

# Invasion by White-browed Laughing Thrushes (*Garrulax sannio*) into Central Japan

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## Abstract

The exotic White-browed Laughing Thrush (*Garrulax sannio*) has been recorded in Gunma Prefecture, central Japan, since the 1990s. We studied the distribution of this alien species, caught one individual in 2000, and found an active nest in 2001. The recorded observations were all in the southeastern region of Gunma Prefecture, except for one in Ibaraki Prefecture. The earliest record was made in 1994, as far as we know. So far, the Laughing Thrushes in Japan have been found in human-modified habitats such as secondary forests, bamboo thickets, cultivated fields, and residential areas. Because such habitats are common in rural areas of Japan, the White-browed Laughing Thrush seems to have no difficulty in expanding its region and may present problems regarding conservation of biological diversity in those areas.

**Key words:** *Garrulax sannio*, introduced species, invasive species, White-browed Laughing Thrush

## 1. Introduction

The family Timaliidae, the babblers, comprises more than 200 species, distributed for the most part in Indo-Malayan Asia and Africa (Cibois, 2003). Although no native babbler species breed in Japan (Ornithological Society of Japan, 2000), three species, the Red-billed Leiothrix, *Leiothrix lutea* (Eguchi & Masuda, 1994; Tojo, 1994), the Masked Laughing Thrush, *Garrulax perspicillatus* (Nakamura *et al.*, 1993), and the Hwamei, *G. canorus* (Sato, 2000), have invaded during the past two or three decades.

Biological invasion is one of the most serious threats to the conservation of native biodiversity, and invasion of alien birds can also cause various economic and ecological problems (Lever, 1994; Holmes & Simons, 1996; Tojo, 1996; Eguchi & Amano, 1999, 2000). Unlike most introduced bird species that prefer human-modified habitats, these babblers may penetrate deep into forests. For example, the Red-billed Leiothrix and the Hwamei have invaded natural forests on the Hawaiian Islands, where they

appear to compete with native bird species. Mountainspring and Scott (1985) explored passerine bird associations in the forests of Hawaii and found that native–exotic species pairs had a significantly greater proportion of negative partial correlations than either native–native pairs or exotic–exotic pairs. In Japan, the Red-billed Leiothrix has invaded natural deciduous forests (Eguchi & Masuda, 1994; Tojo & Nakamura, 2004). Babblers are therefore a group whose potential for invasion needs careful monitoring.

The White-browed Laughing Thrush (*Garrulax sannio*) is native to eastern, central and southern China, Hainan Island, Tibet, eastern Assam, Myanmar, Laos, Tonkin (de Schauensee, 1984) and northern Thailand (Lekagul & Round, 1991). It was never recorded in Japan until recently (Ornithological Society of Japan, 2000).

We determined the present distribution of the White-browed Laughing Thrush in Japan and also studied past records to clarify the initial stages of invasion and future problems this species may cause.

## 2. Study Area and Methods

The area where White-browed Laughing Thrushes have been observed is in the southeastern part of Gunma Prefecture (*e.g.*, Shiono, 1994; Osawa, 1997 and 1998; Maebashi City, 1999). This area is on the northwestern edge of the Kanto Plain and is surrounded by mountain ranges (including Mt. Akagi, 1,828 m) to the north and west. Although this area includes Maebashi City, the capital of Gunma Prefecture, most of the land is used for agriculture and includes rice paddies, mulberry groves, cultivated fields, secondary woods and bamboo thickets as well as residential areas.

We made observations of the Laughing Thrush from 1999 to 2001. Two of us live in the target area and had the opportunity to observe Laughing Thrushes in daily life while also gathering information from other persons. Although many photographs of the White-browed Laughing Thrush had been taken, no birds had been captured and examined in Japan. We thus captured a bird to verify the species identification. We also searched for active nests for evidence of breeding and to investigate the birds' breeding ecology.

In addition, we searched for recorded observations of the species in resources such as local newspapers and newsletters of the Gunma branch of the Wild Bird Society of Japan. We examined these materials for details on past sightings of the species. When possible, we contacted the original observers for additional details.

## 3. Results

### 3.1 Capture and breeding records

On March 18, 2000, we caught a White-browed Laughing Thrush in a mist net in a stand of bamboo in Ogo Town (Fig. 1(a)). All measurements of the bird (Table 1) were within the range for White-browed Laughing Thrushes in China (Cheng, 1987). The bird's short, rounded wings (Fig. 1(b)) suggest that it is not good at long-distance flight. We attached a metal number ring to the bird before releasing it, the first banding of this species in Japan.

We found an active nest in a residential area in Kasakake Town on April 25, 2001. The nest site was in a clump of bamboo (*Pleioblastus chino*) in a resi-

dential lot surrounded by houses, a road, and a graveyard with a small grove. A White-browed Laughing Thrush was sitting on the nest when we discovered it. The nest was set on bamboo stems (Fig. 2(a)) and contained two nestlings and two eggs (Fig. 2(b)). The eggs were pale blue and measured  $26.2 \times 20.0$  mm and  $26.5 \times 19.7$  mm. These characters are consistent with those described by Cheng (1987). The dimensions of the nest (Table 2) also were consistent with the range of those measured in China (Cheng, 1987). When we visited the nest again on May 2, the two unhatched eggs remained. The two nestlings had grown and were measured and banded (Fig. 2(c)).



(a)



(b)

**Fig. 1** A White-browed Laughing Thrush captured on March 18, 2000. (a) Overall view of the bird; (b) view of its rounded wing and long tail.

**Table 1** Measurements of White-browed Laughing Thrushes captured in Japan and China.

Location	Sex	Natural Wing (mm)	Tail (mm)	Tarsus (mm)	Exposed Culmen (mm)	Total Length (mm)	Body Weight (g)
Gunma, Japan	unknown	94.3	106.4	35.8	20.7	235	61
China	males (20)	96.5 (91.5-99.5)	108.8 (98-115.5)	38 (36-39)	21 (19-22)	228 (210-255)	67.5 (60.5-78)
(Cheng1987)	females (20)	93 (90-98)	104 (97.5-111.5)	37 (35-39)	20.6 (19.5-22.5)	215 (108*-234)	65 (57-70)

\*Assumed to be a typographical error for 208.



**Fig. 2** A White-browed Laughing Thrush nest in Kasakake Town, Gunma Prefecture. (a) Nest set among bamboo stems on April 25, 2001; (b) nestlings and eggs in the nest on April 25, 2001; (c) a nestling on May 2, 2001.

**Table 2** Measurements of nests in Japan and China.

Location	Ext. diam. (cm)	Int. diam. (cm)	Ext. depth (cm)	Int. depth (cm)
Gunma, Japan	17.4 × 13.3	9.8 × 7.6	10.7	5.5
China (10 nests, Cheng 1987)	13.8 (11-20) × 11.4 (7.5-14)	8 (6-9.5) × 8 (6-9)	9.8 (8-12)	6 (4-9.2)

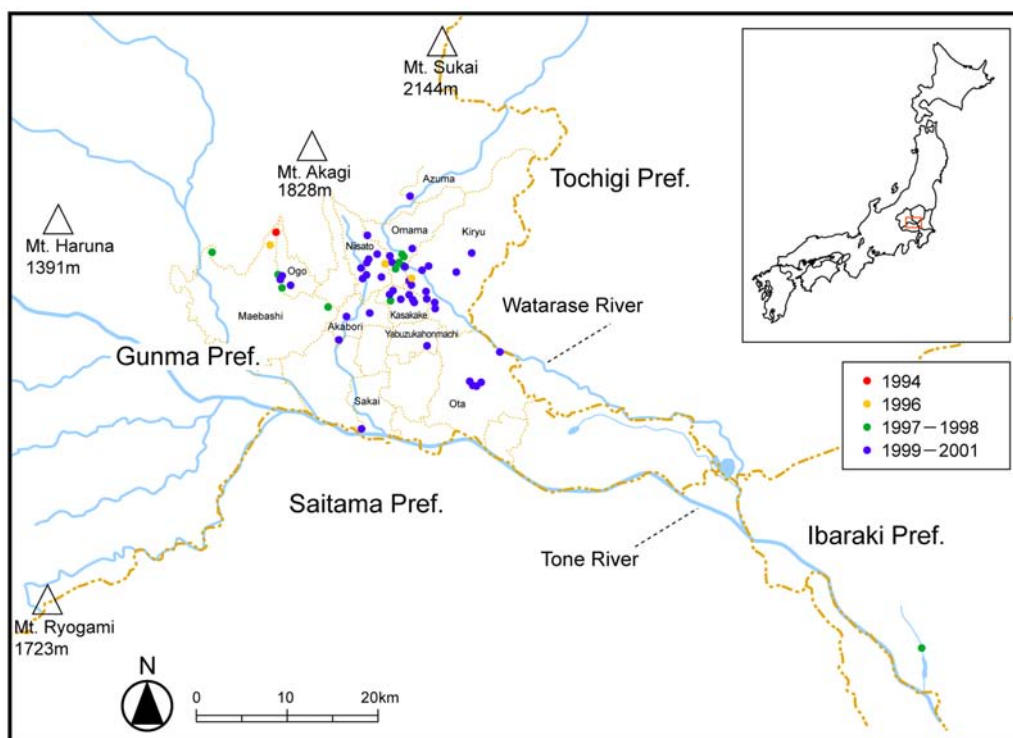
### 3.2 Distribution and habitats

During 1999–2001, we observed Laughing Thrushes at about 30 sites, including the capture site and the nesting site described above. We mapped our observations and those of others (Fig. 3). Laughing Thrushes were observed all year round and thus appeared to be residential, a characteristic of babblers (Campbell & Lack, 1985). Most recorded observations were of two to several birds, although determining the exact number of birds was difficult because they tend to live in the underbrush.

The earliest record that we could find was a photograph taken in Maebashi City in the spring of 1994 (Shiono, 1994). In 1996, Laughing Thrushes were observed over a wide area. In March 1996, one White-browed Laughing Thrush was seen in a residential area in Kiryu City (C. Miyazaki, personal

communication). In the autumn of 1996, 5–6 birds were observed in the border area between Omama Town and Niisato Village, and in February, March, and April 1997, 2–6 birds were repeatedly observed in this area. An observation was also recorded in Maebashi City in December 1996 (Osawa, 1997). In 1998, records of White-browed Laughing Thrush became common in Omama Town, including its residential areas, indicating an increased population (Osawa, 1998). In Maebashi City, White-browed Laughing Thrushes were recorded in four out of 17 census plots for a survey on the natural environment conducted from August 1997 to May 1998 (Maebashi City, 1999).

Outside Gunma Prefecture, we could find only one observation site, in Iwai City, Ibaraki Prefecture. One bird was observed on February 2, 1997, on April



**Fig. 3** Distribution of recorded observations of the White-browed Laughing Thrush. The first year of observation at each point is shown. The mapped points include reports of observations in Maebashi City (1999), Osawa (1997, 1998), and Shiono (1994).

4 and May 2, 1999, and on March 5, 2000, and two birds carrying nest materials were observed on April 27, 1999 (M. Hatori, personal communication with photographs). So far, there is no evidence for successful breeding and establishment of a stable population in Ibaraki.

Habitats in which White-browed Laughing Thrushes were observed were secondary forests, especially those with a bamboo understory, abandoned mulberry groves, cultivated fields, parks, and residential gardens. In Maebashi City, habitat types in which White-browed Laughing Thrushes occurred included broad-leaved woods, pine woods, and cultivated fields (Maebashi City, 1999). In a home garden in a residential area of Omama Town, Laughing Thrushes were observed almost every day after the spring of 1998 (Osawa 1998).

#### 4. Discussion

From the morphological traits of birds and eggs, there remains no doubt that the exotic bird observed in Japan is the White-browed Laughing Thrush. Considering the bird's strict residential nature in its native range and its wing morphology, it seems unlikely that it invaded Japan by itself. The population in central Japan, therefore, appears to derive from birds that were imported and released, whether accidentally or deliberately.

The earliest record of a White-browed Laughing Thrush that we could find was in 1994. The initial

release, however, could have been much earlier than 1994, as our results showed that this species was widely distributed by 1997–1998 (Fig. 3). The Laughing Thrush is now widely distributed in the southeastern part of Gunma Prefecture, between the Tone and Watarase rivers, about 80–500 m above sea level. If our study area was not broad enough, this may well prove to be only part of the range.

The sightings in Ibaraki Prefecture (about 60 km from the area in Gunma Pref.) indicate that long-distance dispersion of this species might occur. The birds observed in Ibaraki Prefecture might have moved along the Tone River from Gunma to Ibaraki. Although no evidence for their establishment in Ibaraki was found, such movement can result in pioneer populations in new areas.

The Laughing Thrush in the study area utilized secondary forests, bamboo thickets, cultivated fields, and residential areas as its main habitats. The preferred habitats of this species in its native areas are secondary forests, bamboo thickets, scrub, grasslands and forest edges (Swinhoe, 1867; de Schauensee, 1984; Lekagul & Round, 1991; Robson, 2000), which are similar to its habitats in Japan. Such habitats are quite common in rural areas of Japan and are probably increasing because of poor management of secondary forests, and neglect of mulberry groves formerly used for sericulture. As this species can nest in bamboo, it is unlikely that a shortage of nesting sites will limit the population size. The Red-billed Leiothrix, which nests in dwarf bamboo (*Sasamorpha borealis*), has

reached very high densities in Japanese forests into which it has penetrated (Amano & Eguchi, 2000; Tojo & Nakamura, 2004). Economic damage to agricultural products may occur if the Laughing Thrush becomes dominant, as it is reputedly a pest of crops, fruits orchards in Thailand (Lekagul & Round, 1991).

Because no natural forests occur within the present range of the White-browed Laughing Thrush in Japan, it is difficult to predict how it may penetrate natural Japanese forests, remnants of which exist mainly at high altitudes. This species is normally distributed in mountainous areas in its native range (Deignan, 1952; de Shauensee, 1984; Viney & Phillipps, 1988; Lekagul & Round, 1991; MacKinnon & Phillipps, 2000; Robson, 2000), so the harsh climate of high altitudes may not prevent invasion by this species in Japan. However, this species may actually prefer human-modified habitats to natural forests. The residential nature of the species may also have slowed expansion of its range into surrounding mountainous areas.

White-browed Laughing Thrushes may pose a problem regarding conservation of biological diversity in rural areas, one important conservation issue recently in Japan. The traditional rural landscape of Japan (called SATOYAMA) has been abandoned or destroyed by regional development projects, especially during the recent 30–40 years (Washitani 2001, Takeuchi *et al.* 2003) and many bird species once common in such a habitat have become rare and some have been red-listed (Ministry of the Environment, Japan, 2002). We suggest that the abandonment of secondary forests and mulberry fields has provided good habitats for Laughing Thrushes and the increase of such exotic bird species will have additional negative effect on declining native bird species through competition or nest predation. Monitoring surveys of bird communities in areas where Laughing Thrushes are increasing are necessary for detecting those effects.

On the other hand, competition among exotic bird species in such habitats was suggested in Hawaii (Moulton & Pimm, 1983; Moulton, 1993). Because the Hwamei's range has expanded into areas neighboring that of the White-browed Laughing Thrush in Japan, competition between these two exotic birds may arise and affect the expansion of their respective distribution ranges.

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