

Jaguar Cichlid, *Parachromis managuensis* (Günther, 1867) (Perciformes, Cichlidae): An Introduced Exotic Fish in Grati Lake, East Java, Indonesia

Sitti Khairul Bariyyah^{1,*}, Sahlan M. Saleh¹, Liga Insani², Novalina Serdiati³ and Fitri Sil Valen⁴

¹ *University of Yapis Papua, Fisheries and Marine Science Faculty, Aquaculture Science Department, Jayapura 99115, Papua, Indonesia*

² *Marine and Fisheries Polytechnic of Jembrana, Fish Aquaculture Study Program, Jembrana 82218, Bali, Indonesia*

³ *University of Tadulako, Fisheries Department, Faculty of Animal Husbandry and Fisheries, Kampus Bumi Tadulako, Palu 94118, Central Sulawesi, Indonesia,*

⁴ *Generasi Biologi Indonesia Foundation, Zoology Division, Gresik 61171, East Java, Indonesia*

(Received 24 April, 2021; Accepted 2 June, 2021)

ABSTRACT

The entry of exotic invasive fish had the potential as a disease vector and damaging food webs that would have a systemic impact on the ecosystem. This study discussed the presence of Jaguar cichlid, *Parachromis managuensis* from Central America in the fresh water of East Java, Indonesia, precisely in the Grati Lake. This species may represent a threat to the Grati Lake ecosystem as a predator or a competitor. A description of morphological features of sampled specimens is provided.

Key words : Alien fish, Freshwater, Invasive, Predator fish

Introduction

The Jaguar Cichlid *Parachromis managuensis* Günther, 1867 is a predator fresh water fish native to Nicaragua, Costa Rica and Honduras (Conkel, 1998) but has been introduced to several adjacent countries: South America (Magalhães and Vitule, 2013), North America (Fuller, 1999) and Southeast Asia (Agasen *et al.*, 2006). *Parachromis managuensis* exhibits highly predaceous and tolerance to new habitats. Because of these attributes, *P. managuensis* has the potential to become an invasive species (Agasen *et al.*, 2006; Yamamoto and Annete, 2000).

Parachromis managuensis was generally sold in the exotic fish market and had not been cultured openly. In Southeast Asia, *P. managuensis* was de-

scribed from Taal Lake in Philippines (Agasen *et al.*, 2006) and several fresh waters in Indoensia (Hedianto *et al.*, 2013; Dahruddin *et al.*, 2017). Grati, a medium lake in the north of East Java (Indonesia), is a fisheries sites, but there is no record of culturing exotic fish there. The presence of *P. managuensis* on Grati Lake constitutes a new record.

Materials and Methods

Sixteen live specimens of *Parachromis managuensis* were obtained from a local fisherman during a field-work carried out on 4 May 2019 in the Grati Lake (7°43'40"S, 113°00'42"E) (Fig. 1). The Grati Lake is a karst lake in East Java with an area of around 100 ha. The site is located in Pasuruan Regency, East Java

Province, Indonesia. The fishing gear used by the fishermen was a medium hook with bottom and bait used were worms (Stein *et al.*, 2012). Collected specimens were labeled and fixed in 96% alcohol solution (Hasan and Tamam 2019) and deposited at the Zoology Laboratory, Generasi Biologi Indonesia, Gresik, Indonesia (GBI0027). Diagnostic morphological characters of the specimens were analyzed using the methods employed by Kullander and Hartel (1997).

Results

The fourteen (14) live specimens of *P. managuensis* had a total length between 81 mm and 311 mm. Morphological characters are as follows: large mouth, a more or less continuous dark stripe between the eye and opercular margin, another between the eye and the lower corner of the opercle, a

row of dark blotches along the middle of the side. Distinguished from other members of the genus by having the preopercle expanded at the corner. Body color silvery to purple; dark spots on body and fins; caudal and anal fins with numerous dark spots; back moss green, sides with purple iridescence, belly whitish; dorsal, interspaces whitish, yellowish or with blue iridescence; a dark blotch on the caudal fin base. All of these characters were found in specimens from the Grati Lake, East Java, Indonesia (Fig. 2).

The introduction of *P. managuensis* is worrying due to its biological characteristics such as tolerate broad environmental variations and survive in low dissolved oxygen, which are common ability to other species of cichlid. It has enlarged pseudo canines, allowing it to hold on to prey. Further aggressive tendencies are demonstrated when providing protection not only to their fry but also developing eggs.

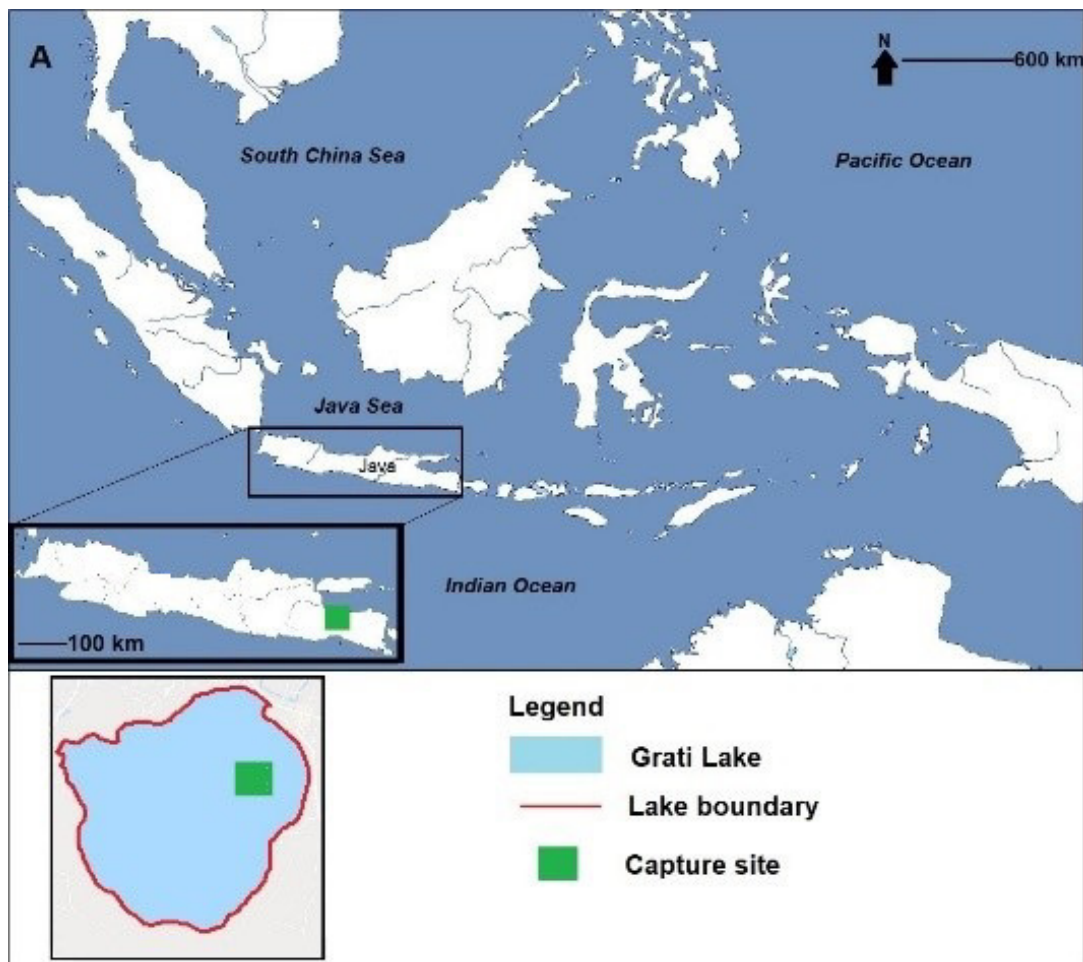


Fig. 1. Green square: Grati Lake, the location where *Parachromis managuensis* found.



Fig. 2. Specimen of *Parachromis managuensis* GBI0027 captured from Grati Lake.

This protection guarantees a fairly high survival rate (Gestring and Shafland, 1997). They are benthopelagic, feeding near the bottom as well as near the surface. These characteristics make *P. managuensis* a dangerous alien species, with potential for a massive invasion (Barroso and Jacobi, 2013; Sampaio *et al.*, 2013).

We speculate that *P. managuensis* was released into Grati Lake on East Java by aquarium trade. This record is an important contribution to the understanding of the dispersal of alien fish in Indonesia. As the lake does not have an ornamental fish culture, further investigation is warranted to determine the source of *P. managuensis* on East Java. The control and prevention of further introductions is needed so that invasive fish does not disturb the freshwater ecosystem (Serdiati *et al.*, 2021; Hasan *et al.*, 2019; Hasan *et al.*, 2020a; Hasan *et al.*, 2020b). In addition, the entry of invasive species can cause the loss of local fish populations in Indonesia (Insani *et al.*, 2020; Hasan *et al.*, 2021).

References

- Agasen, E.V., Clemente, J.P., Rosana, M.R. and Kawi, N.S. 2006. Biological Investigation of Jaguar Guapote *Parachromis managuensis* (Gunther) in Taal Lake, Philippines. *J. Environ. Sci. Manag* 9 (2): 20–30.
- Bussing, W.A. 1998. Peces de Las Aguas Continentales de Costa Rica (Freshwater Fishes of Costa Rica), 2nd editio. Editorial de la Universidad de Costa Rica, San José.
- Conkel, D. 1998. Cichlids of North and Central America. TFH Publications, New York.
- Dahrudin, H., Hutama, A., Busson, F., Sauri, S., Hanner, R., Keith, P., Hadiaty, R. and Hubert, N. 2017. Revisiting the ichthyodiversity of Java and Bali through DNA barcodes: taxonomic coverage, identification accuracy, cryptic diversity and identification of exotic species. *Mol. Ecol. Resour* 17 (2): 288–299.
- Fuller, P.L., Nico, L.G. and Williams, J.D. 1999. Nonindigenous Fishes Introduced into Inland Waters of the United States. *J. North Am. Benthol. Soc.* 18 (4): 563–565.
- Gestring, K.B. and Shafland, P.L. 1997. Status and selected life history attributes of the exotic Jaguar Guapote (*Cichlasoma managuense*) in Florida. *Florida Sci.* 60 (3): 137–142.
- Hasan, V., Mukti, A.T. and Putranto, T.W.C. 2019. Range Expansion of the Invasive Nile Tilapia *Oreochromis Niloticus* (Perciformes/: Cichlidae) in Java Sea and First Record for Kangean Island, Madura, East Java, Indonesia. *Eco. Env. & Cons.* 25 : S187-S-189.
- Hasan, V., Widodo, M.S., Islamy, R.A. and Pebriani, D.A.A. 2020a. New records of alligator gar, *Atractosteus spatula* (Actinopterygii: Lepisosteiformes: Lepisosteidae) from Bali and Java, Indonesia. *Acta Ichthyologica et Piscatoria.* 50 (2) : 233-236.
- Hasan, V., Widodo, M.S., Faqih, A.R., Mahasri, G., Arief, M., Valen, F.S., Tamam, M.B., Yonarta, D., Pratama, F.S. and Fitriadi, R. 2020b. Presence of striped flying barb *Esomus metallicus* (Teleostei, Cyprinidae) from west Sumatra, Indonesia. *Ecology, Environment and Conservation.* 26 (August Suppl. Issue): S73-S75.
- Hasan, V. and Tamam, M.B. 2019. First record of the invasive Nile Tilapia, *Oreochromis niloticus* (Linnaeus, 1758) (Perciformes, Cichlidae), on Bawean Island, Indonesia. *Check List.* 15 (1) : 225-227.
- Hasan, V., Valen, F.S., Islamy, R.A., Widodo, M.S., Saptadjaja, A.M. and Islam, I. 2021. Short Communication: Presence of the vulnerable freshwater goby *Sicyopus auxiliimentus* (Gobiidae, Sicydiinae) on Sangihe Island, Indonesia. *Biodiversitas.* 22 : 573-581.
- Hedianto, D.A., Purnomo, K., and Warsa, A. 2013. Interactions of food resources utilization by fish communities in penjalin reservoir, central java. *Bawal.* 5(1): 33–40.
- Insani, L., Hasan, V., Valen, F.S., Pratama, F.S., Widodo, M.S, Faqih, A.R., Islamy, R.A., Mukti, A.T. and Isoni, W. 2020. Presence of the invasive nile tilapia *Oreochromis niloticus* Linnaeus, 1758 (perciformes, cichlidae) in the Yamdena Island, Indonesia. *Ecology, Environment and Conservation.* 26 (3): 1115-1118.
- Kullander, S.O. and Hartel, K.E. 1997. The systematic status of cichlid genera described by Louis Agassiz in 1859: *Amphilophus*, *Baiodon*, *Hypsophrys* and *Parachromis* (Teleostei: Cichlidae). *Ichthyol. Explor. Freshwaters.* 7 : 193–202.
- Magalhães, A.L.B. and Jacobi, C.M. 2013. Invasion risks posed by ornamental freshwater fish trade to southeastern Brazilian rivers. *Neotrop. Ichthyol.* 11 (2): 433–441.
- Magalhães, A.L.B. and Vitule, J.R.S. 2013. Aquarium industry threatens biodiversity. *Science.* 341(6145) : 457.

- Sampaio, W.M.S., Belei, F., Giongo, P., Dergam, J.A. and Orsi, M.L. 2017. *Heterotilapia buttikoferi* (Hubrecht, 1881) (Perciformes: Cichlidae), an introduced exotic fish in the upper Paraná river basin. *Check List* 13 (4): 245–250.
- Serdiati, N., Insani, L., Safir, M., Rukka, A.H., Mangitung, S.F., Valen, F.S., Tamam, M.B. and Hasan, V. 2021. Range expansion of the Invasive Nile Tilapia *Oreochromis niloticus* (Perciformes: Cichlidae) in Sulawesi Sea and first record for Sangihe Island, Tahuna, North Sulawesi, Indonesia. *Eco. Env. & Cons.* 27 (1) : 168-171.
- Stein, J.A., Shultz, A.D., Cooke, S.J., Danylchuk, A.J., Hayward, K. and Suski, C.D. 2012. The influence of hook size, type, and location on hook retention and survival of angled bonefish (*Albula vulpes*). *Fish. Res.* 113 (1): 147–152.
- Yamamoto, M.N. and Annete, W.T. 2000. *Hawai'i's Native and Exotic Freshwater Animals*. Mutual Publishing, Honolulu.