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The natural history of mudskippers in northern Australia, with field identification characters

TORU TAKITA[1,4], HELEN K. LARSON[2] and ATSUSHI ISHIMATSU[3,5]

[1]*Faculty of Fisheries, Nagasaki University, 1-14 Bunkyo-machi, Nagasaki 852-8521, JAPAN*
[2]*Museum and Art Gallery of the Northern Territory, GPO Box 4646, Darwin NT 0801, AUSTRALIA*
[3]*Institute for East China Sea Research, Nagasaki University, 1551-7 Taira-machi, Nagasaki 851-2213, JAPAN*
[4]*Present address: 18-8 Hokuei-machi, Nagasaki 852-8063, JAPAN*
[5]*Corresponding author:a-ishima@nagasaki-u.ac.jp*

ABSTRACT

We provide field identification characters and report on the natural history of mudskippers (Gobiidae: Oxudercinae) in Cairns, Darwin, Derby and Broome, northern Australia. Nine species in four genera are recorded (*Boleophthalmus birdsongi, B. caeruleomaculatus*, *Periophthalmodon freycineti*, *Periophthalmus argentilineatus, P. darwini, P. minutus, P. novaeguineaensis*, *P. takita* and *Scartelaos histophorus*). The intertidal zonation of mudskippers conforms to previously reported patterns, but subtle differences in habitat preference are observed at both intraspecific and intrageneric levels, underlining the need for in-depth investigation of habitat selection by mudskippers. Although most species inhabit littoral mudflats, some show possible habitat expansion: juvenile *Periophthalmodon freycineti* are found occasionally in pools on a sandy shore, and a population of *Periophthalmus minutus* is found to be established in a marginal mangrove habitat (a salt flat behind a pioneer mangrove assemblage). Burrow confinement during high tide is confirmed for both species of *Boleophthalmus*, two *Periophthalmus* (*P. minutus* and *P. novaeguineaensis*) and *Scartelaos*, but not for *Periophthalmodon* or the other *Periophthalmus* species. Territory formation is described for *S. histophorus.*

Keywords: mudskipper, Oxudercinae, northern Australia, field identification, distribution, habitat condition, natural history

INTRODUCTION

The term mudskipper usually refers to those amphibious gobies that move about actively on the exposed mudflats of creeks, estuaries and coastal areas during low tide (Clayton 1993; Graham 1997; Graham *et al*. 2007). These fishes belong to the gobiid subfamily Oxudercinae, which includes 40 species in 10 genera (Murdy 1989; Lee *et al*. 1995; Murdy & Takita 1999; Darumas & Tantichodok 2002; Larson & Takita 2004; Jaafar & Larson 2008; Jaafar *et al*. 2009) and are distributed from eastern Asia, the South Pacific islands and northern Australia, westward across South-east Asia and the Arabian Peninsula to both the east and west coasts of Africa (Murdy 1989).

Mudskippers are often one of the dominant ecological components on tidal flats, and they play an important ecological role as carnivores and as preferred prey for many avian predators (Clayton 1993). As such, these fishes contribute to the maintenance of the integrity and health of mudflat ecosystems, which are often very vulnerable to negative human impacts, but offer significant ecological services (Reise 1985; Costanza *et al.* 1997). For these reasons and because of their biological peculiarity as amphibious fish, mudskippers have been investigated from various aspects; for example, their life on mud, locomotory mechanics, air-breathing capabilities, burrowing and reproductive behaviour (e.g. Atkinson & Taylor 1991; Harris 1960; Ishimatsu *et al*. 1998, 2007, 2009; MacNae 1968; Takeda *et al*. 1999; Tamura *et al*. 1976; Zhang *et al*. 2003). Recently their ability to produce vocalisations has been confirmed (Polgar *et al*. 2011). In addition, mudskippers are an invaluable source of information for insights into vertebrate invasion from an aquatic to terrestrial environment (Ishimatsu & Gonzales 2011).

Twelve species of oxudercine gobies belonging to six genera are known from tropical and subtropical northern Australia, where numerous mudflats and other soft substrates are located in sheltered bays, estuaries and areas protected by coral reefs or mangrove forests (Murdy 1989; Larson & Williams 1997; Larson & Takita 2004; Hoese & Larson 2006; Jaafar & Larson 2008). Notwithstanding the abundance of mudskippers in these habitats, biological data are scarce and generally restricted to species inhabiting the east coast of Australia. Milward (1974) studied the morphology, physiology, distribution, food and feeding habits, and habitat conditions of five mudskipper species in areas from Cairns to Brisbane, Queensland. Nursall (1981) provided notes on the behaviour and habitat of one *Periophthalmodon* and four *Periophthalmus* species near