



# Exploring tensions and conflicts in invasive species management: The case of Asian carp



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## ABSTRACT

There is a growing recognition that scientific and social conflict pervades invasive species management, but there is a need for empirical work that can help better understand these conflicts and how they can be addressed. We examined the tensions and conflicts facing invasive Asian carp management in Minnesota by conducting 16 in-depth interviews with state and federal agency officials, academics, and stakeholders. Interviewees discussed the tensions and conflicts they saw impacting management, their implications, and what could be done to address them. We found three key areas of conflict and tension in Asian carp management: 1) scientific uncertainty concerning the impacts of Asian carp and the efficacy and non-target effects of possible management actions; 2) social uncertainty concerning both the lack of societal agreement on how to respond to Asian carp and the need to avoid acting from apathy and/or fear; and 3) the desired approach to research and management – whether it is informed by “political need” or “biological reality”. Our study of these tensions and conflicts reveals their importance to Asian carp management and to invasive species management, more broadly. We conclude with a discussion of possible ways to address these areas of tension and conflict, including the potential of deliberative, participatory approaches to risk-related decision making and the need to productively engage with apathy and fear.

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## 1. Introduction

As the fields of invasion biology and invasive species management continue to develop, there have been calls for them to become “more nuanced and less intellectually isolated” through a “growing recognition of complexity and ambiguity” (Davis, 2009, 10). This increasing appreciation for nuance, complexity, and ambiguity can be seen in different realms of invasive species scholarship. First, there is a growing appreciation that an invasive species can have both positive and negative effects on native species and ecosystems. Especially in altered landscapes, invasive species can serve as functional, structural, and compositional parts of transformed ecosystems, and can benefit certain native species – even while causing other types of harm (Tassin and Kull, 2015). Second, there is a more nuanced understanding of the effects of invasive species management, which can itself cause unintended harm to native species and ecosystems (Buckley and Han, 2014). Acknowledgment of this potential has increased the importance of

assessing non-target impacts of management efforts (Lampert et al., 2014). Third, the simple narrative that native species are good and exotic species are bad has held little sway for some time in scientific discourse and is becoming more questioned in popular discussions about invasive species (Goode, 2016).

The scholarly literature on the social aspects of invasive species management, including the role of human values and political judgments, also shows considerable nuance. Much of this literature has focused on preventing human-mediated spread by seeking to understand how people engage in behavior that facilitates the spread of invasive species and how that behavior can be prevented (Clout and Williams, 2009). Recently, this focus has broadened by building on the idea that science alone is inadequate for determining what invasive species are of greatest concern and what management actions are desirable. One conclusion from this literature is that human values are essential to the judgment of whether the change caused by a particular invasive species is deemed harmful (Sagoff, 2009; Hattingh, 2011). Science can often be used to determine whether an invasive species is likely to have an impact on the environment, but it is fundamentally a value judgment whether that change is harmful. Such value judgments can be made explicitly and deliberately or in

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less transparent ways, but they are unavoidable in invasive species management. Second, conflict can exist over the value judgments in invasive species management, such as those concerning the desired state of nature, what constitutes harm from a non-native species, when management is worthwhile, or what non-target consequences of management actions are acceptable (Estévez et al., 2015; Buckley and Han, 2014; Larson et al., 2011). Some practices exist to avoid conflict over management (Larson et al., 2011), but there remains a need for further scholarship to explore the types of conflict that exist surrounding invasive species management and ways to address them (Estévez et al., 2015).

While existing literature points to the importance of exploring complexity and conflict in invasive species management, there remains a lack of work examining what form these issues take in empirical case studies. In addition, there is a need to better understand how scientific and social conflicts influence each other in invasive species management. Such case studies can improve understandings of the challenges facing invasive species management and explore possible ways to address these challenges. The research presented here explores the tensions and conflicts facing invasive species management via a case study of Asian carp management in Minnesota. Using in-depth interviews with managers, researchers, and stakeholders active with Asian carp management, we explore the tensions and conflicts that currently affect Asian carp management as well as possible ways to address these conflicts. These findings provide insights for Asian carp management and shed light on some of the broader challenges facing invasive species management.

### 1.1. Asian carp management

Silver, Bighead, Grass and Black carp, often referred to as “Asian carp”, are four species of invasive fish that have been spreading to and affecting waterways across large portions of the United States. Asian carp were purposefully released into waterways of the United States in the mid-20th century for a variety of reasons including for their use in aquaculture. Silver carp (*Hypophthalmichthys molitrix*) and Bighead carp (*Hypophthalmichthys nobilis*), specifically, were promoted by state and federal agencies as a nonchemical and environmentally friendly way to improve water quality in retention ponds and sewage lagoons (Kelly et al., 2011). Subsequent unintentional release and large flood events are thought to have facilitated the escape of Asian carp into the Mississippi River system in the 1970s (Kelly et al., 2011). Since then they have been making their way upward and outward, with established populations in many river systems of the central and southern United States (Asian Carp Regional Coordinating Committee, 2014). Silver and Bighead carp have the ability to cause a variety of ecological and recreational impacts, from disrupting the aquatic food chain by consuming large amounts of plankton to, in the case of Silver carp, jumping up to 10 feet in the air when disturbed (Kolar et al., 2005).

As a result of the potential and realized threats posed by Asian carp, state and federal agencies have been actively managing invasive Asian carp across the central and southern United States (Conover et al., 2007). In Minnesota, a diversity of agencies work on Asian carp management including the Minnesota Department of Natural Resources, the US Fish and Wildlife Service, the US National Park Service, the US Geological Survey, the US Army Corps of Engineers. These agencies have different core responsibilities determined by their legal mandates, and must find ways to work across these differences when collaborating with other agencies. States can also have differing management priorities based on where they are located relative to the invasion front, which creates challenges for establishing basin-wide management priorities.

Of the four Asian carp species, Silver and Bighead are of particular concern in Minnesota because of the proximity of the self-sustaining breeding populations to the state and because of the negative effects they have caused in nearby areas where large populations are present. Individual Silver and Bighead carp have been captured in Minnesota each year since 2007, excluding 2010, and as far back as 1996, including 5 Bighead carp in the St. Croix river near Stillwater, MN in April 2015. The nearest reproducing population of Bighead and Silver carp, however, is thought to be in the Mississippi River in southern Iowa. State and federal agencies continue to conduct a variety of management and research efforts for Asian carp in Minnesota including, for example, monitoring, control measures, and deterrents to prevent spread. In 2015, the Upper Saint Anthony Falls Lock in Minneapolis was closed as the result of federal legislation to prevent Asian carp from being able to swim further north on the Mississippi River.

Asian carp management in Minnesota is a useful case study to examine the tensions and conflicts facing contemporary invasive species management. In addition to representing a complex contemporary invasive species management issue, our previous research (Kokotovich and Andow, 2015) and informational interviews revealed that although there is broad agreement on the management goal of minimizing the impacts from Asian carp while protecting native fish and ecosystems, there remain consequential tensions surrounding Asian carp management that warrant further study. Our goal for this research was to examine the tensions and conflicts that exist around Asian carp management in Minnesota to help better understand them, their implications, and how they can be addressed. After outlining the methodology, we present the findings from this research and conclude with a discussion of their implications and importance for invasive species management.

## 2. Methodology

To study these tensions, we conducted 16 in-depth interviews with individuals who have been actively involved with Asian carp management in Minnesota. We chose in-depth interviews because speaking individually with an interviewee helps provide the anonymity needed for interviewees to speak openly about the conflicts they perceive. In addition, in-depth interviews allow for follow-up questions and discussions that can help reveal key nuances. We used three main criteria to select interviewees who had been involved with Asian carp management in Minnesota. First, in order to obtain a breadth of views, we selected interviewees from the breadth of organizations involved with management, including state and federal agencies (e.g., Minnesota Department of Natural Resources, US National Park Service, US Army Corps of Engineers, US Fish and Wildlife Service, US Geological Survey), academia, and non-governmental organizations. Second, we selected individuals who had been most actively involved in management, as we judged through our attendance of state-level Asian carp meetings, such as the Invasion Carp Forum, and as identified by other interviewees. Third, we took steps to make sure we gathered the diversity of views present, by, for example, asking all interviewees for other important people to talk to and by continuing to conduct interviews until we reached a saturation point. After 16 interviews we reached a saturation point, both in terms of having talked to all key individuals mentioned by interviewees and in terms of no longer revealing novel understandings of the tensions and conflicts surrounding Asian carp management. Interviews lasted, on average, between 1 and 2 h each and were conducted in person and by phone. Interviews took place from March to May 2015.

A semi-structured interview process was followed where interviewees were all asked the same initial questions, but

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