughout the early natural history of the basin, and yet prior to at least 1900, these streams were pristine and salmon populations vibrant. So what was it about the 1964 flood (and to a lesser degree the 1955 flood) that resulted in such devastation, more than had ever occurred during the thousands of years prior to that point? Evidence suggests that removal of the forests and other management-related destabilizing changes to the land in that relatively short period of time (50 to 100 years prior to the flood) had actually set the stage for the catastrophe that followed.

From the late 1800s and into the mid and late 1900s, logging continued and proliferated in the Lower Van Duzen River Basin (as well as in the Eel River Basin as a whole). It is generally accepted that timber harvest practices during that time did not consider the environmental

consequences (externalities) of those activities, or entertain the concept of sustainable forestry. Harvest methods were designed for expediency and maximization of profit, and resulted in outcomes that while hard to accept, are not surprising. These outcomes included loss of stream integrity (e.g., stream crossings without proper bridges or culverts), loss of protective ground cover with accompanying accumulation of slash and debris, severe eroding, and ecological damage from indiscriminant construction of roads and skid trails.

Photos of hillsides following early logging operations often depicted sterile and exposed ground, slag heaps, tree stumps, and in general, a barren landscape in areas where ancient forests had once stood. Roads and skid trails scoured the slopes, all heading downhill to the streams, and culverts when used, often failed during rainy winter months. The general lack of concern for, or even an awareness of the externalities of logging, especially clear cutting, undoubtedly could have been predicted, as no information or legislation preventing it existed at the time.

One can argue that the stage was set for the catastrophes that followed the historic floods. All of the bedrock, etc. on the hillsides was primed and ready to move. All that was necessary for the ultimate disaster was a storm event big enough to move it, and that came in 1964. That disaster and others like it have resulted in land and debris slides, huge earth flows, high levels of erosion resulting in the deposition of tons of sediment into the streams, and in general, mass wasting of hillsides and stream banks of great proportions. However, this was not a natural disaster – it was largely human caused and exacerbated by human activity.

Today, residents as well as visitors to the area who enjoy river ecosystems (e.g., fishing, swimming, etc.) are experiencing the problems created by earlier mistakes. Streams within the Van Duzen watersheds are still choked with the course sediment that came down in 1964, and that still comes down every winter season. The situation has not abated. Considerable attention has been given lately to a process called best management practices (BMPs), which are designed to facilitate and ensure that all processes related to human activity (i.e., logging) will be designed to maximize watershed integrity and minimize damaging effects leading to sedimentation problems that have occurred in the past. However, vigilance must be maintained to protect and improve the watersheds along the North Coast, including those of the Van Duzen River Basin.

Through the work of volunteers, Friends of the Van Duzen River (FOVDR) has been monitoring streams of historic significance to salmon since 2001. As an offshoot of FOVDR, the Van Duzen Watershed Project engaged in continued monitoring of water quality by volunteers and cooperation between our research activities and state agencies. Monitoring efforts were intended to record water quality conditions, including levels of suspended sediment and turbidity, and to better understand the relationship between water quality and land use within the basin. This document describes the development and results of the Van Duzen Watershed Project, which was in operation from the winter of 2006 through fall of 2008. Discussions and observations with regard to conditions in the Lower Van Duzen River Basin are also provided.

This report includes data collected at the turbidity threshold sampling (TTS) station at Cummings Creek for the hydrologic years (HY) 2007 and 2008. These data, especially from 2008, were useful in estimating annual suspended sediment load (tons per year) for this stream, and provided a basis for estimating annual loads in other streams throughout the lower basin. This report also includes a discussion of chronic turbidity and a comparison of Cummings Creek with 28 other monitoring stations throughout Northern California, based on chronic turbidity and turbidity exceedence levels.

Results are also presented on the grab sampling program, in which 10 to 11 (depending on year) were sampled primarily for turbidity and secondarily for suspended sediment. These data provided an opportunity for comparing these streams and ranking them based on average turbidity throughout two winter sampling seasons (HY07 and HY08). Suspended sediment samples allowed estimates to be made of annual sediment loading for all of the streams that were sampled throughout the two seasons. Also included are data collected from two ISCO suspended sampling stations on the main stem Van Duzen River during HY08.

Data were also analyzed from additional water quality indices, including pH, dissolved oxygen, conductivity, and temperature collected year round in seven monitoring throughout the lower basin. These data represent additional information on water quality that serves to supplement the general study on turbidity and suspended sediment. Streams that were sampled represent major tributaries to the lower Van Duzen River, and provide increased insight into the state of these watersheds. There is also a thorough review of the macro invertebrate populations within the lower basin and an additional in-depth analysis of temperatures within the major tributaries and the main stem Van Duzen River.