

BOOK REVIEW

Alien Reptiles and Amphibians

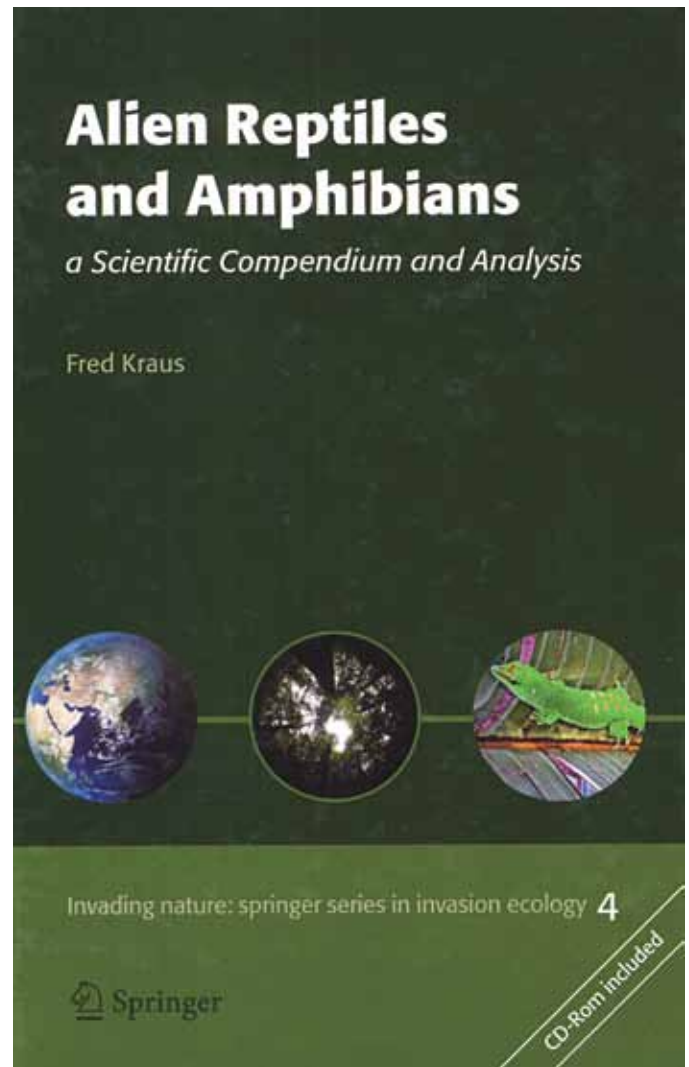
Alien Reptiles and Amphibians: A Scientific Compendium and Analysis. 2009. Fred Kraus. Invading Nature — Springer Series in Invasion Ecology, volume 4. Springer, New York. xii + 563 pp., plus compact disk. Hardback – ISBN: 978-1-4020-8945-9. \$169.00.

“Human-caused introductions of alien biota are an ecological disruption whose consequences rival those of better-known insults like chemical pollution, habitat loss, and climate change. Indeed, the irreversible nature of most alien-species introductions makes them less prone to correction than many other ecological problems.”

Fred Kraus, author of this important and timely volume, goes on to say in his preface that “efforts to prevent or limit further harm are gaining wider scientific and political acceptance.” However, “most research and management efforts involving terrestrial invasives have been showered on mammals, plants, and insects” (mainly because these organisms can “cause tremendous amounts of damage”). This, unfortunately leads to a “Catch-22” situation, presumptions that invasive species not featured in the media are harmless.

Despite some baby steps in the right direction, reptiles and amphibians are among the alien taxa that have received little attention from “policy makers, land managers, and researchers.” The journal, *Applied Herpetology*, regularly includes a section devoted to notes detailing the spread of alien herpetofauna. In 2005, I participated in a symposium at the Joint Annual Meeting of Ichthyologists and Herpetologists in Tampa, Florida, during which a number of speakers bemoaned the inevitability of a single worldwide tropical herpetofauna composed of Cane Toads (*Rhinella marina*), Brown Anoles (*Anolis sagrei*), and Braminy Blindsnakes (*Ramphotyphlops braminus*). Nevertheless, interest in invasive reptiles and amphibians is lacking, as is funding for relevant research; most efforts, maybe understandably, are directed instead at the few remaining “natural” areas. With this volume, however, Kraus clearly shows that the neglect of invasion studies (and management) can only accelerate the rate at which natural areas disappear. He effectively addresses the issue with a thorough, authoritative treatment, in which he provides a discussion of the problems caused by introducing species to places where they do not belong and a database of documented alien species (also on a CD-Rom) supported by a bibliography of about 4,000 citations.

After the preface, which clearly identifies the problem, the book is composed of chapters providing a background to the issue of invasive reptiles and amphibians (which should be mandatory reading for every herpetologist), an overview of introduction patterns, an assessment of the impact of alien species, a summary of management responses, and a list of implications for policy and research. These chapters are followed by the 221-page database listing introduction records and a second, much shorter table that provides erroneous and uncertain introduction claims (and reasons why these claims are invalid). The impressive literature cited (a phenomenal resource in and of itself) and indices to subjects, taxonomy, and geography complete the book.



In the introductory chapter (“background”), Kraus provides a brief history of the growth in interest in invasive species by researchers (and, later in the chapter, a synopsis specifically of the study of herpetological invasions). He then provides a considerable service by clarifying the relevant terminology and clearly addressing two misconceptions that often pervade discussions of this subject. Kraus defines as “alien” any species transported and released outside their natural ranges, whether or not the move was intentional. When that movement is by humans, he calls it an “introduction.” If a population becomes established outside the natural range, it may be referred to as “alien” or “naturalized” (Kraus’s preferred terms), but also as “non-native,” “non-indigenous,” “feral,” or “exotic.” “Invasive” is restricted to that subset (albeit a large one) of alien species with demonstrated negative effects on native ecosystems. Such organisms also might be called “weeds” or “pests,” both terms with appropriate negative connotations.

BOOK REVIEW

The problem with human-mediated dispersal is not that it differs qualitatively from dispersal by other means (i.e., attached to the fur of a mammal or the feathers of a bird or even blown off-course by a storm), but because “the temporal and spatial scales at which humans are homogenizing the world’s biota” dramatically exceed any “previously seen in Earth’s history.” For example, the rate at which new species are becoming established in the Hawaiian Islands (where Kraus works at the Bishop Museum) is currently on the order of 20–30 species per year, a million-fold increase over rates that prevailed before humans became involved.

The misconceptions Kraus addresses are that introductions of alien species are natural phenomena and that they increase biodiversity (when the opposite is almost invariably true). To be “natural,” the rate of introductions should approximate the background (pre-human) rate, which obviously is not applicable in today’s world. He also addresses the mistaken idea that, because humans are a part of the natural world, what we do is therefore “natural” and not of concern. That logic falls apart rapidly if applied to other human activities most of us would not consider “natural” (Kraus’s examples include genocide, torture, and slavery).

Briefly in the overview and again in much greater detail in the subsequent chapters, Kraus analyzes the invasion process. He lists the myriad means by which unintentional introductions occur and outlines many examples of how intentional introductions went awry, invariably the consequence of unanticipated effects in a natural world that is far more complex than our understanding of it. He discusses the venues by which species become established, noting that we have so little natural history data on so many species that we cannot begin to predict with any degree of accuracy which species will and which won’t become permanent fixtures in their new homes or which will or won’t be able to withstand the effects of introductions of aliens into their native ranges.

Furthermore, the early stages of an invasion often are difficult to assess. Because populations are initially small, those that succeed in growing and spreading differ little from those that don’t or even from those that fail. Consequently, the managerial effect is that invasions are “dichotomized” into: (1) “it’s not a problem,” and (2) “it’s too late to do anything.”

This volume is the first to truly analyze the effects of herpetological invasions. Some previous studies provided abbreviated assessments and others failed to distinguish consistently between evidence and speculation. Despite a few success stories (e.g., carefully managed species, such as certain crop plants, that grow only when tended and where intended), recent research increasingly emphasizes the negative nature of invasions — and the almost inevitable unintended consequences that result. Horror stories abound. We’ve all heard them. Mongooses intended to control rats in sugarcane plantations instead decimated ground-nesting birds and terrestrial reptile and amphibian populations, mainly because no one took into consideration the reality that mongooses are diurnal and rats are nocturnal. Cane Toads were introduced to control insect pests in sugarcane fields, without any consideration of their predator-resistant characters and voracious appetites. The impact on native

species almost everywhere these pests have become established has been catastrophic. Unfortunately, long before we realized what was happening in either instance (and many others), the damage had been done. Kraus regales the reader with myriad other examples, one more terrifying than the next — and many preventable.

So, what do we do? Kraus clearly shows that prevention (barriers to entry or ruthless elimination immediately after entry) is far cheaper and easier than eradication after an alien species has become established. However, like the U.S. healthcare industry, prevention is frequently neglected in favor of treatment after the patient is sick (or, the invasion has succeeded). Kraus provides steps that policy makers and land managers now have enough information to take. Sadly, however, I fear that the political will to take preventative action is lacking (it’s hard to make a case for a problem that has yet to reach catastrophic proportions — see, for example, the “debate” on global climate change). As a result, we will continue to face the inevitable consequences: Cane Toads in Australia wreaking havoc on native species, Brown Tree Snakes on Guam decimating native birds and reptiles, and a peninsular Florida, the southern parts of which are so totally dominated by alien species that the term “natural” can be voiced only with an ironic twist.

At this point, as a reviewer, I’m expected to list the shortcomings of the book. However, they are so minor (I found only one typographical error and Kraus anticipated most of the other potentially justifiable criticisms in his comments on the structure and content of the database) in comparison with its strengths, that I see no need (although I did find the cover design somewhat uninspired).

So, have I done justice to the book in this brief review? No. The detail and phenomenally exhaustive survey of an ever-growing literature are impressive, and, as I mentioned above, should be required reading for every herpetologist. Any summary I could provide is inevitably inadequate to convey such important information. Unfortunately, I cannot in good conscience urge everyone to run to his or her local bookstore and buy a copy. The book is simply too damn expensive. For a topic this critically important, I despair at the reality that only a few diehards will acquire a copy and only a very few more dedicated persons will avail themselves of copies acquired by the small subset of libraries not suffering too much from the almost universal cutbacks in funding of academic and research facilities.

I usually like to handle a book or journal, and I frequently express dismay over the inevitable day when publications will be available only via electronic devices. However, in this case, the topic is so important that I wish the publisher could have foregone what will obviously be a relatively limited profit (hard to make much money when you sell very few books) and made the contents of the book available on the world-wide web — where the database could be updated on an ongoing basis and readily available to everyone.

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