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Larval morphological changes and salinity tolerance of aquarium-held freshwater goby *Rhinogobius* sp. BF

Kentarou Hirashima and Kazuya Nakamura

Abstract Larval development and salinity tolerance of *Rhinogobius* sp. BF are described from artificially-reared eggs, larvae and juveniles. Aquarium-held *R*. sp. BF spawned small-type eggs (*n*=816, long axis 1.9 mm, short axis 0.6 mm) on May 17 2004, which were guarded in the nest by a male. Newly-hatched larvae (3.2 mm in notochord length) had a small yolk, and some melanophores apparent on the snout to caudal region. Twenty-two days after hatching (6.8 mm in standard length; SL), the notochord tip projected upwards, and dorsal and anal fin rays appeared. Between thirty (12.0 mm SL) to forty-five days (14.2 mm SL), the larvae settled to the bottom of the aquarium. Sixty days after hatching (15.4 mm SL), all fins and scales were completed (juvenile stage). All larvae subjected to marine salinity (35 psu) died within three days, indicative of the lentic landlocked life history recorded for the species.

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The microhabitat use of *Pseudogobius javanicus* and *P.* masago at Sashiki tidal flat, Okinawa-jima Island, Japan

Taiga Kunishima, Hirotoshi Saimaru and Katsunori Tachihara

Abstract Fishes of *Pseudogobius*, distributed widely in the Indian and West Pacific

Oceans, are represented by 3 species (*P. javanicus*, *P. masago*, *Pseudogobius* sp.) in Japanese waters. Although *P. javanicus* is a common species at Okinawa-jima Island, *P. masago* is scarce and listed as "Vulnerable" in the Red List of the Japan Ministry of Environment. In the present study, micro–habitat use (water temperature, salinity, water depth, flow velocity, median grain size and substratum hardness, percentage of mud, and percentages of litter cover and stone cover) by *P. javanicus* and *P. masago* were examined in 72 quadrats on Sashiki tidal flat, Okinawa–jima Island, from May to September 2013. In total, 36 *P. javanicus* and 97 *P. masago* were collected, the species occurring in 8 and 16 quadrats, respectively. A significant difference in quadrat occupation was apparent between the species. The relationships between number of individuals of each species and environmental factors were analyzed using generalized linear models. Water depth, percentage of litter cover and median grain size (for *P. javanicus*), and substratum hardness, salinity, and percentages of stone cover and mud (for *P. masago*) were significant factors in the ten top models. In particular, the presence of both species was affected by substratum condition (percentages of litter and stone), which may be related to predation risk. The results demonstrated that microhabitat uses of the two species were different. However, the Sashiki tidal flat includes suitable environments for both *P. javanicus* and *P. masago* at present, the accumulated soft substratum being preferred by both species. It is important, however, for continued conservation of both species, that landfills and riverbank revetment works around Nakagusuku Bay be kept to a minimum, in order to provide and prevent an outflow of soft substratum to the tidal flat.

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Population viability analysis for the endangered loach *Parabotia curtus* in the Lake Biwa–Yodo River system, central Japan

Katsutoshi Watanabe, Hidetaka Ichiyanagi, Tsukasa Abe and Akihisa Iwata

Abstract The population of the botiid *Parabotia curtus* in the Katsura River, Lake Biwa–Yodo River system, Kameoka, Kyoto Prefecture, Japan, the only one recorded in the Kinki region since the year 2000, was subjected to a population viability analysis (PVA) based on demographic data between 2006 and 2013 (8 years). Count-based and age-structured models with several conditions for density-dependence, carrying capacity, migration rate, and bias in population estimation (48 settings in total) were used for calculating the quasi-extinction probability within 50 years (extinction threshold <10 individuals), using computer simulations. The estimated population for the 8 year period fluctuated from 200 to 2,300 individuals (average ca. 935, with a coefficient of variation of 66%). PVA demonstrated a significant extinction risk for this population (23–82% extinction in 45 of 48 settings). Although further population monitoring is necessary for a more precise evaluation, we conclude that this population faces a real extinction risk. Sensitivity analysis suggested several requirements for effectively enhancing population viability, i.e., restraining large biotic and abiotic environmental perturbations to avoid extreme depression of the recruitment of young, enhancing winter survival, and promoting upstream migration into the spawning site.

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Short Reports

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First record of the lethrinid fish, *Gymnocranius superciliosus* from Japan

Ryohei Miki, You Sakurai and Yukio Iwatsuki

Abstract Six specimens (189–306 mm in standard length) of the lethrinid fish, *Gymnocranius superciliosus* Brosa, Béarez, Paijo and Chen, 2013, recently described from New Caledonia, were collected from the Ryukyu Islands, Japan, being the first record of the species from the Northern Hemisphere. *Gymnocranius superciliosus* is distinguishable from its congeners by the following combination of characters: elongated body (body depth at 1st dorsal-fin spine origin 2.53–3.06 in standard length); villiform to conical teeth on sides of both jaws; forked caudal fin with rounded posterior margins on both lobes, tips slightly pointed; six rows of scales between 5th dorsal-fin spine base and lateral line; no transverse dark brown bar laterally on head or body, except between eye and interopercular flange; blue speckles dispersed on snout and cheek; body scales each with a basal dark brown dot, forming longitudinal rows; reddish color on margins of dorsal, anal, and pelvic fins.

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Origin of *Tanakia limbata* in Ehime Prefecture indicated by phylogeographic analysis of mitochondrial cytochrome *b* gene sequences

Hideki Matsuba, Shotaro Yoshimi, Mikio Inoue and Hiroki Hata

Abstract Phylogeographic analysis of the bitterling *Tanakia limbata* in western Japan

was conducted to identify the origin of the fish population in Ehime, Shikoku Island. A survey of rivers and spring-fed ponds on the Matsuyama Plain, Ehime, indicated that *T. limbata* had become distributed on the plain over a period of 19 years to the present day. Sequences of the mitochondrial cytochrome *b* gene indicated that the 42 individuals sampled included 4 haplotypes, which were shared with a *T. limbata* population in the Yabe River, Fukuoka, Kyushu Island. All 4 haplotypes belonged to the West Kyushu group of *T. limbata.* On the other hand, *T. limbata* comprising the West Seto clade inhabits western Honshu and eastern Kyushu, which regions shared the same paleoriver system with Ehime 20,000 years BP. These results suggest that individuals of *T. limbata* presently collected in Ehime originated from the Yabe River or adjacent waters, having artificially transported over the mountain chain that may act as a natural barrier separating the West Kyushu and West Seto groups. To conserve an endangered native bitterling, *T. lanceolata*, in Ehime, management of the introduced *T. limbata*, so as to prevent competition and hybridization with the former, is necessary.

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Enlarged distribution of *Nipponocypris temminckii* as a domestic alien fish

Osamu Katano, Yoshihiro Baba, Hitoshi Ohara, Kouichi Kawamura, Masato Sato, Masayuki Kumagaya, Motoi Takeuchi, Shoichi Ito, Shigeharu Togashi and Nobuo Inoue

Abstract The distribution of *Nipponocypris temminckii* was investigated in 24 rivers in Nagano, Niigata, Yamagata, Akita, Iwate, and Aomori Prefectures, the species being collected at seven study sites. Amongst non-benthic fishes, *N. temminckii* was exclusively dominant in two rivers. Supplementary records of the species in Nagano, Niigata, Akita

and Iwate Prefectures were also described. Rivers in which investigations had been conducted over two or three years showed an increasing proportion of *N. temminckii*, indicating successful colonization of the species.

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