

Tłıcho Summer Student Research Assistant Program

Final Report - October 2016

PROJECT TITLE:
Tłıcho Summer Student Research Assistant Program (TSSRAP)
NAME OF SPONSORING ORGANIZATION:
Environment & Natural Resources, Government of the Northwest Territories Wek'èezhìi Renewable Resources Board
PROJECT DESCRIPTION:
Tłıcho youth from the North Slave Region were hired as research assistants to work alongside university researchers at the Tundra Ecosystem Research Station at Daring Lake, Northwest Territories. Students assisted researchers with fieldwork and in the laboratory at the research station. The Tundra Ecosystem Research Station is located 300 km north of Yellowknife. The Research Station facilitates long-term research and monitoring of the tundra ecosystem and supports conservation education programs and training opportunities for northern students. This is the fourth year of a project that will take place over a five-year period. Student Recruitment: Two Tłıcho high school students / youth will be hired each year for a total of 10 students participating in the program over a 5-year period. Each student will be hired for one month; one in July and one in August. Participants should have a minimum of Science 10. Recruitment targets students who have previously attended the Tundra Science and Culture Camp at Daring Lake and are familiar with the Research Station and its operations. The Student Research Assistant Program opportunity is advertised and applicants are required to submit a resume. Students are selected through a screening and interview process. a) Objectives: • To provide education and training experiences for Tłıcho students / youth • To provide valuable work experience for students • To introduce students to careers in science, particularly those related to the environment • To create awareness and interest in scientific research and fieldwork that may encourage future participation in initiatives such as community-based monitoring programs • To support efforts to engage Tłıcho citizens in the stewardship of land, wildlife and resources on Tłıcho lands and in co-management in Wek'èezhìi • To provide a mutually beneficial opportunity for students and researchers. Researchers will benefit from additional field and laboratory assistance, and students will benefit from the mentoring they receive

b) Deliverables:

- Annual Final Report to summarize program activities
- Digital photographs of students engaged in program activities
- Signed photo release forms for each student
- Copy of poster advertising the program and employment opportunity. Posters were sent to Tłıcho community schools. They were also posted on the Wek'èezhì Renewable Resources Board Facebook page and website, as well as on the Tłıcho Government's Facebook page and website. The Tłıcho Government also included the poster and program information in its newsletter.
- Copy of Wek'èezhì Renewable Resources Board (WRRB) E-newsletter story publicizing the project. The story was distributed in the Summer 2016 issue and is posted on the WRRB website at www.wrrb.ca

PROJECT PARTICIPANTS SUMMER 2016

For Year 4 of this project, Joshua Rabesca and Allison Wettrade were hired as Research Assistants for the months of July and August, respectively. Joshua Rabesca was hired for a 28 day term, beginning on July 5, 2016. However, for personal reasons, he resigned his position on July 12, 2016 and accepted a full-time employment position for the remainder of the summer. Allison was hired for a 28 day term, from July 25, 2016 to August 25, 2016, and completed her full term.

The Summer Student Research Assistant employment opportunity was promoted on website and social media, as well as by letter and poster distributed to schools and to Tłıcho Government offices in each of the four Tłıcho communities.

Eleven (11) applications were received and screened and interviews were held by telephone. Job duties and supervision were overseen by Environment & Natural Resources, Government of the Northwest Territories (GNWT).

WORK ACTIVITIES

TSSRAP students assist researchers who are studying aspects of climate change, and impacts on the tundra environment, vegetation growth and carbon exchange. They also assist with camp maintenance and chores.

Daring Lake is one location in a global network of research sites that scientists are monitoring to better understand any impacts climate changes might have on carbon cycle processes. Ultimately, the research is aimed at contributing to a greater understanding of the Arctic's overall response to a changing climate.

As part of a long-term study of tundra-atmosphere interactions at Daring Lake, university researchers are studying the exchange of important greenhouse gases (carbon dioxide and methane) between tundra surfaces and the atmosphere. They are measuring these exchanges over various tundra types (upland tundra, wet sedge fen, and shrub sites) and assessing carbon sink/source strength of the Daring Lake region. For the 2016 field season, core projects addressed some of the ongoing questions about tundra carbon cycling and the effects of climate change on the tundra ecosystem.

This year's researchers were Quan Gu, Rhett Andruko, Daniel Krivenko, Kristyn Forster, Electra Skaarup, and Ki-youn Kim.

This summer, TSSRAP student Joshua Rabesca worked with Paul Grogan, Plant and Ecosystem Ecologist, Department of Biology at Queen's University in Kingston, Ontario. Paul's research is focused on understanding energy and nutrient flow, carbon cycling, and plant-soil interactions in the tundra habitat – and impacts of climate warming on these processes. His team conducted various experiments to investigate potential impacts of warming on tundra plants and soils. For example, how are warming temperatures influencing the availability of nutrients to plants and to plant growth? Winter climate change in the arctic is predicted to result in deeper snow in many locations. How will increased snow cover impact soil properties, plant growth and plant composition?

As temperatures rise, species like Dwarf Birch shrubs are becoming more abundant on the tundra. Paul's team is also interested in the expansion of shrub cover in the Arctic and any consequences of those vegetation shifts on carbon and nutrient cycling. For example, one of his students addressed the following question: “Has the land cover, physical stature, or secondary growth of birch shrubs increased over the past 10 years at Daring Lake, and is this growth dependent on habitat type?”

Joshua assisted the research team in gathering plant and soil samples from various fertilisation plots. He also spent a day with Professor Grogan doing maintenance on the snow fence, caribou enclosure, and greenhouse warming plots.

A specific project is using tea bags as a way to investigate decomposition and nutrient cycling in the Arctic, as part of the Circumpolar Biodiversity Monitoring Program. Decomposition rates can vary with different environmental conditions, such as moisture, temperature and amount of permafrost.

“Reading the tea leaves” next summer will tell researchers how fast plants decompose in an area. By comparing the weight before and after decomposition, researchers will be able to measure the rate of decomposition. Knowing the rate that organic matter degrades can help researchers better understand what will happen with climate change. When plant material decomposes, some carbon is released into the atmosphere as carbon dioxide and some is retained in the soil. Researchers are interested in observing how the rates of decomposition and release of carbon dioxide exchange will be affected by the warming climate. Next summer, researchers will compare rates of decomposition at each site.

This summer, TSSRAP summer student Allison Wetrade helped remove tea bags that were put in last year and had overwintered, while others had been put in the ground this spring.

There are related questions about the impact of thawing permafrost on the carbon cycle as a result of warming climate. Methane (CH₄), locked in permafrost, is escaping as ice thaws. The type, timing and the amount of greenhouse gas emission is uncertain, but there is concern that degradation of permafrost would have very significant local impacts on aquatic and terrestrial species and ecosystems.

Allison also measured plants, assisted with an insect survey, and helped the camp manager with maintenance projects such as building boardwalks.

In addition to her work term, Allison participated in the 10-day annual Tundra Science and Culture Camp (TSCC), July 25-August 3, also at Daring Lake. Coordinated by Environment & Natural Resources, GNWT, the camp provides intensive courses in multiple field sciences and cross-cultural outdoor environmental education. This opportunity further enriched her work experience by providing interdisciplinary learning about the tundra ecosystem and hands-on exposure in field techniques. Allison was particularly interested in the area's prehistory and archaeological sites, and shared some traditional stories about sacred sites near her home community of Behchokò. She commented that it was fascinating to see ancient tent rings and other evidence that people actually lived on the tundra.

One of the activities at TSCC involves monitoring small mammal population trends using a new live trapping method. Students run the trap line and check the traps to find out which traps had been fired and which species were caught. Red-backed voles were among the most common species trapped. Population indices are calculated by collecting and monitoring species each year, information that is collected and monitored by circumpolar agencies.

Being on the tundra itself was a rewarding experience, "something I never get a chance to do," Allison said. The unique landscape with its eskers, the vast, open tundra with seemingly unending views where one can see so far in the distance, and the wildlife all left strong impressions.

PRIMARY CONTACTS

ENR, GNWT: Karin Clark, Cumulative Effects Biologist (Karin_Clark@gov.nt.ca) (867-767-9237 ext 53225)

WRRB: Jody Pellissey, Executive Director, (jpellissey@wrrb.ca) (867-873-5740)

List of Attachments

- Digital photographs of students engaged in program activities
- Signed photo release forms for each student
- Copy of poster advertising the program and employment opportunity. Posters were sent to Tłı̄cho community schools. They were also posted on the Wek'èezhì Renewable Resources Board Facebook page and website, as well as on the Tłı̄cho Government's Facebook page and website.
- Copy of Wek'èezhì Renewable Resources Board (WRRB) E-newsletter story publicizing the project. The story was distributed in the Summer 2016 issue and is posted on the WRRB website: <http://wrrb.ca/news/tlcho-summer-student-research-assistant-program-2016>

Attachment 1 - Digital photographs of students engaged in program activities

Joshua Rabesca



Photo: Paul Grogan, Queen's University. Climate change in summer is resulting in warming air and soil temperatures in many locations in the arctic. A plastic greenhouse experiment was established in 2004 to warm the tundra during summer, and allow investigation of the potential impacts of warming on tundra plants and soils. Here, researchers from Queen's University, Kingston, Ontario (Qian Gu and Rhett Andruko) are re-installing the plastic covering on one of the greenhouses in early Summer 2016.



Photo: Paul Grogan, Queen's University. Winter climate in the arctic is predicted to result in deeper snow in many locations. Snow fences were established in 2004 to increase snow depth over winter and study its impacts on soil properties as well as plant growth and composition. The fences increase the peak snow depth from ~35 cm up to ~90 cm, and four other snowfences as well as five control plots are located nearby.



Photo: Paul Grogan, Queen's University. Group shot. Joshua Rabesca is fourth from the left, at the back in a red hoodie.



Photo: Paul Grogan, Queen's University. Tundra Ecosystem Research Station at Daring Lake, NWT.



Photo: Paul Grogan, Queen's University. Arctic plant growth is strongly regulated by nutrient availability. Here, ion exchange membranes are being inserted by researchers from Queen's University, Kingston, Ontario (Qian Gu and Rhett Andruko) into tundra soil to measure nutrient availability to the nearby plants at a research site near the Tundra Ecosystems Research Station, Daring Lake, N.W.T.

Allison Wetrade



Allison Wetrade (front, right) exploring the aquatic ecosystem, along with Tundra Science and Culture Camp students at Daring Lake. Photo: GNWT / K. Clark, ENR



In these two photos, ENR Public Education Specialist Tasha Stephenson is explaining characteristics and anatomy of fish species found at Daring Lake. Allison Wettrade is at top of photo above and on the left in photo below. Photos: GNWT / K.Clark, ENR





Exploring the natural history of the Barren-lands and its tundra ecosystem. Allison Wetrade is second from the left. Photo: GNWT / K.Clark, ENR



In a few places on the mostly treeless tundra, the soil has enough nutrients to support rare tree growth. Allison Wetrade is pictured second from the left. Photo: GNWT / K. Clark, ENR



Learning about terrestrial and aquatic ecosystems on the Barren-lands, along with geology, archaeology, ornithology and other multi-disciplinary studies. Photos: GNWT / K.Clark, ENR



Attachment 2 – Signed photo release forms

Attachment 3 - Copy of poster advertising the Tłıcho Student Research Assistant program and employment opportunity.

Posters were sent to Tłıcho community schools. They were also posted on the Wek'èezhì Renewable Resources Board Facebook page and website, as well as on the Tłıcho Government's Facebook page and website

Attachment 4 - Copy of Wek'èezhì Renewable Resources Board (WRRB) E-newsletter story publicizing the Tłı̨cho Student Research Assistant project.

The story was distributed in the Summer 2016 issue and is posted on the WRRB website.