Presence/Absence Point Records of Japanese Serow (*Naemorhedus crispus*) with Environmental Predictors in the Fuji-Tanzawa Region, Japan

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Abstract: The Japanese Serow (*Naemorhedus crispus*) is endemic to Japan, and has been designated as a Japanese natural monument. We produced a total of 319 point records of Japanese Serow occurrence (160 presence records and 159 absence records), with data for 14 environmental predictors. The environmental predictors were altitude, slope, annual precipitation, annual maximum temperature, annual minimum temperature, distance to rivers, distance to all roads, distance to highways, distance to general roads, distance to paths and stone steps, distance to wide roads (>13 m), distance to narrow roads (≤13 m), the normalized difference vegetation index), and the vegetation cover types at the vegetation community level. The data formats were CSV format (.csv), Google Earth (.kmz), and Arc/Info (.shp). The projected datum was the Japanese Geodetic Datum 2000. The spatial resolution of raster data used to produce the dataset was 50 m. The data size was 43 KB for CSV (.csv), 29 KB for Google Earth (.kmz), and 249 KB for Arc/Info (.shp) format.

Keywords: Fuji-Tanzawa region; Japan, species records; Japanese Serow; point data

1 Introduction

The Japanese Serow (*Naemorhedus crispus*) is endemic to Japan (Figure 1). The species inhabits montane regions of Honshu, Shikoku, and Kyushu[1]. Once overhunted for meat and fur, it became so rare that the government of Japan declared it a national treasure[2]. It has subsequently been designated a Japanese natural monument. Since then, its population has recovered[2].

We produced a total of 319 point records of Japanese Serow occurrence (160 presence records and 159 absence records), with data for 14 potential predictors.

(A) The government of Japan pays special attention to the Japanese Serow and has produced a stamp calling for its preservation (The Japanese Serow featured on a 1952 stamp)

(B) Japanese Serow[3] (length: est. 80 cm, weight: est. 35 kg[4])

(C) Japanese Serow's diet[3]

Figure 1   Photographs of Japanese Serow

2 Metadata of Dataset

The metadata regarding Japanese Serow occurrence, together with the data for the environmental predictors in the Fuji-Tanzawa region in Japan ("JpSerow_env_FT")[5] are listed in Table 1 (Japanese Serow occurrence with data for environmental predictors in the Fuji-Tanzawa region in Japan ("JpSerow_env_FT" for short)).

3 Methods

A full description of the method can be found in the work of Doko and Chen[1] and Doko[7]. Here, we summarize the main methods used to produce the dataset.

3.1 Study Area

The study was conducted in the Fuji and Tanzawa region of Japan (35°10′ to 35°40′ N and 138°30 to 139°20′ E in Japanese Geodetic Datum 2000, Figure 2). The study area is mountainous and includes Fuji National Park, as well as Tanzawa Quasi-National Park. These parks contain various landscapes and are characterized by a very high biodiversity, including the occurrence of a number of endemic species[1,9].

3.2 Extraction of Species Records

First, a map containing the 160 observed point localities for Japanese Serow in the Tanzawa region[3] was scanned. This map was created based on questionnaires and interviews with surveyors from the Research Group of the Tanzawa Mountains (57 respondents), whose research was conducted from 1993 to 1996, nature guides from prefectural parks (100 respondents), members of nature conservation groups (32 respondents), mountaineering associations (72 groups), and other respondents[3]. These selected respondents were considered to represent people likely to have knowledge and information regarding Japanese Serow in the Tanzawa Mountains. The purpose of this activity was to collect information regarding the Japanese Serow inhabiting the Tanzawa Mountains, because the distribution and habitat of this species in Tanzawa was completely unknown[3]. The extent of the map included the entire area of the Tanzawa region.

Table 1   Japanese Serow occurrence with data for environmental predictors
in the Fuji-Tanzawa region in Japan ("JpSerow_env_FT" for short)

Items	Description
Dataset full name	Japanese Serow occurrence with data for environmental predictors in the Fuji-Tanzawa region in Japan
Datasen short name	JpSerow_env_FT
Authors	Doko, T. L-6494-2016, Keio Research Institute at SFC, Keio University, Japan, doko-chan@ sfc.keio.ac.jp Chen, W. B. L-5715-2016, Keio Research Institute at SFC, Keio University, Japan, chenwb3@ gmail.com
Geographical region	Asia from latitudes 35°10′ to 35°40′ N and 138°30 to 139°20′ E in Japanese Geodetic Datum 2000
Year of dataset	2013
Spatial resolution	50 m
Data format	.csv, .kmz, .shp
Data size	43 KB for CSV (.csv), 29 KB for Google Earth (.kmz), and 249 KB for Arc/Info (.shp)
Foundation(s)	International Institute for Geo-information Science and Earth Observation (ITC), a Grant-in-Aid for Japan Society for the Promotion of Science (JSPS) Fellows 2012 (KAKENHI No.23-4520), and the International Program for Environmental Innovators, Keio University through Strategic Funds for the Promotion of Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn/
Address	No.11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	*Data* from the Global Change Research Data Publishing & Repository includes metadata, datasets (data products), and publications (in this case, in the *Journal of Global Change Data & Discovery*). *Data* sharing policy includes: (1) *Data* are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use *Data* subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute *Data* subject to written permission from the GCdataPR Editorial Office and the issuance of a *Data* redistribution license; and (4) If *Data* are used to compile new datasets, the 'ten per cent principal' should be followed such that *Data* records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[6]

The scanned map was then geo-referenced. The map was suitable for georeferencing, with the locations of rivers identified in the map so that authors could find ground control points easily. A first-order polynomial affine transformation was applied to rectify the scanned image. The associated root mean square (RMS) error was 251 m. Based on the rectified image, 160 points were digitized manually. Geographic coordinates were calculated by ArcMap®.

Due to the lack of accurate absence data for the Japanese Serow, absence data were obtained from a national distributional map of Japanese mammals[10] using a previously described method[9]. A total of 160 absence points was generated. The national distribution map of Japanese mammals is composed of grid cells measuring 5×5 km^2 across Japan. However, instead of using grid cells directly, this method plots random points inside the polygons where no serows were observed between 1978 and 2003. Hence, the spatial resolution of the absence points was considered to be comparable to the presence data.

3.3 Geo-database for the Environmental Predictors

Based on the known ecology of the Japanese Serow[3,11–13], the following environmental

(A) Study area in bird's-eye view, processed
from Landsat ETM+ images and DEM

(B) Area of interest in bird's-eye view, processed
from Landsat TM images and DEM[8]
A red circle indicates an approximate range of area of interest.
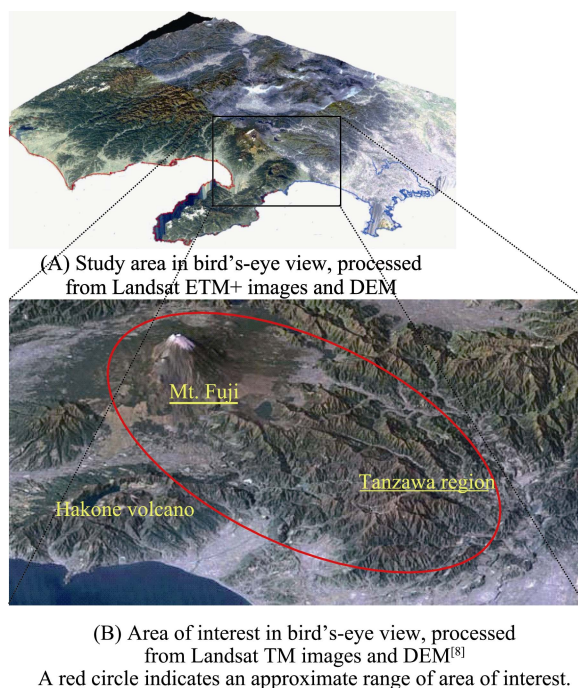
Figure 2 The study area of the Fuji-Tanzawa region, Japan (DEM = digital elevation model)

predictors, which can potentially influence the serow's distribution, were selected: altitude, slope, annual precipitation, annual maximum temperature, annual minimum temperature, distance to rivers, distance to all roads, distance to highways, distance to general roads, distance to paths and stone steps, distance to wide roads (>13 m), distance to narrow roads ($\leqslant$ 13 m), the normalized difference vegetation index (NDVI), and the vegetation cover types at the vegetation community level. A threshold value of 13 m was used for the road width, because this would encompass two or more lanes, and it was assumed that it would be difficult for animals to cross such a road.

Precipitation data were derived in ESRI (Redlands, CA, USA) grid format at a resolution of 1×1 km^2 (30 arc-seconds) from the WorldClim database[14]. The annual precipitation was calculated from the precipitation data for 12 months. The minimum and maximum temperature were derived from the WorldClim database. The annual minimum and maximum temperature were calculated. The NDVI was derived from the red:near-infrared reflectance ratio. NDVI = (NIR−RED)/(NIR+RED), where NIR and RED are the amounts of near-infrared and red light, respectively, that are reflected by the vegetation and captured by the sensor of the satellites. NDVI values range from −1 to +1, where negative values correspond to an absence of vegetation. All variables were obtained digitally from various sources (Table 2) and stored in a geographic information system (GIS) environment. Considering the relatively small size of important landscape elements in the Japanese landscape and the high precision of the species records, all predictor variables were compiled at a resolution of 50×50 m^2. Erdas Imagine® 8.7 was used to calculate NDVI values. ArcGIS® 9.3 was used for the other variables.

Table 2   Potential environmental predictors of Japanese Serow

Category (Source)		Environmental predictor	Unit
Topography (digital elevation model (DEM) data from Shuttle Radar Topography Mission (SRTM))		Altitude	m
		Slope	°
Climate data (WorldClim)		Annual mean precipitation	mm
		Annual minimum temperature	°C
		Annual maximum temperature	°C
Water resources (Digital Map 25000 and Global Map Japan Ver.1)		Distance to rivers	m
Roads (Digital Map 25000)	All	Distance to all roads	m
		Distance to highways	m
	Type	Distance to general roads	m
		Distance to paths and stone steps	m
	Width	Distance to wide roads (more than 13 m)	m
		Distance to narrow roads (less than 13 m)	m
Vegetation (Landsat-7 ETM+ from the Global Land Cover Facility (GLCF) for the NDVI and a GIS dataset from the Ministry of the Environment (MOE) for vegetation cover)		Normalized difference vegetation index (NDVI)	N/A
		Vegetation cover types (at the vegetation community level)	N/A

The image processing procedures specified in the paper[9] were applied.

When 320 records were plotted in ArcMap 9.3® with other environmental variables, one absence record fell outside the study area. This record was discarded from the species data, and the total number of records became 319. Pixel values were extracted from all layers of environmental predictor variables by ArcMap 9.3® to obtain the geographic coordinates of the records of presence and absence.

Figure 3 shows a flow chart of JpSerow_env_FT data production. Table 3 describes the
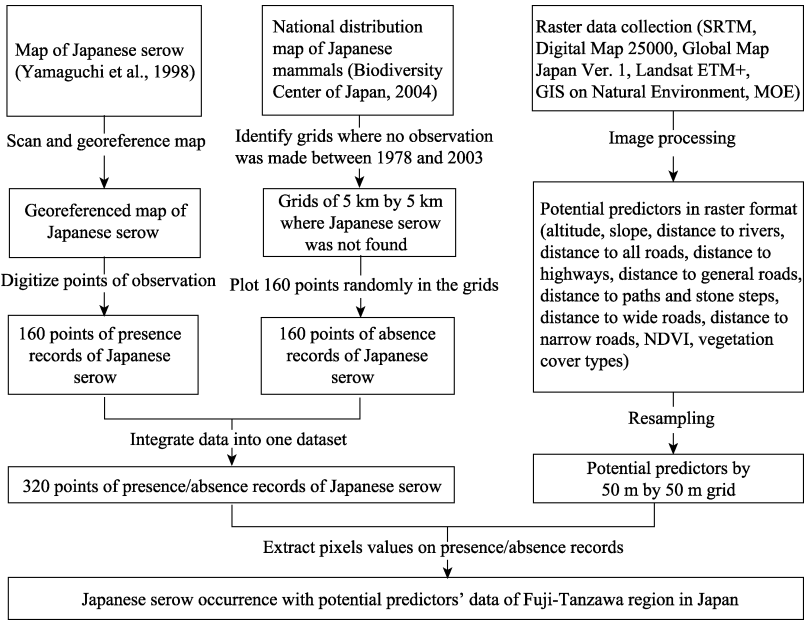

Figure 3   Flow Chart of the dataset development

Table 3   Description of the JpSerow_env_FT data

Variables	Code (attribute)	Data types	Numerical precision
Species scientific name	SPECIES	Factor	–
X coordinate in WGS 84 UTM Zone 54	X	Numeric	1 m
Y coordinate in WGS 84 UTM Zone 54	Y	Numeric	1 m
Presence or Absence data	1 or 0	Logical [*1]	–
Name of location where species were observed	AREA	Factor	–
Year of observation	YEAR	Factor	–
Altitude	DEM	Numeric	1 m
Slope	SLOPE	Numeric	1 angular degree
Annual mean precipitation	PREP	Numeric	1 mm
Annual minimum temperature	TMIN	Numeric	1 °C
Annual maximum temperature	TMAX	Numeric	1 °C
Distance to all roads	DIS_ROAD	Numeric	1 m
Distance to highways	HIGHWAY	Numeric	1 m
Distance to general roads	NORMALROAD	Numeric	1 m
Distance to paths and stone steps	SMALLSTREET	Numeric	1 m
Distance to wide roads (more than 13 m)	WIDEROAD	Numeric	1 m
Distance to narrow roads (less than 13 m)	NARROWROAD	Numeric	1 m
Distance to river streams	RIVER	Numeric	1 m
Value of the normalized difference vegetation index (NDVI)	NDVI	Numeric	0.000,001
Vegetation cover types	VEG	Factor [*2]	–
X coordinate in Japanese Geodetic Datum 2000	LAT	Numeric	0.000,000,1 degree
Y coordinate in Japanese Geodetic Datum 2000	LONG	Numeric	0.000,000,1 degree

[*1] Note. 1 means presence, 0 means absence.
[*2] Note. Vegetation cover types are coded by four digits.

meaning of the columns in the JpSerow_env_FT database. Table 4 provides an additional explanation of the meaning of the vegetation code (VEG) in Table 3.

Figure 4 shows Japanese Serow records, with an ESRI satellite imagery basemap, and roads

Table 4   Look-up-table for the vegetation code [VEG] and its meaning

Code [VEG] [*1]	6veg.cover	15veg.cover
2005	Subalpine zone	Subalpine evergreen needleleaf forest
2020	Subalpine zone	Subalpine broad-leaved deciduous forest
3008	Others	Logged forest
4015	Montane zone	Montane zone broad-leaved deciduous forest
4024	Montane zone	Montane zone broad-leaved deciduous forest
4028	montane zone	Montane zone broad-leaved deciduous forest
4030	Montane zone	Montane zone evergreen needleleaf forest

(*Continued*)

Code [VEG][*1]	6veg.cover	15veg.cover
4093	Montane zone	Montane zone broad-leaved deciduous forest
4110	Montane zone	Montane zone broad-leaved deciduous forest
4132	Montane zone	Montane zone broad-leaved deciduous forest
5009	Montane zone	Montane zone broad-leaved deciduous forest
5020	Montane zone	Montane zone broad-leaved deciduous forest
5035	Montane zone	Montane zone broad-leaved deciduous forest
5042	Others	Grass field
5046	Others	Grass field
5049	Others	Grass field
5055	Others	Grass field
5066	Others	Logged forest
6002	Low country	Low country evergreen needleleaf forest
6020	Low country	Low country broad-leaved evergreen forest
6039	Low country	Low country broad-leaved deciduous forest
6074	Low country	Low country broad-leaved evergreen forest
6120	Low country	Low country broad-leaved deciduous forest
7002	Low country	Low country broad-leaved deciduous forest
7006	Low country	Low country broad-leaved deciduous forest
7011	Low country	Low country broad-leaved deciduous forest
7012	Low country	Low country broad-leaved deciduous forest
7013	Low country	Low country broad-leaved deciduous forest
7017	Low country	Low country broad-leaved evergreen forest
7036	Others	Logged forest
7040	Others	Logged forest
7054	Others	Grass field
7061	Others	Grass field
7069	Others	Grass field
7072	Others	Developed land
7081	Low country	Low country evergreen needleleaf forest
7095	Others	Dry riverbed or bare land
8054	Others	Grass field
9006	Plantation	Planted evergreen needleleaf forest
9011	Plantation	Planted evergreen needleleaf forest
9013	Plantation	Planted evergreen needleleaf forest
9016	Plantation	Planted evergreen needleleaf forest
9023	Plantation	Planted broad-leaved needleleaf forest
9055	Others	Arable land
9062	Others	Arable land
9064	Others	Arable land
9066	Others	Arable land
9068	Others	Arable land
9070	Others	Arable land
9072	Others	Arable land
9082	Others	Grass field
9083	Others	Grass field

(*Continued*)

Code [VEG] [*1]	6veg.cover	15veg.cover
9095	Others	Developed land
9098	Others	Arable land
9902	Others	Developed land
9905	Others	Developed land
9915	Others	Developed land
9919	Others	Developed land
9931	Others	Dry riverbed or bare land
9933	Others	Dry riverbed or bare land

[*1] Note: The four-digit vegetation code [VEG] is equivalent to "MAJOR1" in the Japanese standard classification legend of the second to fifth vegetation maps prepared by the Ministry of Environment (See http://vegetation.jp/qanda/xls/hanrei-taiou. xls)[15].
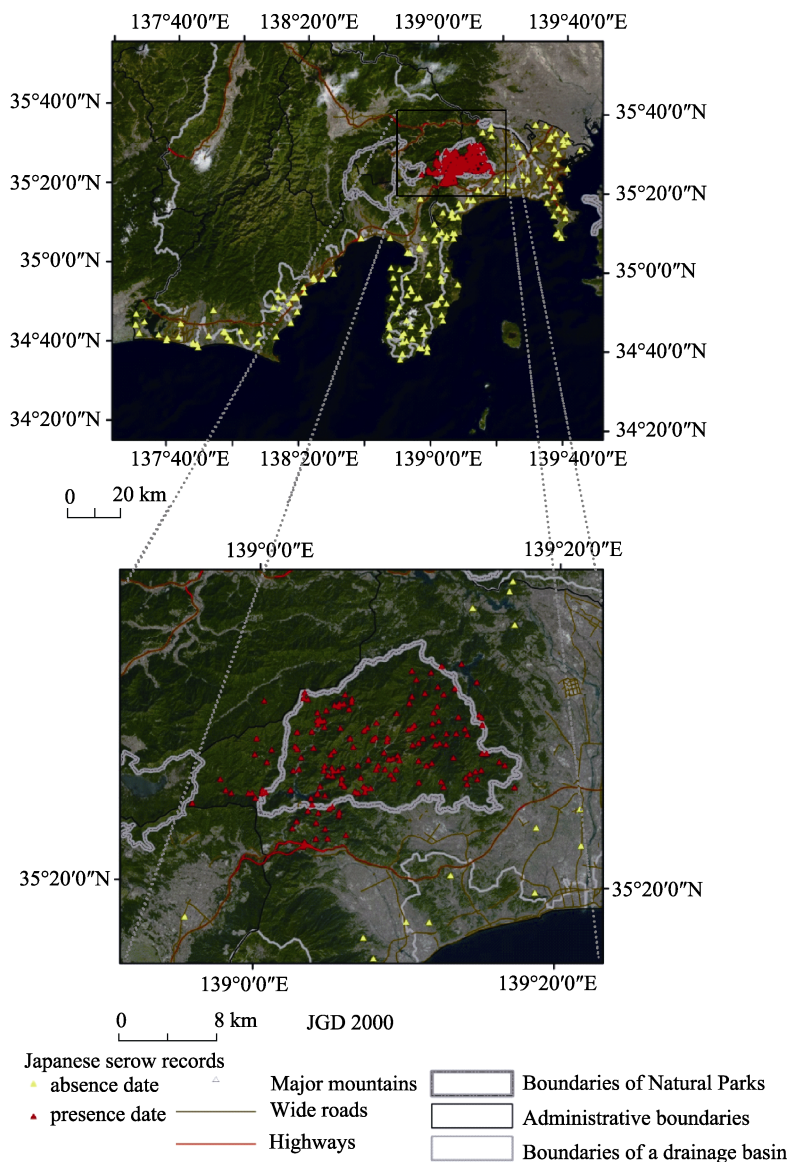

Figure 4 Map of Japanese Serow records, with an ESRI satellite imagery basemap, and roads and boundaries

and boundaries. The point records indicated as Japanese Serow records (red and yellow tri-angles) in the map are available as a dataset through this study. Other items such as major mountains, wide roads, highways, boundaries as well as ESRI satellite imagery basemaps were not included in the dataset.

4 Dataset Quality Control and Validation

The dataset has been validated by researchers from Keio University in Japan. The associated RMS error was 251 m for a scanned map of Japanese Serow occurrences.

5 Conclusion

This dataset provides a record of presence/absence data for Japanese Serow, which is en-demic to Japan, with records associated with environmental predictors. The environmental predictors are altitude, slope, annual precipitation, annual maximum temperature, annual minimum temperature, distance to rivers, distance to all roads, distance to highways, dis-tance to general roads, distance to paths and stone steps, distance to wide roads (>13 m), distance to narrow roads (≤13 m), the NDVI, and vegetation cover types at the vegetation community level.

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