

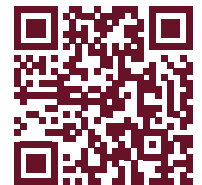
Project

Setting boundaries: borderlines and bear dogs in a Japanese town

Amelia Hiorns, Hiroo Tamatani

Picchio Wildlife Research Centre, Karuizawa, Nagano, Japan

Contact: musteattaiyaki@picchio.co.jp



Bear-human interactions

The Asiatic black bear (*Ursus thibetanus*) (Fig. 1) has a fairly wide distribution and can be found throughout southeast Asia, China and Japan [1]. In some parts of their range, such as Taiwan, Asiatic black bears are struggling with low or decreasing population densities in the face of habitat destruction and poaching [2]. Bear body parts such as gall bladders are coveted in both Chinese and Taiwanese markets for their supposed benefits in traditional medicine as well as their bushmeat value. As a result, the species is currently listed as vulnerable by the IUCN [3].



Fig. 1. An Asiatic black bear (Photo: Picchio).

Japan's population of Asiatic black bears is also considered vulnerable [4], although the IUCN has assessed it as stable [3]. The last national population estimate put the number of bears in 2011 at 15,685 animals [5]. However, the species is now largely confined to the main island of Honshu (Fig. 2), having been extinct on Kyushu since 2012 [6] and currently numbering only 16 – 24 bears on Shikoku [7]. It is likely that these subpopulations declined to such a point because of habitat loss and persecution [8] (Fig. 3). These same causes have led to the distribution on Honshu becoming fragmented, with some portions recognised as endangered local populations now facing genetic isolation [9].

Persecution of bears is often in response to conflict issues and the potential harm that bears may cause to people and agriculture [10]. Plantations, corn fields, orchards, fish farms and apiaries are all prone to attracting bears, which can result in considerable damage [11] (Fig. 4). In order to protect their livelihoods, farmers and landowners often want bears permanently removed from their area. In Shikoku, foresters killed bears in an effort to protect plantations from bark stripping, further reducing the already dwindling bear population [8].

With the lack of a national wildlife agency in Japan, it mostly falls to local municipalities and hunting associa-

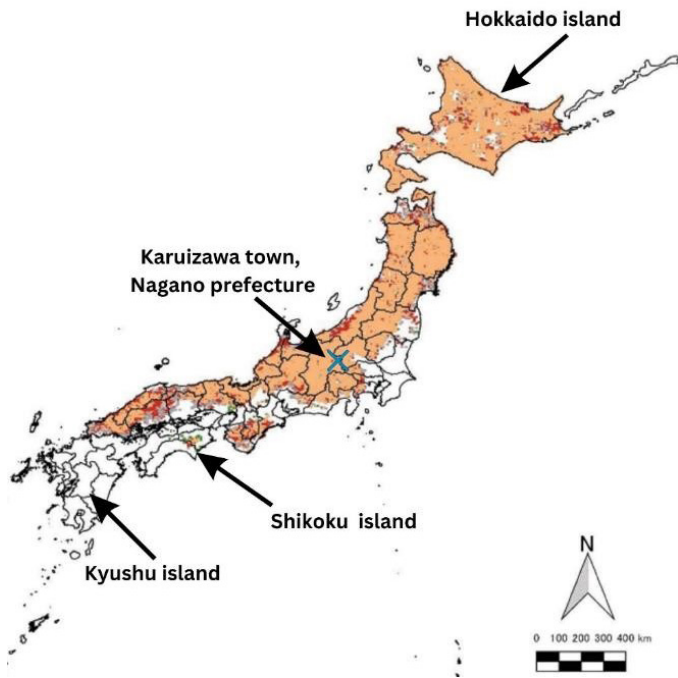


Fig. 2. Distribution range of Asiatic black bears (and brown bears on Hokkaido) in Japan based on capture data, questionnaires and sightings. Data collected in 2018 are marked in red. Location of Karuizawa town is shown with a blue cross (Source: Ministry of the Environment [18]).

tions to respond to conflicts with lethal control [10,12]. The removal of a few bears each year would not be too problematic, but it has been observed that hunters often take more bears than government limits dictate, resulting in the killing of an average of over 3,000 Asiatic black bears per year in Japan in 2012 – 2022 [13]. Persecution and harvesting at such levels are very likely to impact even the large Honshu population.

It is thought that conflicts have increased in recent



Fig. 3. A typical example of a human settlement surrounded by bear habitat in forested mountains in Japan. The tree in the foreground shows signs of bear feeding (Photo: Picchio).

decades in part due to changes in land use. Areas once utilised by local people for timber production or agriculture (e.g. rice fields) have been abandoned and instead, through succession, become bear habitat which has spread towards and overlaps with human-inhabited areas [11] (Fig. 5). This phenomenon increases the risk to people of encountering bears: an average of 85 people were attacked by black bears per year in 2012 – 2022, with up to 156 people attacked in a single year [14]. Some of these attacks occurred when people entered forests close to their homes in order to collect wild plants and unexpectedly came into contact with bears feeding in the area [15]. The encroachment of bears into human-inhabited areas is mostly perceived as something that should not happen and many local people (not just landowners and hunters) have negative opinions of bears, either as a result of per-



Fig. 4. Damage by Asiatic black bears in the Karuizawa locality to A) an apiary; and B) a corn field, showing the outcome of a failed attempt to capture the bear responsible (Photo: Picchio).



Fig. 5. A female Asiatic black bear using an old charcoal kiln in an abandoned forest plantation as a den to over-winter and raise her cubs (Photo: Picchio).

sonal experience or because of a lack of knowledge driving misconceptions of the threat that bears pose [10].

Besides coming into direct contact with humans in shared landscapes and natural habitats, some bears are attracted to anthropogenic food sources such as refuse, waste oil and compost. This can result in them exploring further into human-inhabited areas, losing their innate wariness of people and even becoming food-conditioned. This in turn can result in unfortunate consequences for the bears themselves as food-conditioned individuals are almost always killed by management authorities. Seeking such food may also lead bears to traverse busy roads or railway lines, resulting in injury or death due to collisions with vehicles. Cubs sometimes fall into man-made water courses and drown if they are unable to escape (Picchio unpublished data).

Coexistence and waste management

The town of Karuizawa in Nagano prefecture has struggled with many of the issues described above. A popular resort town in the middle of Japan (Fig. 2), its resident population of around 20,000 people swells into the millions every summer as tourists from Tokyo and elsewhere flock into the mountains to take advantage of cool weather and fresh air. Many residents and visitors have built holiday homes within the surrounding forest and, at the same time, bear habitat has spread outwards. As a result, Karuizawa experiences a substantial overlap between humans and wildlife, perhaps more so than other countryside towns in Japan, which is a situation that calls for a dedicated management system.

In 1998, members of the Wild Bird Research Centre, since renamed the Picchio Wildlife Research Centre and currently operating as both a nature tour operator and conservation organisation, wanted to understand the behaviour of a male bear that had been captured beside a rubbish disposal site in the town and was likely responsible for considerable damage in the area. They followed his movements via a radio-telemetry collar and came to the conclusion that he was highly food-conditioned. After several failed attempts to scare him away, he was eventually euthanised.

This case helped draw attention to the accessibility of food sources ('attractants') within the town as an underlying cause of conflicts, driving motivation to change Karuizawa's refuse disposal system (Fig. 6). Enlisting the support of the municipal authority, Picchio designed a bear-proof container that could help prevent similar



Fig. 6. A radio-collared bear opening a standard refuse bin with its nose. The bear subsequently accessed the contents and left the area carrying a bag of rubbish in its mouth (Photo: Picchio).

problems recurring in the future (Fig. 7). Use of this container reduced the number of incidents with bears at rubbish disposal sites from nearly 80 in 2003 to zero in 2009 (Fig. 8).

This solution was not enough on its own, however, to keep bears away entirely and some bears still occasionally wandered into town. Young males (1–3 years of age) would often pass through residential areas while dispersing from their natal home ranges [16,17]. Thus, in order to improve the lives not just of people but also of bears, Picchio commenced a multi-faceted conservation management programme consisting mostly of non-lethal measures aimed at promoting human–bear coexistence, the likes of which did not then exist either in Nagano or more widely in Japan.



Fig. 7. Bear-proof containers designed, tested and implemented by Picchio in cooperation with Karuzawa municipal authority (Photo: Picchio).

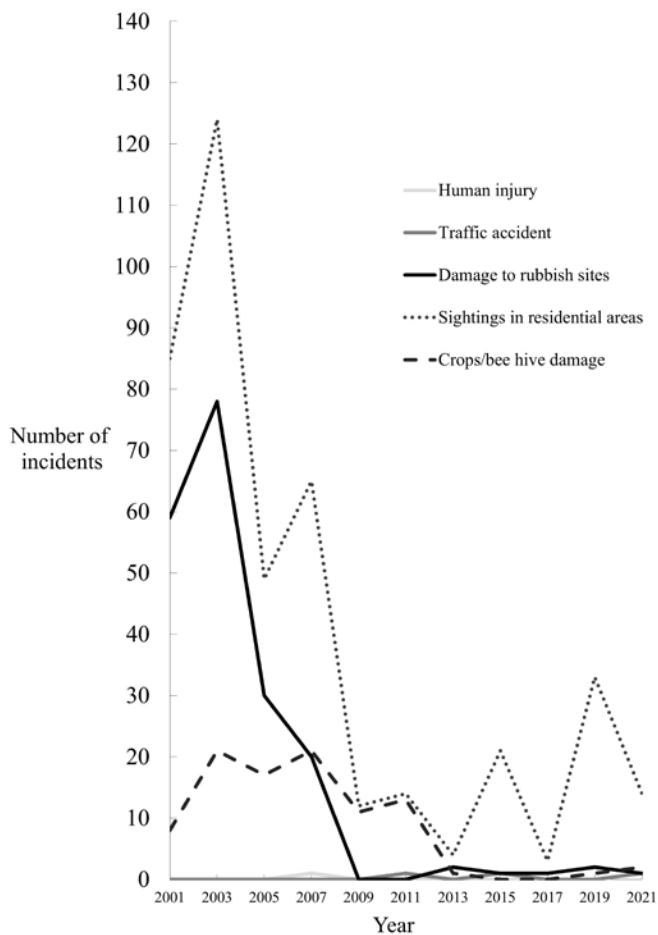


Fig. 8. Trends in various types of bear-related incidents documented in Karuzawa during the period 2001–2021. “Damage to rubbish sites” includes any kind of interference by bears: removal of rubbish bags, attempts to access containers, broken lids, etc. (Source: Picchio).

In addition to installing bear-proof refuse containers, one of the main elements of the work has been a system for capturing, collaring and releasing bears in conjunction with the use of aversive conditioning. The latter involves exposing bears to negative stimuli such as fireworks or projectiles during releases and subsequent chases. The rationale behind this is that if bears learn to associate such stimuli with proximity to humans, they will be more likely to avoid human-occupied areas in the future or, at the very least, to move away from them quickly when confronted. Assisting in the success of these techniques was the introduction of Karelian bear dogs.

Boundaries and bear shepherding

The Karelian bear dog¹ is a hunting breed that originates in Finland and can bring to bay large game such as moose (*Alces alces*), wild boar (*Sus scrofa*) and brown bears (*Ursus arctos*). Karelians were imported to the USA by bear biologist Carrie Hunt and trained as ‘bear shepherding dogs’ or ‘wildlife K-9s’ at the Wind River Bear Institute (WRBI)² which she founded in 1996. Bear shepherding dogs are encouraged to actively track and approach bears, under the supervision of their handlers, in order to push or chase them away through barking and pursuit. Picchio obtained a Karelian bear dog named Bullet from the WRBI in 2004 and began using him as a bear shepherding dog in Karuzawa.

Aversive conditioning and chasing of bears was not completely effective at first and there was still a need for lethal control when bears encroached to such an extent that they represented a threat to residents. This was in part due to Bullet’s youth and his handlers’ inexperience. While damages decreased, bears still lived close to residential areas and sightings remained fairly common in the surroundings of the town, so it was important to define where and when bears would not be tolerated. To this end, Picchio and Karuzawa municipal authorities designed a system with two borders. Border 1 outlines the main residential area of the town while Border 2 outlines the ‘second home area’ – a mostly forested area with holiday villas, cafes, some schools and allotments (Fig. 9). The system works in concert with a set of spatial and temporal conditions that can be applied to bear movements.

¹ <https://www.akc.org/dog-breeds/karelian-bear-dog/>
² <https://beardogs.org>

No.107 ♀ (1→3yrs)

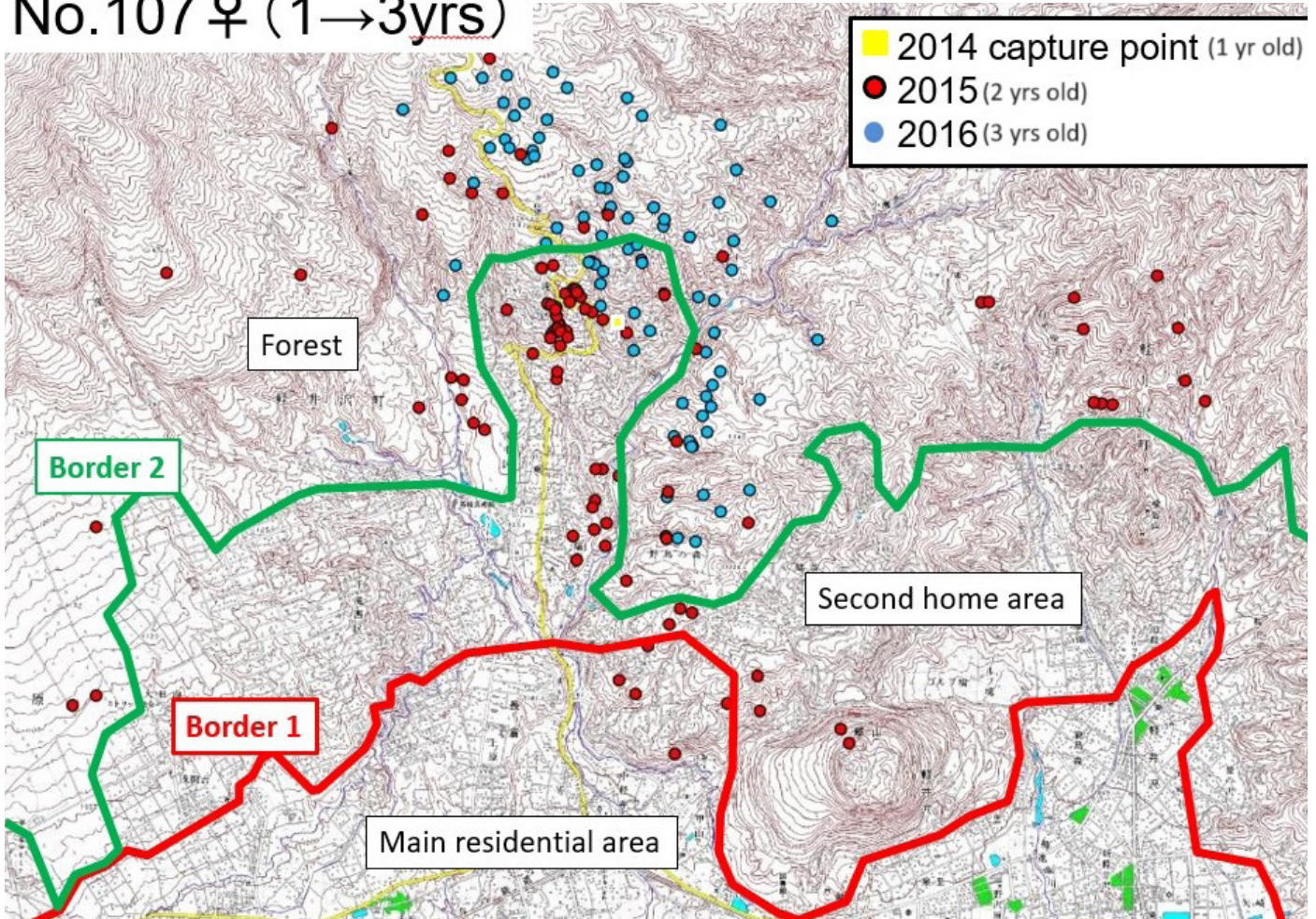


Fig. 9. Telemetry-located positions of a female bear in relation to the boundaries of Karuizawa town (red line) and second home area (green line). The difference in positions recorded in 2016 (blue dots) compared to 2015 (red dots) shows the effect of a year's worth of efforts to haze (chase) the bear away from residential areas (Source: Picchio).

By the time Tama and Nanuq, the second generation of bear dogs, arrived the handlers had more experience and this, combined with the border system, led to more success in shepherding bears (Fig. 10).

Where a bear is and at what time of day determines the type of response required and whether chasing with a bear dog is deemed necessary or not. Originally, Picchio's nightly patrols located the positions of bears fitted with radio-telemetry collars at least once every 24 hours. The introduction of GPS collars since 2022 has made this part of the process a lot more efficient and precise. Bears found within either border are chased back into the forest before daytime so as to minimise any unnecessary interactions with people. Individuals located within the residential area represent more of a problem than those in the second home area as more effort is required to shepherd them away. Bears found in the residential area during

the day may have to be captured and relocated, using the opportunity to administer aversive conditioning during release (Fig. 11).



Fig. 10. Karelian bear dogs Tama and Rela watch a bear they just chased up a tree (Photo: Picchio).



Fig. 11. A trapped and relocated bear is chased away on release (Photo: Picchio).

In both shepherding and capture–releases, bear dogs enforce the border system, effectively teaching bears where they can and cannot go, thereby creating a safe distance between people and bears and improving the efficacy of the system as a conflict mitigation strategy. The presence of the dogs and regular patrols also provides reassurance to local people that they are being protected; and all with minimal harm to bears.

Raising awareness and promoting bear tourism

Handlers take their bear dogs into schools in order to explain their work and drive home the message of coexistence, which is vital for people to continue to support such methods and begin to feel more positively towards bears. Picchio’s long-term efforts to manage damage and conflicts have encouraged a more accepting attitude towards bears. Local magazines and newspapers write more positively about nature and bears than they did previously. However, ongoing public outreach is important to avert a resurgence in animosity towards bears. Picchio also promotes nature tours to explore habitats, spot bears and learn more about their conservation and management. It is hoped that these tours will amplify the other work and further encourage a positive relationship between townspeople and bears.

Replication and future actions

The successes of the Karuizawa programme, including reductions in damage, better management of individual bears and the proven efficacy and assurance of the bear dogs, has been acknowledged around Japan. There are increasing efforts to replicate Picchio’s methods elsewhere, such as in the prefecture of Niigata and Kamikochi National Park. It is hoped that the next generation of bear dogs will go to Sapporo, capital of Hokkaido prefecture, and assist with the management of Hokkaido brown bears living close to the city.

There are also increasing efforts to quell another conflict issue occurring across Nagano prefecture and elsewhere: the unintended capture of Asiatic black bears in wire snares (Fig. 12). In 2018–2022, Picchio responded to between 88 and 116 such cases of bear mis-captures per year around Karuizawa and neighbouring towns. While it is common practice for hunters to catch and cull sika deer (*Cervus nippon*) using snares, trapping bears this way is illegal and they must be released. The process involves anaesthetising the bear, removing it from the snare and relocating it to an area free of traps. Helping to rescue bears from snares is another aspect of managing conflicts. Providing the means to release snared bears safely reduces the risk of them being shot out of fear or misunderstanding. However, while efforts are underway by several groups to improve the situation such as by redesigning snares, it is likely that this problem will persist until snares are no longer used and the deer population is controlled by other means.



Fig. 12. A young bear with his back leg caught in a wire snare intended for capturing deer (Photo: Picchio).

With several conflict issues afflicting Japan's relationship with bears, a range of different responses is necessary to improve the situation. Thus a multi-faceted approach, such as that employed by Picchio to manage bears as individuals through tracking, chasing and aversive conditioning as well as to educate the public, is vital for a successful resolution. Picchio staff are eager to learn and would like to see how this style of bear management compares with that of towns facing similar challenges in other countries, to share best practice and continue to improve upon the path of coexistence for both bears and people. With any conflict situation involving people and wildlife there are regrettable outcomes on both sides but only we, as humans, can make a conscious decision to

make it easier for humans and Asiatic black bears to live alongside each other before one side loses out completely.

Acknowledgements

We thank the Karuizawa municipal authorities for funding and supporting our bear-related activities and allowing the use of information and figures in this article. We also thank those individuals and organisations who have helped fund our activities through donations and grants. Finally, we thank all past and present members of Picchio whose hard work and dedication have contributed to improving coexistence with nature in Karuizawa.

References

- [1] Kozakai C et al. (2020) Asiatic black bear (*Ursus thibetanus*). In: Penteriani V & Melletti M, eds. Bears of the world: Ecology, conservation and management. Cambridge University Press, Cambridge, pp. 110 – 121.
- [2] Hwang M & Wang Y (2006) The status and management of Asiatic black bears in Taiwan. In: Yamazaki K et al., eds. Understanding Asian bears to secure their future. Japan Bear Network Compiler, Ibaraki, Japan, pp. 107 – 110.
- [3] Garshelis D & Steinmetz R (2020) *Ursus thibetanus* (amended version of 2016 assessment). The IUCN Red List of Threatened Species 2020. <https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22824A166528664.en>.
- [4] Yamazaki K (2016) Basic information on bears. Training session on protection and management of specified birds and beasts. Nature Conservation Bureau, Ministry of the Environment, Japan. https://www.env.go.jp/nature/choju/effort/effort5/effort5-3e/joukyu/kuma_2.pdf [in Japanese].
- [5] MoE (2011) Fiscal 2010 basic survey on natural environment conservation - Report on specified mammal inhabitation survey and survey system construction. Biodiversity Center, Nature Conservation Bureau, Ministry of the Environment, Yamanashi. <https://www.biodic.go.jp/reports3/7th/honyurui2010.pdf> [in Japanese].
- [6] MoE (2012) Publication of the 4th Red List (Announcement). Wildlife Division, Nature Conservation Bureau, Ministry of the Environment, Japan. <https://www.env.go.jp/press/15619.html> [in Japanese].
- [7] Uno-Onodera R et al. (2019) Pedigree and reproductive history of black bears captured in Shikoku. Japanese Journal of Conservation Ecology 24: 61 – 69.
- [8] Tamatani H (2021) The status of forestry damage by black bears. Japan Forest Technology Association 949: 8 – 11 [in Japanese].
- [9] Ohnishi N et al. (2007) Low genetic diversities in isolated populations of the Asian black bear (*Ursus thibetanus*) in Japan, in comparison with large stable populations. Conservation Genetics 8: 1331 – 1337.
- [10] Sakurai R & Jacobson SK (2011) Public perceptions of bears and management interventions in Japan. Human–Wildlife Interactions 5: 123 – 134.
- [11] Kishimoto R (2009) Status of the 2006 drastic rise of Asiatic black bear (*Ursus thibetanus*) intrusions into residential areas in Nagano prefecture. In: Oi T et al., eds. FFPRI Scientific Meeting Report 4 Biology of bear intrusions. Forestry and Forest Products Research Institute, Ibaraki, Japan, pp. 35 – 39.
- [12] Huygens OC et al. (2001) Asiatic black bear conservation in Nagano Prefecture, central Japan: problems and solutions. Biosphere Conservation 3: 97 – 106.
- [13] MoE (2023) Number of permitted captures of bears (preliminary figures). Nature Conservation Bureau, Ministry of the Environment, Japan. <https://www.env.go.jp/nature/choju/effort/effort12/effort12.html>. [in Japanese].
- [14] MoE (2023) Number of casualties caused by bears (preliminary figures). Nature Conservation Bureau, Ministry of the Environment, Japan. <https://www.env.go.jp/nature/choju/effort/effort12/effort12.html>. [in Japanese].
- [15] MoE (2021) Trends in personal injuries. In: Bear encroachment response manual, revised edition. Nature Conservation Bureau, Ministry of the Environment, Japan pp. 99 – 105. <https://www.env.go.jp/nature/choju/docs/docs5-4a/> [in Japanese].
- [16] Costello CM (2010) Estimates of dispersal and home-range fidelity in American black bears. Journal of Mammalogy 91: 116 – 121.
- [17] Takayama K et al. (2023) Timing and distance of natal dispersal in Asian black bears. Journal of Mammalogy 104: 265 – 278.
- [18] MoE (2019) FY2018 medium and large mammal distribution survey report bears (brown bear, Asiatic black bear) and Japanese serow. Biodiversity Center, Nature Conservation Bureau, Ministry of the Environment, Yamanashi. https://www.biodic.go.jp/youchui/reports/h30_chuogata_houkoku_teisei.pdf [in Japanese].