

# Impacts of Vegetation Change in the Canadian Arctic: Local and Regional Assessments

## Summary

### Project Leader(s)

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The tundra across the Canadian Arctic is already reacting to climate change. Northerners and scientists are observing changes, such as shrubs getting taller and more numerous. The taller shrubs catch more snow, and change the depth and pattern of snow drifting, which could affect travel and caribou migration. Increases in the cover of shrubs will also result in more sunlight being absorbed by the leaves and this will increase the temperature even further. We will study these changes near Arctic communities across the North. Community members will be involved in designing the studies and in conducting measurements on tundra vegetation. One important aspect will be to measure the changes in amounts of berries produced each year in traditional berry picking areas near the communities. Experimental studies including warming with small open-top greenhouses and altering snow deposition with snow fences will also be established. These studies can be incorporated into science studies in the local schools and used to show students how we can put traditional knowledge and scientific studies together. The results will be used in the communities and will contribute to national and international efforts to understand the responses of tundra ecosystems to climate variability and change.

## People

### Network Investigators

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## **Partners**

First Air  
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Indian and Northern Affairs Canada - Northern Scientific Training Program  
IPY Federal Program Office  
IPY- Climate Change Impacts on Canadian Arctic Tundra Ecosystems (CiCAT)  
Kugluktuk Hunters & Trappers Organization (HTO)  
Memorial University of Newfoundland  
Ministère Développement économique, innovation et exportation (MDEIE)  
Natural Resources Canada - Polar Continental Shelf Project  
Nunatsiavut Government  
Parks Canada  
Polar Continental Shelf Program  
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Western Ag Innovations

## **Publications**

### **Articles Published in Refereed Publications**

Downing, A. and Cuerrier, A., 2010, A Synthesis of the Impacts of Climate Change on the First Nations and Inuit of Canada, Indian Journal of Traditional Knowledge, , Submitted

Elliott, T. L. and Henry, G.H.R., 2010, Effects of Simulated Grazing in Ungrazed Wet Sedge Tundra in the High Arctic, Arctic, Antarctic and Alpine Research, , Accepted

Gérin-Lajoie J., Lévesque, E. and Cuerrier, A., 2010, Inuit Perception of Vegetation and Climate Change in Three Communities of Nunavik, Quebec: Using a Quantitative Approach, Arctic, , Submitted

Hill, G.B. and Henry, G.H.R. , 2010, Responses of High Arctic wet sedge tundra to climate warming since 1980. , Global Change Biology, 1, Accepted

Hill, G.B. and Henry, G.H.R., 2011, Responses of High Arctic Wet Sedge Tundra to Climate Warming since 1980, Global Change Biology, v.17, 276-287, Published

Hudson, J.G.M, and Henry, G.H.R., 2010, High Arctic plant community resists 15 years of experimental warming., Journal of Ecology, , 1, Accepted

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Hudson, J.M.G. and Henry, G.H.R., 2010, High Arctic Plant Community Resists 15 Years of Experimental Warming, Journal of Ecology, v.98, 1035-1041, Published

Hudson, J.M.G., Henry, G.H.R., and Cornwell, W.K., 2011, Taller and Larger: Shifts in Arctic Tundra Leaf Traits after 16 Years of Experimental Warming, Global Change Biology, v.17, 1013-1021, Published

Klady, R.A., Henry, G.H.R., and Lemay, V., 2011, Changes in High Arctic Plant Reproduction in Response to Long-term Experimental Warming, Global Change Biology, doi: 10.1111/j.1365-2486.2010.02319.x, Published

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Tremblay, B., Lévesque, E. and Boudreau, S., 2010, Recent Expansion of Erect Woody Vegetation in the Canadian Eastern Low Arctic, Arctic, Antarctic and Alpine Research, , Accepted

### **Other Refereed Contributions**

Lévesque, E., Hermanutz, L. and Gérin-Lajoie, J., 2010, Trends in Vegetation Cover Dynamics and Impact on Berry Productivity, ArcticNet IRIS 4, , Submitted

### **Non-Refereed Contributions**

Bjorkman, A. and Henry, G.H.R., 2010, Effects of Long-term Experimental Warming on Phenotypic and Phenological traits of Papaver radicum on Ellesmere Island, Nunavut, Canada, International Polar Year Conference, Understanding Circumpolar Ecosystems in a Changing World, Edmonton, , Accepted

Bryson, K. and Henry, G.H.R., 2010, Assessing the Impact of Climate Change on Tundra Vegetation through Experimental Warming and Fertilization, International Polar Year Conference, Understanding Circumpolar Ecosystems in a Changing World, Edmonton, , Accepted

Cuerrier, A., 2010, Inuit Perception of Climate Change in the Canadian Arctic, La science de la biodiversité au Québec, Colloque annuel du CSBQ, , Accepted

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- Cuerrier, A., Gérin-Lajoie, J. and Lévesque, E., 2010, Inuit Perception of Climate Change in Nunavik (Quebec, Canada), 12th International Congress of Ethnobiology, , Accepted
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- Edwards, M. and Henry, G.H.R., 2010, Above-ground Biomass, CO<sub>2</sub> Flux and Species Composition in Three Arctic Plant Communities: Response to Experimental Warming along a Soil Moisture Gradient, International Polar Year Conference, Understanding Circumpolar Ecosystems in a Changing World, Edmonton, , Accepted
- Elmendorf, S., Henry, G. and the Tundra Vegetation Change Group, 2010, Air Temperature Warming Not Associated with Recent Tundra Vegetation Change: Results of Plot Based Monitoring, AGU Annual Meeting, , Accepted
- George, J., 2008, The Bittersweet Secrets of High Arctic Climate Change, Nunatitq News, July 11 interview, 1, Published
- Gérin-Lajoie, J. and Lévesque E., 2008, The Impacts of Climate Change on Berry Ecology in the North, Makivik magazine, Spring edition, issue 84, 1, Published
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- Gérin-Lajoie, J., Cuerrier, A. and Lévesque, E. , 2009, Inuit perception of environmental changes affecting vegetation in three communities in Nunavik: regional differences. , 2009 ArcticNet Annual Conference Proceedings., 42, Accepted
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- Gérin-Lajoie, J., Cuerrier, A., Lévesque, E., 2008, Inuit Perception of Climate Change Impacts on Plants and Environmental Factors in Communities of Nunavik and Nunavut, 2008 ArcticNet Annual Conference Proceedings, 225, Published
- Gérin-Lajoie, J., Cuerrier, A., Siegwart Collier, L., Lévesque, E., Hermanutz, L., Henry, G. and Spiech, C., 2010, From Nain, Nunatsiavut to Kugluktuk, Nunavut: Analysing Vegetation Change by Interviewing Local Experts from 8 Inuit Communities across the Canadian Arctic, ArcticNet Annual Science Meeting, , Accepted
- Gérin-Lajoie, J., Lévesque, E. , Cuerrier, A. , Hermanutz, L. , Spiech, C. and Siegwart-Collier, L., 2009, Community-based monitoring of shrubs and berries: so much more than just getting data!, 2009 Canadian Arctic Tundra Ecosystems in a Changing Climate (CiCAT) Conference Proceedings. , 1, Accepted
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- Henry, G., 2010, Impacts of Climate Change on Tundra Ecosystems in Canada: Preliminary Synthesis of Results from the Canadian IPY Project CiCAT, ArcticNet Annual Science Meeting, , Accepted
- Henry, G. and CiCAT Co-Investigators, 2010, CiCAT: Climate Change Impacts on Canadian Arctic Tundra Ecosystems, IPY ArcticWOLVES Final Meeting, Québec, , Accepted
- Henry, G. and Elmendorf, S., and the Tundra Vegetation Change Group, 2010, Tundra Vegetation Change over the Past 30 years: Results of Plot Based Monitoring across the Tundra Biome, International Polar Year Conference, Understanding Circumpolar Ecosystems in a Changing World, Edmonton, , Accepted
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- Lavallée, C. and Lévesque, E., 2008, Berry Productivity in a Warmer North: Natural Variation and Impact of Field Experiment., 2008 Canadian Arctic Tundra Ecosystems in a Changing Climate (CiCAT) Conference Proceedings, 1, Published
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- Lévesque, E., Cuerrier, A., Boudreau, S. Gérin-Lajoie, J., Tremblay, B., Lavallée, C., Spiech, C., 2008, Towards an Understanding of the Implications of Shrub Cover Change in Nunavik, 2008 ArcticNet Annual Conference Proceedings, 115, Published
- Lévesque, E., Gérin-Lajoie, J. , Hermanutz, L., Jacobs, J. , Cuerrier, A. , Siegwart-Collier, L., Lavallée, C., and Spiech, C. , 2009, Community-based assessment of berry productivity across the Canadian Arctic. , 2009 ArcticNet Annual Conference Proceedings., 112, Accepted
- Lévesque, E., Gérin-Lajoie, J., Hermanutz, L., Jacobs, J., Cuerrier, A., Siegwart-Collier, L. and Jacob, A., 2010, Three Years of Community-based Assessment of Berry Productivity across the Canadian Arctic, ArcticNet Annual Science Meeting, , Accepted
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- Siewgart Collier, L., 2010, Documenting Changes in Plants, Berries and their Traditional Uses in Nunatsiavut : A Community Perspective, Battle Harbour Climate Change Conference in Battle Harbour, Labrador, , Accepted
- Siewgart Collier, L. and Cuerrier, A., 2010, Learning to Sample and Detect Change in Tundra Plants, Tukisinnik Community Research Forum in Nain, Nunatiavut, , Accepted
- Siewgart Collier, L. and Hermanutz, L., 2010, Short and Sweet! Factors Affecting Berry Plant Growth and Fruit Production in Nain, Nunatsiavut, ArcticNet Annual Science Meeting, , Accepted
- Siewgart Collier, L., Cuerrier, A., Hermanutz, L. and Jacobs, J., 2010, Understanding Changes in Plants, Berries and their Traditional Uses in Nunatsiavut, Tukisinnik Community Research Forum in Nain, Nunatiavut, , Accepted
- Siewgart Collier, L., Hermanutz, L. Marino, P., Trant, A., Upshall, M., Simms, A., Simms, E., Jacobs, J. and Chan, S., 2010, Monitoring and Predicting Change in Tundra Ecosystems of Nunatsiavut, Northern Labrador, IPY Science Conference, Oslo, , Accepted
- Siewgart Collier, L., Hermanutz, L., Wheeler, J., Koncz, P., Cuerrier, A. and Marino, P., 2010, Vegetation Change After Experimental Warming in Wet and Dry Tundra Ecosystems of Torngat Mountains National Park, Northern Labrador, International Polar Year Conference, Understanding Circumpolar Ecosystems in a Changing World, Edmonton, , Accepted
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- Spiech, C., Lévesque, E. , Gérin-Lajoie, J. and Cuerrier, A., 2009, Spatial Distribution and Productivity of Berry Producing Shrubs in the vicinity of Baker Lake, Nunavut., 2009 ArcticNet Annual Conference Proceedings., 134, Accepted

Tremblay, B. and Lévesque E., 2008, Erect Ligneous Vegetation in a Warmer North: What's Going on in the Canadian Eastern Arctic?, 2008 Canadian Arctic Tundra Ecosystems in a Changing Climate (CiCAT) Conference Proceedings, 1, Published

Tremblay, B. and Lévesque, E., 2008, Increasing Erect Ligneous Vegetation in the Canadian Eastern Arctic: A Case Study from the Forest-shrub Tundra Transition Zone, 2008 ArcticNet Annual Conference Proceedings, 316, Submitted