

The California Watershed Assessment Manual Volume I



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(In addition to the agencies/organizations represented in our Steering Committee, representatives from these groups, agencies, organizations, and businesses provided feedback in the initial stages of the Manual's development)

- California Departments of Parks & Recreation, Water Resources
- East Bay Watershed Center (Merritt College)
- Friends of Five Creeks
- Los Angeles San Gabriel Rivers Watershed Council
- Mattole Restoration Council
- MUSCI-Natural Resource Assessment
- Orange County (Michael Wellborn)
- Pacific Lumber Company
- Pit River Watershed Alliance
- Regional Water Quality Control Board (Central Valley, North Coast)
- Roseburg Forest Products
- San Francisco Public Utilities Commission
- Santa Clara Basin Watershed Management Initiative
- Santa Cruz Blue Circle
- Sonoma Ecology Center
- Southern California Wetlands Recovery Project
- US Army Corps of Engineers (Los Angeles office)
- US Forest Service (Redwood Sciences Laboratory)
- Western Shasta Resource Conservation District

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Executive Summary

Watersheds by their nature are fluid and complex, making it difficult to fully understand their processes and conditions. Understanding watersheds in California is all the more challenging, due to the state's exceptionally diverse array of geographic and hydrologic conditions, which is overlain by an equally diverse set of social and economic conditions. The amount of data available about these conditions also varies greatly from watershed to watershed which adds to difficulty in understanding watershed condition. All of these factors contribute to watershed assessment in the state being a challenging undertaking.

“Watershed assessment” is one method used to understand a watershed. It is a process for evaluating how well a watershed is functioning. Watershed assessment may include identifying important issues, examining historic conditions, evaluating present conditions and processes, and determining the effects of human activities. It can mean describing the parts and processes of the whole watershed and analyzing their functioning in general, or relative to some standard (such as a water quality standard or historic condition). It also can mean focusing on particular concerns about human activities, conditions, or processes in the watershed.

The California Watershed Assessment Manual provides a series of approaches that will assist watershed assessors, and those guiding assessments, in planning and carrying out watershed assessments. These approaches are appropriate for a variety of watershed stakeholders, including members of watershed groups, agency representatives, landowners, scientists, members of the academic community, business representatives, and consultants. While the Manual is not prescriptive, it is thorough. It presents a comprehensive view of the watershed assessment process, with

specific guidance on starting the process, putting together an integrated assessment team, determining the assessment's purpose, planning and conducting the assessment work, and completing the assessment report. The Manual also describes the basics of watershed functioning, thus laying a foundation for understanding the rest of the Manual and watersheds generally. It lays out methods for defining the assessment's boundaries, for determining how complex the analysis should be, and for identifying gaps in data, knowledge, or analysis. It provides methods for gathering, managing, analyzing, and presenting data, and it suggests approaches for integrating information in order to better understand watershed conditions. The Manual describes ways to present the assessment and use it to support decision-making and adaptive management.

This is the first version of the Manual. It is intended to provide guidance for planning and conducting watershed assessments for wildland and rural areas of northern and central California. However, many aspects of it will be useful for other areas in the state and country. Future editions of the Manual will focus on the remainder of California and issues relating to particularly agricultural and urban areas, pending additional funding. We welcome your feedback and contributions, which will make future versions of the Manual even more responsive to the needs of California's watershed assessors.

Manual Structure

Volume I of the Manual currently contains 8 chapters. These flow from the introductory chapter (1), through chapters describing the details of assessment planning (2), fundamentals of watershed functioning (3), data collection (4), data analysis (5), and

data integration (6). Chapter 7 gives details on how to structure an assessment report; and chapter 8 describes connecting the assessment with decision-making. Volume II will be a compendium of tools for use in specific circumstances and with specific natural or human processes or conditions. The chapters are described in slightly more detail below.

Chapter 1

We describe the Manual's purpose, intended audience, regional focus, identified need, development process, format, and next steps in evolution.

Chapter 2

We describe some of the decisions that need to be made before beginning the assessment, after first defining what a watershed assessment is and is not. Planning topics include deciding the purpose, focusing on questions about watershed condition, developing the assessment team, working with the watershed communities, and deciding the boundaries of the analyses and the assessment area. We talk about steps that

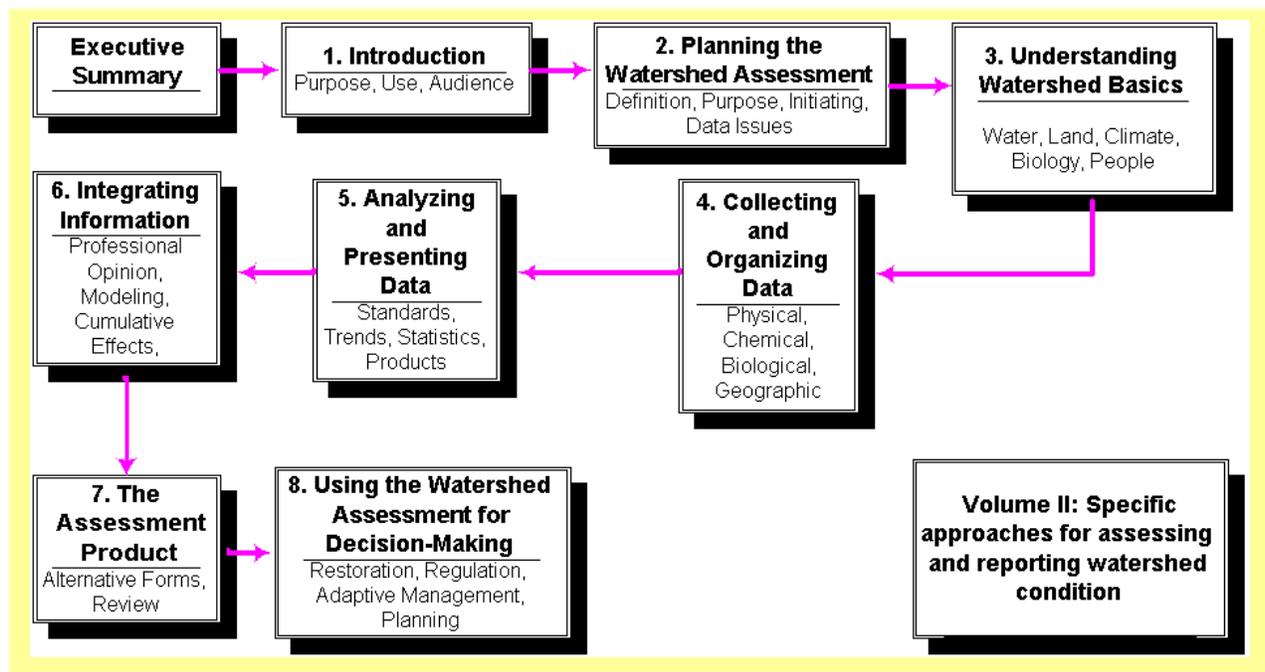
should be taken to prepare for the assessment and give a rough sketch of the assessment itself. We also take on the topics of scale, uncertainty, and data and knowledge gaps.

Chapter 3

To provide a baseline for understanding the watershed processes that are usually the subject of watershed assessments, we devote this chapter to describing many of these processes within the general categories of geography, hydrology, climate, geology, sediment, water quality, aquatic and terrestrial ecosystems, land and water use and management, and socio-economics. Readers with substantial background in particular topics can skip around to areas where they want more information.

Chapter 4

This chapter marks the beginning of the data-intensive part of the assessment – the collection and organization of information about the watershed. We suggest sources of information about watershed conditions in California. We also talk about the how to



organize collected data appropriately relative to the questions developed earlier in the planning process.

Chapter 5

Data analysis is at the heart of figuring out the conditions in the watershed in response to questions about these conditions. This chapter provides tools for preparing the data analysis, resources for conducting data analysis and applying statistics, information on space and time considerations, and ways to evaluate and present data.

Chapter 6

Information integration is the focus of this chapter. We define information integration as the process of synthesizing data on social, physical, chemical, and biological conditions in the watershed, and the watershed processes that mediate them, into a single analysis. The integration product is intended to be used for decision-support. Data integration is not easily done and is not commonly done in today's watershed assessment. We discuss ways that watershed assessors can take information collection and knowledge development, described in earlier chapters, and draw conclusions about potential relationships between activities in the watershed and impacts and condition. We also "demystify" modeling, talk about the role of change over time, and provide guidance for conducting scenario development.

Chapter 7

This chapter describes the basic components of a watershed assessment report, including the minimum information to include, how to present different kinds of data, and tailoring the assessment report to match the decision-making process.

Chapter 8

This chapter focuses on the different decision-making processes that a watershed assessment can support, since the product is not an endpoint. These processes range from designing a monitoring program, responding to regulatory requirements for land use or nonpoint source pollution discharge, and local land use planning to developing a watershed restoration or protection plan. All of this should be done in the context of watershed adaptive management, a cyclic process of taking action, monitoring the results of the actions, evaluating effectiveness, and using what is learned to improve future actions.

Volume II

Volume II will offer a variety of tools for analyzing natural and human processes and conditions, organized by topic. For example, we will describe how channel processes are measured, how surface erosion process can be described and quantified, how benthic macroinvertebrate data can be collected and used in watershed assessment, and how spatial modeling is conducted.