

Chapter 2-9

Invasive Alien Species

Abstract

The Lake Biwa ecosystem has suffered from the adverse effects of invasive alien species. Considerable efforts have been made for their regulation and control, not only through direct suppression of their abundance but also by the establishment of a new legal background and the promotion of volunteer activities.

Keywords: Invasive alien species, Submerged waterweed, Amphibious plant, Large-mouth bass, Bluegill, Alien Watcher Project

1. Aquatic Plants

The first experience of a strongly invasive alien plant in the Lake Biwa region was the overgrowth of the submerged waterweed *Elodea nuttallii* in the 1970s. This continued into the 1990s, with the replacement of *E. nuttallii* by another introduced waterweed *Egeria densa* in the 1980s. The underwater biomass of waterweeds became even more excessive after the lake experienced its lowest water level in 1995. Operation of specialized “mowing” vessels and the participation of fishermen in weed removal have been aimed at lessening these weeds’ obstruction to cruising and fishing activities and at reducing the mass of waterweeds drifting ashore. In terms of species composition, however, the major removal targets now are mostly native species which have overwhelmed these two introduced species.

In recent years, some other exotic amphibious plants have appeared such as Senegal Tea Plant *Gymnocoronis spilanthoides*, Alligatorweed *Alternanthera philoxeroides*, and a water primrose *Ludwigia grandiflora*. These plants are supposed to become seriously invasive when they cover the water surface along the shore. Collaborative removal efforts supported by the participation of volunteers have been carried out to stop their expansion and achieve local eradication.



Fig. 2-9-1 A water primrose *Ludwigia grandiflora* has rapidly spread along the shore of Lake Biwa, including the reed vegetation. Its effective removal requires extensive efforts.

2. Predatory Fishes

Introduced populations of Largemouth bass (or Black bass) *Micropterus salmoides* and Bluegill *Lepomis macrochirus* have exploded in Lake Biwa. These North American predatory fishes have caused serious impacts on the littoral fish communities and local fisheries, especially

after the middle 1980s when Largemouth Bass suddenly increased in the lake. Not a few indigenous fishes, including fisheries target species, have greatly decreased or even disappeared from the lake since then.

Commercial fishermen have been engaging in selective capture of these alien fishes since 1984. Due to the continuous proliferation of Bluegill through the 1990s, eradication efforts were intensified in 1999, including the payment of weight-related bounties from 2000. In 2003, the Shiga Prefectural Government urged recreational fishermen to cooperate not releasing the captured alien fishes and established a new ordinance for the regulation of leisure activities in Lake Biwa. In 2013, the Shiga Prefectural Government introduced an electro-fishing boat for



Fig. 2-9-2 Bluegill and Largemouth bass have become predominant in the fish community of Lake Biwa at present. They have been selectively caught by commercial fishermen to be transported to a fish-meal factory.

their effective removal. As a result, in the 2000s and after, around 300-500 tons of alien fishes have been taken from the lake annually and their estimated biomass has become less than a half in these 10 years.

3. Legal Framework

The Shiga Prefectural Government established a local ordinance for coexistence with wildlife in 2007, including the designation of certain “Local Invasive Species (LIS),” to supplement “Invasive Alien Species Act,” a national law enacted in 2005. Sixteen species including a domestic fish species have been selected as “LIS.” For effective promotion of the law and ordinance, the Nature Environment Conservation Division of the Shiga Prefectural Government carried out an “Alien Watcher Project” from 2008 to 2013, which revealed the detailed geographical distribution of 17 major alien species within the prefecture.

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Fig. 2-9-3 Japanese Aucha Perch or Oya-nirami *Coreoperca kawamebari* is an endangered species in its original range but was selected as Local Invasive Species of Shiga Prefecture.