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***Cottus schitsuumsh*, a new species of sculpin (Scorpaeniformes: Cottidae) in the Columbia River basin, Idaho-Montana, USA**

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Abstract

Fishes of the genus *Cottus* have long been taxonomically challenging because of morphological similarities among species and their tendency to hybridize, and a number of undescribed species may remain in this genus. We used a combination of genetic and morphological methods to delineate and describe *Cottus schitsuumsh*, Cedar Sculpin, a new species, from the upper Columbia River basin, Idaho-Montana, USA. Although historically confused with the Shorthead Sculpin (*C. confusus*), the genetic distance between *C. schitsuumsh* and *C. confusus* (4.84–6.29%) suggests these species are distant relatives. Moreover, the two species can be differentiated on the basis of lateral-line pores on the caudal peduncle, head width, and interpelvic width. *Cottus schitsuumsh* is also distinct from all other *Cottus* in this region in having a single small, skin-covered, preopercular spine. Haplotypes of mtDNA cytochrome oxidase *c* subunit 1 of *C. schitsuumsh* differed from all other members of the genus at three positions, had interspecific genetic distances typical for congeneric fishes (1.61–2.74% to nearest neighbors), and were monophyletic in maximum-likelihood trees. Microsatellite analyses confirmed these taxonomic groupings for species potentially sympatric with *C. schitsuumsh* and that fish used in morphological comparisons were unlikely to be introgressed. Its irregular distribution, in the Spokane River basin in Idaho and portions of the Clark Fork River basin in Montana, may have resulted from human-assisted translocation.

Key words: Cedar Sculpin, COI, Couer d'Alene River, DNA barcode, microsatellite, Shorthead Sculpin, St. Joe River

Introduction

North American freshwater fishes of the genus *Cottus* (Actinopterygii; Scorpaeniformes; Cottidae), commonly known as sculpins, have long been a taxonomic challenge (McAllister & Lindsey 1961; Kinziger *et al.* 2005). Sculpins are among the most difficult freshwater fishes to identify based on morphological characteristics (Jenkins & Burkhead 1994; Wydoski & Whitney 2003), a difficulty compounded by occasional hybridization between sympatric species (Strauss 1986; Markle & Hill 2000; Nolte *et al.* 2005) and geographic variation in phenotypically diagnostic characters within individual species (Maughan 1978; McPhail 2007). The limited movement and home ranges (< 250 m) exhibited by many fluvial sculpins (Petty & Grossman 2007; Hudy & Shiflet 2009) should favor speciation at relatively small geographic scales, yet the tendency has been to assign populations across broad geographical ranges to single species (e.g., *C. bairdii* in eastern and western North America; Jenkins & Burkhead 1994; Markle & Hill 2000). Recent morphological and genetic evaluations of sculpins in portions of the eastern U.S. have delineated several species of *Cottus* once thought to be part of more broadly distributed taxa (Neely *et al.* 2007; Kinziger & Wood 2010; Adams *et al.* 2013). Thus, it seems likely that diversity in *Cottus* elsewhere in North America has been underestimated.

One such region is the upper Columbia River basin in western North America. There is little consensus on the number and distribution of *Cottus* species in this basin, despite the efforts of several authors (McAllister & Lindsey 1961; Bailey & Bond 1963; Maughan 1978; Neely 2003; McPhail 2007). Particularly problematic has been delimiting the range of the Shorthead Sculpin, *C. confusus*. This species was described as occupying waters across

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