Data Article

Data on swan arrival, departure, and population size on the Asadokoro tidal flat, Aomori Prefecture, Japan, from 1956 to 2010

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\section*{A B S T R A C T}

The arrival and departure dates and the daily maximum populations of migrating swans (Cygnus cygnus) on the Asadokoro tidal flat, Hiranai town, Aomori Prefecture, Japan, were recorded by elementary school students for more than 50 years between 1956 and 2010. The Asadokoro tidal flat, which lies along the coast of Mutsu Bay, has been designated a National Special Natural Monument, known as “The swans of Kominato and their migration grounds.” This long history of observation unfortunately came to an end with the closure of the elementary school in 2012. If analyzed together with data on environmental factors, such as temperature changes or the effects of avian influenza, this dataset could provide a potentially valuable source of information, and consequently, future secondary use of the data is anticipated.

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Specifications Table

| Subject                              | Biological Sciences |
|--------------------------------------|---------------------|
| Specific subject area                | Ecology, Behavior   |
| Type of data                         | Table               |
| How data were acquired               | Visual observations and counting |
| Data format                          | Raw                 |
| Parameters for data collection       | Long-term continuous observations were considered. Elementary school students conducted these observations systematically as an extracurricular activity over more than 50 years. |
| Description of data collection       | Elementary school students undertook observations and recording to the best of their ability. |
| Data source location                 | Hiranai Town, Aomori Prefecture |
|                                     | Japan               |
|                                     | WGS84, Latitude: 40.93894166, Longitude: 140.97181666 |
| Data accessibility                   | Mendeley data [9]   |
|                                     | Published: 28 Jan 2021|Version 1| https://doi.org/10.17632/g9tcw92bgy.1 |

Value of the Data

- Data on fluctuations in migratory bird populations were collected over a period of over 50 years, based on observations performed by elementary school students.
- The study site and swans are designated as special natural monuments of Japan [1]. It is argued that a reduction in the number of swans in Hiranai town may have led to a decline in the tourism value of the local area. The data obtained can be used to influence administrative decisions at national and regional levels.
- The data are also of potential value for analyzing changes in the number of swans flying to this site in relation to environmental factors, such as temperature [2], avian influenza [3,4], and human activities [5,6]. They may also prove useful for estimating the impact of migratory birds on the surrounding environment, such as vegetation [7,8]. For example, the arrival of migratory birds at this site has a substantial effect on the distribution of seagrass [1].

Data Description

The data presented herein relate to the size of the swan population on the Asadokoro tidal flat and the dates on which the swans arrived at and departed from the study site. Table 1 shows the dates from 1956 to 2009 on which the first swans arrived at the Asadokoro tidal flat in autumn, together with the number of individuals observed on each date, whereas Table 2 shows the dates from 1957 to 2010 (mainly in spring) when the last swans departed from the site, together with the number of individuals observed on each date. Table 3 presents the monthly maximum numbers of observed swans per day from 1960 to 2010, and Table 4 summarizes the timing of data acquisition. The raw data file was deposited in Mendeley data (http://dx.doi.org/10.17632/g9tcw92bgy.1)

Experimental Design, Materials and Methods

In each of the years from 1956 to 2010, observations and recording of swan populations were carried out almost daily at Asadokoro tidal flat (Fig. 1). Each year, students from the Asadokoro Elementary School, which was adjacent to the survey site, formed a team of dozens of individuals under the guidance of teachers, and conducted daily observations in rotation. Teachers gave the students clear instructions to count the number of swans visible from the designated observation location (Fig. 1) within the prescribed time (Table 4). If possible, they also tried to distinguish between adult and young birds. Adult birds are white, whereas young birds are gray,
Table 1
The date on which the first swans arrived at Asadokoro tidal flat and the number of individuals. The breakdown of adults and juveniles is also indicated.

| Year | Month | Day | Number of individuals | Remarks |
|------|-------|-----|-----------------------|---------|
| 1956 | 10    | 23  | 6                     |         |
| 1957 | 10    | 19  | 8                     |         |
| 1958 | 10    | 15  | 8                     |         |
| 1959 | 10    | 15  | 8                     |         |
| 1960 | 10    | 20  | 18                    |         |
| 1961 | 11    | 2   | 8                     |         |
| 1962 | 10    | 10  | 5                     |         |
| 1963 | 11    | 2   | 5                     |         |
| 1964 | 11    | 2   | 5                     |         |
| 1965 | 10    | 31  | 4                     |         |
| 1966 | 10    | 21  | 3                     |         |
| 1967 | 11    | 11  | 6                     | Adult 6 |
| 1968 | 11    | 9   | 1                     |         |
| 1969 | 11    | 7   | 4                     | Adult 3, Young 1 |
| 1970 | 11    | 1   | 3                     | Adult 3 |
| 1971 | 11    | 8   | 7                     | Adult 2, Young 5 |
| 1972 | 10    | 26  | 4                     |         |
| 1973 | 11    | 1   | 6                     | Adult 2, Young 4 |
| 1974 | 11    | 1   | 4                     | Adult 2, Young 2 |
| 1975 | 11    | 2   | 11                    |         |
| 1976 | 10    | 14  | 6                     | Adult 2, Young 4 |
| 1977 | 10    | 19  | 2                     | Adult 2 |
| 1978 | 10    | 28  | 7                     | Adult 5, Young 2 |
| 1979 | 10    | 29  | 13                    | Adult 4, Young 9 |
| 1980 | 11    | 10  | 13                    |         |
| 1981 | 10    | 20  | 24                    | Adult 20, Young 4 |
| 1982 | 11    | 4   | 2                     | Adult 2 |
| 1983 | 10    | 19  | 20                    | Adult 16, Young 4 |
| 1984 | 10    | 7   | 3                     | Adult 3 |
| 1985 | 10    | 15  | 3                     | Adult 3 |
| 1986 | 10    | 16  | 7                     | Adult 5, Young 2 |
| 1987 | 10    | 15  | 10                    | Adult 10 |
| 1988 | 10    | 17  | 16                    | Adult 16 |
| 1989 | 10    | 21  | 4                     | Adult 4 |
| 1990 | 10    | 11  | 3                     | Adult 3 |
| 1991 | 10    | 15  | 2                     | Adult 2 |
| 1992 | 10    | 15  | 30                    | Adult 26, Young 4 |
| 1993 | 10    | 16  | 5                     | Adult 4, Young 1 |
| 1994 | 10    | 21  | 18                    | Adult 14, Young 4 |
| 1995 | 10    | 24  | 7                     | Adult 7 |
| 1996 | 10    | 12  | 3                     | Adult 3 |
| 1997 | 10    | 24  | 2                     | Adult 2 |
| 1998 | 10    | 22  | 18                    | Adult 14, Young 4 |
| 1999 | 10    | 20  | 27                    | Adult 24, Young 3 |
| 2000 | 10    | 20  | 52                    | Adult 38, Young 14 |
| 2001 | 10    | 20  | 17                    | Adult 9, Young 8 |
| 2002 | 10    | 21  | 27                    | Adult 24, Young 3 |
| 2003 | 10    | 20  | 70                    | Adult 58, Young 12 |
| 2004 | 10    | 20  | 22                    | Adult 22 |
| 2005 | 10    | 24  | 135                   | Adult 103, Young 32 |
| 2006 | 10    | 24  | 36                    | Adult 33, Young 3 |
| 2007 | 10    | 25  | 96                    | Adult 88, Young 8 |
| 2008 | 10    | 31  | 39                    | Adult 30, Young 9 |
| 2009 | 10    | 20  | 1                     | Adult 1 |
Table 2
The date on which the last swans departed from Asadokoro tidal flat and the number of Individuals. The breakdown of adults and juveniles is also indicated.

| Year | Month | Day  | Number of Individuals | Remarks |
|------|-------|------|------------------------|---------|
| 1957 | 3     | 15   | 1                      | Record by Mr. Wada |
| 1958 | 2     | 11   | 28                     | Record by Mr. Wada |
| 1959 | 2     | 10   | 3                      | Record by Mr. Wada |
| 1960 | 5     | 24   | 1                      | Record by Mr. Wada |
| 1961 | 6     | 18   | 35                     |          |
| 1962 | 3     | 10   | 2                      |          |
| 1963 | 3     | 21   | 12                     |          |
| 1964 | 4     | 26   | 4                      |          |
| 1965 | 4     | 12   | 6                      |          |
| 1966 | 4     | 4    | 7                      |          |
| 1967 | 4     | 8    | 4                      | Adult 4  |
| 1968 | 4     | 8    | 5                      |          |
| 1969 | 4     | 13   | 7                      |          |
| 1970 | 4     | 6    | 4                      |          |
| 1971 | 4     | 6    | 4                      | Adult 1, Young 3 |
| 1972 | 4     | 2    | 5                      | Adult 2, Young 3 |
| 1973 | 4     | 16   | 23                     |          |
| 1974 | 4     | 20   | 1                      | Adult 1  |
| 1975 | 4     | 18   | 1                      | Adult 1  |
| 1976 | 4     | 7    | 38                     |          |
| 1977 | 4     | 12   | 2                      | Young 2  |
| 1978 | 4     | 13   | 19                     | Adult 6, Young 13 |
| 1979 | 4     | 5    | 13                     | Adult 8, Young 5 |
| 1980 | 4     | 20   | 3                      | Adult 1, Young 2 |
| 1981 | 4     | 18   | 6                      | Adult 4, Young 2 |
| 1982 | 4     | 19   | 23                     | Adult 23 |
| 1983 | 4     | 23   | 3                      | Adult 3  |
| 1984 | 5     | 14   | 2                      | Adult 1, Young 1 |
| 1985 | 5     | 4    | 2                      | Adult 1, Young 1 |
| 1986 | 4     | 28   | 4                      | Adult 4  |
| 1987 | 5     | 13   | 3                      | Adult 1, Young 2 |
| 1988 | 4     | 27   | 1                      | Young 1  |
| 1989 | 4     | 18   | 3                      | Adult 3  |
| 1990 | 4     | 19   | 2                      | Adult 2  |
| 1991 | 5     | 17   | 3                      | Adult 1, Young 2 |
| 1992 | 5     | 7    | 1                      | Young 1  |
| 1993 | 4     | 26   | 1                      | Adult 1  |
| 1994 | 4     | 27   | 4                      | Adult 2, Young 2 |
| 1995 | 4     | 28   | 3                      | Adult 3  |
| 1996 | 5     | 20   | 6                      | Adult 5, Young 1 |
| 1997 | 5     | 1    | 5                      | Adult 2, Young 3 |
| 1998 | 4     | 30   | 1                      | Adult 1  |
| 1999 | 5     | 1    | 5                      | Adult 4, Young 1 |
| 2000 | 4     | 28   | 4                      | Adult 4  |
| 2001 | 4     | 27   | 6                      | Adult 6  |
| 2002 | 4     | 22   | 7                      | Adult 6, Young 1 |
| 2003 | 4     | 30   | 3                      | Adult 2, Young 1 |
| 2004 | 4     | 23   | 3                      | Adult 3  |
| 2005 | 5     | 2    | 8                      | Adult 8  |
| 2006 | 4     | 24   | 9                      | Adult 7, Young 2 |
| 2007 | 4     | 18   | 11                     | Adult 8, Young 3 |
| 2008 | 4     | 16   | 10                     | Adult 4, Young 6 |
| 2009 | 4     | 27   | 2                      | Adult 2  |
| 2010 | 3     | 18   | 1                      | Adult 1  |
making them easy to distinguish. In this paper, we present a summary of the observational data relating to the day when the first swans arrived (Table 1), the day on which the last swans departed from the tidal flat (Table 2), and the maximum number of swans observed per day in each month of the observational period (Table 3). Tables 1 to 3 show compilations of the raw data extracted by teachers and students. The timing of observations is given in Table 4. As some of the raw data are missing, it is not possible to provide the timing of observations prior to
Table 4
Timing of observations. ◦ = research was conducted. R = rest, no research. N.D. = no data (although the original data were lost, conditions appear to have been similar to those in the previous and subsequent years.

| Fiscal year | Survey time zone AM | PM | Weekend AM | PM | New Year |
|-------------|---------------------|----|------------|----|----------|
| 1966        | 8:00                | 3:00| o          | o  | o        |
| 1967        | 8:00                | 3:00| o          | o  | o        |
| 1968        | 8:00                | 3:00| o          | o  | o        |
| 1969        | N. D.               | N. D.| N. D.     | N. D.| N. D.   |
| 1970        | 8:00                | 3:00| o          | o  | o        |
| 1971        | 8:00                | 3:00| o          | o  | o        |
| 1972        | N. D.               | N. D.| N. D.     | N. D.| N. D.   |
| 1973        | 8:00                | 3:00| o          | o  | o        |
| 1974        | 8:00                | 3:00| o          | o  | o        |
| 1975        | N. D.               | N. D.| N. D.     | N. D.| N. D.   |
| 1976        | 8:00                | 3:00| o          | R  | o        |
| 1977        | 8:00                | 3:00| o          | R  | o        |
| 1978        | 8:00                | 3:00| o          | o  | o        |
| 1979        | 8:00                | 3:00| o          | o  | o        |
| 1980        | 8:00                | 3:00| o          | o  | o        |
| 1981        | 8:00                | 3:00| o          | o  | o        |
| 1982        | 8:00                | 3:00| o          | o  | o        |
| 1983        | 8:00                | 3:00| o          | o  | o        |
| 1984        | 8:00                | 3:00| o          | o  | o        |
| 1985        | 8:00                | 3:00| o          | o  | o        |
| 1986        | 8:00                | 3:00| o          | o  | o        |
| 1987        | 8:00                | 3:00| o          | o  | o        |
| 1988        | 8:00                | 3:00| o          | o  | o        |
| 1989        | 8:00                | 3:00| o          | o  | o        |
| 1990        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 1991        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 1992        | 8:00                | 3:00| R          | R  | R (28 Dec - 5 Jan) |
| 1993        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 1994        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 1995        | 8:00                | 3:00| R          | R  | R (28 Dec - 7 Jan) |
| 1996        | 8:00                | 3:00| R          | R  | R (28 Dec - 5 Jan) |
| 1997        | 8:00                | 3:00| R          | R  | R (29 Dec - 4 Jan) |
| 1998        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 1999        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 2000        | 8:00                | 3:00| R          | R  | R (28 Dec - 3 Jan) |
| 2001        | 8:00                | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 2002        | 10:00               | 3:00| R          | R  | R (28 Dec - 5 Jan) |
| 2003        | 10:00               | 3:00| R          | R  | R (29 Dec - 4 Jan) |
| 2004        | 10:00               | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 2005        | 10:00               | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 2006        | 10:00               | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 2007        | 10:00               | 3:00| R          | R  | R (29 Dec - 3 Jan) |
| 2008        | 10:00               | 3:00| R          | R  | R (27 Dec - 4 Jan) |
| 2009        | 10:00               | 3:00| R          | R  | R (18 Dec - 18 Jan) |

1965; however, it is assumed that data were acquired according to schedules similar to those used after 1966, as summarized in Tables 1 to 3. From 1966 to 1989, observations were carried out from the time of arrival of the first swans to their departure, including during the year-end and New Year holidays and weekends. However, after 1990, observations were suspended for approximately one week during the year-end and New Year holidays, and observations were not made on Saturdays or Sundays. In 2009, observations were conducted only on Tuesdays and Thursdays, as contact with wild birds at this time was discouraged owing to the death of swans from avian influenza in Aomori Prefecture in 2008 [3,4]. However, during arrival and departure periods, intensive observations were carried out regardless of the day of the week.
Fig. 1. Study site. The figure was modified from a Google Earth Pro image. The red ellipse indicates the area around which the elementary school students walked to observe the swans. The blue ellipse indicates the approximate area in which the swans under observation were present.

Observations were conducted twice daily, at approximately 8:00 am before the start of classes and at approximately 3:00 pm after classes had finished. From 2002 until the final year of observations in 2010, the timing of the morning survey was changed to approximately 10:00 am, coinciding with the morning break. Observations during each survey period were conducted for approximately 20 min. Of the two daily counts, the one yielding the largest number of individuals was taken as the population number for that particular day. Given that swans differ considerably from other migratory birds that fly to this area with respect to size and color, it is assumed that the elementary school students are unlikely to have confused the swans with other species. However, it is conceivable that they may not have been able to distinguish between the whooper swan *Cygnus cygnus* and the tundra swan *C. columbianus*. Nevertheless, the results of a recent survey conducted by the Hiranai Society for Swan Protection have indicated that most of the swans observed in this area are whooper swans (Mitsuya et al., unpublished data).

Although the survey was conducted for the final time in the fiscal year 2010, the data for that year were excluded from the dataset presented herein, owing to the lack of certain population
data. In March 2012, Asadokoro Elementary School closed down, and the monitoring of swans that had continued for more than 50 years ended. To date, there has been no resumption of similar monitoring.

**Ethics Statement**

Not applicable.

**CRediT Author Statement**

**Masaki Ogata**: Resources, Writing - Original Draft; **Takeshi Mitsuya**: Resources, Data Curation; **Yoshiyuki Tanaka**: Data Curation, Funding acquisition, Writing - Review & Editing.

**Declaration of Competing Interest**

The authors declare that they have no competing financial interests or personal relationships that influenced or could be perceived to have influenced the work reported in this article.

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