Preface

The flora of California, in the past one hundred and fifty years of exploration and study, has become reasonably well known. There are, however, certain areas of the state which, because of difficulties of access or for other reasons, have not been fully investigated botanically, and thus their floras are still not completely known. One such flora is that found in the marshlands scattered over the state.

From the current manuals the erroneous impression might easily be gained that floras of the marshes and ponds are best developed in the southern part of California, since many, if not most, of the marshland species are recorded only for that region. Actually, however, these floras occur widely over the state, and, with few exceptions, the species populations are also widespread. The degree of differentiation in their floristics seems to be more the result of edaphic conditions and conditions associated with altitude than of climatic differences associated with geographic position. For instance, the salt marshes and the fresh-water marshes have their characteristic floras, as do also the lowland and the upland marshes, and these floras vary only slightly throughout the length of California.

The present state of incomplete knowledge concerning the marsh floras has made difficult the routine identification of plants by the nonbotanist and by those working in the applied fields of botany such as game management. Work-

ers naturally have assumed that published floras were based on relatively complete knowledge. Consequently, to find unrecorded plants or those growing far out of their published range has been a disconcerting experience.

The drainage of many of the marshlands and their conversion to agriculture have led inevitably to problems of game management. In addition, the depredations of waterfowl on agricultural crops have brought the interests of the sportsman into conflict with those of the agriculturalist. Demands have been made that something be done to alleviate this situation. These problems have required that the game manager assess his area with a view to establishing facts about the natural food supply for waterfowl, and to creating conditions that would increase and improve this food supply.

To provide a basis for the study of this problem, a practical manual for the identification of the marsh plants has been needed, and the present work is designed to meet that need. The work was sponsored under the joint auspices of the California Department of Fish and Game, the Federal Fish and Wildlife Service of the United States Department of the Interior, and the Department of Botany of the University of California. Funds were provided for a field survey through a Pittman-Robertson Grant for five years. This study was made possible with funds of federal aid in Wildlife Restoration Project W20-R. Delay in its approval until late in the first season reduced the period of effectiveness of the grant to four years of field work. To all who have had a part in the fulfillment of the grant I here express my gratitude.

The stated aim of this sponsored project was to make a floristic survey of the feeding and resting areas along the major flyways of aquatic birds, namely the coastal area, the Central Valley, the northeastern plateau, the valleys east of the crest of the Sierra Nevada, and the areas to the south through the Imperial Valley. It became necessary, however, to do much more extensive field work than this, in order that the taxonomic problems raised in the survey might be solved. These problems pertained chiefly to determining the morphological limits of species and to seeking data with respect to their geographic range. As a result, field work was done in irrigation ditches, rice fields, streams, ponds, and lakes, as well as in swamps, marshes, and bogs over much of the area of California, with the exception of the high montane regions. However, when the species known from these montane habitats were necessary for identification or helpful in facilitating it, they were included in the taxonomic treatment.

Since the work is designed chiefly to be a source for identification of the materials encountered in studies of the food habits of waterfowl, we allowed ourselves some latitude with respect to the inclusion of plants other than marsh plants. Many waterfowl graze over the floodplains adjacent to waterways. Because the seed of plants on these floodplains finds its way into resting and feeding ponds formed by the fall and winter rains, these plants comprise a conspicuous element in waterfowl food. Many of the common members of this marginal flora are therefore included.

The plan of the work called for: first, bringing the taxonomic material abreast of published research on each group; second, evaluating the taxonomic problems evident in the local plant materials on which no monograph is available, or on which monographs are available but are at variance with the evidence from the local flora; third, giving the geographic and ecological range of the species; and fourth, illustrating the more important species.

The field work was executed by sampling; in no locality was it possible to make an exhaustive survey. This limitation was dictated by the law of diminishing returns and the availability of time. This method has, I think, permitted the accrual of an adequate knowledge of the more common species, as well as of many less common species, to make the finished work very useful throughout the state.

It is impossible to anticipate the fluctuating recurrence of a species that is locally common in an area for a year or two and then disappears there, perhaps to reappear at a later time—a phenomenon observed for several species in the course of this study. Hence, further range extensions are bound to be reported in the future. Also, some plants not observed in this survey are likely to be discovered, and still others have yet to become established in California.

The taxonomic presentation is documented by herbarium vouchers, the first set of which is deposited in the Herbarium of the University of California, at Berkeley. The illustrations were drawn mainly from fresh material, although some, such as those of the grasses and sedges, had to be done from dried material during winter months. Most of the illustrations are by Mary Barnas Pomeroy and may be identified by the initials "CMB"; a few are by Patricia Verret Reinholtz, Robert Miller, and Emily Patterson Reid. In addition, Mrs. Reid is responsible for those illustrations employed in conjunction with the keys and glossary. Since the excellence of the drawings will provide a conspicuous element of the utility of the work, I wish to express my appreciation to these artists.

The field assistants included Dr. Verne Grant, Dr. Irving Schneider, Mr. Malcolm Nobs, Mr. S. Galen Smith, and Mr. G. Thomas Robbins. In addition, Dr. Grant aided in the preliminary draft of the Cyperaceae, Mr. Nobs aided in the preliminary draft of the grasses and the genus *Polygonum*, Mr. Smith helped to make the preliminary draft of the Lemnaceae, and Mr. Robbins contributed to the final draft of several groups, as well as to the solution of many taxonomic, bibliographic, and nomenclatural problems. Many changes were made in the final draft, and for these I take full responsibility, but I wish to express appreciation for the groundwork laid by these assistants.

Finally, I take this opportunity to express my great appreciation to my colleagues Miss Annetta Carter, Miss Francia Chisaki, Dr. Helen Sharsmith, and Miss Isabelle Tavares, who have assisted both with botanical problems and with the manuscript in so many ways that it is impossible even to mention them all. Miss Carter, Miss Chisaki, Miss Tavares, and Dr. Sharsmith edited the manuscript in its last draft before it was submitted to the University of Cali-

fornia Press, and in so doing were able to make significant contributions by discovering deficiencies and errors and by rounding out the botanical treatment. Miss Chisaki, in addition, prepared the treatment of the Boraginaceae and organized the preliminary manuscript for several other groups. Dr. Sharsmith organized the preliminary manuscript in many groups, often so efficiently that very little further attention was required. She also critically reviewed the manuscript for the glossary and made many helpful suggestions by way of added information, judgment, and opinions. Dr. John Ingram, Mr. Howard Arnott, and Mr. S. Galen Smith also gave much time and helpful effort during the editorial phase of the work. For their continuing loyalty and sympathetic understanding I am truly grateful. As I review their part in this work I am filled with deep humility when I inscribe my name as author.

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