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Authors: Hisano, Masumi, Nakabayashi, Miyabi, Ohte, Nobuhito, and Evans, Maldwyn J.

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SHORT NOTE

Urban records of the Japanese marten (*Martes melampus*) in a small woodland patch in central Japan

Masumi HISANO[1,2*], Miyabi NAKABAYASHI[3], Nobuhito OHTE[2] and Maldwyn J. EVANS[4]

[1] *Graduate School of Advanced Science and Engineering, Hiroshima University, Kagamiyama, Higashihiroshima, Hiroshima, Japan; e-mail: hisano@hiroshima-u.ac.jp*

[2] *Graduate School of Informatics, Kyoto University, Yoshida-honmachi, Sakyo, Kyoto, Japan; e-mail: ohte.nobuhito.5a@kyoto-u.ac.jp*

[3] *Graduate School of Integrated Sciences for Life, Hiroshima University, Kagamiyama, Higashihiroshima, Hiroshima, Japan; e-mail: nmiyabi@hiroshima-u.ac.jp*

[4] *Fenner School of Environment and Society, The Australian National University, Canberra, Australia; e-mail: m.john.evans@anu.edu.au*

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Abstract. The Japanese marten (*Martes melampus*) inhabits forest environments in Japan, ranging from extensive natural forests to fragmented forest landscapes in agricultural areas. Anecdotally, there have been some observations of Japanese marten using urban green spaces. Evidence to corroborate this, however, is lacking. Here, we report on the presence of Japanese martens in a small urban woodland patch surrounded by residential neighbourhoods of Uji City, Kyoto in central Japan. In 2023, we obtained four independent camera-trapped images and one video of the species in this small woodland patch. We also found samples of its faeces. While it is uncertain whether the Japanese marten was a resident or temporary visitor to the woodland patch, these records confirm that the marten can extend its range into green spaces in urban areas. Our report adds to the limited observations of Japanese martens in urban systems and highlights the importance of understanding their distribution and habitat use in the face of urban expansion.

Key words: camera trap, faeces, mesocarnivore, mustelid, urban carnivore, urban forest and greenspace

Introduction

Martens (*Martes* spp.) are small carnivores that inhabit forested habitats (Hargis et al. 1999, Moriarty et al. 2011) in North America, Europe, and Asia. The structurally complex and dense characteristics of forest habitats provide them with foraging opportunities (Andruskiw et al. 2008), and snags and cavities associated with large trees provide them with denning habitat (Slauson & Zielinski 2009). The Japanese marten (*M. melampus*), listed as Nearly Threatened in some regional municipalities of Japan (Hisano 2020), similarly prefers forested habitats (Tsujino & Yumoto 2014), relying on foraging resources such as rodents, invertebrates, and wild berries (Hisano & Deguchi 2018, Hisano 2019, Hisano et al. 2019).

In the central to western regions of Japan, the Japanese marten is known anecdotally to inhabit

* *Corresponding Author*

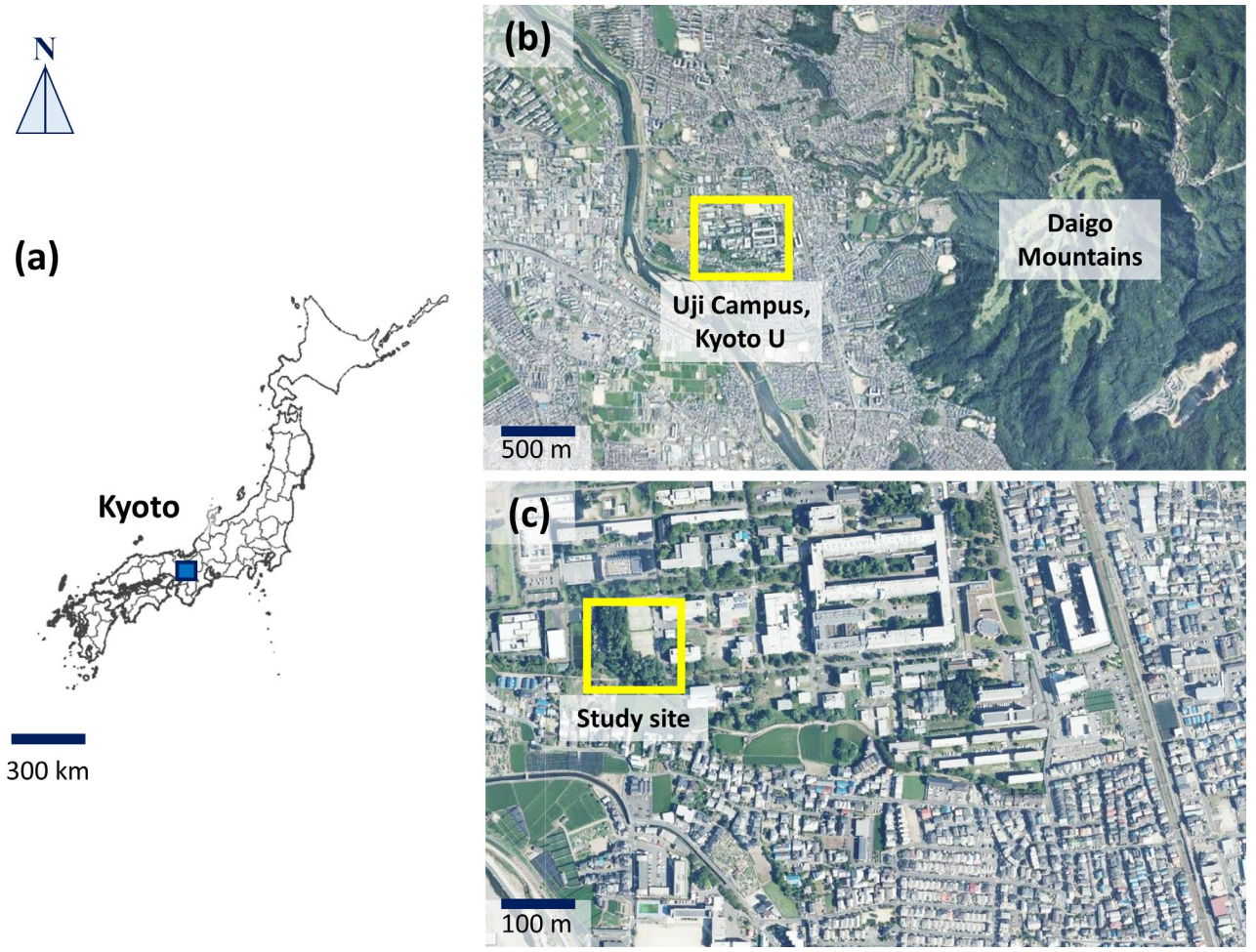

Fig. 1. (a) A map of the Japanese archipelago, with the blue square indicating the location of Kyoto Prefecture; (b) The location of the Uji Campus, Kyoto University (Uji City, Kyoto), highlighted by the yellow square; (c) The location of the study site, a small woodland patch on Uji Campus, indicated by the yellow square. Based on maps and aerial photos of the Geospatial Information Authority of Japan (https://www.gsi.go.jp/; the aerial photos are from 2020).

forested areas and residential areas adjacent to forests. In these areas, martens have been observed denning and rearing offspring in attics (e.g. ASWAT 2024), similar to urban-adaptive stone martens (*M. foina*) in Europe (Herr et al. 2010). Pine martens (*M. martes*), traditionally strict forest specialists are also increasingly reported in open and mosaic landscapes altered by human activity in Europe, including forest edge, Mediterranean shrubland, and cultivated areas with fragmented forests (Lombardini et al. 2015, Manzo et al. 2018, Remonti et al. 2022). These studies suggest a broader habitat niche of the pine marten than previously believed. However, observations of the Japanese marten in human-modified landscapes have far only been communicated in blogs or posts on local media by pest-repelling companies (Watanabe 2020, ASWAT 2024). Official records and evidence of the Japanese marten utilising urban greenspaces are still rare. Thus, such a phenomenon is not widely recognised, and the potential mechanisms behind the adaptation of Japanese martens to human-modified environments have never been discussed, nor has it received international attention. In the face of the rapid urbanisation in rural and suburban areas of Japan, understanding the Japanese marten's distribution and habitat use in urban areas is crucial. This understanding would provide information essential for designing a landscape favourable for the species (Capon et al. 2021) while mitigating any conflicts with humans (Bateman & Fleming 2012). These measures are particularly important given that stone martens in Europe often cause conflicts with residents in European cities (Herr et al. 2009, Kistler et al. 2013) and have the potential to carry parasites and zoonoses (Zamzam et al. 2024).

Here we report on camera trapping records of the Japanese marten in a small urban woodland in Uji City, Kyoto, central Japan (34°54′33′′ N, 135°47′52′′ E; with approximately 180,000 residents in its municipal), a suburb of the Keihanshin (Kyoto-Osaka-Kobe) Metropolitan Area with more than 19 million people, central Japan. We then supplement these findings with other evidence of marten presence found in

the urban woodland. Finally, we discuss how our findings contribute to advancing knowledge about the marten's distribution and habitat use in urban environments.

Material and Methods

We conducted our study in a small woodland patch located on Kyoto University's Uji Campus (Uji City, Kyoto, central Japan; 34°54′33′′ N, 135°47′52′′ E). The patch is surrounded by a residential area with small, patchy rice fields (see also Hisano 2023, Hisano et al. 2024). Approximately 1.5 km to the east of the study site is a hilly forested area with an altitude of between 200 and 400 metres (Daigo Mountains; Fig. 1b). The population density of Uji City was 2,656 people/km^2 as of 2020. The woodland patch of the study site is a secondary forest covering 4,845 m^2, located in the southern part of the Uji Campus (Fig. 1c). The dominant overstorey species in the woodland patch are *Pinus densiflora*, *Mallotus japonicus*, and *Aphananthe aspera*.

From 25th October 2023 to 10th March 2024, we set up four trail cameras (Bushnell: 119932C) at the study site (Hisano et al. 2024). These months overlapped with a period when young martens might show increased movement as they continue dispersing after gaining independence in summer (Tatara 1994), which may potentially increase marten detectability. We placed two of them inside the woodland patch, one at the edge and the other in the grassland area adjacent to the woodland. We placed camera stations approximately 30 m apart from one another. We set all camera traps to take consecutive shots of three photographs at 1-min intervals when animals were detected, during the periods of 25-28th October (1st session, three camera trap days (CTD)), 12th November-9th December (3rd session, 27 CTD), and 9-28th December (4th session, 19 CTD). We also set them to take 1-min videos at 1-min intervals during the periods of 28th October-12th November (2nd session, 15 CTD) and 28th December-10th March (5th session, 73 CTD). A session refers to a specific period after the memory cards were reinstalled. We assumed that animals captured within a 30-min interval were considered a single event in this study (Balestrieri et al. 2021). The camera-trap batteries remained operational throughout the study period. We used two types of baits to attract the animals to facilitate the camera trapping survey within the short study period (Ferreira-Rodríguez & Pombal 2019). First, we sprayed pilchard oil around the forest floor and the lower part of the trunks (Robley et al. 2010). We then placed a cup (200 cm^3) of dry cat food ('Neko-Gourmet', chicken/tuna/bonito flavoured, manufactured by DCM, Japan) at the bottom of a plastic pot, buried in the forest floor, with the surface covered by pine tree leaf litter.

In addition to our camera traps, a single surveyor (M. Hisano) searched for marten faeces within the campus three to four times a month between October 2023 and March 2024 using visual and olfactory diagnostic techniques developed by previous studies (martens *vs*. red foxes (*Vulpes vulpes*) (Hisano et al. 2016, 2017, Hisano 2022), *vs*. Japanese weasels (*Mustela itatsi*) (Tsuji et al. 2011a, b), *vs*. masked palm civets (*Paguma larvata*) (Zhou et al. 2008, 2011)).

Results and Discussion

We recorded a Japanese marten on one of our cameras installed inside the woodland patch on the 31st of October and the 13th and 14th of November (Table 1, Fig. 2). We obtained five observations, all within 30 min before sunrise or two to three hours after sunset. Observing the marten at these times is consistent with the understanding that this species is primarily active during the low-light conditions of sunset or sunrise (Watabe et al. 2022). In two of the images, the marten was caught sniffing the ground, indicating that the bait had attracted the marten to the camera-trap station.

During the study period, we also found three faeces on campus' building areas and the small woodland ('Extended Data Fig. 1' on FigShare (https://doi.org/10.6084/m9.figshare.27000433.v1)). Of these, one found on 4th November 2023 (Fig. 2e here) undoubtedly exhibited the marten's characteristic sweet odour (Zhou et al. 2011, Hisano et al. 2016, 2017), described as 'musky' (Birks et al. 2005) or 'fermenting fruit mixed with soy sauce/sour wine' (Hisano et al. 2016). These characteristics provided us with conclusive evidence that this sample belonged to the Japanese marten. The faecal contents included seeds of domestic persimmon (*Diospyros kaki*) (Fig. 2e). Note that several persimmon trees are planted on campus, and we visually confirmed their fruiting during the study period. Thereby, we speculate that the presence of fruit trees may favour Japanese martens' use of urban areas by providing human-subsidised foods, a behaviour commonly observed in stone martens in Europe (Tóth et al. 2009, Hisano et al. 2016).

Our research contributes to the limited existing knowledge of Japanese martens utilising urban

Table 1. Summary reports of the Japanese marten recorded by camera trapping survey in Uji City, Kyoto, central Japan. †Those captured after an interval > 30 min were considered independent records. *Not included in Fig. 2 due to space constraints (available as 'Extended Data DCIM0019_ed.JPG' on FigShare: https://doi.org/10.6084/m9.figshare.27000433.v1).

Independent observational ID†	Recorded date	Recorded time	Sunrise	Sunset	Recorded behaviour	Recording media
#1. (Fig. 2a)	31st October 2023	5:42	6:16	17:05	Running	Video
#2. (Fig. 2b)	13th November 2023	18:58	6:29	16:53	Sniffing the ground	Photo
#3. (Fig. 2c)	14th November 2023	19:17	6:30	16:53	Sniffing the ground	Photo
#3. (Fig. 2d)	14th November 2023	19:18	6:30	16:53	Jumping	Photo
#4. (*)	14th November 2023	19:55	6:30	16:53	Walking	Photo

systems. The Japanese marten is typically dependent on forest environments (Tsujino & Yumoto 2014), inhabiting a range of habitats from extensive natural forests to fragmented forest landscapes in agricultural areas (Saito & Koike 2013). In our study site, we observed the Japanese marten within a small woodland patch on the university campus surrounded by residential neighbourhoods. There are very few records of martens utilising urban areas elsewhere in Japan. In central Japan, particularly, we believe that this is a result of a lack of research into their use of urban areas rather than an indication that this is a rare occurrence. For example, in Okayama City, western Japan, recent reports have documented their occurrence in urban green spaces, such as residential backyards (Takasaki 2022).

Similar trends have been observed in European martens. While stone martens are naturally adapted to urban environments, the pine marten (*M. martes*), like the Japanese marten, has traditionally been viewed as a forest specialist, closely associated with dense woodland habitats. However, studies over the past two decades have shown that pine martens are increasingly being observed in fragmented landscapes (Lombardini et al. 2015, Manzo et al.

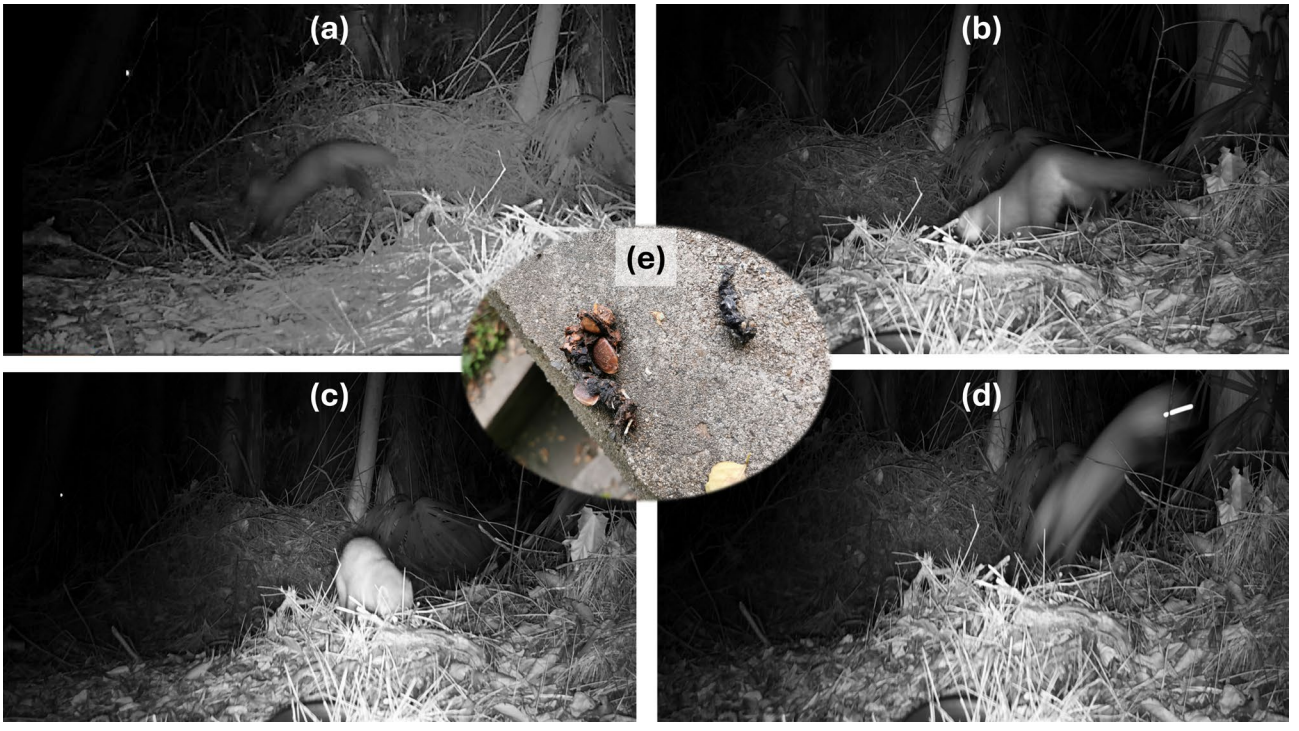

Fig. 2. Camera trapping and field sign records of the Japanese marten in Uji City, Kyoto, central Japan. (a) Recorded at 5:42, 31st October 2023 (captured from video); (b) Photographed at 18:58, 13th November 2023; (c) Photographed at 19:17, 14th November 2023; (d) Photographed at 19:18, 14th November 2023; (e) Marten faeces found in the study site on 4th November 2023. All the original images (including consecutive duplicate shots) are available as 'Extended Data' on FigShare: https://doi.org/10.6084/m9.figshare.27000433.v1.

2018, Remonti et al. 2022). Although they typically use forested areas for shelter and resting sites (Larroque et al. 2015, Wereszczuk & Zalewski 2015), pine martens have been reported to forage in agricultural areas (Balestrieri et al. 2011), benefiting from more productive and diverse food resources provided by mosaic landscapes of agricultural land and forest patches (Remonti et al. 2022). However, reports of pine martens in densely populated urban areas are still rare, which includes those from a northern lowland village in Switzerland (Weber et al. 2018) and an occasional sighting in London where a pine marten was spotted for the first time in over a century (Guardian 2022). These observations suggest that while martens generally prefer forested environments, they are capable of adapting to human-modified landscapes when necessary. In our study area in central Japan, habitat fragmentation and the availability of resources in mosaic landscapes may also be influencing the behaviour and distribution of the Japanese marten.

It is unlikely that the marten observed here exclusively utilised the small woodland patch on the campus. Research indicates that the home range of Japanese martens can range from 0.37 to over 5 km^2, varying widely depending on sex, resource availability, and environmental conditions (Kawauchi et al. 2003, Okumura & Jiang 2009). It is highly plausible, therefore, that the marten has extended into the urban areas from its nearby core habitat, such as the mountainous areas of extensive natural forests located 1.5 km to the east (Fig. 1b). Indeed, during the same period (23rd December 2023), we identified two marten scats ('Extended Data Fig. 2' on FigShare) in the large natural forests (dominated by evergreen *Quercus* spp.) at Daigo Mountains located 1.5 km to the east, east of the campus (Fig. 1b). This could suggest that martens in this region, which includes natural forests adjacent to urban areas (Fig. 1b), may be partly supported by persimmon fruit in urban areas. Similar foraging patterns that combine natural prey with anthropogenic fruit are commonly observed in European urban stone martens (Lanszki 2003, Hisano et al. 2013, Hisano 2018). The movements of Japanese martens between natural and urban habitats may thus induce the invasion of cultivated plant species to natural forests (Dovrat et al. 2012).

It is unclear how the marten travelled into the woodland patch, given that there is no complete habitat connectivity between the large forests and the campus. There is, however, a narrow stream that flows from the large forests through the residential area of the city. The stream includes a bushy greenbelt comprised of shrubs and grasses, which could function as an urban corridor for mesocarnivores (Jeong et al. 2018), including the marten. Alternatively, the marten may have travelled through urban green spaces such as residential backyards, small parks, and scattered green tea farms, which are characteristic of the landscape in the region of southern Kyoto, to reach the campus woodland patch (Zhang et al. 2019). It is possible that the marten used networks of gutters or ditches beside the road when travelling between green spaces like stone martens do (Seljee 2021), as Japanese martens tend to avoid exposed environments and prefer pathways with cover (Suzuki & Saito 2023).

Whilst biodiversity in and around human centres has many benefits for humans and nature, there are also risks and challenges. Human-marten conflicts are increasingly recognised in central Japan, and it is common to see advertising for mammalian pest-repelling services, which deal with issues of odours from faeces and urine, food remnants, and damage caused by martens' intrusion into attics (e.g. ASWAT 2024). Further, it is important to consider the increased risks of parasitic infectious diseases and zoonoses, such as rabies, encephalitis, and pneumonia from urban stone martens (Zamzam et al. 2024). However, potential challenges may arise if their removal or control is legally difficult due to their local protection status. Our findings that Japanese martens can utilise urban areas in direct proximity to humans in central Japan might raise concerns about the potential for such zoonotic transmissions.

The confirmation of the distribution, or even occasional/seasonal habitat use, of a species of Carnivora within the residential area of a medium-sized city like Uji, Kyoto, provides valuable data for assessing and understanding urban biodiversity in central to western Japan. However, there is a need for much more research on how martens use urban environments (e.g. for denning) and the benefits and risks to humans. Such research should include monitoring through extensive camera trapping, dietary surveys, and GPS or radio telemetry tracking across seasons and years. This research will help gain a comprehensive understanding of the marten's ecology and behaviours in urban areas, providing information essential for designing a wildlife-friendly landscape while mitigating human-wildlife conflicts.

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Author Contributions

Conceptualisation: M. Hisano; Methodology: M. Hisano; Formal analysis and investigation: M. Hisano; Writing – original draft preparation: M. Hisano; Writing – review and editing: all the authors; Resources: M. Hisano and N. Ohte; Funding acquisition: N. Ohte (RIHN-FS) and M. Hisano (HU-SFYR). The authors declare no competing interests.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available in the FigShare Digital Repository: https://doi.org/10.6084/m9.figshare.27000433.v1.

Literature

Andruskiw M., Fryxell J.M., Thompson I.D. & Baker J.A. 2008: Habitat-mediated variation in predation risk by the American marten. *Ecology 89: 2273–2280.*

ASWAT 2024: Weasel extermination specialist business ASWAT. *https://www.e-aswat.com/*

Balestrieri A., Mosini A., Fonda F. et al. 2021: Spatial ecology of the stone marten in an Alpine area: combining camera-trapping and genetic surveys. *Mamm. Res. 66: 267–279.*

Balestrieri A., Remonti L., Ruiz-González A. et al. 2011: Food habits of genetically identified pine marten (*Martes martes*) expanding in agricultural lowlands (NW Italy). *Acta Theriol. 56: 199–207.*

Bateman P.W. & Fleming P.A. 2012: Big city life: carnivores in urban environments. *J. Zool. 287: 1–23.*

Birks J., Messenger J., Braithwaite T. et al. 2005: Are scat surveys a reliable method for assessing distribution and population status of pine martens? In: Harrison D.J., Fuller A.K. & Proulx G. (eds.), Martens and fishers (*Martes*) in human-altered environments: an international perspective. *Springer US, Boston, MA, USA: 235–252.*

Capon M., Lysaniuk B., Godard V. et al. 2021: Characterising the landscape compositions of urban wildlife encounters: the case of the stone marten (*Martes foina*), the red fox (*Vulpes vulpes*) and the hedgehog (*Erinaceus europaeus*) in the Greater Paris area. *Urban Ecosyst. 24: 885–903.*

Dovrat G., Perevolotsky A. & Ne'eman G. 2012: Wild boars as seed dispersal agents of exotic plants from agricultural lands to conservation areas. *J. Arid Environ. 78: 49–54.*

Ferreira-Rodríguez N. & Pombal M.A. 2019: Bait effectiveness in camera trap studies in the Iberian Peninsula. *Mamm. Res. 64: 155–164.*

Guardian T. 2022: Pine marten spotted in London for first time in more than a century. *https://www.theguardian.com/environment/2022/sep/08/pine-marten-spotted-in-london-for-first-time-in-more-than-a-century*

Hargis C.D., Bissonette J.A. & Turner D.L. 1999: The influence of forest fragmentation and landscape pattern on American martens. *J. Appl. Ecol. 36: 157–172.*

Herr J., Schley L., Engel E. & Roper T.J. 2010: Den preferences and denning behaviour in urban stone martens (*Martes foina*). *Mamm. Biol. 75: 138–145.*

Herr J., Schley L. & Roper T.J. 2009: Stone martens (*Martes foina*) and cars: investigation of a common human-wildlife conflict. *Eur. J. Wildl. Res. 55: 471–477.*

Hisano M. 2018: Frugivory of the stone marten (*Martes foina* Erxl.) in Bulgaria – a review from an urban perspective. *ZooNotes 119: 1–4.*

Hisano M. 2019: Insectivory characteristics of the Japanese marten (*Martes melampus*): a qualitative review. *Zool. Ecol. 29: 71–77.*

Hisano M. 2022: Variation in food habits of martens. In: Masuda R. & Kaneko Y. (eds.), Diversity of carnivora in East Europe and Japan. *Nakanishi-Shuppan, Sapporo, Japan: 88–98.*

Hisano M. 2020: Toward a better understanding of the Japanese marten *Martes melampus* diet. *Small Carniv. Conserv. 58: e58009.*

Hisano M. 2023: Urban sighting of the Ural owl *Strix uralensis* on the Uji Campus of Kyoto University, Kyoto, western Japan. *For. Res. (Kyoto) 82: 29–32. (in Japanese)*

Hisano M. & Deguchi S. 2018: Reviewing frugivory characteristics of the Japanese marten (*Martes melampus*). *Zool. Ecol. 28: 10–20.*

Hisano M., Hoshino L., Kamada S. et al. 2017: A comparison of visual and genetic techniques for identifying Japanese marten scats – enabling diet examination in relation to seasonal food availability in a sub-alpine area of Japan. *Zool. Sci. 34: 137–146.*

Hisano M., Motomura K. & Ohte N. 2024: A record of the sparrowhawk *Accipiter nisus* in an isolated small forest patch of urban landscape in central Japan. *For. Res. (Kyoto) 83: 1–4. (in Japanese)*

Hisano M., Newman C., Deguchi S. & Kaneko Y. 2019: Thermal forest zone explains regional variations in the diet composition of the Japanese marten (*Martes melampus*). *Mamm. Biol. 95: 173–180.*

Hisano M., Raichev E.G., Peeva S. et al. 2016: Comparing the summer diet of stone martens (*Martes foina*) in urban and natural habitats in Central Bulgaria. *Ethol. Ecol. Evol. 28: 295–311.*

Hisano M., Raichev E.G., Tsunoda H. et al. 2013: Winter diet of the stone marten (*Martes foina*) in central Bulgaria. *Mamm. Study 38: 293–298.*

Jeong S., Kim H.G., Thorne J.H. et al. 2018: Evaluating connectivity for two mid-sized mammals across modified riparian corridors with wildlife crossing monitoring and species distribution modeling. *Glob. Ecol. Conserv. 16: e00485.*

Kawauchi N., Yamamoto Y. & Imai K. 2003: Annual changes in testicular plasma testosterone concentration, home range and active time in

wild male marten, *Martes melampus melampus*. *Mamm. Sci. 43: 93–98. (in Japanese with English summary)*

Kistler C., Hegglin D., von Wattenwyl K. & Bontadina F. 2013: Is electric fencing an efficient and animal-friendly tool to prevent stone martens from entering buildings? *Eur. J. Wildl. Res. 59: 905–909.*

Lanszki J. 2003: Feeding habits of stone martens in a Hungarian village and its surroundings. *Folia Zool. 52: 367–377.*

Larroque J., Ruette S., Vandel J.-M. & Devillard S. 2015: Where to sleep in a rural landscape? A comparative study of resting site patterns in two syntopic *Martes* species. *Ecography 38: 1129–1140.*

Lombardini M., Cinerari C.E., Murru M. et al. 2015: Habitat requirements of Eurasian pine marten *Martes martes* in a Mediterranean environment. *Mamm. Res. 60: 97–105.*

Manzo E., Bartolommei P., Giuliani A. et al. 2018: Habitat selection of European pine marten in Central Italy: from a tree dependent to a generalist species. *Mamm. Res. 63: 357–367.*

Moriarty K.M., Zielinski W.J. & Forsman E.D. 2011: Decline in American marten occupancy rates at Sagehen Experimental Forest, California. *J. Wildl. Manag. 75: 1774–1787.*

Okumura C. & Jiang Z. 2009: Research on the circulation mechanism of the natural ecosystem of Mt. Fuji: survey report on the habitat status of wild animals at the northern foot of Mt. Fuji. *Yamanashi Institute of Environmental Sciences Research Fujiyoshida: Yamanashi Institute of Environmental Sciences, vol. 23. (in Japanese)*

Remonti L., Ruiz-González A. & Balestrieri A. 2022: Colonisation of agricultural landscapes by the pine marten. In: Do E., San L., Sato J.J. et al. (eds.), Small carnivores: evolution, ecology, behaviour, and conservation. *Wiley, Oxford, UK: 275–292.*

Robley A., Gormley A., Woodford L. et al. 2010: Evaluation of camera trap sampling designs used to determine change in occupancy rate and abundance of feral cats. *Arthur Rylah Institute for Environmental Research, Technical series no. 201, Department of Sustainability and Environment, Heidelberg, Victoria, Australia.*

Saito M. & Koike F. 2013: Distribution of wild mammal assemblages along an urban-rural-forest landscape gradient in warm-temperate East Asia. *PLOS ONE 8: e65464.*

Seljee F.C. 2021: Habitat use of beech martens *Martes foina* in relation to meadowbird conservation practices in the Netherlands. *University of Groningen, Groningen, Netherlands.*

Slauson K.M. & Zielinski W.J. 2009: Characteristics of summer and fall diurnal resting habitat used by American martens in coastal northwestern California. *Northwest Sci. 83: 35–45.*

Suzuki M. & Saito M.U. 2023: Forest road use by mammals revealed by camera traps: a case study in northeastern Japan. *Landsc. Ecol. Eng. 19: 289–296.*

Takasaki H. 2022: Japanese marten, *Martes melampus melampus*, first camera-trapped in an urban residential area in Okayama City, western Japan. *Naturalistae 26: 41–42.*

Tatara M. 1994: Notes on the breeding ecology and behavior of Japanese martens on Tsushima Islands, Japan. *J. Mamm. Soc. Japan 19: 67–74.*

Tóth M., Bárány A. & Kis R. 2009: An evaluation of stone marten (*Martes foina*) records in the city of Budapest, Hungary. *Acta Zool. Acad. Sci. Hung. 55: 199–209.*

Tsuji Y., Tatewaki T. & Kanda E. 2011a: Endozoochorous seed dispersal by sympatric mustelids, *Martes melampus* and *Mustela itatsi*, in western Tokyo, central Japan. *Mamm. Biol. 76: 628–633.*

Tsuji Y., Uesugi T., Shiraishi T. et al. 2011b: Faecal size criteria to discriminate Japanese marten (*Martes melampus*) and Japanese weasel (*Mustela itatsi*). *J. Jpn. Assoc. Zoos and Aquariums 52: 8–15. (in Japanese with English summary)*

Tsujino R. & Yumoto T. 2014: Habitat preferences of medium/large mammals in human disturbed forests in Central Japan. *Ecol. Res. 29: 701–710.*

Watabe R., Tsunoda H. & Saito M.U. 2022: Evaluating the temporal and spatio-temporal niche partitioning between carnivores by different analytical method in northeastern Japan. *Sci. Rep. 12: 11987.*

Watanabe S. 2020: Shigeki Watanabe's weasel stories: an endangered species, Japanese marten. *https://ameblo.jp/itachiaswat/entry-12623356265.html (in Janapese)*

Weber D., Roth T., Tesini C. & Thiel D. 2018: Widespread distribution of pine martens (*Martes martes*) in a fragmented suburban landscape. *Mamm. Res. 63: 349–356.*

Wereszczuk A. & Zalewski A. 2015: Spatial niche segregation of sympatric stone marten and pine marten – avoidance of competition or aelection of optimal habitat? *PLOS ONE 10: e0139852.*

Zamzam S.H., Ghorani M., Eslami F. & Mostofi S. 2024: The first report of rabies in stone marten (*Martes foina*) in Chaharmahal and Bakhtiari Province (Iran). *Vet. Med. Sci. 10: e1328.*

Zhang Z., Meerow S., Newell J.P. & Lindquist M. 2019: Enhancing landscape connectivity through

multifunctional green infrastructure corridor modeling and design. *Urban For. Urban Green. 38: 305–317.*

Zhou Y.B., Newman C., Buesching C.D. et al. 2011: Diet of an opportunistically frugivorous carnivore, *Martes flavigula*, in subtropical forest. *J. Mammal. 92: 611–619.*

Zhou Y.B., Zhang J., Slade E. et al. 2008: Dietary shifts in relation to fruit availability among masked palm civets (*Paguma larvata)* in central China. *J. Mammal. 89: 435–447.*