Bibliographies on Coastal Sage Scrub and Related Malacophyllous Shrublands of Other Mediterranean-Type Climates

California Wildlife Conservation Bulletin No. 10

1994

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Preface

Coastal sage scrub is often referred to as "soft chaparral" to differentiate it from "hard chaparral," the more widespread shrub community that generally occupies more mesic sites and higher elevations in cismontane California. Unlike evergreen, sclerophyllous chaparral, coastal sage scrub is characterized by malacophyllous subshrubs with leaves that abscise during summer drought and are replaced by fewer smaller leaves (Westman 1981, Gray and Schlesinger 1983). Sage scrub also contrasts with chaparral in its lower stature (0.5 - 1.5 meters vs. 2 - 4 meters for chaparral), shallower roots systems, comparatively open canopies, and different component species. The more open nature of coastal sage scrub permits the occurrence of a greater herbaceous component of forbs, grasses and succulents than is usually associated with dense stands of mature chaparral.

European settlement since Mission times has resulted in a marked reduction in the extent of coastal sage scrub. The occurrence of coastal sage scrub on relatively fertile lowlands made it particularly vulnerable to early agricultural development. With rapid population increases, especially during the past two decades, agricultural areas and remaining sage scrub have become increasingly displaced by spreading urbanization (Fig. 1). Estimates of historic losses of sage scrub coverage range from "no more than 66 percent of coastal sage scrub in San Diego, Orange and Riverside counties" (Michael Brandman Associates 1991) to as great as 90 percent (Westman 1981).

Numerous approved and proposed development projects on coastal sage scrub habitat are slated for the near future by private developers and various public agencies. Continued displacement of coastal sage scrub has resulted in the increased isolation of habitat fragments. In addition, much of this remnant habitat has been degraded by grazing, weed invasion, frequent fires, recreational activities, military training exercises, and possibly air pollution (OLeary 1990, OLeary and Westman 1988). Recent estimates indicate that the percentage of remaining sage scrub that is degraded is 51 percent in Riverside County (Regional Environmental Consultants 1991), 15-25 percent in Orange County (Fred Roberts, pers. comm.), and 9-23 percent in San Diego County (Pacific Southwest Biological Services 1988, Ogden Environmental and Energy Services 1992).

Nearly one hundred species of plants and animals that are obligately or facultatively associated with coastal sage scrub are currently classified as rare, sensitive, threatened or endangered by federal and state agencies. Clearly, coastal sage scrub vegetation and the animal species it supports are now seriously imperiled in southern California. In order to conserve functional remnants of coastal sage scrub and to prevent extinction of many of its associated species in southern California, the State of California has initiated a regionally focused conservation planning process for natural communities.

The following sets of bibliographies were compiled to facilitate all aspects of basic and applied research regarding coastal sage scrub vegetation in Alta and Baja California. The intent and format of this publication were patterned after the comprehensive publication of bibliographic sets on chaparral vegetation by Jon E. Keeley (Bibliographies on Chaparral and the Fire Ecology of Other Mediterranean Systems, second edition, California Water Resources Center, University of California Report No. 69, 1988). Categories were created that not only address various biological properties of coastal sage scrub but also incorporate

relevant information from cognate disciplines. Additionally included are references that largely pertain to adjacent vegetation types (e.g., chaparral and grassland) but also contain significant information regarding sage scrub. We attempted to avoid duplication of entries in other categories.

While the great bulk of entries were taken from periodicals, a serious effort was made to include entries from the "gray literature," i.e. entries representing technical reports, government documents, conference abstracts, and chapters from books and symposia proceedings. Selected references to EIRs were included that address projects having significant amounts of coastal sage scrub and/or special relevance to sage scrub. Some technical reports produced by environmental research firms and private consultants may require special permission before their acquisition. The first author would appreciate learning of any errors of omission or commission or of new entries for possible future updates of these bibliographic sets.

We hope that this information proves useful to a wide range of researchers interested in various aspects of this imperiled vegetation type. We additionally hope that others will produce similar bibliographic sets on other vegetation types in California - particularly those most heavily impacted by humans.

ACKNOWLEDGMENTS

We thank E. Loft and the anonymous reviewers for their reviews and comments upon this manuscript, and those people who provided entries and suggestions for the compilation of these bibliographic sets. We also thank L. Bolick, S. Michel, V. Parker, D. Smith and M. Streiff for assistance with manuscript preparation. Publication funding by the Resources Agency of California, Department of Fish and Game, is gratefully acknowledged.

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