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Winter habitat suitability and spatial niche overlap between Japanese serow (Capricornis crispus) and sika deer (Cervus nippon) in Shonai and Minamiaizu, Japan
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WINTER HABITAT SUITABILITY AND SPATIAL NICHE OVERLAP BETWEEN JAPANESE SEROW (*Capricornis crispus*) AND SIKA DEER (*Cervus nippon*) IN SHONAI AND MINAMIAIZU, JAPAN

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ABSTRACT

Winter snow restricts movement and forage accessibility for sympatric ungulates, potentially altering shared habitat use. This study compared predicted winter habitat suitability and spatial niche overlap between Japanese serow (*Capricornis crispus*) and sika deer (*Cervus nippon*) in Shonai and Minamiaizu, Japan. Presence-only records from snow-tracking surveys were analyzed using MaxEnt and seven environmental predictors at 30 m resolution: elevation, slope, snow depth, distances to roads and rivers, aspect, and land cover. Aspect and land cover were categorical predictors. Continuous predictors were screened using Spearman correlations and variance inflation factors. Models were evaluated using five-fold cross-validation, and Schoener's D was calculated from normalized mean suitability surfaces.

Mean test AUC ranged from 0.936 to 0.959. Distance to roads contributed most to the serow models in Shonai (53.7%) and Minamiaizu (69.4%) and the deer model in Shonai (48.9%), whereas elevation dominated the deer model in Minamiaizu (39.3%). Marginal predicted suitability declined with increasing distance from roads in all models. Snow depth contributed more to the serow model in Shonai than in Minamiaizu (27.1% versus 3.0%). Spatial overlap was greater in Shonai (D = 0.671) than in Minamiaizu (D = 0.441).

These results reveal regional differences in modeled habitat relationships and greater spatial differentiation in Minamiaizu. They inform hypotheses about winter habitat sharing but do not establish interspecific competition as the cause of these differences.

Keywords: Japanese serow, sika deer, winter habitat suitability, niche overlap, MaxEnt

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KESESUAIAN HABITAT MUSIM DINGIN DAN TUMPANG TINDIH RELUNG SPASIAL ANTARA SEROW JEPANG (*Capricornis crispus*) DAN RUSA SIKA (*Cervus nippon*) DI SHONAI DAN MINAMIAIZU, JEPANG

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INTISARI

Salju pada musim dingin membatasi pergerakan dan akses ungulata simpatrik terhadap pakan, sehingga berpotensi mengubah penggunaan habitat bersama. Penelitian ini membandingkan prediksi kesesuaian habitat musim dingin dan tumpang tindih relung spasial antara serow Jepang (*Capricornis crispus*) dan rusa sika (*Cervus nippon*) di Shonai dan Minamiaizu, Jepang. Data kehadiran spesies dari survei penelusuran jejak satwa di salju dianalisis menggunakan MaxEnt dan tujuh prediktor lingkungan beresolusi 30 m: elevasi, kemiringan lereng, kedalaman salju, jarak dari jalan, jarak dari sungai, arah hadap lereng, dan tutupan lahan. Arah hadap lereng dan tutupan lahan diperlakukan sebagai prediktor kategoris. Prediktor kontinu diperiksa menggunakan korelasi Spearman dan faktor inflasi varians. Model dievaluasi melalui validasi silang lima lipatan, sedangkan indeks Schoener's D dihitung dari permukaan rerata kesesuaian habitat yang telah dinormalisasi.

Rerata AUC pengujian berkisar antara 0,936 dan 0,959. Jarak dari jalan memberikan kontribusi terbesar pada model serow di Shonai (53,7%) dan Minamiaizu (69,4%) serta model rusa sika di Shonai (48,9%), sedangkan elevasi mendominasi model rusa sika di Minamiaizu (39,3%). Prediksi kesesuaian marginal menurun seiring bertambahnya jarak dari jalan pada seluruh model. Kontribusi kedalaman salju pada model serow lebih besar di Shonai dibandingkan Minamiaizu (27,1% berbanding 3,0%). Tumpang tindih spasial lebih tinggi di Shonai (D = 0,671) dibandingkan Minamiaizu (D = 0,441).

Hasil ini menunjukkan perbedaan hubungan habitat yang dimodelkan antarwilayah dan diferensiasi spasial yang lebih besar di Minamiaizu. Temuan ini memberikan dasar bagi hipotesis mengenai penggunaan habitat bersama pada musim dingin, tetapi tidak membuktikan bahwa kompetisi antarspesies merupakan penyebab perbedaan tersebut.

Kata kunci: serow Jepang, rusa sika, kesesuaian habitat musim dingin, tumpang tindih relung, MaxEnt

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