Public Registry - Project Proposals

NPC 151055: Leaf photosynthesis of shrub species - Response to air temperature and climatic feedback

Close

Proposal Status: Conformity Determination Issued

Overview Documents

Project Overview

Type of application: New

Proponent name:

Maire Vincent

Proponent company:

University of Quebec in Trois-Rivieres

Project Description:

Context: The Arctic is warming at three to four times faster the rate of the rest of the world. This is causing shrubs to grow taller and spread across the tundra (a process called shrubification). This change affects how the land absorbs heat, and stores carbon into the soil or release it back to the atmosphere. Research Goal: Our project specifically studies leaf photosynthesis—how plants turn sunlight and carbon dioxide into energy and organic carbon. We aim to determine whether rising temperatures enable these shrubs to capture more carbon and at what point the heat begins to impede plant C capture. As such, we are examining the optimal temperature and the thresholds at which photosynthesis operate for four shrub species - Betula glandulosa, Salix richardsonii, Salix reticulata and Salix arctica. We will compare the photosynthesis temperature response of these shrubs both in Iqaluit and Bylot Island to determine whether they are simply adjusting to the heat difference between the two locations or whether they have genetically adapted over time. Why it matters: This research helps us predict the future of the Arctic landscape and climate. Understanding these plants will help to better protecting local biodiversity and managing the impacts of climate change on northern ecosystems.

Project Schedule

Start Date:

2026-07-13

End Date:

2026-08-13

Project Map

List of project geometries:

Id

Geometry

Location Name

19486

polygon

Research area where shrub species will be sampled

NPC Planning regions:

No Approved Plan

Project Land Use and Authorizations

Project Land Use:

Scientific Research

Licensing Agencies:

Nunavut Parks

Government of Canada - Canadian Wildlife Service

Material Use

Equipment:

Type

Quantity

Type

Use

VTT

1

86*48 in

The vehicule may be use to go on-site

Fuel Use:

Type

Container

Capacity

Use

No data found

Hazardous Material and Chemical Use:

Type

Container

Capacity

Use

No data found

Water Consumption:

Daily Amount (m^2)

Retrieval Method

Retrieval Location

0

Waste and Impacts

Environmental Impacts:

The proposed research will have minimal and localized environmental impacts. Field activities are limited to the collection of a small number of shrub branches (one branch per individual, two individuals per species, across four species and contrasting fertility conditions at three sites). This sampling approach is non-destructive, as individual plants will remain alive and functional following branch removal, with the majority of biomass left intact. In addition, limited soil sampling will be conducted, consisting of three soil cores per contrast (10 cm depth and 6 cm diameter), which represents a small and localized

disturbance. All soil sampling sites will be restored immediately after collection by refilling the holes with surrounding substrate to maintain surface integrity. Temporary microclimate measurements will also be conducted using small temperature and air humidity sensors (2 × 2 × 2 cm) installed approximately 20 cm above the ground surface. These sensors will be deployed for a short period (approximately one month) and protected by a small wire mesh enclosure. No permanent infrastructure will be installed, and all equipment will be removed at the end of the measurement period. No excavation beyond these small soil cores or installation of permanent equipment is planned. Measurements of photosynthesis will be conducted on collected plant material shortly after sampling, and all samples (plant and soil) will be transported to laboratory facilities at Université du Québec à Trois-Rivières for further analyses. Access to the park will be conducted by ATV, while all site prospecting and sampling within the study area will be carried out on foot to minimize disturbance to vegetation and soils. No hazardous substances will be used or released in the environment. Overall, the project is designed to have negligible ecological impact while contributing to a better understanding of Arctic shrub functioning in the context of climate change.

Waste Management:

Waste Type

Quantity Generated

Treatement Method

Disposal Method

No data found