



BOOK REVIEW

Proceedings of the First International Snakehead Symposium. Edited by John S. Odenkirk and Duane C. Chapman. *American Fisheries Society, Symposium 89, Bethesda, Maryland. 2019. 261 pages. US\$79 (\$55.30 for American Fisheries Society members) (hardcover).*

Snakehead fishes (family Channidae) are among the most maligned aquatic invasive species in the USA and some other countries where they have been introduced outside of their native range in Asia and Africa. Nevertheless, snakeheads continue to be widely exploited in the live-food trade in aquaculture and wild-capture fisheries, are highly sought by anglers, and are also popular in the aquarium trade (Courtenay and Williams 2004). The Northern Snakehead *Channa argus* is the most widespread of the three channid species that are currently naturalized in the USA. This species has generated much concern and controversy, a situation that is partly fueled by sensational media coverage and B-grade science fiction horror films, such as “Frankenfish,” “Snakehead Terror,” and “Snakehead Swamp.” Media reports of snakehead introductions are often replete with provocative terms, such as “vicious,” “villain,” “voracious,” “monster,” “diabolical,” and even “ecological Armageddon.” When snakeheads first appeared in natural waters of the USA, fisheries professionals became increasingly interested in their status. Established populations rapidly expanded in the mid-Atlantic region and Arkansas, with scattered reports of introduced snakeheads from isolated locations in Hawaii, California, North Carolina, Florida, the Upper Midwest, and New England. In 2002, snakeheads were added to the list of injurious fishes under the Lacey Act, thereby prohibiting their importation or transport across state lines without a permit. This symposium was conceived by the editors and other concerned fisheries professionals of the Mississippi River Basin Panel on Aquatic Invasive Species. The mission of the symposium, held in Alexandria, Virginia, in July 2018, was to bring together experts on snakehead biology and ecology and to synthesize existing information into summary papers.

In this book, 35 authors contributed to 15 peer-reviewed articles that detail the current state of knowledge about snakehead introductions in the USA. Additionally, 16 abstracts are included from meeting presentations that were not accompanied by full-length manuscripts. Also included is a summary of a facilitated symposium panel discussion featuring eight experts representing state and federal natural resource agencies and private fishing

organizations. The book is organized into six sections. In the first section (Distribution), three papers provide an overview of the *Channa* species introduced into the USA and historical accounts of occurrence and dispersal of the Northern Snakehead in the mid-Atlantic region and Arkansas. The second section (Biology/Ecology) consists of two articles that examine growth and energetics of Northern Snakehead populations and two papers that investigate diet, diel feeding activity, and movement of this species in the Potomac River drainage. The third section (Monitoring/Response) includes a paper that models range expansion of the Northern Snakehead in the southeastern USA based on occurrence data and environmental conditions. Also included in this section is a paper summarizing an environmental DNA study to assess the status and range of the Bullseye Snakehead *C. marulius* in southern Florida. The fourth section (Management/Control) is comprised of four papers that address harvest, age and growth, and development of a stock–recruitment model to inform management decisions regarding control and mitigation for Northern Snakehead populations in the greater Chesapeake Bay area. The fifth section (Perspectives) includes a paper on the history of snakehead introductions in Japan and a thought-provoking social commentary on the human dimensions of Northern Snakehead management. Abstracts in the final section provide brief summaries of a diversity of snakehead studies, including aspects of distribution, ecology, behavior, control and monitoring efforts, public outreach, and pathology. The summary of the panel discussion is an engaging dialogue about the challenges of snakehead management in the context of conflicts regarding snakeheads as injurious versus their value as game and food species.

Most of this book is focused on the Northern Snakehead. Much has been done to document snakehead distributions and certain aspects of snakehead biology, such as diets, age, and growth. Less research has been devoted to understanding the ecological impacts of snakeheads to native aquatic communities and ecosystems. This book would have benefited from a chapter summarizing the current systematics and diversity of the Channidae to inform fisheries biologists about the morphological characteristics of the family, approximate numbers of genera and species, and taxonomic instability. Exemplifying the latter, recent molecular and morphological evidence indicates uncertainty regarding identification of the feral snakehead population in Florida (Adamson and Britz 2019). Those authors suggest that this population may have originated

from western Thailand, a possibility that could have implications for understanding historical pathways of snakehead introductions into the USA.

In comparison with many published AFS symposia, this volume is relatively narrow in scope and lacks cohesive integration. It will primarily be of interest to those fisheries professionals engaged in the study of snakeheads as well as other nonnative species for which there are contrasting social values regarding their management: whether to monitor and attempt control or eradication efforts or to maintain populations for harvest as game or food species. The book should serve to identify information gaps and guide future research.

REFERENCES

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