

A Draft Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Vernal Pool Depressional Wetlands in Southern California

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December 2009
Updated November 8, 2011



ABSTRACT: This Draft Guidebook is an assessment tool that focuses on the functioning of vernal pool wetlands within the Southern Californian eco-region, specifically San Diego County. Its purpose is to provide trained practitioners the means to achieve efficient, reproducible and logical functional assessment results for vernal pool wetlands in San Diego County, California. Results of these assessments can then be used in a variety of ways, such as evaluation of sites for restoration potential, assessment of impacts from existing or proposed projects and monitoring restoration success. Due to the high degree of variability experienced by temporary wetlands in arid climates, we have developed both direct and indirect functional indices for four of the five functions we identified. Direct assessments can only be made when there is sufficient precipitation to elicit the responses that demonstrate function, and we have sought to objectively define "sufficient." Consistent with an HGM approach, use of this Draft Guidebook should be confined to the geographic region and hydrogeomorphic class, subclass and pool types for which it was developed. Use of this methodology outside the boundaries of the reference domain is wholly inappropriate. We are hopeful that our approach can be modified for other pool types within the region, and to vernal pools in other parts of California and Oregon.

Bauder, Ellen T., Andrew J. Bohonak, Barry Hecht, Marie A. Simovich, David Shaw, David G. Jenkins, and Mark Rains. 2009. A Draft Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Vernal Pool Depressional Wetlands in Southern California. San Diego State University, San Diego, CA.

1 Introduction

Background

The Hydrogeomorphic (HGM) Approach is a collection of concepts and methods for developing functional indices, and subsequently using them to assess a wetland's capacity to perform functions relative to similar wetlands in the region. The approach was initially designed to be used in the context of the Clean Water Act Section 404 Regulatory Program permit review sequence to consider alternatives, minimize impacts, assess unavoidable project impacts, determine mitigation requirements and monitor the success of mitigation projects. However, a variety of other potential applications for the approach have been identified, including comparison of wetland management alternatives or results, identification of priorities for acquisition or set asides, development of design criteria for wetland mitigation or restoration projects, evaluation of the restoration potential of a wetland, and management and monitoring of completed restoration projects (Smith *et al.* 1995).

On 16 August 1996, a National Action Plan to Implement the Hydrogeomorphic Approach (NAP) was published (National Interagency Implementation Team, *Federal Register*, 1997). A National Interagency Implementation Team consisting of the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), National Resources Conservation Service (NRCS), Federal Highways Administration (FHWA) and U.S. Fish and Wildlife Service (USFWS) cooperatively developed the NAP. Publication of the NAP was designed to outline a strategy and promote the development of Regional Guidebooks for assessing the functions of regional wetland subclasses using the HGM Approach; to solicit the cooperation and participation of Federal, state, and local agencies, academia and the private sector in this effort; and to update the status of Regional Guidebook development.

Development of the regional guidebook for "Vernal Pool Depressional Wetlands in Southern California" was overseen by the US Environmental Protection Agency, Region IX. The guidebook follows the format outlined in the NAP (p. 33612) and explained in various publications of the US Army Corps of Engineers (Brinson 1993, Clairain 2002, Smith 2001, Smith and Wakeley 2001, Smith *et al.* 1995, Wakeley and Smith 2001). The A-Team (Assessment Team) included representatives of local, state and federal agencies, a hydrogeological consulting firm and four academic institutions. The following areas of expertise were represented: hydrogeology, soil science, botany and plant ecology, aquatic vertebrates and invertebrates,

population genetics, biogeochemistry and statistics. The group met in San Diego County, California for workshops and fieldwork on three occasions: June 2001, July 2003 and January 2007. Various individuals with private sector biological consulting firms, state and local agencies/jurisdictions and preserve management teams assisted with the fieldwork and provided feedback on elements of the guidebook. Based on the workshops and fieldwork, the regional subclass was defined and characterized, pool types were described, a reference domain was defined, wetland functions were selected, model variables were identified and conceptual models were developed. Each workshop resulted in a refinement of these guidebook elements.

Reference data were collected in 2001, 2002, 2003 and 2007 at a total of 73 reference sites. The data collection periods included a winter with average precipitation, two winters with abnormally low precipitation and one summer following a rainfall year with average precipitation. After each field season, the field protocols were refined and the functions and variables were reviewed and revised. When the data collection was complete, graphical and statistical analytical procedures were used to calibrate the variables and construct FCIs (Functional Capacity Indices) for each wetland function. For purposes of model development and parameterization, we used the reference data collected in 2001 and 2003, and supplemented this with data collected in other, unrelated studies. Data taken in 2002 and 2007 were used to refine field protocols but were not included in model development.

Objectives

The objectives of this Regional Guidebook are to (a) characterize the vernal pool wetlands in southern California south of the Transverse Ranges, (b) present the rationale used to select functions, (c) present the rationale used to select model variables and metrics, (d) present the rationale and analytical techniques used to develop assessment models, (e) provide data from reference wetlands and document their use in calibrating model variables and assessment models and (f) outline the necessary protocols for applying the functional indices to the assessment of wetland functions.

Scope

This guidebook is organized in the following manner. Chapter 1 provides the background, objectives and organization of the guidebook. Chapter 2 provides a brief overview of the major components of the HGM approach and the development and application phases required to implement that approach. Chapter 3 characterizes vernal pool depressional wetlands in southern California in terms of geographical extent, climate, geomorphic setting and soils, hydrology,

biogeochemical processes, vegetation, characteristic fauna and other factors that influence wetland function. Chapter 4 discusses each of the wetland functions, model variables and function indices. This discussion includes a definition of the function; a quantitative, independent measure of the function for validation; a description of the wetland ecosystem and landscape characteristics that influence the function; a definition and description of model variables used to represent these characteristics in the assessment model; a discussion of the assessment model used to derive indirect and, if possible, direct indices per function; and an explanation of the rationale and analytical techniques used to calibrate the indices with reference wetland data. Chapter 5 outlines the steps of the assessment protocol for identifying and assessing vernal pool depressional wetlands in southern California. The References (Literature Cited) section follows. Appendix A is a Glossary developed specifically for this Draft Guidebook. Appendix B summarizes the functions, assessment models and variables used in the models. Appendix C includes the forms used for data collection. Appendix D provides supplementary material.

Although it is possible to assess the functions of vernal pool depressional wetlands in southern California using only the information contained in Chapters 4 and 5, it is strongly suggested that users familiarize themselves with the information in Chapters 2 and 3 prior to conducting an assessment.