Local Ecological Knowledge of Staging Areas for Geese in the Western Canadian Arctic

Blake Bartzen
Prairie and Northern Region

Canadian Wildlife Service
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LOCAL ECOLOGICAL KNOWLEDGE OF STAGING AREAS FOR GEESE IN THE WESTERN CANADIAN ARCTIC

Blake Bartzen

Technical Report Series No. 529
2014
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ABSTRACT

Geese are an important subsistence food source for Aboriginal people of the Western Canadian Arctic. As harvesters of geese, Aboriginal people have knowledge of distribution and abundance of geese, timing of migration, and changes in conditions over time. In the autumn and early winter of 2008, 50 people from the communities of Aklavik, Fort McPherson, Inuvik, Old Crow and Tuktoyaktuk in the Western Canadian Arctic were interviewed for information on locations of major staging areas of geese in the region. Participants answered questionnaires and sketched general travel routes and locations where geese were observed. Information from the questionnaires was then summarized, and map information was digitized for geographic information system purposes. There were 55 unique observations of major staging areas of geese throughout the region, and most observations were of Snow Geese (Chen caerulescens), followed by Greater White-fronted Geese (Anser albifrons), and then Canada/Cackling Geese (Branta canadensis, Branta hutchinsii). In addition, most observations were from spring. Participants noted changes in abundance and timing of migration of geese, but responses were inconsistent as to how the changes were occurring (i.e., more or less, earlier or later). Some participants noted seeing birds that were new to them such as Peregrine Falcons (Falco peregrinus) and Osprey (Pandion haliaetus), “blue” phase Snow Geese, Black-billed Magpies (Pica hudsonia), woodpeckers, and several different small passerine species. This information will be used to help with management and conservation of geese in the Western Canadian Arctic.
ACKNOWLEDGEMENTS

Jessica Beaubier and Sarah McKenzie designed the project and organized the interview logistics with the participating communities. Myra Robertson from Canadian Wildlife Service reviewed a draft of this report and suggested many improvements that were incorporated. We thank the 50 interviewees whose knowledge and experience on the land made this study possible. We also thank the five interviewers, who persevered to complete the interviews within a timely fashion. We appreciated the help of the Hunters and Trappers Committees and Renewable Resource Councils of Aklavik, Fort McPherson, Inuvik, Old Crow and Tuktoyaktuk for their participation and facilitation during this study. Funding for this project was provided by the Canadian Wildlife Service of Environment Canada.
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1 INTRODUCTION

The Mackenzie Delta region in combination with adjacent lands in the Western Canadian Arctic are some of the most productive areas for waterfowl and other waterbirds in North America (Bellrose 1980, Latour et al. 2008; Fig. 1). Significant percentages of continental populations of several different species of geese, ducks and shorebirds breed, stage or migrate through this area (Latour et al. 2008). Tundra Swans (*Cygnus columbianus*), Red-throated and Pacific Loons (*Gavia stellata* and *G. pacifica*), Glaucous and Sabine’s Gulls (*Larus hyperboreus* and *Xema sabini*), Arctic Terns (*Sterna paradisaea*), and Sandhill Cranes (*Grus canadensis*) also breed in significant numbers in this region (Latour et al. 2008). Two Canadian Wildlife Service migratory bird sanctuaries have been established and several key habitat sites have been identified for their importance to birds and other wildlife within the region (Latour et al. 2008; Fig. 1). Greater White-fronted Geese (*Anser albifrons*) utilize many locations from the Mackenzie River delta to the Anderson River delta for nesting and moulting (Hines et al. 2006); Black Brant (*Branta bernicla nigricans*) and Canada/Cackling Geese (*B. canadensis, B. hutchinsii*) also use these areas to a lesser but still significant extent (Hines et al. 2006, Wiebe Robertson and Hines 2006). Snow Geese (*Chen caerulescens*) nest in the Kendall Island and Anderson River Delta Migratory Bird Sanctuaries, but the largest concentration of nesting Snow Geese is at Egg River on Banks Island (Samelius et al. 2008). However, Snow Geese migrating to and from Banks Island travel through and stage at several locations on and near the coastal mainland (Armstrong et al. 1999).

Waterfowl are an important subsistence food source for Gwich’in and Inuvialuit people living in the Western Canadian Arctic and geese make up a large percentage of the waterfowl taken each year (Bromley 1996, McDonald 2009, The Joint Secretariat 2003). Although breeding locations of geese and population trends are well documented in the Western Canadian Arctic, less is known about important staging areas during spring and fall migration because conventional population surveys for waterfowl do not routinely occur in the region during those periods (Hines et al. 2004). However, local Aboriginal people are often harvesting waterfowl and other wildlife during those times (Bromley 1996, McDonald 2009, The Joint Secretariat 2003). Knowledge from Aboriginal people (hereafter, local ecological knowledge or local knowledge) who spend, or have spent, time on the land can be used to help identify staging areas, and use of
local knowledge can be an effective method for documenting changes in patterns of migration and habitat use by geese as population abundance or environmental conditions change. Consequently, local ecological knowledge can be used in conjunction with conventional monitoring to guide conservation and management of Arctic goose populations (Gilchrist et al. 2005).

Extensive oil and gas exploration has occurred in the Mackenzie Delta region and offshore in the Beaufort Sea leading to several substantial discoveries. In addition to potential direct impacts from resource extraction, there is also potential for impact from infrastructure development to support oil and gas industries. Identification of important goose staging areas would aid in mitigating impacts from future developments and would provide baseline information for future comparisons. Local ecological knowledge also helps to identify key staging areas as they relate to regional land use by different communities. This study’s objectives were 1) to use local knowledge to identify key goose staging areas in the Mackenzie Delta region and surrounding area, and 2) determine if community members had noticed any changes in migration routes, staging areas, population abundance, or any other changes.

2 METHODS

2.1 INTERVIEW METHODS

A questionnaire was developed to standardize the questions and information that was collected. The first part of the questionnaire was a consent form, requiring some basic personal information of the interviewee and a signature which consented to the disclosure of statements in the questionnaire. The second part of the questionnaire dealt with the information relevant to the results and discussion of this report. Interviewees were asked 1) details about their hunting activities and travel routes, 2) whether they or somebody they knew had observed 1000 or more geese, 3) if they had noticed any changes in goose abundance or migration timing, and 4) if they had noticed any other changes such as new species or changes in environmental conditions. Interviewees were provided a map (80 × 80 cm) to mark their travel routes and locations where they observed geese.
The Northwest Territories communities of Aklavik, Fort McPherson, Inuvik, and Tuktoyaktuk participated in this study as well as the village of Old Crow, in the North Yukon region. We also intended to have the participation of Tsiigehtchic (Northwest Territories), but there were logistical complications in initiating the questionnaire process. The Hunters and Trappers Committee (HTC) for each community, or Renewable Resource Council (RRC) in the cases of Fort McPherson and Old Crow, were contacted by letter with a project proposal and a draft questionnaire. Each HTC and RRC approved of the project and agreed to coordinate the interviews in their communities. Through a contract from Environment Canada, the HTCs and RRCs hired a local community member and provided a list of potential interviewees who spent time on the land outside of the communities in spring and fall. Each interviewer was given brief instruction on how to conduct the interviews and was provided with questionnaires, maps and other stationery materials to complete the interviews. The interviewers selected 10 members from each community, and interviews were conducted from October 2008 to January 2009. Interviews typically took 1.5–2 hours to complete. Copies of the completed maps and questionnaires were provided to each of the aforementioned respective community organizations.

2.2 QUESTIONNAIRE SUMMARY

Questionnaires were examined and summarized once they were returned by the interviewers. Information pertaining to geese was given particular attention and noted. If the interviewee had noticed changes in geese abundance or timing of migration, their views on what had caused the changes were noted. Any interviewee’s accounts of new species in the region were also detailed.

2.3 MAPPING

ArcMap 10.0 (Environmental Systems Research Institute, 2010, Redlands, CA – www.esri.com) was used to digitize locations where interviewees observed flocks ≥ 1000 geese, and these digitized locations were linked to attribute data reported by each interviewee: 1) year of sighting, 2) season, 3) species, 4) flock size, and 5) geese activity at the time of sighting.
3 RESULTS

3.1 QUESTIONNAIRE SUMMARY

Of the 50 participants in the interviews, 43 considered themselves harvesters, 19 were elders, and all interviewees said they hunted geese for subsistence. There were two female participants from Aklavik, but the rest of the participants were male, and the average age was 50 ± 16 years (standard deviation). Dates of observations ranged from the late 1940s to the present with some observations being made on an annual or semi-regular basis. Some observations were made on unspecified or unknown dates. Thirty interviewees had noticed a change in geese abundance and changes were reported by all communities; the range was 5–7 participants per community reporting a change. Eleven participants reported an increase in goose abundance, 17 reported a decrease in abundance, and two did not specify whether the change was an increase or decrease. When the interviewees were asked why they thought they were seeing these changes in abundance, the most common response was climate change, but responses also included changes in harvest numbers, changing habitat conditions, disturbance from industrial activities, contamination and pollution in southern wintering grounds, and natural changes in migration patterns.

Twenty-two interviewees felt there was a change in the timing of geese migration, and climatic factors were commonly listed as the cause. Nine interviewees indicated that migration of geese in the spring was occurring earlier because of climate change. Another four interviewees indicated that climate change was the cause for the changes in migration timing, but they did not indicate whether migrations were earlier or later. Two interviewees felt that migrations were actually occurring later because of climate change, and two other interviewees indicated that the timing of migration was variable among years because of variable weather conditions.

Twenty interviewees reported seeing birds that were new to them. Although some descriptions of the new birds were unclear, others reported seeing raptors, including Peregrine Falcons (*Falco peregrinus*) and Osprey (*Pandion haliaetus*), “blue” phase Snow Geese, Black-billed Magpies (*Pica husonia*), woodpeckers, and several different small passerine species.
3.2 MAPPING

Twenty-seven of the interviewees had observed flocks ≥ 1000 geese at least once, and some of these interviewees had observed multiple flocks ≥ 1000 geese, resulting in 55 unique observations (Fig. 2). However, there was some overlap where observations occurred at the same locations. Sightings were concentrated in the Mackenzie River and Anderson River delta regions, and Tuktoyaktuk Peninsula, but ranged from south of Fort McPherson to the Beaufort coast in the north, and from Mason River in the east to Herschel Island in the west. The number of observations of flocks ≥ 1000 geese reported by participants from each community varied (Fig. 2). There were 22 observations from the 10 Aklavik participants, seven observations from five Fort McPherson participants, two observations from two Inuvik participants, and 23 observations from nine Tuktoyaktuk participants. Only one participant from Old Crow reported a large number of geese (≥ 1000), but the observation was indirect (i.e., the participant heard about the flock from somebody else), and the observation was from 1957. Several participants did note areas where geese staged and are hunted on the maps, but they did not specify species or if the geese were ≥ 1000 (47 observations; Fig. 3). Although the Old Crow interviewees did not specifically report observations of large numbers of geese, many of them incidentally noted large numbers of scoters (locally known as “black ducks”) in a lake and wetland complex north of Old Crow and south of Vuntut National Park. Both Aklavik and Tuktoyaktuk participants reported observations more than 200 km from their respective communities. There were an additional 29 observations of flocks of geese that were either less than 1000 or unclear whether the observation was ≥ 1000 (Fig. 3). Because the questionnaire specifically asked for locations where flocks ≥ 1000 geese were observed, these 29 observations were not further assessed.

Most of the observations consisted of multiple species, but there were 13 observations of only Snow Geese, and one observation of only Canada/Cackling Geese. Snow Geese were noted in at least 41 of the observations. There were an additional 11 observations for which specific species were not mentioned, but the interviewees suggested all or many species were present. I inferred that snow geese were present in these observations (Fig. 4). Greater White-fronted Geese were present in at least 27 of the observations, and Canada/Cackling Geese were present in at least 20 of the observations (Fig. 5). Brant were only specifically mentioned in one observation from a Tuktoyaktuk community member. These Brant occurred in a group with other species,
and I could not determine if the flock was ≥ 1000 geese; therefore, this group was not mapped. Of the 55 observations, 40 were from spring, 12 were from fall, one was from summer, one was from spring and fall, and the season for one observation was unreported (Fig. 6).

4 DISCUSSION

Local ecological knowledge is an invaluable tool for wildlife conservation and management, especially in remote regions such as the Arctic where other sources of monitoring information are limited (Gilchrist et al. 2005). The North is expansive, remote and dynamic; local ecological knowledge can be the first indication of new sites being used by birds or sites that have been overlooked by previous surveys. Because many members of northern communities spend time on the land for subsistence hunting, they have an opportunity to make observations that wildlife studies cannot. Conventional wildlife studies often have a limited spatial and temporal scope due to financial constraints, whereas local ecological knowledge can be acquired throughout the year. In addition, local knowledge can be used to identify areas of potential relevance to future wildlife studies. There were 55 observations from participants in this study where 1000 or more geese were sighted, and the highest concentrations of sightings were around Mackenzie River and Anderson River delta regions and Tuktoyaktuk Peninsula. Although many participants noted changes in abundance and timing of migration, responses were inconsistent as to how the changes were occurring (i.e., more or less, earlier or later). In addition, there were some accounts of new species by participants, but there were no consistently reported patterns of new species.

Future questionnaire surveys may benefit if biologists or designers of the survey could be present during interviews if interviewees felt comfortable giving responses in their presence. Survey designers could ask for clarification on some of the more unclear responses or for more details for specific observations of interest. Although much of the information from the questionnaires was used, some responses had to be left out of the results because of unclear details. Voice recordings of the interviews may also be useful for reviewing and documenting responses. Periodically repeating this survey could identify and document changes in relation to abundance and distribution of geese earlier and could also identify possible causal factors such as changes of habitat or predator conditions (e.g., Obst et al. 2013). Finally, to be more comprehensive for the Western Canadian Arctic, future surveys would benefit from including
the Northwest Territories communities of Paulatuk and the island communities of Sachs Harbour and Ulukhaktok. As Aklavik and Inuvik have Gwich’in residents in addition to Inuvialuit, it would also be good to include the RRC’s of both communities in addition to the HTC’s to have more complete representation.

Information provided in this study has implications for conservation and management in the Western Canadian Arctic. Local ecological knowledge from this report will be used to confirm or identify new important staging areas for geese. Most of the areas where observations of ≥ 1000 geese occurred were areas that had also been identified as important goose and other migratory bird areas through conventional surveys and monitoring (Hines and Wiebe Robertson 2006, Latour et al. 2008), which is further corroboration of the importance of these areas. However, there were several observations of light and dark geese around the southwest part of Husky Lakes (68° 56’ N, 133° 08’ W), i.e., north of Sitidgi Lake, and this is not an area that has been previously identified as an important migratory bird site (Latour et al. 2008). Further surveys in that area could lead to identification of another important site for geese in the region. This information not only indicates key staging areas for geese, but also indicates areas used by local community members. Based on the study results, it is possible that large concentrations of geese could be encountered in several places near the coast from the North Slope of the Yukon in the west to Mason and Anderson River in the east, and local people are also utilizing a similar area. This study also provides baseline information for trend monitoring in the future. Although the Western Canadian Arctic population of snow geese is considerably smaller than populations in the Central and Eastern Canadian Arctic, the population has been increasing (Samelius et al. 2008; Hines et al. 2010). Population increases could have negative implications for habitat and other wildlife (Abraham and Jefferies 1997; Samelius et al. 2008; Hines et al. 2010). Once key staging areas have been verified, they could be monitored to determine the number of geese using the areas and to measure the impacts of geese on vegetation and other wildlife. Key staging areas could also be measured for possible changes as they relate to potential climate change in the future. Finally, identification of staging areas of geese will also help to mitigate adverse effects of any future industrial developments in this region.
LITERATURE CITED


Figure 1. Communities and federal protected areas of the mainland of the Western Canadian Arctic. Inset map shows the study area’s location in North America, and the brown line is an all-weather road. MBS = migratory bird sanctuary.
Figure 2. Community observations of 1000 or more geese in the Western Canadian Arctic.
Figure 3. Observations of geese in the Western Canadian Arctic where it was unclear whether there were more than 1000 geese.
Figure 4. Areas where 1000 or more Snow Geese were observed in the Western Canadian Arctic. Some of the flocks were mixed with dark geese (Greater White-fronted and/or Canada/Cackling Geese).
Figure 5. Areas where 1000 or more dark geese (Greater White-fronted and/or Canada/Cackling Geese) were observed in the Western Canadian Arctic. Some of the flocks were mixed with Snow Geese.
Figure 6. Seasonal observations of 1000 or more geese in the Western Canadian Arctic. August and September were included for autumn months, while April, May and June were included for spring months.
# APPENDIX 1. NAMES OF SPECIES OF GEESE MENTIONED IN THIS REPORT

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Gwich’in Name</th>
<th>Inuvialuit Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brant</td>
<td><em>Branta bernicla nigricans</em></td>
<td></td>
<td>Nigliknak, Negleknak</td>
</tr>
<tr>
<td>Canada/Cackling Goose</td>
<td><em>Branta canadensis, Branta hutchinsii</em></td>
<td>Kheh</td>
<td>Ulugullik, Oloagotlik</td>
</tr>
<tr>
<td>Greater White-fronted Goose</td>
<td><em>Anser albifrons</em></td>
<td>Deech’yuh</td>
<td>Niglik, Nirliq</td>
</tr>
<tr>
<td>Snow Goose</td>
<td><em>Chen caerulescens</em></td>
<td>Gugeh</td>
<td>Kanguq, Kanuq, Kangok</td>
</tr>
</tbody>
</table>
APPENDIX 2. TRADITIONAL KNOWLEDGE CONSENT FORM USED FOR THIS STUDY

TRADITIONAL KNOWLEDGE RESEARCH CONSENT FORM

PART 1

Participant Name: ____________________________________________

Interview Number: ____________________________________________

Date of Interview: ____________________________________________

Community: __________________________________________________

Participant Address: ____________________________________________

Date of Birth: ________________________________________________

Length of residence on the land: ________________________________

Elder ___ Harvester ___ Community Member ___

Male ___ Female ___

Was a language other than English used during the interview? Yes ___ No ___

Which? ______________________________________________________

Interpreter Name: ____________________________________________

PART 2

Researcher Statement

Interviews are being done in the communities of Inuvik, Aklavik, Fort McPherson, Tuktoyaktuk, Tsiigehtchic and Old Crow. Elders, harvesters and/or community members are being asked to share their knowledge, experiences and wisdom about the areas that birds, in particular geese, use in the springtime and fall.

As per the Traditional Knowledge Collection Protocols with your community, the study team agrees to:

- Respect restrictions on the use and distribution of information provided,
- Respect and present the information provided by the participants accurately and appropriately in our interpretations and analysis, and
- Provide drafts of any interpretations and analysis of traditional knowledge in a timely manner to community representatives and/or participants, who shall have the right to review the information to ensure its accuracy.
PART 2 (cont’d)

*Participant Statement*

___________________________ *Interviewer’s name* has talked to me about the work they are doing for the goose staging local knowledge survey and I agree to provide information for this study.

I understand that the information collected will be used to help the Canadian Wildlife Service identify high-use staging areas of birds and geese in the Mackenzie Delta. This information is very important and will be incorporated into management plans and future monitoring programs.

I understand that a copy of working materials (i.e. questionnaire and map document) will be returned to my local Hunter and Trapper Committee for archival.

I give permission for my statements to be used in study reports: Yes ___ No ___
I would like my quotes to be used, but I would like my name protected: Yes ___ No ___

PART 3

___________________________ __________________________
*Participant (print name)* *Signature*

___________________________ __________________________
*Interviewer (print name)* *Signature*

Consent Form adapted from:
APPENDIX 3. INTERVIEW QUESTIONNAIRE USED FOR THIS STUDY

Goose Staging Local Knowledge Survey Form Fall/Winter 2008

Interview #: __________________
Date: __________________
Time: ________________

Introduction

I have been hired by Environment Canada to interview you and collect local knowledge about spring and fall staging areas used by geese and other birds in the Mackenzie Delta. This project is being conducted in coordination with the local Hunter and Trapper Committee.

1. Name of interviewee (please print): ________________________________

2. Where do you live? ________________________________________________

3. How long have you lived here? Since ________ (year)

4. Where were you born? ____________________________________________

5. When was the last time you were out on the land? ____________________

Travel Routes and Areas Used:

1. Do you have a cabin(s)/tent frame(s) that you travel to in the spring and/or fall?
   YES      NO

2. If YES, in what months of the year do you travel to these places
   (please circle months)?
   March    April    May    June    July    August    September    October

3. Do you set up your own camps in the winter and spring?
   YES      NO

4. Can you show on a map where you travel in the spring time? (draw travel routes as lines on the map provided)

5. Can you show on a map where you travel in fall time? (draw travel routes as lines on the map provided)
Goose Areas:

1. Have you ever observed a large flock of geese? (+1000 birds)
   YES NO If YES, please fill out the Goose Staging Form.

2. Have you ever been told the location of a large flock of geese by another person?
   YES NO If YES, please fill out the Goose Staging Form.

3. In general, where do geese gather in either spring (when the ice is starting to open)
   or fall? Please indicate on the map the general areas and the times of year geese are
   in that area.

Goose Hunting:

1. Have you ever hunted geese? YES NO
2. Do you hunt geese for subsistence? YES NO
3. What kinds of geese do you hunt? __________________________________________
4. About how many geese/year do you take? __________________________________
5. Where are the most important hunting locations? Please indicate them on the map.

________________________________
________________________________
________________________________
________________________________
________________________________

Other Geese Observations:

1 (a). Are you seeing any changes in the numbers of geese in the areas you travel?
   Do you see more or less geese?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

1 (b). If yes, why do you think this is?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
2 (a). Are you seeing changes in the time of year that you see geese, or hunt geese?

________________________________

________________________________

________________________________

2 (b). If yes, why do you think this is?

________________________________

________________________________

________________________________

3. Are there any other observations about geese that you would like to tell us about?

________________________________

________________________________

________________________________

________________________________

________________________________

________________________________
**Other Birds:**

1. Please indicate on the map any other areas where you see large groups of birds in the spring and fall. (*Include the species or type of bird, the time of year, and the size of the flocks that you have seen.*)

2. Have you seen birds in your area that are new? What did they look like? Please describe when and where you saw them. (*Please let us know if they were nesting!*)

3. Have you noticed any changes in the timing of bird migrations through your area? (*Are birds migrating earlier or later?*)

4. Are there any other observations about other birds that you would like to tell us about?
Goose Staging Forms (1 per area)  Interview #:________

Can you show on the map where a large flock of geese was observed by you or by someone else? (mark as G1, G2, etc. on the map). Did you observe the group? YES/NO

Group number: G_______ Year? _________ Month? __________

Approximately how many geese in group? __________ Any juveniles? __________

What kind of geese? ________________________________________________

What were the birds doing when you saw them?

________________________________________________________________________

If on the ground: Were the birds molting? YES NO Don’t know
Were the birds feeding? YES NO Don’t know

If flying: In which direction was the group flying? ______________

What were you doing when you saw the geese? _______________________________

What type of area were the birds in? (e.g. upland, lowland, lake, ocean, river)________

Are there any other observations about this flock of geese that you would like to share?

________________________________________________________________________

________________________________________________________________________

Can you show on the map where a large flock of geese was observed by you or by someone else? (mark as G1, G2, etc. on the map). Did you observe the group? YES/NO

Group number: G_______ Year? _________ Month? __________

Approximately how many geese in group? __________ Any juveniles? __________

What kind of geese? ________________________________________________

What were the birds doing when you saw them?

________________________________________________________________________

If on the ground: Were the birds molting? YES NO Don’t know
Were the birds feeding? YES NO Don’t know

If flying: In which direction was the group flying? ______________

What were you doing when you saw the geese? _______________________________

What type of area were the birds in? (e.g. upland, lowland, lake, ocean, river)________

Are there any other observations about this flock of geese that you would like to share?

________________________________________________________________________

________________________________________________________________________
www.ec.gc.ca

Additional information can be obtained at:
Environment Canada
Inquiry Centre
10 Wellington Street, 23rd Floor
Gatineau QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-997-2800
Fax: 819-994-1412
TTY: 819-994-0736
Email: enviroinfo@ec.gc.ca