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## GIZZARD SHAD (*DOROSOMA CEPEDIANUM*) EXPANSION AND REPRODUCTION IN THE UPPER COLORADO RIVER BASIN

Sam T. Finney<sup>1,2</sup> and Mark H. Fuller<sup>1</sup>

**ABSTRACT.**—Gizzard shad (*Dorosoma cepedianum*) were introduced into the Colorado River Basin circa 1996 via an unintentional contaminated stocking. Gizzard shad were collected throughout much of the Upper Colorado River Basin in 2005, 2006, and 2007. These collections document a rapid range expansion of this introduced species and a threat to intact fisheries.

*Key words:* gizzard shad, *Dorosoma cepedianum*, Upper Colorado River Basin, range expansion.

Gizzard shad (*Dorosoma cepedianum*) are believed to have been accidentally introduced into the Colorado River Basin circa 1996 via a transbasin sport-fish stocking at Morgan Lake, New Mexico, an impoundment near the San Juan River. Detected in the San Juan River in June 2000 (Mueller and Brooks 2004), this species multiplied and spread through the San Juan arm of Lake Powell (Blommer and Gustaveson 2002) and then expanded up the Colorado River, where it was first detected in the Green River at Sand Wash nearly 419 km upstream of Lake Powell (river km 347.0; Utah Division of Wildlife Resources, unpublished data). By 2006, gizzard shad had ascended to the Gunnison River at the Redland Fish Ladder (river km 3.7; McAda and Burdick 2007a); to the Colorado River in areas at, and downstream of, Price–Stubb Dam (river km 303.0; McAda and Burdick 2007b); and to the Middle Green River (river km 347.6–453.8; Utah Division of Wildlife Resources, unpublished data). Gizzard shad were reported at Echo Park, Colorado, near the confluence of the Green and Yampa rivers (river km 537.5; U.S. Fish and Wildlife Service, unpublished data) by 2007. No collections were made prior to 2004 despite intensive sampling throughout most of the Colorado River Basin.

The source of these fish is most likely Lake Powell or natural reproduction within the river system by colonizers. Introductions by other mechanisms are possible but not likely.

These collections demonstrate the potential for a rapid range expansion by gizzard shad

after their introduction into a new basin. Although specific information on adult gizzard shad movement is limited, the fish has been documented migrating en masse in lotic environments (Swanson 1932). Documented rapid expansion over a short time period and suspected river recruitment (Trina Hedrick, Utah Division of Wildlife Resources, personal communication) are causes for alarm.

Gizzard shad pose a threat to native and sport fisheries in the Upper Colorado River Basin. Mueller and Brooks (2004) identified many of these threats. The gizzard shad is the 1st introduced fish in the basin that is a filter feeder throughout its entire life history (Whitehead 1985), and it also thrives in both reservoir and riverine environments. Gizzard shad are known to numerically dominate fish communities (Noble 1981) and alter entire food webs (DeVries and Stein 1992). The recent introduction of gizzard shad and more recently burbot (*Lota lota*; Wyoming Game and Fish Department 2006a, 2006b) in the Green River Basin adds to the growing litany of nonnative fish competition and predation that threatens native fish recovery in the Upper Colorado River Basin (Minckley and Deacon 1991, Fuller et al. 1999, Tyus and Saunders 2000). Nonnative fish control and removal programs have increased efforts and expenditures during the past decade but thus far have been unsuccessful in controlling or removing unwanted species (Clarkson et al. 2005, Mueller 2005). The successful establishment and spread of yet more nonnative fish species further complicates

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management of sport fisheries and efforts to recover native fish.

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