CALIFORNIA AMPHIBIAN *and* REPTILE SPECIES *of* SPECIAL CONCERN

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FOREWORD

California boasts one of the most biologically diverse faunas in the United States, as well as one of the most threatened. One of the key elements of the state's efforts to protect its vertebrate fauna is through its Species of Special Concern program. The current volume, *California Amphibian and Reptile Species of Special Concern*, is an essential foundation upon which both biologists and state and federal agencies can manage the biological resources of the state. California has exceedingly sensitive species and ecosystems, many of which are at risk of extirpation or extinction as the state's environment changes at rates greater than at any time in history.

This book builds upon the shoulders of its predecessor from two decades ago (Jennings and Hayes 1994a), but it is not just a simple update. Jennings and Hayes surveyed an enormous number of experts to create a comprehensive publication on California's special concern amphibians and reptiles, and their volume was a key management tool for a generation of biologists. However, this new book goes several steps further, making it a necessary reference for wildlife and land managers, biologists, and nature lovers interested in amphibians and reptiles.

First, the maps generated for this book are stunning. They are literally beautiful enough to be framed, and detailed enough to guide resource managers. Second, there are color images of every taxon, generally taken in the field and highlighting the key features of each species. Third, the authors rely on the published literature to the maximum extent possible, pulling in the gray literature only when it is needed (which is often because many of these species are poorly known). But perhaps most importantly, the authors used multifactorial risk metrics that bring several measures of potential and actual threat into a single numeric score that captures the sensitivity of the species. The result is a tool that provides an important first pass at the difficult task of identifying those taxa that should be candidate Special Concern species.

Of course, there will always be important biological considerations that may argue against a strict interpretation of the metric scores, as the authors fully realize. For example, there are species on the Special Concern list that are so narrowly precinctive that the narrowness of their geographic range alone signals reason to be extra cautious about the species. The sandstone night lizard is one such taxon; its geographic range is much smaller than listed species such as black toad (*Bufo exsul*), and we know much less about the night lizard

than we do about black toads. Regardless of the risk model score, this is a scary situation, and the narrowness of geographic range alone signals reason to be extremely cautious. Herpetologists are well aware of extinctions of entire species that were so narrowly precinctive that very subtle (sometimes unknown) environmental changes have caused those extinctions (e.g., the golden toad of Costa Rica, which had a geographic range the same size as that of the sandstone night lizard).

There are other species covered in this volume that will be challenging to manage for their protection in California. For example, the Gila monster (*Heloderma suspectum*) can be found in the extreme eastern part of the Mojave Desert in California (east of 116° longitude), where it has been recorded fewer than 30 times in the last 150 years. Within the distribution of Gila monsters in California, the pattern of rainfall includes winter rains and summer (monsoonal) rains; this biphasic pattern is typical in Utah, Nevada, and Arizona where Gila monsters are relatively more common. Throughout their geographic range, Gila monsters depend upon climate conditions conducive for reproduction by small mammals because neonatal small mammals are the principal prey for this species. However, climate is demonstrably changing in California to be warmer (especially in summers) and with increased frequencies of drought. These changes may not be mitigable at a local level, and this creates conservation challenges. Nevertheless, knowledge of both changes of climate and the biology of Gila monsters is meager, and this signals both that the Gila monster is clearly a reasonable candidate for SSC status and a need for additional research.

In keeping with this example, this volume calls for significantly increasing research and monitoring of these species. This is a recommendation that must be taken very seriously. Change to California wildlife is accelerating at a more rapid rate than ever before in history, and the best chance to protect California's Species of Special Concern from extirpation or extinction is increasing our knowledge of these poorly studied animals. Long-term monitoring of the status of populations is key, and contemporary methods such as population genomics can provide insights into population status and viability that were not possible just a few years ago.

As complete as it is, this volume should be considered a beginning, rather than a final set of definitive answers, for understanding ecologically sensitive amphibians and reptiles in California. It constitutes an enormously valuable benchmark, and also provides solid information about the biology and ecology of amphibian and reptile species in California. Now we need to pursue its recommendations so that we can facilitate the needed science that will help us protect California's biological resources. California needs to expand science and management of the state's precious biological resources so that our children and grandchildren, hopefully, will be able to experience no fewer species than are present in California today. This book is an important step in that direction.

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PREFACE

California's amphibians and reptiles are unique in the United States for the tremendous amount of evolutionary and ecological diversity that they represent. California is second only to Texas in terms of the number of native amphibians and reptiles found within a state and contains endemic species of all major groups except turtles and tortoises. The state is home to what might be the best-known example of ring speciation (in *Ensatina* salamanders), which provides a unique view into the process of species diversification. California is home to the tailed frog (*Ascaphus truei*), a species that is among the last surviving members of an ancient lineage that is the sister group to all other frogs on earth. It houses reptile and amphibian species with genetic- and temperature-dependent sex determination; species that lay eggs in the water, on land, or that are live-bearing; and species with a two-staged life cycle that undergo a profound metamorphosis, switching between distinctly different habitats in the process.

The California Department of Fish and Wildlife (formerly, California Department of Fish and Game) is the trustee agency for California's fish and wildlife resources. The challenges associated with effective management and conservation of these resources are formidable in California, where a large human population, diverse stakeholder interests, and extremely high biotic diversity must be jointly managed. Despite the challenge of implementing effective conservation in the state, doing so is an important and worthy goal given the vast diversity that the state supports. We have attempted to evaluate conservation status for the state's amphibians and reptiles openly and transparently, relying on both the best available science and the breadth of expert opinions relating to amphibian and reptile conservation in California. We have sought (and received) broad feedback from a wide range of interested parties including agency representatives, academic scientists, and avocational herpetologists and used this combined input to make informed recommendations about conservation risk and management needs for California's amphibians and reptiles. We have also highlighted where data are lacking and discussed how the community might fill these gaps in our knowledge. Our goal is for this volume to serve as both a summary of where we stand and a launching point for what we can achieve in the management and restoration of healthy amphibian and reptile populations in California.

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