The dominant paradigms of large herbivores predict a first irruption, followed by a recovery to a reduced carrying capacity, however, supporting evidence has tended to be anecdotal [1]. The sika deer (Cervus nippon) population on Nakanoshima Island (5.2 km²), Hokkaido showed repeated irruption which imposed irreversible changes on the vegetation. The sika deer reached to the first peak (52.5 deer/km²) in 1984 and the second peak (83.5 deer/km²) in 2001 that was 1.6 times higher than the first peak. The population relatively remained stable at 45-59 deer/km² during 2008-2012. Thus annual rate of increase (λ) changed from 16% in the initial irruption (Phase 1) to 7% in the second irruption (Phase 2) and stabilize thereafter (Phase 3) [2]. Under heavy browsing, deer eliminated dwarf bamboo during the first irruption and plum yew during the second irruption, thereafter fallen leaves were staple food in all season. Fallen leaves occupied 92% of the potential food supply and contributed 76% of the total consumption of the deer in Phase 2 [3]. Crude protein of fallen leaves was over requirement level for body growth in summer and declined in autumn and fall, however, which exceeded the requirement for maintenance level. The deer herd exhibited density dependent changes in life history trait, such as delayed sexual maturity, lower calf recruitment, lower body mass and smaller body size (jaw length) in the post-initial irruption (Phase 2-3). The body mass of adult female (≥3 yrs old) was related to pregnancy rate, which decreased as body mass decrease. Corresponding to the change in food habits, the molar wear rate accelerated in Phase 2-3 [4]. Nevertheless, female adult survival was maintained at a high level with a mean of 0.84 (95% CI: 0.80–0.88), which might contribute to the maintenance of a high-density sika deer population even under sever resource limitation [5]. In the absence of predation, hunting or culling may be the only management tool available to control ungulate populations and negative impacts on vegetation.

References