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# Records of sika deer *Cervus nippon* from the southern Kuril Islands in 1986–2019, with special reference to a continuous record of living deer on Kunashir Island since 2017

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**Abstract.** The sika deer (*Cervus nippon*) is native to eastern Asia and commonly occurs on Hokkaido Island, northern Japan. The nearby localities of the southern Kuril Islands, located east of Hokkaido, have not been regarded as part of the sika deer’s regular range, despite isolated observations and trace evidence described before 2017. Here we consolidate the information of the sika deer in the southern Kuril Islands since 1986 with new information that establishes a continuous record of living sika deer on Kunashir Island from 2017 to 2019.

**Key words:** *Cervus nippon*, Chishima Islands, Habomai Islands, Kunashiri Island.

The sika deer (*Cervus nippon* Temminck, 1838) was originally widespread throughout East Asia but today is now restricted to Japan (Hokkaido, Honshu, Kyushu, Shikoku, and some adjacent small islands) and some isolated regions of Far Eastern Russia, North Korea, China, and Vietnam. The species has also been introduced outside of its native range to Europe, North America, and New Zealand (Baryshnikov et al. 1981; McCullough et al. 2009; Harris 2015; Nagata 2015). Isolated reports of single individuals have been noted from Kunashir (Kunashiri), Tanfilieva (Suisho), and Zelenyi (Shibotsu) Islands of the southern Kuril Islands in 1970’s and 1980’s, respectively, but all of them were hunted or otherwise disappeared soon after their observation (Voronov and Voronov 1977; Voronov 2011; Pavlinov and Lisovsky 2012). Therefore, it has been thought that the southern Kuril Islands is not part of the regular range of the sika deer, although Voronov and Voronov (1977) suggested that sika deer might have inhabited the Lesser Kuril Chain in previous centuries. Recently, the sika deer have been often observed on Kunashir Island, which may affect the ecological condition of the island, but there have no offi-

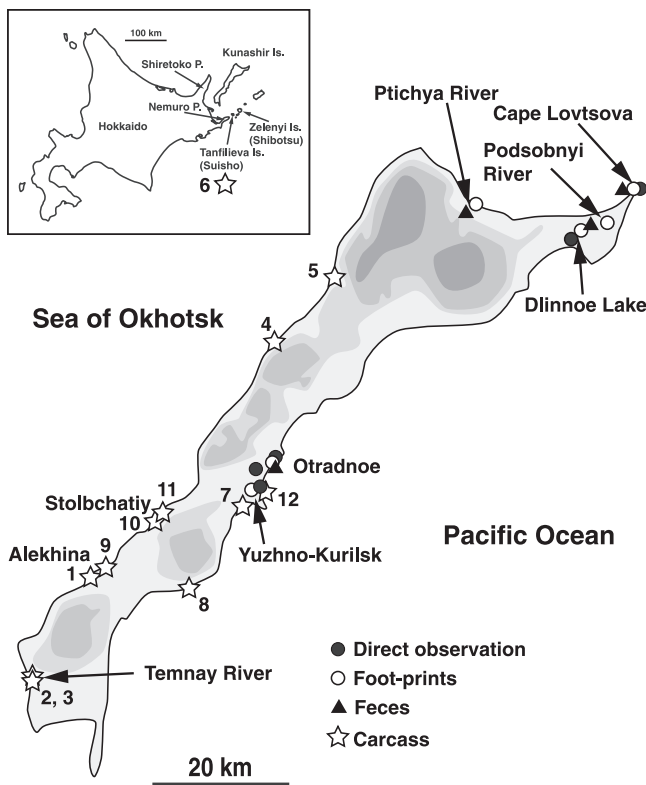
cial records of deer since late 1980’s. Since 1986, State Nature Reserve “Kurilskiy” staff have documented the occurrence of deer on the southern Kuril Islands. Here, we build on these records and combined multiple types of evidence to confirm the presence of sika deer from Kunashir Island and the Lesser Kuril Chain from 1986 to 2019.

Usage of names for island groups in the “Kuril” or “Chishima” Islands is complicated, and there is no biunique names of the island groups between Russia and Japan. In this paper, “the southern Kuril Islands” includes Iturup (Etorofu) Island, Kunashir Island, and the Lesser Kuril Chain (= the Habomai Islands + Shikotan Island).

## Methods

Information about the sika deer on Kunashir Island and the Lesser Kuril Chain was obtained accidentally by staff members of the State Nature Reserve “Kurilskiy” and other people (local residents and visitors) since 1986. The information was critically checked by researchers of the State Nature Reserve “Kurilskiy”, and suspected

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**Fig. 1.** Map of Kunashir (Kunashiri) Island highlighting the records of sika deer noted in this paper. Numbers associated with the stars correspond to the carcasses of Table 1.

information was excluded in the present paper. We developed a database to consolidate many different types of evidence and credible reports made by the researchers of the Nature Reserve since 1986, including carcasses, footprints, feces, and direct observations of sika deer on Kunashir Island and the Lesser Kuril Chain (Fig. 1).

## Results

### Carcasses

We report the occurrence of 12 carcasses in total: 11 carcasses from Kunashir Island and one from Tanfilieva (Suisho) Island (the Lesser Kuril Islands) (Table 1). Of these 12 carcasses, nine were female and three were male (Table 1). On Kunashir Island, eight carcasses were found near the Okhotsk Sea coast and three were near the Pacific Ocean coast (Fig. 1). We could not determine whether these deer died on the island or were instead the result of floatation from another location. Three carcasses were found after storm events (Table 1) and one of them had an injured leg (Fig. 2).

### Footprints

Footprints of sika deer were first recorded on 11 March 2017 at a location 5.5 km north of Yuzhno-Kurilsk (Furukamappu) on Kunashir Island. Since 2017, footprints of deer (Fig. 3) have been recorded every year on Kunashir Island (Table 1). On 9 August 2019, footprints of two different sizes were observed near Dlinnoe (Nishi-Biroku) Lake (Table 1), indicating the existence of at least two individuals. The locations that footprints were found were northeastern part of the island and Otradnoe (Chikappunai) in the central part (Fig. 1).

### Feces

On 11 March 2017, deer feces (Fig. 4) were recorded at a location 5.5 km north of Yuzhno-Kurilsk (Table 1). These feces were produced by the same individual as footprint #1 and direct observation #2. Since 2017, feces have been recorded every year on Kunashir Island (Table 1). Feces have been found on the northeastern and central part of the island (Fig. 1).

### Direct observations

Since 2017, sika deer have been directly observed on Kunashir Island on the Pacific Ocean side of the island (Fig. 1). All observed individuals were female (Table 1).

The first deer was directly observed on 9 March 2017 on the coastline 6 km north of Yuzhno-Kurilsk (Table 1 and Fig. 1). Two days later, on 11 March 2017, probably the same individual was observed near the location of the first observation (Table 1). Further, probably the same individual was subsequently occasionally observed by local residents around the same area until June, 2017.

In February–March of 2018, two female deer regularly visited buildings in the area of Cape Lovtsova (Atoiya), where they were fed by lighthouse workers (Table 1).

From June to September of 2018, one female was periodically observed near a herd of domestic cows near the village of Otradnoe in the site 2 km north of the first direct observation site in 2017.

On 12 April 2019, a video of an adult female was taken on a coast of Otradnoe, 3 km north of Yuzhno-Kurilsk (Fig. 5). On 3 September 2019, a female deer was observed from a helicopter flying over Dlinnoe Lake (Table 1).

### Summary

Since 1986, sika deer carcasses have been occasionally found on Kunashir Island and the Lesser Kuril Chain (Table 1), although it could not be determined whether

**Table 1.** Records of sika deer from Kunashir Island and Tanfilieva Island (the Lesser Kuril Islands) in 1986–2019

| #                         | Location*                                            | Sex    | Date           | Informant                                                         | Note                                                                                 |
|---------------------------|------------------------------------------------------|--------|----------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Carcass</b>            |                                                      |        |                |                                                                   |                                                                                      |
| 1                         | Cape Alekhina                                        | female | Jan. 1986      | Victor Zuev <sup>1</sup>                                          |                                                                                      |
| 2                         | The mouth of Temnaya (Sarukamappu) River             | female | Feb. 1987      | Victor Zuev <sup>1</sup>                                          |                                                                                      |
| 3                         | The mouth of Temnaya River                           | female | Mar. 1988      | Victor Zuev <sup>1</sup>                                          |                                                                                      |
| 4                         | Cape Lesistiy                                        | female | Jan. 1989      | Victor Karpov <sup>1</sup>                                        |                                                                                      |
| 5                         | The mouth of Severyanka River                        | male   | Feb. 1991      | Victor Karpov <sup>1</sup>                                        |                                                                                      |
| 6                         | Tanfilieva (Suisho) Island of the Lesser Kuril Chain | female | Jul. 1994      | Dmitriy Sokov <sup>1</sup>                                        |                                                                                      |
| 7                         | Yuzhno-Kurilsk (Furukamappu) Bay                     | male   | Aug. 2000      | Anatoliy Milichkin <sup>1</sup>                                   |                                                                                      |
| 8                         | The mouth of Tyurina River                           | female | 18 May 2014    | Aleksandr Kisleiko <sup>1</sup>                                   |                                                                                      |
| 9                         | Cape Znamenka (Nihon-Iwa)                            | male   | 28 Oct. 2016   | Victor Varfolomeev <sup>2</sup>                                   | Found after a storm. Fig. 2                                                          |
| 10                        | Cape Stolbchatiy (Shimanobori)                       | female | 13 May 2017    | Elena Linnlik <sup>1</sup>                                        | Found after a storm                                                                  |
| 11                        | 2 km east from Cape Stolbchatiy (Zaimoku-Iwa)        | female | 23 Sep. 2018   | Victor Varfolomeev <sup>2</sup>                                   | Found after a storm                                                                  |
| 12                        | Golovnin Bay                                         | female | 9 Aug. 2019    | Evgeniy Kozlovskiy <sup>1</sup>                                   |                                                                                      |
| <b>Footprints</b>         |                                                      |        |                |                                                                   |                                                                                      |
| 1                         | 5.5 km north of Yuzhno-Kurilsk                       | female | 11 Mar. 2017   | Evgeniy Kozlovskiy <sup>1</sup> , Aleksandr Kisleiko <sup>1</sup> | The same individual as in direct observation #2                                      |
| 2                         | Cape Lovtsova (Atoiya)                               | female | Feb.–Mar. 2018 | Lidiya Fofanova <sup>3</sup>                                      | The same individual as in direct observation #4                                      |
| 3                         | Ptichya (Sokoboi) River                              | –      | 28 Aug. 2018   | Evgeniy Kozlovskiy <sup>1</sup> , Aleksandr Kisleiko <sup>1</sup> | 1 individual                                                                         |
| 4                         | Otradnoe (Chikappunai)                               | female | 12 Apr. 2019   | Andrey Polyushkevich <sup>4</sup>                                 | The same individual as in direct observation #5                                      |
| 5                         | Podsobnyi River                                      | –      | 8 Aug. 2019    | Polina Volkova <sup>5</sup>                                       | 1 individual                                                                         |
| 6                         | Dlinnoe (Nishi-Biroku) Lake                          | –      | 9 Aug. 2019    | Polina Volkova <sup>5</sup>                                       | 2 different sizes                                                                    |
| <b>Feces</b>              |                                                      |        |                |                                                                   |                                                                                      |
| 1                         | 5.5 km north of Yuzhno-Kurilsk                       | –      | 11 Mar. 2017   | Aleksandr Kisleiko <sup>1</sup>                                   | One dung pat. The same individual as in direct observation #2                        |
| 2                         | Cape Lovtsova                                        | –      | Feb.–Mar. 2018 | Lidiya Fofanova <sup>3</sup>                                      | Several dung pats. The same individual as in direct observation #4                   |
| 3                         | Ptichya River                                        | –      | 2 Sep. 2018    | Evgeniy Kozlovskiy <sup>1</sup>                                   | One dung pat. Fig. 4                                                                 |
| 4                         | Dlinnoe Lake                                         | –      | 9 Aug. 2019    | Polina Volkova <sup>5</sup>                                       | One dung pat                                                                         |
| <b>Direct observation</b> |                                                      |        |                |                                                                   |                                                                                      |
| 1                         | 6 km north of Yuzhno-Kurilsk (Chikappunai)           | female | 9 Mar. 2017    | Valeriy Kolesnik <sup>6</sup>                                     |                                                                                      |
| 2                         | 5.5 km north of Yuzhno-Kurilsk (Chikappunai)         | female | 11 Mar. 2017   | Aleksandr Kisleiko <sup>1</sup>                                   | Probably the same individual as #1. Hereafter occasionally observed until June, 2017 |
| 3                         | Otradnoe (Chikappunai)                               | female | Jun.–Sep. 2018 | Dmitriy Sokov <sup>1</sup> , Petr Pavlyukevich <sup>7</sup>       | With a cattle herd                                                                   |
| 4                         | Cape Lovtsova                                        | female | Feb.–Mar. 2018 | Lidiya Fofanova <sup>3</sup>                                      | Two individuals. Around the lighthouse                                               |
| 5                         | Otradnoe                                             | female | 12 Apr. 2019   | Andrey Polyushkevich <sup>4</sup>                                 | Recorded in video. Fig. 5                                                            |
| 6                         | Dlinnoe Lake                                         | female | 3 Sep. 2019    | Nadejda Kudrevskay <sup>8</sup>                                   | Observed from a helicopter                                                           |

\* Records were from Kunashir Island except for carcass #6.

<sup>1</sup> Staff member of the Nature Reserve “Kurilskiy”. <sup>2</sup> Local hunter. <sup>3</sup> Lighthouse worker. <sup>4</sup> Businessman. <sup>5</sup> Botanist and naturalist. <sup>6</sup> Local fisherman.

<sup>7</sup> Local livestock breeder. <sup>8</sup> Local administration employee.



**Fig. 2.** Carcass of a male sika deer found on the coast near Cape Znamenka (Nihon-Iwa), Kunashir Island, on 28 October 2016. This individual was found after a storm and its left hind-leg was broken. Photo taken by Vladimir Varfolomeev.



**Fig. 3.** A footprint of a sika deer found on a sand bank of Ptichya (Sokoboi) River on 28 August 2018. The scale unit is cm. Photo taken by E. Kozlovskiy.

the carcasses floated to the islands as debris or the deer actually died on the islands themselves. However, since 2017, the continuous presence of the sika deer has been confirmed by footprints, feces, and direct observations on Kunashir Island (Table 1). It is concluded that at least three individuals (one in the center of the island and two in the north) have lived on Kunashir Island in 2018 and 2019. However, there is currently no direct evidence of newborn deer or reproduction on the island.



**Fig. 4.** Feces of sika deer found near the mouth of the Ptichya (Sokoboi) River on 2 September 2018. The scale is 15 cm. Photo taken by E. Kozlovskiy.



**Fig. 5.** A screen-captured image from a video of a female sika deer taken on the coast of Otradnoe (Chikappunai) on 12 April 2019. The video was taken by Andrey Polyushkevich.

## Discussion

It has been thought that the occasional appearance of sika deer on the southern Kuril Islands is the result of accidental immigration from Hokkaido (Voronov 1974; Voronov 2011; Pavlinov and Lisovsky 2012), although there is no direct evidence to support this claim. The Shiretoko and Nemuro Peninsulas of Hokkaido are very close to Kunashir Island and the Lesser Kuril Chain, being separated by just 7–16 km at the closest points (Fig. 1). Recently, eastern Hokkaido has experienced a rapidly increasing sika deer population, resulting in

severe damage to forest vegetation and agricultural products (Kaji et al. 2004, 2010). Therefore, it is plausible that the deer on Kunashir immigrated from the now over-populated eastern Hokkaido by walking on floating ice in the winter/early spring or by swimming over the strait in spring–autumn. In the future, genetic analyses could be conducted to guide interpretation of these hypothesized origins.

The arrival of deer to Kunashir Island has potential conservation and management implications, as the island has fragile vegetation including endangered plant species (Barkalov 2000, 2009; Takahashi 2015) and has not experienced the high-level exposure of the deer herbivory. If a sika deer population should grow unsustainably on Kunashir Island in the absence of a native predator, there may be negative, irreversible consequences for the vegetation of Kunashir. Thus, we recommend intense monitoring of sika deer individuals in this region.

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