

Ecography

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**Supplementary material**

## Supplementary material Appendix 1

Table A1. Study sites and results of field experiments.

Island	Site code <sup>1)</sup>	Latitude, longitude	Altitude (m)	Control experiment <sup>2)</sup>		Burial-prevention experiment <sup>2)</sup>	Numbers of <i>N. quadripunctatus</i> per trap <sup>3)</sup>		
				Removal	Burial	Removal			
Honshu	H1	35°25'N, 132°39'E	181	1	4	1	0	0	0
	H2	35°25'N, 132°42'E	32	3	2	2	0	0	0
	H3	35°25'N, 132°43'E	67	0	5	0	11	2	0
	H4	35°26'N, 132°45'E	55	3	2	1	4	0	28
	H5	35°28'N, 132°48'E	106	2	3	3	1	1	7
	H6	35°29'N, 132°50'E	132	2	3	3	1	0	1
	H7	35°28'N, 132°56'E	21	1	4	1	0	0	0
	H8	35°34'N, 133° 4'E	44	2	3	5	2	0	0
	H9	35°34'N, 133° 6'E	30	4	1	5	37	0	0
	H10	35°34'N, 133°14'E	35	4	1	5	7	0	0
	H11	35°33'N, 133°15'E	147	1	4	5	0	0	4
	H12	35°33'N, 133°18'E	61	5	0	5	0	1	0
Dogo	D1	36°18'N, 133°15'E	210	1	4	1	3	3	14
	D2	36°18'N, 133°19'E	38	1	4	1	15	7	0
	D3	36°16'N, 133°22'E	73	1	4	2	3	3	0
	D4	36°11'N, 133°14'E	6	2	3	5	4	0	0
	D5	36°12'N, 133°12'E	116	0	5	0	7	2	2
	D6	36°16'N, 133°11'E	67	0	5	0	24	4	4
	D7	36°14'N, 133°16'E	65	1	4	0	0	0	0
Nishinoshima	Ni1	36° 6'N, 133° 4'E	75	1	3	0	3	0	0
	Ni2	36° 5'N, 133° 1'E	53	0	5	0	1	21	0
	Ni3	36° 5'N, 132°59'E	73	0	5	0	0	50	1
	Ni4	36° 4'N, 132°59'E	18	5	0	5	0	5	0
Nakanoshima	Na1	36° 6'N, 133°7'E	49	1	4	5	0	9	3
	Na2	36° 5'N, 133°6'E	109	0	5	4	17	0	4
	Na3	36° 4'N, 133°5'E	88	0	5	0	5	0	1
	Na4	36° 3'N, 133°5'E	60	0	5	1	12	4	0
Chiburijima	C1	36° 0'N, 133°3'E	13	5	0	5	0	0	8
	C2	36° 1'N, 133°2'E	48	5	0	3	2	0	0
	C3	36° 0'N, 133°1'E	154	4	1	5	4	2	3

<sup>1)</sup> Study site code numbers are referred to in Fig. 1.

<sup>2)</sup> Results of field experiments: 'Removal,' the numbers of mice removed by vertebrate scavengers; 'Burial,' the numbers of mice buried by *Nicrophorus* beetles.

<sup>3)</sup> Three traps were placed at each study site; the number of *N. quadripunctatus* captured in each trap is provided. Although *N. quadripunctatus* was not captured in bait traps deployed at four sites, it was sampled using other methods at all sites.

Table A2. Home range sizes of the vertebrate and invertebrate scavengers.

Class	Species	Common name	Home range		References <sup>1)</sup>
			Area	Radius	
Mammalia					
	<i>Vulpes vulpes</i>	Red fox	1.0–8.0 km <sup>2</sup>	564–1,596 m	Uraguchi 2015
	<i>Nyctereutes procyonoides</i>	Raccoon dog	0.1–6.0 km <sup>2</sup>	178–1,381 m	Saeki 2015
	<i>Mustela itatsi</i>	Japanese weasel	0.4 km <sup>2</sup>	334 m	Masuda and Watanabe 2015
	<i>Mustela sibirica</i>	Siberian weasel	0.013–1.4 km <sup>2</sup>	65–207 m	Sasaki 2015
	<i>Martes melampus</i>	Japanese marten	0.8–2.3 km <sup>2</sup>	505–856 m	Masuda 2015
	<i>Sus scrofa</i>	Wild boar	0.8–1.3 km <sup>2</sup>	509–649 m	Kodera 2015
Aves					
	<i>Corvus corone</i>	Carrion crow	0.15–0.29 km <sup>2</sup>	218–303 m	Nakamura 1998, Smedshaug et al. 2002
Insecta					
	<i>Nicrophorus quadripunctatus</i>	Burying beetle	1.5 to 2.0 km <sup>2</sup>	700–800 m	Sugiura et al. 2013

<sup>1)</sup> See References in the main text.

Table A3. Percentage of mouse carcasses removed by vertebrates and buried by *Nicrophorus* beetles on Honshu and the Oki Islands.

Island	Site (n) <sup>1)</sup>	Control experiment				Burial-prevention experiment	
		Removal % (n) <sup>2)</sup>	Burial % (n) <sup>3)</sup>	Remain % (n) <sup>4)</sup>	Total % (n) <sup>5)</sup>	Removal % (n) <sup>2)</sup>	Total % (n) <sup>5)</sup>
Honshu	12	46.7 (28)	53.3 (32)	0.0 (0)	100.0 (60)	60.0 (36)	100.0 (60)
Oki Islands							
Dōgo	7	17.1 (6)	82.9 (29)	0.0 (0)	100.0 (35)	25.7 (9)	100.0 (35)
Nishinoshima	4	30.0 (6)	65.0 (13)	5.0 (1)	100.0 (20)	25.0 (5)	100.0 (20)
Nakanoshima	4	5.0 (1)	95.0 (19)	0.0 (0)	100.0 (20)	50.0 (10)	100.0 (20)
Chiburijima	3	93.3 (14)	6.7 (1)	0.0 (0)	100.0 (15)	86.7 (13)	100.0 (15)
Total	30	36.7 (55)	62.7 (94)	0.7 (1)	100.0 (150)	48.7 (73)	100.0 (150)

<sup>1)</sup> Numbers of study sites.

<sup>2)</sup> Percentage (numbers) of mouse carcasses removed by vertebrate scavengers.

<sup>3)</sup> Percentage (numbers) of mouse carcasses buried by *Nicrophorus* beetles.

<sup>4)</sup> Percentage (numbers) of mouse carcasses left.

<sup>5)</sup> Percentage (total numbers) of mouse carcasses.

Table A4. Results of a generalised linear mixed model for carcass removal by vertebrate scavengers on Honshu and the Oki Islands.

Response variable	Explanatory variable (fixed factor)	Coefficient estimate	SE	z value	p value
Carcass removal by vertebrates	Intercept	-0.1598	0.4142	-0.386	0.6996
	Study region (Dōgo)*	-1.6731	0.7589	-2.205	0.0275
	Study region (Nishinoshima)*	-0.9557	0.8969	-1.066	0.2866
	Study region (Nakanoshima)*	-3.2042	1.2873	-2.489	0.0128
	Study region (Chiburijima)*	3.1943	1.3383	2.387	0.017

\* Honshu was used as a reference.

Table A5. Results of a generalised linear mixed model for carcass burial by *Nicrophorus* beetles on Honshu and the Oki Islands.

Response variable	Explanatory variable (fixed factor)	Coefficient estimate	SE	z value	p value
Carcass burial by <i>Nicrophorus</i>	Intercept	0.1588	0.4067	0.39	0.6962
	Study region (Dōgo)*	1.6625	0.7471	2.225	0.0261
	Study region (Nishinoshima)*	0.645	0.8553	0.754	0.4508
	Study region (Nakanoshima)*	3.1821	1.2741	2.498	0.0125
	Study region (Chiburijima)*	-3.1721	1.3232	-2.397	0.0165

\* Honshu was used as a reference.

Table A6. Results of a generalised linear mixed model for the effects of *Nicrophorus quadripunctatus* abundance on carcass removal by vertebrate scavengers.

Response variable	Explanatory variable (fixed factor)	Coefficient estimate	SE	z value	p value
Carcass removal by vertebrates	Intercept	-0.15956	0.56328	-0.283	0.777
	<i>N. quadripunctatus</i> abundance	-0.06146	0.03703	-1.660	0.097

Table A7. Results of a generalised linear mixed model for the effects of *Nicrophorus quadripunctatus* abundance on carcass burial by *Nicrophorus* beetles.

Response variable	Explanatory variable (fixed factor)	Coefficient estimate	SE	z value	p value
Carcass burial by <i>Nicrophorus</i>	Intercept	0.09473	0.55354	0.171	0.8641
	<i>N. quadripunctatus</i> abundance	0.06297	0.03651	1.725	0.0845

Table A8. Results of a generalised linear mixed model for the effects of burial-prevention treatment on carcass removal by vertebrate scavengers.

Response variable	Explanatory variable (fixed factor)	Coefficient estimate	SE	z value	p value
Carcass removal by vertebrates	Intercept	-1.0184	0.7194	-1.416	0.15685
	Burial-prevention treatment*	0.9024	0.3134	2.879	0.00398

\* Control (carcasses on the ground) was used as a reference.

Table A9. Results of a generalised linear mixed model for numbers of *Nicrophorus quadripunctatus* per trap.

Response variable	Explanatory variable (fixed factor)	Coefficient estimate	SE	z value	p value
Numbers of <i>N. quadripunctatus</i> per trap	Intercept	0.2408	0.3764	0.64	0.5224
	Study region (Dōgo)*	0.8233	0.5844	1.409	0.1589
	Study region (Nishinoshima)*	1.1263	0.6984	1.613	0.1068
	Study region (Nakanoshima)*	1.1585	0.6947	1.668	0.0954
	Study region (Chiburijima)*	0.2976	0.7951	0.374	0.7082

\* Honshu was used as a reference.