

Research Bulletin

NWT Cumulative Impact Monitoring Program

What is the Role of Birch Shrubs in ‘Greening’ the Bathurst Caribou Range?

Summary

Vegetation has become more productive on the Bathurst caribou herd’s range in recent decades. This trend was detected by satellites measuring light reflected from actively growing plants. But what does “greening” mean on the ground? Most tundra plants are small and low-growing but some shrubs, such as birch, can grow large and upright. We studied birch to find out if greening is from more shrubs, bigger shrubs, or shrubs expanding into new areas of the Bathurst range.

Why is This Important?

Large shrubs can interfere with caribou movements and can shelter biting insects from the wind. It is important to understand past habitat changes that might have affected the Bathurst caribou’s decline to help us understand potential future conditions.

What Did We Do?

We measured birch shrubs and collected stem samples in areas that had greened between 2000 to 2017, based on satellites measurements. We did the same in areas where productivity had remained unchanged in the same time period. We then compared birch growth in these two types of areas to find differences between them.



View of the treeline landscape on the Bathurst caribou range. (Credit: J. Koop)



What Did We Find?

Surprisingly, birch shrubs were similar in age, abundance, and density across our study area. Stems had become established over similar time periods, were the same length, and were growing at the same rate. However, birch canopies had 13% more cover in "greening" areas while shrubs in areas that hadn't changed had 9% more dead stems.

What Does This Mean?

Given all the similarities, we suspect that birch in "greening" areas have healthier, more productive foliage from either more leaves or larger leaves. In other areas, dead stems may be dimming "green" light reflected from birch and other tundra vegetation. These subtle differences suggest that vegetation on the Bathurst range is changing in unanticipated ways.

What's Next?

The results of this project, and other related projects, will be combined with caribou location data available since the late 1990's to understand how vegetation changes have altered caribou habitat use during the same period. These collective findings will help us better understand the influence of vegetation on Bathurst caribou.

Remote Sensing

Healthy vegetation reflects more near infrared light and less red light than unhealthy vegetation during photosynthesis. Based on a standardized index of the difference between near infrared and red light, scientists can assign a measure of "greening" to an area.



Taking measurements of shrub growth.
(Credit: J. Koop)

For More Information

Carolyn Bonta, Queen's University
carolyn_bonta@hotmail.com

NWT Cumulative Impact Monitoring Program
(CIMP187) nwtcimp@gov.nt.ca

Bonta, C., King, G.M., and Danby, R.K. (2023). *Greening on the Bathurst caribou range in northern Canada: are erect shrubs responsible for remotely-sensed trends?* Arctic Science. 9(3): 581-599. <https://doi.org/10.1139/as-2022-0036>

Danby, K.D. and Danby, R.K. (2022). *Remotely-sensed trends in vegetation productivity and phenology during population decline of the Bathurst caribou (Rangifer tarandus groenlandicus) herd.* Arctic Science, 8(1): 228-251. <https://doi.org/10.1139/as-2021-003>