【別紙２】

論文名：Changes in the timing of spring and autumn bird migration in a coastal forest near the city of Niigata, Japan（要約）

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Changes in the timing of bird migration in spring and autumn in a coastal forest near the city of Niigata, central Honshu, Japan, were analyzed based on 27 years (1991-2017) of bird-banding records. Bird species were selected for analyses only if at least 10 different individuals were captured in at least 10 years (28 and 26 species in spring and autumn, respectively). Median capture date was calculated to assess the migration timing using the total number of individuals captured for each species. Half of the bird species studied, including all migratory types except residents, arrived or departed significantly earlier in spring due to an increase in spring temperatures. The rate of change observed in this study in spring migration timing due to changes in temperature was identical to or slightly greater than those reported in studies from other countries. The spring arrival of the Narcissus Flycatcher and the Japanese Thrush, both long-distance summer migrants to nearby mountains, became earlier (advanced) annually, however, for reasons that remained unclear because the spring temperatures did not show significant yearly trends across the 27 study years. Median capture date in autumn was significantly associated with year for five species. Of these, the median capture date of the Japanese White-eye, a resident and wandering bird, and the Black-faced Bunting, a wandering bird, advanced annually, while for the Japanese Robin and two other species (all long-distance migrants), it was delayed. Since the autumn temperature did not show significant yearly trends across the 27 study years, I hypothesized that forest succession from a simple pine forest to a mixed forest with well-developed sub-canopy and shrub layers might have strongly influenced the Japanese White-eye and the Black-faced Bunting due to an increase in breeding in the study area, resulting in an earlier median autumn capture date. Forest succession also influenced the Japanese Robin's food resources, enabling it to stay longer in the study area and resulting in a delay in autumn departure date. Autumn migration timing or behavior was controlled by temperature for only the Japanese Bush Warbler. Thus, changes in bird migration timing differed according to different environmental factors in spring and autumn.