

Lynn J. Gillespie, Ph.D.
Research Scientist
Canadian Museum of Nature
PO Box 3443 Stn D
Ottawa, Ontario, Canada K1P 6P4

Nunavut Water Board P.O. Box 119
Gjoa Haven, Nunavut X0B 1J0 Canada

1 March 2016

Dear Nunavut Water Board Manager of Licensing:

RE: Application for the use of water or deposit of waste without a licence

Please find attached a completed and signed application for the use of water or deposit of waste without a licence, in support of botanical research to study and collect plants in the vicinity of Arviat, in July 2016.

This document is being submitted electronically (filename: Gillespie NWB Application 2016.pdf).

Included in this file are, in the following order:


- 1) This cover letter [page 1]
- 2) Executive summary of application (in English) [page 2]
- 3) Executive summary of application (in Inuktitut) [page 3]
- 4) Application for the use of water or deposit of waste without a licence [pages 4–14]

In addition to this application, I have submitted an application to the Wildlife Research Section, Nunavut Department of Environment for a Wildlife Research permit.

If the application is missing information, please do not hesitate to contact me for further details.

Thank you for considering this signed application for the use of water or deposit of waste without a licence.

Sincerely,



Digitally signed by
Lynn Gillespie
Date: 2016.04.04
15:18:50 -04'00'

Lynn J. Gillespie, Ph.D.
Email: lgillespie@mus-nature.ca
Phone: 613.364.4075

EXECUTIVE SUMMARY OF WATER LICENCE APPLICATION

1 March 2016

Applicant: Lynn J. Gillespie

Research Project Title: Flora of the Canadian Arctic

Location of the Undertaking:

1. The region south of the Maguse River, north of Arviat, 61°16'N, 94°13'W, 11-15 July 2016.

Description of the Undertaking:

The composition and distribution of plants in the Canadian Arctic is likely to experience a major shift in the coming century in response to climate change, but detailed information on plant diversity, necessary to track future change, is lacking for many Arctic regions. The plants of some Arctic regions have never been explored, and many regions are poorly and incompletely studied.

We plan to conduct field work in July 2016 in Arviat and vicinity, specifically in the region south of the Maguse River. Plant diversity here, which may include boreal and Arctic species, has not been studied in detail. We will document plant biodiversity at all sites by exploring (on foot) different habitats, and making collections of all the species we find. Collections will be dried in a plant press, and the specimens will be stored in the plant collection at the Canadian Museum of Nature, Ottawa, where they will contribute to ongoing efforts to document all the plants in the Canadian Arctic. Our research team includes five people, and we will set up a small, temporary camp in the area south of the Maguse River

Water use: Water will be used only for domestic purposes (drinking, cooking, washing) in our field camps.

Quantity of water involved: 6 people x 5L/person/day = 30 L/day = 0.030 m³/day

Waste: Grey water (from cooking and washing). Sewage (human excrement; five people)

Other persons or properties affected by the undertaking: n/a

Predicted environmental impacts of the undertaking and proposed mitigation measures: None expected, as we will be using a very small volume of water, only for domestic purposes.



P.O. Box 119

GJOA HAVEN, NU X0B 1J0

TEL: (867) 360-6338

FAX: (867) 360-6369

kNK5 wmoEp5 vtmp5

NUNAVUT WATER BOARD

NUNAVUT IMALIRIYIN KATIMAYIT

OFFICE DES EAUX DU NUNAVUT

APPLICATION FOR APPROVAL FOR THE USE OF WATER OR DEPOSIT OF WASTE WITHOUT A LICENCE

Refer to the Guide to the Approval for the Use of Water or Deposit of Waste Without a Licence (Guide) in completing this Application.

APPLICATION NO: (for NWB use only)	
1. APPLICANT CONTACT INFORMATION (name, address) Dr. Lynn J. Gillespie Canadian Museum of Nature, PO Box 3443, Stn. D, Ottawa, Ontario, K1Y 1X7 CANADA Phone: 1.613.364.4075 Fax: 1.613.364.4027 e-mail: lgillespie@mus-nature.ca	2. APPLICANT REPRESENTATIVE CONTACT INFORMATION if different from Block 1 (name, address) Phone: _____ Fax: _____ e-mail: _____ (Attach authorization letter)
3. NAME OF THE OWNER OF THE LAND THAT WILL BE USED IN RELATION TO THE WATER TO BE USED OR THE WASTE TO BE DEPOSITED Crown land	
4. NAME OF PROJECT (consistent with the name of the project issued by other regulatory agencies) Project title: Flora of the Canadian Arctic Project location: Arviat and vicinity; region south of Maguse River	
5. LOCATION OF UNDERTAKING Project Extents NW: Latitude: (61°18' " N) Longitude: (94°23' " W) NE: Latitude: (61°18' " N) Longitude: (94°10' " W) SE: Latitude: (61°15' " N) Longitude: (94°10' " W) SW: Latitude: (61°15' " N) Longitude: (94°23' " W) Camp Location(s): 1. Camp south of Maguse River, 61°16'N, 94°13'W, 11-15 July 2016. MAP - Attach a topographical map, indicating the main components of the undertaking.	



NTS Map Sheet No.: **55E**
Map Scale: **1:145 000**

Map Name: **Arviat**

Name of the Water Management Area in which the Undertaking is located. (Please see Appendix D of the Guide):

21. Maguse Watershed

6. CLASSIFICATION OF UNDERTAKING - Indicate the classification of undertaking by checking one of the following boxes.

- ☐ Industrial
- ☐ Mining
- ☐ Conservation
- ☐ Municipal

- ☐ Agricultural
- ☐ Recreational
- ☐ Power
- ☒ Other: (describe)

We will be conducting botanical research and collecting plant specimens to document the biodiversity and distribution of plants near Arviat and vicinity, in the regions in which we plan to work (see project proposal above).

7. DESCRIPTION OF UNDERTAKING AND EQUIPMENT USED – Provide a brief description of the undertaking including a description of any equipment that will be used in using water or depositing waste.

Flora of the Canadian Arctic

Species inventories and identifications are important for investigating the effects of global warming on arctic ecosystems. The composition and distribution of the Canadian Arctic flora is likely to experience a dramatic shift in the coming century in response to environmental change, but comprehensive present-day floristic data, necessary to track future change, is lacking for many Arctic regions. There are many gaps in current knowledge of the diversity and distribution of the Canadian Arctic flora. Some regions have never been explored botanically, and many remain poorly and incompletely studied. We are still discovering plant species new to science in the arctic islands (e.g., *Puccinellia banksiensis* Consaul, *Draba cayouetti* G.A. Mulligan & Al-Shehbaz), documenting many range extensions (e.g. Saarela et al. 2013), and refining species circumscriptions. Accurate information on current distributions of species and robust identification tools are critical for understanding the impact of climate change on arctic plant species and plant communities.

This project will provide comprehensive baseline data on arctic plants (taxonomy, distribution, ecology), with the goal of producing a complete Canadian Arctic Flora. It builds on our extensive, ongoing work on the arctic flora (see summary of our recent research progress in Appendix B), and continues the strong, century-long tradition of arctic botany at the Canadian Museum of Nature (CMN), the only Canadian institution with major plant systematic research activities in the Arctic.

We have been conducting comprehensive floristic studies in the Arctic since 2008, and have worked in five areas so far: (1) South-western Victoria Island, Nunavut (Nunavut Wildlife Research Permit number WL 2008-1039) in 2008; (2) Tukturnogait National Park and Paulatuk and vicinity, Northwest Territories, in 2009; (3) Ulukhaktok and Minto Inlet, Victoria Island, Northwest Territories, in 2010; (4) Katannilik Territorial Park, Baffin Island, in 2012 (Nunavut Wildlife Research Permit number 2012-034); (5) Cunningham Inlet, Somerset Island, Nunavut, in 2013 (Nunavut Wildlife Research Permit number 2013-026); and (6) the lower Coppermine River, Kugluk/Bloody Falls Territorial Park and Kugluktuk and vicinity, in 2014 (Nunavut Wildlife Research Permit number 2014-034). These trips yielded over 7000 new vascular plant collections, substantially increasing knowledge of the floras of Victoria Island, the western Arctic Archipelago, the Canadian Arctic mainland, and Canada.

2016 Fieldwork in Nunavut

We plan to conduct field work in July 2016 in the area south of the Maguse River north of the community of Arviat (see map above). Species diversity here, has not been previously studied. Baseline vascular plant data for this site will provide information crucial to measuring the effects of climate change and development within the community.

Arviat, the second-southernmost community in Nunavut, is approx. 100 km east of the eastern limit of the treeline in Nunavut. There is evidence that treeline vegetation is changing, including replacement of bare surfaces with herbaceous plants, increased shrubiness, and increased recruitment and growth of conifers in the northern treeline (e.g., Olthof & Pouliot 2010). Some models predict that by the end of the century, the distribution of tundra in Canada will be pushed northward. Baseline knowledge of treeline vascular plant diversity is needed to track future changes in the distribution, as these plant species are the ones likely to migrate northwards in response to climate change.

The flora of Arviat is not well known, although there are unpublished collections in the National Herbarium of Canada (CAN), Canadian Museum of Nature. Some collections from the area are documented in the report of the Fifth Thule Expedition, 1921-1924, which collected vascular plants along the west coast of Hudson Bay (Rasmussen 1940), and in others are documented in Gussow (1933). The majority of the collections from this area were made with imprecise collection localities, and no comprehensive studies of the flora have been conducted. Given its low arctic floristic affinities, diverse coastal and inland habitats, and the lack of comprehensive collecting, we expect the flora of the region to be more diverse than is currently known.

We plan to study the flora of the following location:

1. The area adjacent to the road north of Arviat, south of the Maguse River 61°16'N, 94°13'W, 11-15 July 2016.

Objectives:

Our overall goals are to gain a more complete understanding of the present state of the distribution and composition of the Canadian arctic flora and to expand the knowledge base for understanding the broad-scale impacts of environmental change on the arctic flora.

The data and specimens collected on this trip will be used in support of several projects:

1. a floristic study of the vicinity of Arviat, published in a peer-reviewed journal;
2. they will be incorporated into the Arctic Flora of Canada and Alaska project we are leading, which will treat all vascular plants in the entire Canadian Arctic and the North Slope of Alaska (<http://arcticplants.myspecies.info/>);
3. DNA barcoding studies of the Arctic flora (e.g., Saarela et al. 2013);
4. on-going and future taxonomic/systematic studies of Arctic species complexes;
5. once incorporated into herbaria, the specimens will be available to all scientists for study, and the data will be shared internationally through digital biodiversity repositories, such as the Global Biodiversity Information Facility and the Collections Online website (<http://collections.nature.ca/en/Search>) at the Canadian Museum of Nature.

Management Implications: Our research will provide new and up-to-date information on plant diversity in Arviat. This information will be inform future land management related to plants in the region.

Plant Collecting Methods—We will undertake research in the vicinities of each camp by foot, complete

plant inventories of all vascular plants and lichens, and collect data on conservation status, ecology, distribution, and population variation as appropriate. All of these data will be useful for long-term monitoring of potential changes in species diversity in the future. We will explore remote and ecologically diverse sites in the vicinity of our camp..

Approximately 300 vascular plant specimens will be collected, photographed, and studied. Collections will be deposited at the National Herbarium of Canada (Canadian Museum of Nature), and duplicate specimens will be distributed to national and international herbaria, all contributing to the permanent scientific record documenting the distributions of Arctic plant species in time and space.

We collect plant specimens using a plant press, the standard method that botanists have used for several centuries. Once collected, plant specimens are arranged into sheets of newspaper, placed between two pieces of cardboard, piled up, and tightened with two straps. The specimens are flattened and dry in the press; once dry they will last for centuries when stored in a herbarium (dried plant collection).

For each collection event we:

- Collect one to several individuals of a species (depending on the size of an individual, and how common the species is locally). If a species is not common, we collect only enough material (i.e., enough for one or two herbarium sheets) to properly document its occurrence at the site. If a species is rare, we do not collect any specimens, and document its occurrence only with photographs.
- Record detailed notes on the location of the species, its local growing conditions, and other species that grow at the site. In a subset of instances we take photographs of the species growing in its natural state.
- Preserve a small amount of leaf tissue in silica gel (a desiccant), which rapidly dries the genetic material in the leaf tissue in a way that is suitable for later study (e.g., DNA sequencing) in the molecular laboratory.

References

- Feng, S., Ho, C.-H., Hu, Q., Oglesby, R.J., Jeong, S.-J., & Kim, B.-M. 2012. Evaluating observed and projected future climate changes for the Arctic using the Köppen-Trewartha climate classification. *Climate Dynamics* 38:1359–1373.
- Gussow, W. C. 1933. Contributions to the knowledge of the flora of northern Manitoba and the Northwest Territories, Dominion of Canada. *Can. Field-Nat*, 47, 116-119.
- Olthof, I., & Pouliot, D. 2010. Treeline vegetation composition and change in Canada's western Subarctic from AVHRR and canopy reflectance modeling. *Remote Sensing of Environment* 114:805-815.
- Rasmussen, K. 1940. Report of the Fifth Thule Expedition, 1921-24: The Danish Expedition to Arctic North America (Vol. 2). Gyldendalske Boghandel, Nordisk Forlag.
- Saarela, J.M., Gillespie, L.J., Consaul, L.L., & Bull, R.D. 2013. Annotated checklist to the vascular plant flora of Tuktoyaktuk National Park and the Melville Hills region (Canadian Low Arctic). *Phytotaxa* 102:1-177.

8. SCHEDULE – Applicants are advised that approvals without a licence are issued for a one year term.

Proposed Start Date: **30 June 2016**
(Month/Year)

Proposed Completion Date: **31 July 2016**
(Month/Year)

9. TYPE OF USE OF WATER WITHOUT A LICENCE PROPOSED - Check the box that applies to the type of water use proposed. If none of the water uses listed below applies to the proposed water use, an application for a water licence will be required. See the NWB's Guide 4 – Completing and Submitting a Water Licence Application for a New Licence.

☐ For an undertaking other than a Power undertaking and for a use of water related to the construction of a structure across a watercourse that is less than 5 metres wide at the ordinary high water mark at the point of construction.

☐ For an undertaking other than a Power undertaking and for a use of water related to the training of an intermittent watercourse.

☐ For an undertaking other than a Power undertaking and for a use of water related to the training of a watercourse that involves the infilling of the watercourse, if the watercourse has no inflow or outflow and a surface area of less than 0.5 hectares.

☐ For an undertaking other than a Power undertaking and for a use of water related to the training of a watercourse that involves removal or placement of less than 100 m³ of material.

☐ For an undertaking other than a Power undertaking and for a use of water related to the construction of a temporary structure in a watercourse for the purpose of flood control.

☐ For an undertaking other than a Power undertaking and for any use of water related to the storage of 2,500 m³ or less.

☒ For an undertaking other than a Power undertaking and for any use of water less than 50 m³ per day.

10. QUANTITY AND QUALITY OF WATER INVOLVED - For each type of water use indicated in Block 9, provide the source of water, the estimated quantity to be used in cubic metres per day, and the periods during which water will be extracted.

Type of Water Use indicated in Block 9	Name of water source	Estimated quantity of water to be used in cubic metres per day	Periods during which water will be extracted
For an undertaking other than a Power undertaking and for any use of water less than 50 m ³ per day.	Unnamed streams or lakes in study region	0.030 m ³ /day	11-15 July 2016

11. TYPE OF DEPOSIT OF WASTE PROPOSED - Check the box that applies to the type of deposit of waste proposed. If none of the deposits of waste listed below apply to the proposed deposit of waste, an application for a water licence will be required. See the NWB's Guide 4 – Completing and Submitting a Water Licence Application for a New Licence.

☐

For an Industrial undertaking, for an activity related to hydrostatic testing or cleaning of storage tanks and pipelines, and for any deposit of waste resulting from hydrostatic testing or cleaning of unused storage tanks or pipelines.

- ☐ For an Industrial undertaking, for an activity related to quarrying and gravel washing, and for any deposit of waste that is not deposited to surface water and that results from quarrying or gravel washing above the ordinary high water mark.
- ☐ For a Mining undertaking, for an activity related to exploratory work, any deposit of sewage to a sump.
- ☐ For a Power undertaking, any deposit of sewage to a sump.
- ☐ For an Agricultural undertaking, any deposit of sewage to a sump.
- ☐ For a Recreation undertaking, any deposit of sewage to a sump.
- ☒ For any Other type of undertaking not listed above, other than Municipal, any deposit of sewage to a sump.

12. QUANTITY AND QUALITY OF WASTE INVOLVED – For each type of waste indicated in Block 11, describe the quantity in cubic metres/day, measures to avoid or mitigate adverse impacts, and periods of deposition.

Type of Waste indicated in Block 11	Quantity to be deposited in cubic metres per day	Measures to avoid or mitigate any adverse impacts	Periods during which waste will be deposited
For any Other type of undertaking not listed above, other than Municipal, any deposit of sewage to a sump. (Greywater)	0.015 m ³ /day	Will dump grey water at least 50 m from water sources	11-15 July 2016
For any Other type of undertaking not listed above, other than Municipal, any deposit of sewage to a sump. (Sewage)	Minimal (five people)	Will be buried	11-15 July 2016

13. SIGNATURE

I, _____ (print name), certify that the information given on this form is, to the best of my knowledge, correct and complete.

☒ Yes

☐ No

OR

I, _____ (print name), as an authorized representative of the Applicant, _____, certify that the information given on this form is, to the best of my knowledge, correct and complete.

☒ Yes

☐ No

I certify that the Nunavut Planning Commission's land use planning requirements under Article 11 of the Nunavut Land Claims Agreement have been met.

☒ Yes

☐ No

I certify that the Nunavut Impact Review Board's development impact review requirements under Article 12 of the NLCA have been met.

☒ Yes

☐ No

I certify that the proposed water use is of a type set out in column 2 of Schedule 2 of the Regulations that is further specified by column 3, in respect of an undertaking set out in column 1. See list in Block 9.

☒ Yes

☐ NA

☐ No

I certify that the proposed deposit of waste is an activity that is set out and then further specified in columns 2 and 3 of Schedule 3 of the Regulations, in respect of an undertaking that is set out in column 1 of Schedule 3. See list in Block 11.

☒ Yes

☐ NA

☐ No

I certify that the proposed water use or deposit of waste will not substantially affect the quality, quantity or flow of the watercourse whose waters are used.

☒ Yes

☐ No

I certify that the proposed water use or deposit of waste will not substantially affect the quality, quantity or flow of waters flowing through Inuit Owned Lands.

☒ Yes

☐ No

I certify that the proposed water use or deposit of waste will not affect the use of waters by a person who would be entitled to compensation under sections 58 or 60 of the Nunavut Waters Nunavut Surface Rights Tribunal Act (Act) if their use of these waters were to be adversely affected by an applicant for a licence.

☒ Yes

☐ No

I certify that a licence is not required for another use of water, or deposit of waste in respect of the proposed undertaking.

☒ Yes

☐ No

I have read and agree to comply with the following conditions outlined in sections 4(3), 5(4), 5(5) and 6 of the Nunavut Waters Regulations:

1. In the case of an applicant who has a mineral right and who intends to use waters or deposit waste in relation to that right, the applicant shall respect the priority conferred on Inuit by section 62 of the *Act* as if that applicant had a licence for the use or deposit.
2. Measures must be taken prior to using water to minimize any alteration to the bed or banks of a watercourse whose waters are to be used, and the measures shall be maintained during the operation of the undertaking.
3. No waste is to be deposited to surface water or within 31 metres of the ordinary high water mark of any body of water.
4. The waste shall not contain more than 15 milligrams per litre of petroleum or petroleum product and must not have a visible hydrocarbon sheen.
5. Prior to the closure or abandonment of the undertaking or end of the period authorized for the use of water or deposit of waste without a licence, whichever occurs first, the site shall be restored — to the extent practicable — to the state in which it was before the water was used or the waste was deposited.^a
6. An applicant who is authorized under the Regulations to use waters or deposit waste without a licence shall:
 - a. maintain accurate and detailed books and records of:
 - i. the quantity of water, in cubic metres, used each day,
 - ii. the quantity, in cubic metres, of waste deposited each day,
 - iii. the type of waste deposited each day,
 - iv. where the waste is deposited,
 - v. the concentration of the substance, or substances, in the deposited solid or liquid that has the effect of making the deposit waste,
 - vi. the methodology used to calculate or determine the information referred to in items (i) to (iv), and
 - vii. the measures that were taken to avoid or mitigate any adverse impacts of the deposit of waste.
 - b. keep the books and records on the site of the undertaking during the period of its operation and make them available during that period to an inspector on request;
 - c. submit to the Board a report containing a summary description and supporting photographs of the restoration of the site of the undertaking within 30 days after the earliest of (i) the day on which the undertaking is closed or abandoned, and (ii) the last day of the period authorized for the use or deposit without a licence;^b and
 - d. keep the books and records for two years after submitting the report describing the restoration of the site of the undertaking.

Notes:

a) A site need not be restored prior to the end of the period authorized for the water use or deposit of waste without a licence, as required by Item 5, if the Board issues a licence for the use of water or deposit of waste on that site prior to the end of that period.

b) An applicant need not submit the report referred to in Item 6 (c), to the Board if the applicant obtains the Board's approval for a use of water or deposit of waste without a licence, or a licence for a use of water or deposit of waste, on the same site within thirty (30) days after the last day of the period authorized for the use or deposit.

☒ Yes

☐ No

I understand that any approval granted by the Board for the use of water or deposit of waste without a licence will be authorized for a period of one year after the day on which the Board approves the Application. The use or deposit is not authorized until the Board approves the Application and it is only valid as long as the applicant is in compliance with the conditions set out in the declaration above.

☒ Yes

☐ No


I understand that if I have answered "No" to any of the above statements a water licence is required from the Nunavut Water Board prior to the use of water or deposit of waste.

☒ Yes

☐ No

Lynn J. Gillespie

Research Scientist



Digitally signed by
Lynn Gillespie
Date: 2016.04.04
15:16:55 -04'00'

1 March 2016

Name (Print)	Title (Print)	Signature	Date
---------------------	----------------------	------------------	-------------