



## Irruptive Population and Spatial Dynamics of Introduced Island Caribou

Large mammalian herbivores introduced to islands without predators are predicted to undergo irruptive population and spatial dynamics—booming and busting as surplus forage supplies are exploited, and then exhausted. But only a few well-documented case studies support this paradigm, as these populations can also go extinct before studies can be made, or the timing of boom and bust stages missed during survey intervals.

Caribou (*Rangifer tarandus*) introduced to Adak Island in Alaska's Aleutian Archipelago during the late 1950s represent an informative case study. Federal and university researchers have compiled and analyzed data from spatially organized aerial counts conducted on this Adak population over a 54-year period. Their findings are published in the journal *Ecosphere*.

The Adak caribou population size increased from 23 animals released in the 1950s to approximately 2,900 animals by 2012. Two distinct periods of irruptive growth occurred during this time, separated by a long time period of relative stability, driven mostly by annual variation in hunting pressure.

An unexpected deceleration resembling logistic population growth occurred between the peak of the second irruption in 2005 and the next survey in 2012. Modeling analyses indicated that a reduction in population recruitment as caribou density increased—combined with 1) intensifying mortality from continued hunting, or 2) possible impacts from two harsh winters—were likely explanations for this observed slow-down in population growth.

Modeling results from caribou space use data over time found that concentrated areas of use during post-calving season expanded outwardly as population size increased, and caribou ultimately dispersed to neighboring Kagalaska Island by 2012. Conversely, Adak caribou maintained their fidelity to calving sites in the south-central portion of the island during calving season across the full range of population densities. These are key findings, because to our knowledge, no studies of introduced *Rangifer* have measured long-term patterns of spatial use to the extent described in this study.

### This Brief Refers To:

Ricca, MA, DH Van Vuren, FW Weckerly, JC Williams, AK Miles. 2014. **Irruptive dynamics of introduced caribou on Adak Island, Alaska: an evaluation of Riney-Caughley model predictions.** *Ecosphere* 5:94. doi:10.1890/ES13-00338.1 <http://www.werc.usgs.gov/ProductDetails.aspx?ID=5058>



Caribou on Adak have been subjected to variable hunting pressure over their 50 years of history, and they exploit a graminoid plant community rather than lichen-dominated one for food. Mark Ricca/USGS.

### MANAGEMENT IMPLICATIONS

- On Adak, caribou population irruption patterns appear to be influenced by variations in hunter harvest pressure as well as sustained availability of food sources, due to the tolerance of graminoid plant communities to caribou foraging, as compared to lichen communities which recover poorly from heavy foraging.
- This study extensively measured space use of introduced caribou across the range of population densities. The detected seasonal variation in caribou space use (calving versus post-calving) appears to influence model predictions of caribou spatial expansion.
- Caribou dispersal to and reproduction on neighboring Kagalaska Island represents a new dispersal front for irruptive dynamics and a new challenge for the Alaska Maritime National Wildlife Refuge, tasked with maintaining native ecological integrity of these islands. While the future demography of caribou on both islands is far from certain, sustained and significant hunting pressure could serve as an important management tool.

### RESEARCH CONTACT

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