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

Agreement # 06-149-551-0

Watershed Management Plan

September 2010

Van Duzen Watershed Project

Project Director _________________________ **Date**__________________

Grant Manager _________________________ **Date**__________________

Executive Summary

The Van Duzen River runs through 74 miles of Coastal Mountains, from an elevation of 5,906 feet at its headwaters, to its confluence with the Eel River at an elevation of 62 feet above sea level. The Van Duzen is one of the few remaining free-flowing rivers in California and is included in the state's Wild and Scenic Rivers system. The lower part of the Van Duzen River (VDR) Basin comprises the scope of the Van Duzen Watershed Project or VDWP. The dimensions of the project area extend from the town of Bridgeville, CA upstream, to the point where the Van Duzen River reaches the Eel River near the town of Alton. This area includes the large Yager Creek drainage system, which is a major tributary of the Van Duzen River. The lower basin is approximately 244 square miles in area, which is about 155,990 acres, and 631 square kilometers.

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 local residents, fisheries and watershed scientists, and other members of the community at large. Within the last 40 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, Tetra Tech 2002a & 2002b, Humboldt County Resource Conservation District 2002b, NCRWQCB 2005). Some of the information presented in this management plan 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 (NCRWQCB 2005). 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, observations, and recommendations with regard to conditions in the Lower Van Duzen River Basin are also provided.

Forward

Water quality problems within the lower VDR basin are in some ways fairly straightforward and are for the most part, the result of unregulated logging practices. The lower basin has not, as yet, experienced heavy urbanization, and does not exhibit severe problems resulting from toxic waste, although some sightings have been reported in the upper basin. With the exception of gravel mining in the lower reaches of the main stem Van Duzen River (which degrades channel integrity), most of the negative side effects of upslope mining, such as mine tailings do not appear to be severe problems. The overriding cause and existing state of decline resulting in the loss of salmon in the lower basin has been the result of high rates of sedimentation from hillsides into the streams, and the secondary effects stemming from that sediment, including elevated stream temperatures, chronic turbidity, decreased oxygen, siltation of spawning areas, and loss of habitat.

A proposal for the Van Duzen Watershed Project was developed to address some of these problems facing the Van Duzen River and its tributaries within the lower basin. This proposal for a water quality monitoring project was developed over the course of one year prior to being submitted to the Water Quality Control Board. During development of the goals and objectives and the timeline for project accomplishments, a plan for how the project would proceed was established. It was recognized that the project would involve numerous FOVDR and FOER staff, landowners within the lower basin, and other interested individuals and stakeholders.

A Technical Advisory Committee (TAC) was formed and was described in the original proposal to the Water Quality Control Board. The TAC was organized during the initiation of the project and met quarterly to oversee technical planning elements and to oversee proper use of experimental design throughout the monitoring part of the project. Members of the TAC were also available for guidance on the writing of the watershed management plan, and to review and critique the various drafts as they are produced. The TAC was comprised of agency representatives from the CA Department of Fish & Game, non-profit organizations such as Salmon Forever, the professional sciences including Hydrology, Geology, and Engineering, and educational and research institutions including College of the Redwoods and Humboldt State University.

Our project was designed to provide information on the current state of health of the watersheds within the basin, and culminate in a watershed management plan for this area. The following document embodies that plan and provides for the recommendations that have evolved from the study. Chapters within this plan are designed to provide critical information on the state of the watersheds, including turbidity, sediment, temperature, habitat, and other indices of water quality within the lower basin, as well upslope conditions in the surrounding hillsides. Additionally, these chapters provide recommendations for actions that relate to these topics as they are discussed throughout the document.

Chapter 1 is an introduction to the Van Duzen Watershed Project and includes a discussion of the history and background of the Van Duzen River Basin, which as part of the Eel River Hydrobasin, also shares its history with the Eel River. Not surprisingly, more information exists about the history of the Eel River than about the history of the Van Duzen River. This chapter also describes the State of the Watersheds and the Causes and Sources of Sediment problems within the basin.

Chapter 2 is a review of the CA Department of Fish & Game habitat surveys for many of the most important tributaries to the Van Duzen River. These tributaries include Cummings Creek, Hely Creek, Stevens Creek, Grizzly Creek, Lawrence Creek, and the North, Middle, and South Forks of Yager Creek. This chapter also includes the results of habitat typing data collected on the main stem of the Van Duzen River in 2008 for the Van Duzen Watershed Project. The last part of this chapter briefly addresses some of the problems incurred as a result of gravel mining in the lower alluvial plain of the main stem Van Duzen River.

Chapter 3 is a review of upslope conditions within the lower basin, from a planning watershed perspective. The first part of this chapter reviews the effort to improve the 1:24,000 scale road database, traditionally used by GIS analysts. Based on relatively high resolution aerial photography (1 meter resolution) obtained from the National Agricultural Imagery Program (NAIP), available road data appeared to be markedly in error with respect to road density and often, also road location. Therefore, a major effort was made to improve this database by adding new arcs where for missing roads and moving arc to the correct location for roads that were in error. Calculations of road data before and after editing showed that the editing process increased the accuracy of the data by as much as 64%. Summary statistics are provided on numerous biological and physical conditions on a per watershed basis. Some of these indices include road density, road-streams crossings, and numerous vegetative, physical, and land use indices.

Chapter 4 is a review of upslope conditions within the lower basin, from a rainfall catchment area (or drainage system) perspective. Knowing the location of a monitoring site and the elevation of the associated hillsides, an analyst can program GIS software to define all of the upslope area that contributes water and runoff to that particular point in the stream. Therefore, having spatially recorded the locations of all 11 monitoring sites within the project boundary and having DEM grid data for the entire area, it is possible to define the shapes and sizes of each catchment area associated with each monitoring site. Calculation of these georeferenced catchment areas allowed delineation of numerous kinds of data and the calculation of summary statistics on a per catchment area basis. These data are similar to those analyzed on a per watershed basis, but on a different spatial scheme that, in this case, allows for the calculation of associations and correlations between conditions on the hillsides (upslope) and turbidity in the streams. These relationships add another dimension to the project and offer additional information on the relationship between water quality, slope stability, and human activities in the watersheds.

Chapter 5 is a review of data gaps that are considered to exist with respect water quality and watershed conditions within the Lower Van Duzen River Basin. Some of these data gaps include more data that are needed with regard to total maximum daily load (TMDL), especially that which constitutes naturally occurring backgrounds for the types of indices relating to water quality, including turbidity, sediment, temperature, habitat, fish, and hydrology (flow).

Chapter 6 represents the culmination of efforts to analyze water quality and watershed health within the Lower Van Duzen River Basin, and develop action plans for implementation projects that are based on the information collected and recovered throughout the planning grant project. Organized to provide information as recommended by Water Quality Control Board guidelines, this chapter addresses critical aspects of the Watershed Management Plan, and specifically lists information relating to the key elements as outlined in the Required Elements for Watershed Based Plans per CWA Section 319 of Appendix A. Other than the first element, which is addressed in Chapter 1, these elements are addressed in Chapter 6. These elements are 1) Causes and Sources of Impairment, 2) Expected Load Reductions, 3) Management Measures, 4) Technical and Financial Assistance, 5) Information/Education, 6) Schedule (and Implementation Prioritization), 7) Measurable Milestones, 8) Evaluation of Progress, and 9) Monitoring (of Efficacy of Restoration Efforts).

Chapter 7 addresses, in specific terms, implementation goals and strategies, which was designated as a deliverable in the original planning grant proposal. The topics that are addressed in this chapter include 1) The long term vision for the Van Duzen River Basin, 2) Short term and long term goals, 3) Strategies for future activities in watersheds (land use, planning, regulation, and partnerships), 4) Regulatory strategies, 5) Restoration projects to benefit watersheds, 6) Research and monitoring to fill data gaps, 7) Educational strategies, 8) Impact of the watershed plan on future decision-making processes, and 9) Chances for success.

Chapter 8 is a listing of the References Cited throughout the Watershed Management Plan.

Chapter 9 is a listing of Appendices

Acknowledgments

We wish to thank the California Water Quality Control Board for the major funding of this project. We also wish to thank Salmon Forever, Van Duzen Firesafe Council, ESRI ECP Grant Program, Science in the Schools Project, and the Department of Fish & Wildlife Sediment Analysis Laboratory at Humboldt State University for their continued support of the project and their contributions to cost sharing. We also wish to especially thank the Landowners who allowed members of the Van Duzen Watershed Project access to the streams for monitoring purposes, our Community Monitoring Group (CMG) Volunteers, our Technical Advisory Committee, and all other cooperators who volunteered time, effort, and matching funds for the benefit of the project.

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Cooperating Agencies

CA State Park System

CA Department of Fish & Game

CA Regional Water Quality Control Board

AmeriCorps National Service Organization

Special Thanks:

Friends of the Eel River for administration of this project

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