

Chapter 2-1

Endemic Species

Abstract

A total of 61 taxa from Lake Biwa are regarded as endemic at the present time. With the exception of the pleurocerid gastropod, *Semisulcospira (Biwamelania)*, endemics of Lake Biwa exhibit low evolutionary diversity. This subgenus comprises a species flock of 15 endemic species. About 60% of the endemics are classified as critically endangered, endangered, vulnerable or near threatened on the Red List of Japan.

Keywords: Endemism, Species flock, *Semisulcospira (Biwamelania)*, Red List

1. Lake Biwa as an Ancient Lake

Lake Biwa is one of the world's oldest lakes, originally formed about 4 million years ago about 50 km southeast of the present site. The present lake is roughly estimated at 400,000 years old.

About 1,700 indigenous aquatic taxa have so far been reported from Lake Biwa (Nishino, 2012). Around 100 taxa have never been found except in Lake Biwa. Of these taxa, 61 are regarded as endemic at the present time. Further investigation of the remaining taxa will be required to determine their endemism.

2. The Peculiarities of Endemism in Lake Biwa

Three species of diatom, two of vascular plants and 56 animal taxa (48 species and 8 subspecies) are presently regarded as endemic. The endemic animals comprise one sponge, two flatworm and one nematode species, 29 mollusk taxa, one annelid, four crustacean, two insect species and 16 fish taxa (Table 2-1-1).

More than 70% of the endemic taxa are either mollusks (29 taxa) or fish (16 taxa). Insects and rotifers are highly diverse groups in the lake, but despite their speciosity, only two endemic insect species and no endemic rotifers have been recorded.

Endemic taxa comprise only 4% of the total recorded aquatic taxa of the lake. There are only two endemic genera with a single species: the gastropod *Heterogen* and bivalve *Oguranodonta*. There are only one or two endemic taxa of respective

genera so far reported from the lake. On the whole, endemics of Lake Biwa exhibit low evolutionary diversity.

The sole exception is the pleurocerid gastropod, *Semisulcospira (Biwamelania)*, which comprises a species flock of 15 endemic species (Nishino and Watanabe, 2000). Members of this subgenus are widely distributed over various kinds of littoral bottoms.

3. Red List

Recent artificial environmental changes such as the construction of dikes along the shore and water level control have degraded the habitats of endemic taxa. Invasive alien fish such as *Micropterus salmoides* and *Lepomis macrochirus* from the U.S.A., have fed on or competed with indigenous and endemic fish. As a result, about 60% of the endemics (37 out of 61 taxa) have been classified as critically endangered, endangered, vulnerable or near threatened on the Red List of the Japanese Ministry of the Environment (Table 2-1-1). Of particular note is endemic fish, with 75% of their taxa (12 out of 16) classified on the Red List.

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Table 2-1-1 List of the endemic taxa of Lake Biwa with their assigned categories in the Red List of Japan (Ministry of Environment, 2012)
Categories are as follows: CR; Critically Endangered, EN; Endangered, VU; Vulnerable, NT; Near threatened, DD; Data deficient.

Taxonomic group	Scientific name	Category
Plantae		
Bacillariophyceae (diatom)	<i>Aulacoseira nipponica</i>	
	<i>Stephanodiscus pseudosuzukii</i>	
	<i>Stephanodiscus suzukii</i>	
Monocotyledoneae (monocot)	<i>Potamogeton biwaensis</i>	
	<i>Vallisneria asiatica</i> var. <i>biwaensis</i>	
Animalia		
Porifera (sponge)	<i>Spongilla inarmata</i>	DD
Platyhelminthes (flatworm)	<i>Bdellocephala annandalei</i>	CR+EN
	<i>Macrostomum kawamurai</i>	
Nematoda	<i>Raphidascaris qiqi</i>	
Gastropoda (gastropod)	<i>Heterogen longispira</i>	NT
	<i>Valvata biwaensis</i>	NT
	<i>Semisulcospira (Biwamelania) arenicola</i>	NT
	<i>Semisulcospira (Biwamelania) decipiens</i>	NT
	<i>Semisulcospira (Biwamelania) dilatata</i>	DD
	<i>Semisulcospira (Biwamelania) fluvialis</i>	DD
	<i>Semisulcospira (Biwamelania) fuscata</i>	VU
	<i>Semisulcospira (Biwamelania) habei</i>	
	<i>Semisulcospira (Biwamelania) morii</i>	NT
	<i>Semisulcospira (Biwamelania) multigranosa</i>	NT
	<i>Semisulcospira (Biwamelania) nakasekioae</i>	CR+EN
	<i>Semisulcospira (Biwamelania) nipponica</i>	NT
	<i>Semisulcospira (Biwamelania) ourense</i>	DD
	<i>Semisulcospira (Biwamelania) reticulata</i>	NT
	<i>Semisulcospira (Biwamelania) rugosa</i>	DD
	<i>Semisulcospira (Biwamelania) shirashimensis</i>	NT
	<i>Semisulcospira (Biwamelania) takeshimensis</i>	NT
	<i>Radix onychia</i>	VU
	<i>Gyraurus biwaensis</i> ¹⁾	NT
	<i>Gyraurus amplificatus</i>	
Bivalvia (bivalve)	<i>Hvynopsis schlegelii</i>	CR+EN
	<i>Unio douglasiae biwae</i>	
	<i>Inversunio reinianus</i>	VU
	<i>Clistaria plicata ciessini</i> ²⁾	NT
	<i>Lanceolaria oxyrhyncha</i> ³⁾	NT
	<i>Anodonta calyptogus</i>	VU
	<i>Quarandonta ogurae</i>	CR+EN
	<i>Corbicula sandai</i>	VU
	<i>Pisidium kawamurai</i>	
Hirudinea (leech)	<i>Ancyrobdella biwae</i>	DD
Crustacea	<i>Daphnia biwaensis</i>	
	<i>Jesogammarus annandalei</i>	NT
	<i>Jesogammarus naritai</i>	NT
	<i>Kamaka biwae</i>	
Insecta (insect)	<i>Epholon limnobium</i>	NT
	<i>Apatania biwae</i>	
Pisces (fish)	<i>Onchorhynchus masou</i> subsp.	NT
	<i>Ischikauia steenackeri</i>	CR
	<i>Gnathopogon caeruleus</i>	CR
	<i>Sarcocheilichthys biwaensis</i>	CR
	<i>Sarcocheilichthys variegatus microoculus</i>	
	<i>Squalidus chankaensis biwae</i>	VU
	<i>Carrasius auratus grandoculis</i>	EN
	<i>Carrasius cuvieri</i>	EN
	<i>Bivia yodoensis</i>	EN
	<i>Silurus biwaensis</i>	
	<i>Silurus lithophilus</i>	NT
	<i>Rhincogobius</i> sp. BW ⁴⁾	DD
	<i>Gymnogobius isaza</i>	CR
	<i>Cottus reinii</i>	
	<i>Cobitis magnostriata</i>	EN
	<i>Cobitis minamimori cumiensis</i>	EN

1), 2), 3): These species are synonymized with 1) *Choanomphalodes perstriatulus*, 2) *Clistaria plicata*, 3) *Lanceolaria grayana* in the Red List, respectively.

4): This species has not yet been described as a distinct species, but its endemism is accepted by the ichthyologist.