

F-2.2 Study on the mechanism of the population decline of long-distance migratory birds in Japan

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Abstract

In order to show the population trend of forest and wetland summer visitors to Japan, field observations, literature surveys, and questionnaire surveys were conducted in 1995-1997. Field observations and literature surveys showed that the number of seven species of summer visitors drastically declined in some areas of Japan: Black Paradise Flycatchers *Terpsiphone atricaudata*, Ashy Minivets *Pericrocotus divaricatus*, Yellow-breasted Buntings *Emberiza aureola*, Ruddy Kingfishers *Halcyon coromanda*, Brown Hawk Owls *Ninox scutulata*, Jungle Nightjars *Caprimulgus indicus*, and Porzana Crakes *Porzana fusca*.

These seven species were the focus of questionnaires sent to the members of the Wild Bird Society of Japan. It was shown that all these species declined in many areas of Japan during the past 25 years, although the pattern of decline varied somewhat by species. Natural and artificial wetlands, the breeding habitat of Porzana Crakes, had been destroyed or altered in many of the areas, suggesting that habitat destruction in Japan is the main reason for the decline of the crakes. However, serious habitat destruction and deterioration did not occur in half of the study areas of the other six forest and grassland species. Long-term observation records showed that in many areas the number of species decreased in summer visitors but did not change or increased in residents. It seems that the population decline of summer visitors is mostly associated with habitat destruction in their wintering areas of Southeast Asia.

Field and reference surveys were conducted in Sumatra, Java, Kalimantan, and Singapore. Tropical rainforests had been extensively cut in many of these wintering areas, and Japanese summer visitors were not observed there. Useful references and information could not be found for the population trends of these birds.

Some recommendations are proposed for further research and conservation in Japan and other Asian countries.

Key words Conservation, Migration, Population decline, Summer visitor, Tropical rainforest

1. Introduction

Recently, long-distance summer visitors have been declining in Japan¹⁾ and other countries^{2), 3), 4)}. In North America, many studies demonstrated the population decline of tropical migratory species, and showed that the decline resulted from habitat fragmentation and associated increase in predation and brood parasitism^{2), 3), 4)}. In Japan,

however, few studies have been conducted on this subject, and it is not well known as to which species are actually declining and which areas are severely affected.

In order to examine the population trends of summer visitors to Japan and the reasons for their decline, field observations, literature surveys, and questionnaire surveys were conducted in 1995-1997. The target species are forest and wetland birds. The study areas ranged from Hokkaido to the Tokara Islands south of Kyushu. In this report, we describe the main results of field studies in some areas and of analyses of questionnaire and literature surveys, and propose recommendations for the conservation of the birds.

Detailed results will be published separately.

2. Study areas and Study methods

Breeding distribution and population numbers of Black Paradise Flycatchers and Brown Hawk Owls were studied using maps in Higashimatsuyama in Saitama and Shizuoka-city in Shizuoka, respectively. Line censuses were conducted in Shunkunitai in eastern Hokkaido, Oiso in Kanagawa, Matsuyama in Ehime, and Nakano-shima of the Tokara Islands in Kagoshima. The results of map surveys and line censuses were compared with those of earlier studies conducted in the same areas.

Questionnaires were included with the Yacho magazine which is sent to the members of the Wild Bird Society of Japan. The seven target species were Black Paradise Flycatchers *Terpsiphone atricaudata*, Ashy Minivets *Pericrocotus divaricatus*, Yellow-breasted Buntings *Emberiza aureola*, Ruddy Kingfishers *Halcyon coromanda*, Brown Hawk Owls *Ninox scutulata*, Jungle Nightjars *Caprimulgus indicus*, and Porzana Crakes *Porzana fusca*. These are species known to be declining based on field observations and literature surveys. Information requested included name of area, habitat, observation period, observed years for each species, and habitat alterations. One hundred and forty questionnaires were returned covering about 380 areas throughout Japan.

Long-term observation records were also collected from reports published by local chapters of the Wild Bird Society of Japan. These records and the results of the questionnaire survey were used to show the distribution of areas where populations are in decline, and the annual fluctuation in number of species and in frequency of occurrence of each species throughout the observation period. Probit analysis was used on SPSS⁵⁾ to show the change in the frequency of occurrence of each species in a particular area.

3. Results and Discussion

(1) Field studies

a. Black Paradise Flycatchers in Higashimatsuyama

The breeding distribution and population numbers of this species have been monitored by Hiroshi Uchida since 1972 in a forest area of about 100 km² (Uchida 1996). In 1972, more than 90 Paradise Flycatchers were observed at 19 sites within the study area, but the population declined drastically during the 1980s and no birds were found in 1995 (Fig. 1). Habitat destruction and fragmentation have occurred during the past 25 years in this area, and about 30% of the forest has been lost. However, this extent of habitat loss does not seem to be enough to explain the local extinction of the flycatchers. There are still many woodlots of more than 10 ha in area where the flycatchers should be able to live and breed.

During the 1980s, tropical rainforest was extensively destroyed in the wintering ground of Sumatra, Indonesia. Taking the forest area of 1932 as our baseline, about 40% of the Sumatra forest was lost in only 5 years between 1980 and 1985 (Fig. 2). By contrast, 30% had been cut during the nearly 50 years between 1932 and 1980⁷⁾. Such extensive forest destruction during a short period probably negatively impacted this species and has reduced the wintering population of the birds. This period of rapid loss of forest habitat in Sumatra coincides with the period during which the population of Black Paradise Flycatchers drastically declined in Japan.

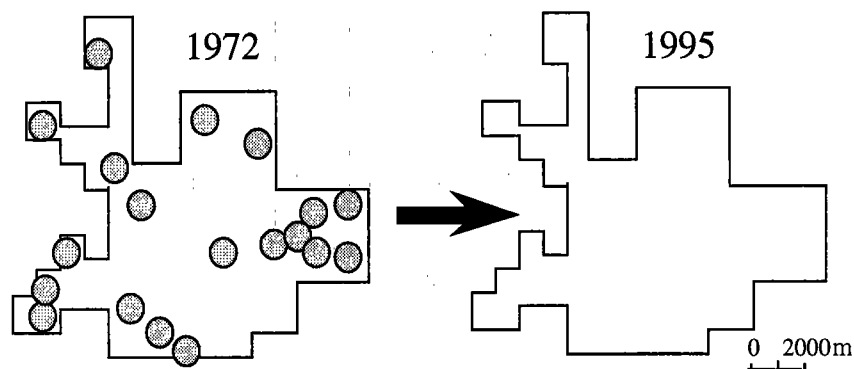


Fig. 1. Breeding sites (●) of Black Paradise Flycatchers in Higashimatsuyama, Saitama, in 1972 and 1995. From Uchida (1996)⁶⁾

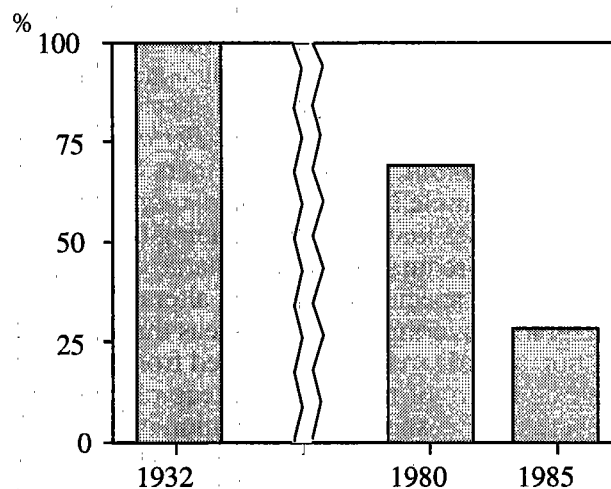


Fig. 2. Changes in forest area (area in 1932=100 %) of Sumatra, Indonesia, from 1932 through 1985. From Mackinnon and Phillipps (1993)⁷⁾

b. Summer visitors in Shunkunitai

Line censuses were conducted by Shinji Kawasaki and some others in grassland and forest habitats in June and July of 1995 and 1996, and the results were compared with those of 1983 (Fig. 3). Populations of Siberian Rubythroats *Erythacus calliope* and Black-browed Reed Warblers *Acrocephalus bistrigiceps* declined between 1983 and 1995/96, and Yellow-breasted Buntings *Emberiza aureola* were extirpated during this period. On the other hand, Stonechat *Saxicola torquata* and Middendorff's Grasshopper Warbler *Locustella ochotensis* populations increased.

In the Shunkunitai area, the ground has subsided 30-40 cm during the past 50 years, and has made this habitat wetter. However, it is not known whether this habitat change caused the population decrease or increase of the above species. No other serious habitat changes have been recognized in this area.

The decrease of Yellow-breasted Buntings and the increase of Middendorff's Grasshopper Warblers have been observed in neighboring Hashirikotan and Notsuke Peninsula. It is likely that the same population trend occurs extensively in eastern Hokkaido in each of these two species.

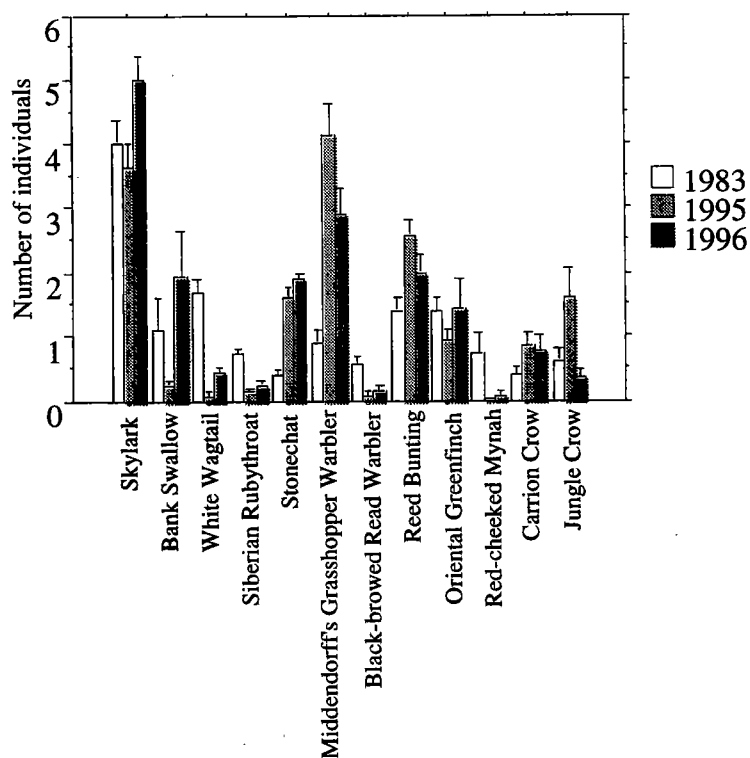


Fig. 3. An example of line census results in a grassland of Shunkunitai, Hokkaido, in 1983, 1995, and 1996. Numbers of individuals ($\bar{x} \pm se$) per census (/1km x 50m) are shown. Kawasaki et al. (1997)⁸⁾

c. Summer visitors on Mt. Komayama in Oiso

Line censuses were conducted by Tetsuichi Hamaguchi in broad-leaved evergreen and deciduous forests on Mt. Komayama and its neighboring area in the breeding season of 1996, and the results were compared with those of 1980⁹⁾.

In both years, the dominant five species were residents such as Brown-eared Bulbuls *Hypsipetes amaurotis*, White-eyes *Zosterops japonica*, Tree Sparrows *Passer montanus*, and Great Tits *Parus major*. Among summer visitors, on the other hand, Japanese Night Herons *Gorsachius goisagi*, Grey-faced Buzzard Eagles *Butastur indicus*, Ashy Minivets, Eastern Crowned Warblers *Phylloscopus coronatus*, and Narcissus Flycatchers *Ficedula narcissina* disappeared between 1980 and 1996, although populations of Blue-and-white Flycatchers *Cyanoptila cyanomelana* and Short-tailed Bush Warblers *Cettia squameiceps* did not decline.

Serious habitat alterations were not found in this and neighboring areas during the period. It is not known why the populations of only some summer visitors declined.

d. Brown Hawk Owls in Shizuoka-shi, Shizuoka

The breeding distribution and population numbers of Brown Hawk Owls were studied by Takashi Miyake and some others in central part of Shizuoka city in 1997, and the results were compared with those of 1978/79 and 1983^{10), 11), 12)}. The owls were observed at 55 sites in 1978/79, but the number of sites where owls were found decreased to 51 in 1983 and 26 in 1997 (Fig. 4). These results suggest that the drastic decline occurred after the late 1980s.

The reason for the decline was partly associated with habitat alterations such as forest destruction and cutting nest trees. However, the owls also disappeared from many sites without serious habitat changes.

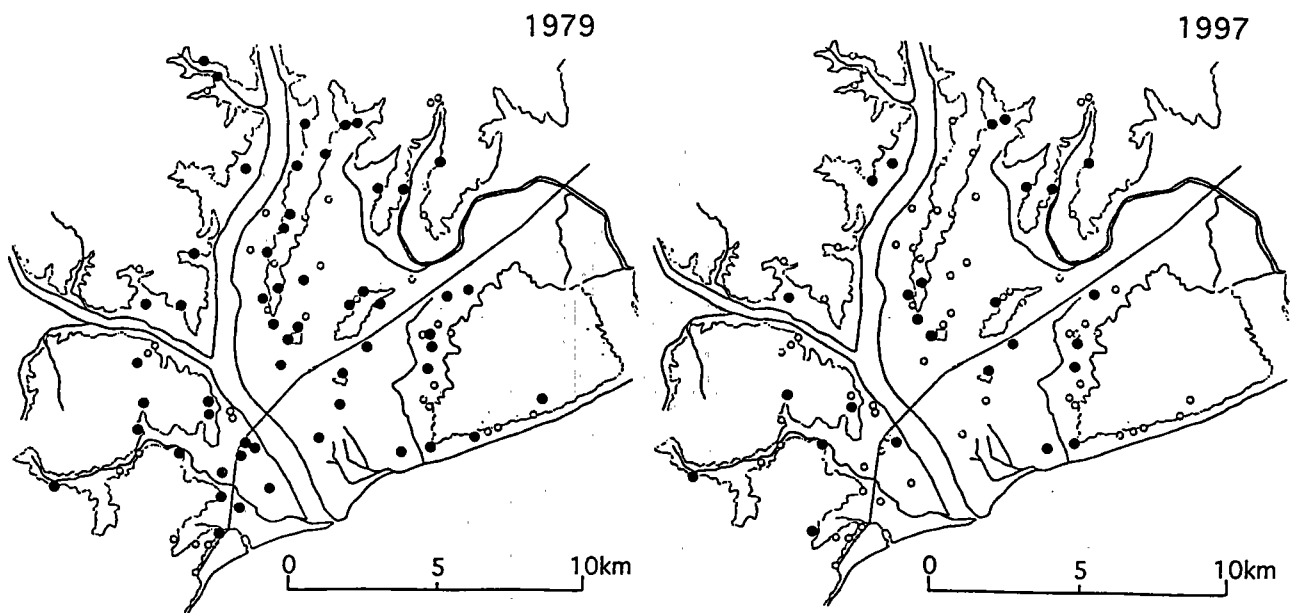


Fig. 4. Observation sites (●) of Brown Hawk Owls in Shizuoka in 1979 and 1997. White dots indicate the sites where the owls were not observed

e. Summer visitors on Nakano-shima Island in Kagoshima

Line censuses were conducted by Hiroyoshi Higuchi in three areas of broad-leaved evergreen and deciduous forests on Nakano-shima Island in June 1996. Eight species of summer visitors were observed: Ryukyu Robins *Erithacus komadori*, Black Paradise Flycatchers, Narcissus Flycatchers, Ijima's Willow Warblers *Phylloscopus ijimae*, Ashy Minivets, Ruddy Kingfishers *Halcyon coromanda*, Little Cuckoos *Cuculus poliocephalus*, and Brown Hawk Owls.

The number of singing males/5 ha was 9-16 for Ryukyu Robins, 1-3 for Black Paradise Flycatchers, Ruddy Kingfishers, Ijima's Willow Warblers, and Little Cuckoos, and 0-1 for Narcissus Flycatchers and Ashy Minivets. The density of nocturnal Brown Hawk Owls could not be determined.

Ryukyu Robins, Black Paradise Flycatchers, Narcissus Flycatchers, and Ruddy Kingfishers were found throughout the island, and were common in broad-leaved evergreen forest. Ashy Minivets and Little Cuckoos were rare throughout the island. Most of Ijima's Willow Warblers were found in some limited areas of broad-leaved evergreen forest.

(2) Questionnaire survey and long-term observation records

A nation-wide questionnaire survey showed that populations of Black Paradise Flycatchers, Ashy Minivets, Yellow-breasted Buntings, Ruddy Kingfishers, Brown Hawk Owls, Jungle Nightjars, and Porzana Crakes have declined in many parts of Japan during the past 25 years, although the pattern of decline varies somewhat by species (Fig. 5). Natural and artificial wetlands, the breeding habitat of Porzana Crakes, were destroyed or altered in many of the areas, suggesting that habitat destruction in Japan is the main reason for the decline of the crakes. However, serious habitat alterations did not occur in half of the study areas of the other six forest and grassland species.

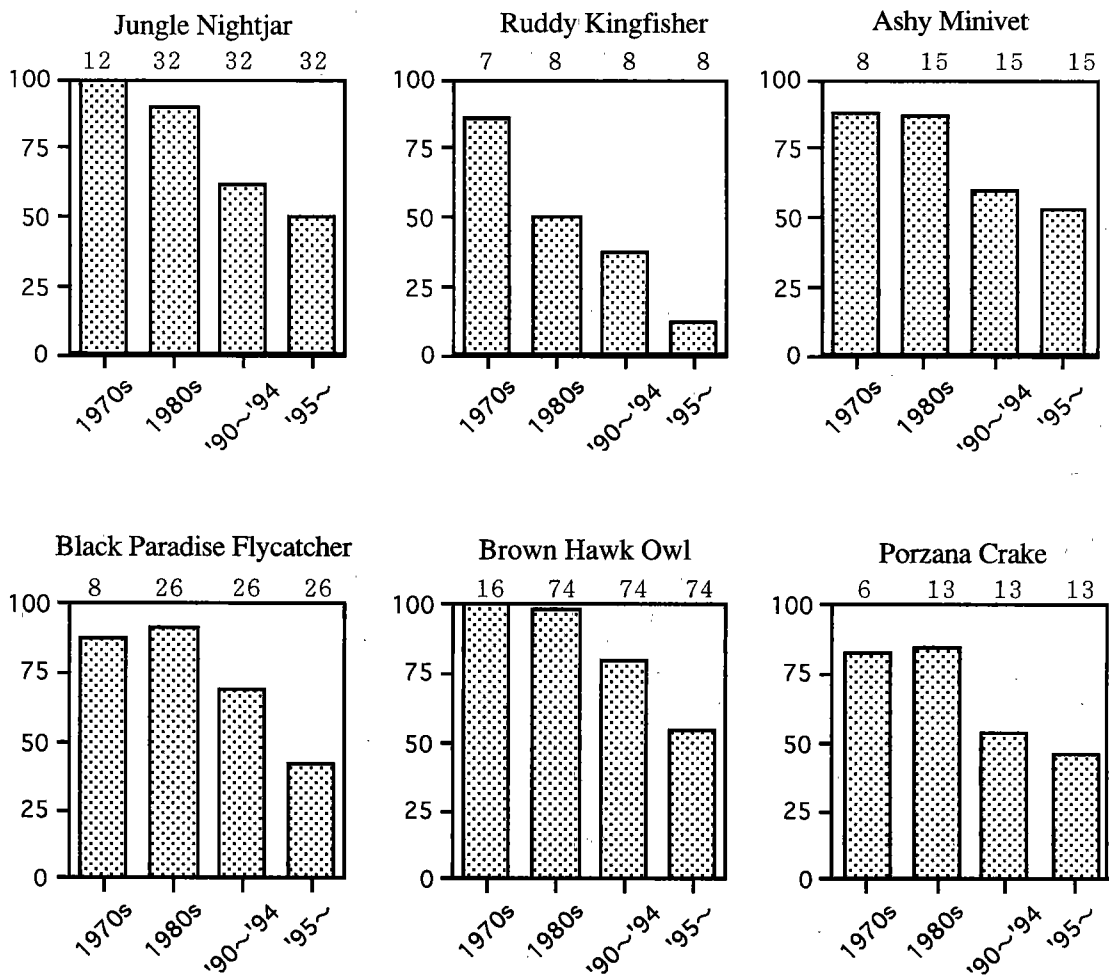


Fig. 5. Fluctuations in the frequency of occurrence (%) of seven species of summer visitors from the 1970s to the 1990s. Frequency of occurrence (%) = (Number of sites with the species ÷ total number of target sites) x 100. Each numeral above bar indicates the total number of target sites.

Long-term observation records showed that in many areas the number of species decreased in summer visitors but did not change or increased in residents (Fig. 6). Probit analysis illustrated the yearly fluctuation in the frequency of occurrence of each species in a particular area (Fig. 7). It showed that many summer visitors declined during the 1980s in many parts of Japan.

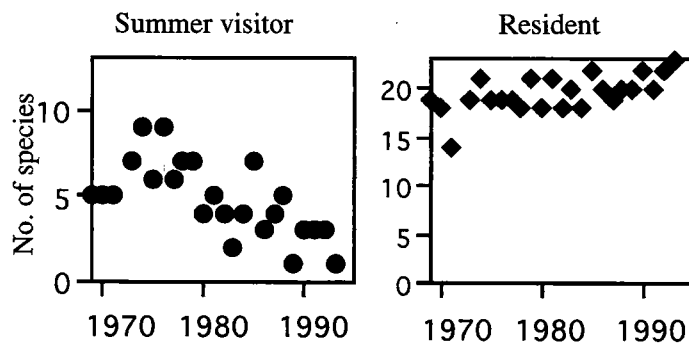


Fig. 6. Yearly fluctuations from the 1970s to the 1990s in the number of species among summer visitors and residents on Mt. Kannonyama, Gunma.

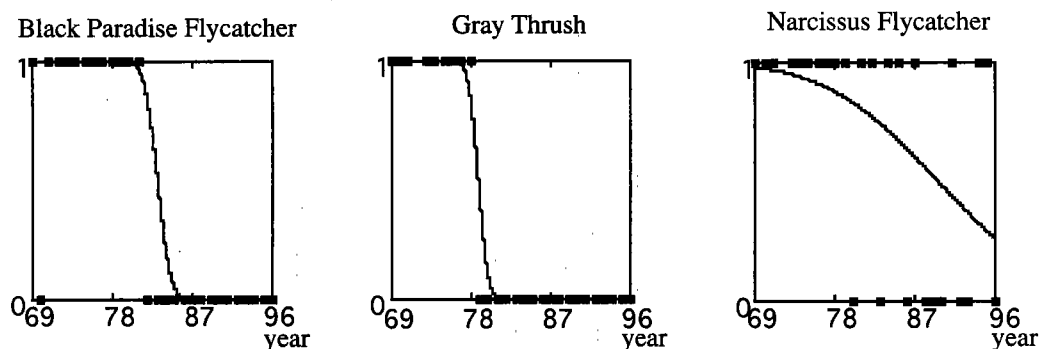


Fig. 7. Probit analysis for three species of summer visitors on Mt. Kannonyama, Gunma. Probit model was applied on SPSS⁵ to the yearly fluctuation in the frequency of occurrence (1 = presence, 0 = absence) of each species.

(3) South-East Asian survey

Field and literature surveys were conducted in Sumatra, Java, and Kalimantan in February 1997 and in Singapore in late December 1997 and early January 1998. The main purpose was to know the present state of Japanese summer visitors in their wintering habitats. Tropical rainforests had been extensively cut in many of the wintering areas, and Japanese summer visitors were not observed except an Asian Brown Flycatcher *Muscicapa latirostris* in Bogor, Java.

Useful references and information on the population trends of Japanese summer visitors could not be found. Long-term population censuses for land birds have never been conducted in South-East Asian countries.

4. Further research and conservation

It is important to study the characteristics of breeding and wintering habitats for the conservation of threatened species. Population and habitat monitoring must be promoted immediately in staging and wintering areas as well as in breeding area. In order to do so, an international network for field survey is needed. Remote sensing and GIS (geographical information system) are useful to monitor large-scale habitat changes.

A computer data base should be constructed to store and analyze large quantities of data. This information and data should be exchanged freely among scientists and conservationists and used to design action plans for the conservation of these species.

5. Acknowledgments

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