

Predictive Distribution of Hynobiid Salamanders in Taiwan

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Pei-Fen Lee, Kuang-Yang Lue, and Shan-Huah Wu (2006) Predictive distribution of hynobiid salamanders in Taiwan. *Zoological Studies* 45(2): 244-254. The distribution patterns of hynobiid salamanders in Taiwan, based on species and species complex, i.e., *Hynobius arisanensis*, the *H. formosanus-sonani* complex, and *Hynobius* sp. 1 (an undescribed species), were studied using a wildlife distribution database and an environmental factor database with univariate statistics and discriminant function analysis (DFA). The distribution maps suggested that these salamanders are restricted to certain regions and show distribution patterns distinct from each other. The *H. arisanensis* population has the largest range of distribution, while the *H. formosanus-sonani* complex was only found in the southwestern corner of Taroko National Park (in the Hehuanshan area) and in the center of Yushan National Park. Distributions of *H. arisanensis* and the *H. formosanus-sonani* complex overlapped in the center of Yushan National Park. Additionally, *Hynobius* sp. 1 was only found in the northern part of the range of the *H. formosanus-sonani* complex, mostly localized in the Shei-pa and Taroko National Park regions. Although both *H. arisanensis* and *Hynobius* sp. 1 are found in Shei-pa National Park, they show differences in microhabitat use with each other. The only overlapping site of these 2 species is located in the Hehuanshan region. The predictive DFA model has 82% classification accuracy with 5 predictive variables, including total precipitation in the dry period (Oct.-Mar.), and proximity to major roads, the coastline, rivers, and areas above 3000 m. We applied the classification rules to predict the potential distributions of salamanders in Taiwan and discussed the viability of the salamanders with respect to their population distributions and conservation. <http://zoolstud.sinica.edu.tw/Journals/45.2/244.pdf>

Key words: *Hynobius*, Conservation, GIS, Discriminant function analysis.

Taiwan is the southernmost region of distribution of hynobiid salamanders in the world (Seto and Utsunomiya 1987, Zhao and Hu 1988). The Taiwanese species, all belonging to the genus *Hynobius*, are endemic to the island, and their population sizes are extremely small (Lue et al. 1989). These salamanders reside in mountain meadows, woodlands, and broadleaf and coniferous forests, ranging from 2000 to 3650 m in elevation (Chen 1984, Lue et al. 1989 1990). They spend most of their lives under rocks and logs near standing water and small creeks in local habitats. Eggs are laid in clusters with egg sacs (Lue and Chuang 1992). The breeding seasons of these species generally range from Nov. to Jan.,

and the clutch size is usually less than 25 (Yeh 1991, Lue and Chuang 1992). Adult salamanders usually search for food actively at night under debris on the forest floor (Chen 1984, Yeh 1991), and prey mainly on sow bugs, earthworms, and other terrestrial invertebrates (Du and Lue 1982). Their natural enemies are snakes and other predators (Yeh et al. 1988).

The taxonomic status of the Taiwanese salamanders has long been debated (Lue et al. 1989, Yeh 1991, Matsui and Ota 1995, Lue and Lai 1997), mainly due to the loss of pertinent type specimens during World War II (Lue and Lai 1997) and insufficient diagnoses in the original descriptions of relevant species. From Taiwan, Maki

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