



Wetlands

Mean Life

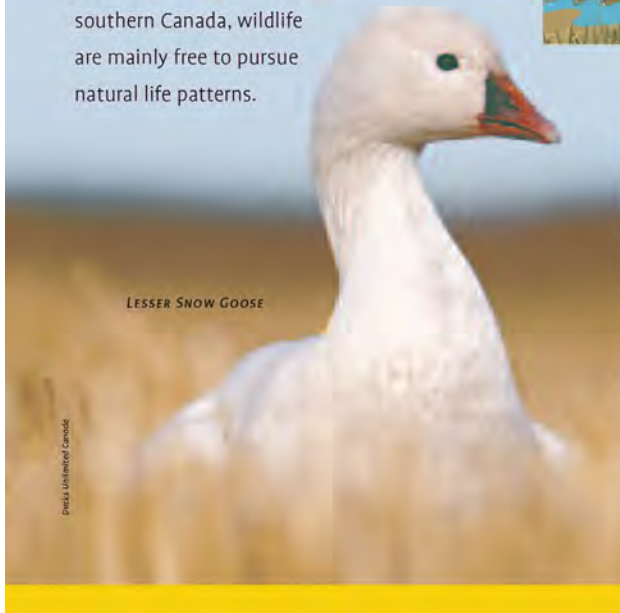
The Hudson and James Bay Lowlands

THE GREAT WATERSHED OF HUDSON AND JAMES BAY COVERS MORE THAN 30 PERCENT OF OUR NATION.

An abundance of life emerges each year from the lowlands surrounding the southern portions of this inland sea. Richly varied landscapes and a wealth of wild foods support a hotbed of plant and animal life, particularly in spring and summer.

Whales troll the estuaries, bays and open waters. Herds of caribou traverse ancient corridors from the coast to the forest and back again. Geese, ducks and shorebirds flock to the coasts to nest and feed. Polar bears prowl the ice for seals in winter and retreat to summer dens on the land.

This vast ecozone of relatively undisturbed wilderness is fundamental to the health of many wild populations. Far from the intense human influence that occurs in southern Canada, wildlife are mainly free to pursue natural life patterns.



LESSER SNOW GOOSE

- | | |
|----------------------------|---------------------|
| 1 WOODLAND CARIBOU | 10 RED FOX |
| 2 MELISSA ARCTIC BUTTERFLY | 11 POLAR BEAR |
| 3 FIREWEED | 12 SNOWY OWL |
| 4 NORTHERN PINTAIL PAIR | 13 HUDSONIAN GODWIT |
| 5 ARCTIC CHAR | 14 BELUGA WHALE |
| 6 RED KNOT | 15 CANADA GEESE |
| 7 EELGRASS | 16 WOOD FROG |
| 8 LICHEN | 17 BLACK SPRUCE |
| 9 ARCTIC COTTON | |

Dariusz Jankowski/Canada

Life means biodiversity

The three largest wetland zones in the world

- 1 WEST SIBERIAN LOWLANDS (RUSSIA)
- 2 AMAZON RIVER FLOODPLAIN (BRAZIL)
- 3 HUDSON BAY LOWLANDS (CANADA)

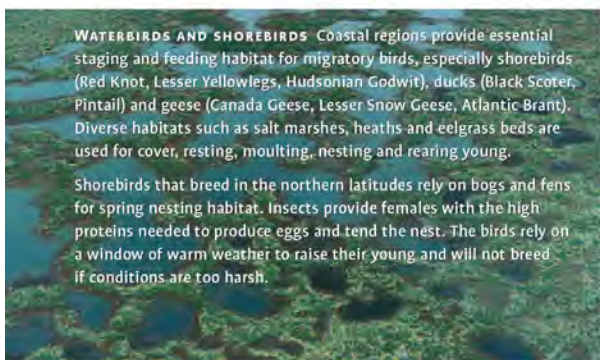
More than 80 percent of the Hudson and James Bay Lowlands are peat-accumulating wetlands, often called muskeg. Biologists identify muskeg by its two wetland types: fens and bogs. These wetlands extend across the low, wet landscape and act as a nursery for innumerable insects that, in turn, feed thousands of breeding birds and other wild species.

From the fertile coastal waters, the terrain of the lowlands slopes gently upward through wetlands sprinkled with ponds, lakes and waterways. Upland areas are higher and further inland than shorelines. These landscapes contain heaths, shrub forest, white pine-moss forest, and finally taiga – immense boreal forests dominated by black spruce and tamarack. Northern forests give way to open tundra, which is an extremely cold, treeless plain with a layer of permanently frozen subsoil called permafrost.

Smaller ecosystems within the ecozone include polynyas (open-water leads or gaps in the ice), eelgrass beds and tidal flats along the coastlines and, further upland, lichen or rocky heaths. Northern ecosystems do not support the biodiversity or variety of life that, for example, rainforest ecosystems support. However, the lowlands sustain many species, often at critical stages such as migration or rearing young.

MEAN MONTHLY TEMPERATURES	EXTREME TEMPERATURES	
JANUARY	< -25°C	-40.3°C
JULY	> 10°C	34.4°C

Recorded at Chisasibi, Québec



The climate of the Hudson Plains ecozone is defined by fluctuations in temperature. Cold seawater enters the bays from the Atlantic Ocean and Arctic Sea. Broad, shallow rivers flow across the landscape into the bays, merging freshwater with saltwater. This mix reduces the bays' salt content so that a broad array of wild species can thrive along the coastlines. As well, reduced salinity allows the bays to freeze over and thaw each year – these are the largest water bodies in the world to do so.

All winter, thick shore ice covers the coastal tidal flats and portions of the salt marshes, reducing ambient temperatures so that polar conditions extend south into this ecozone. The ice comes in around December and lingers until May. Thick, maritime fogs may occur along the coasts during high humidity periods.

Vast expanses of marshy flats line the west coast. Eastern shorelines tend to be rocky, with highly-developed salt marshes found in larger bays. Seasonal wave and ice action against the land continually shape the shorelines. Isostatic rebound is another dominant force along the coasts. During past glacial eras, the great weight of ice formed depressions on the surface of the Earth. Even today, the Earth's crust is still slowly moving upward to transform the face of the land.



Essential ecosystems: wetlands

Wetlands are complex ecosystems that provide a range of essential habitat types for wildlife. For many species, northern wetlands (coastal and inland) provide habitats for protection, reproduction and migration.

These ecosystems are seasonally or permanently covered in salt or freshwater, or the water table is at or very close to the surface. The presence of water, sometimes in the form of permafrost, allows 1. *hydric (wet) soils to develop* and 2. *plants that are adapted to grow in water to colonize the area.*

Wetlands perform a beneficial function called groundwater recharge, the process of water from precipitation or run-off soaking into the land to become groundwater.

Salt marshes develop along protected shorelines that allow sediment to collect and form a basis (substrate) for plant life. They extend along the slope from the upper limit of tidal flats to the spring high-tide level. Plant meadows are often lush. Marsh plants depend on seasonal submergence (underwater), the quality of the substrate (soil, organic material), freshwater inflow, and the functions of the local drainage network. Arctic zone marshes tend to be more exposed due to steeper slopes and more intense seasonal ice action. Plants include spikerush, alkali seagrass, marsh arrow grass and sedges.

Freshwater marshes tend to extend inland from salt marshes beyond the high-tide level. They are characterized by a significant source of freshwater inflow and plant communities made up of emergent aquatic vegetation. These plants are rooted in shallow water with most of the stem and leaves above the water. As organic material collects over time, marshes in this ecozone may give way to fens. Plants include bogbean, marsh cinquefoil and sedges.

Fens accumulate peat, which is soil made up of partly-decomposed organic material. Groundwater is their dominant water source. Fens are wholly or partly covered with water and support a variety of aquatic plant species, including sedges and grasses.

Bogs are also peat-accumulating and trap precipitation as their only water source. They are covered with grasses and moss growing on wet, acidic peat. They are commonly low in the nutrients required for plant growth.



Alain Goulet



Canadian Wildlife Service



Alain Goulet



Daruk Delmonico Goulet



Canadian Wildlife Service

KNOWN around the globe

The Ramsar Convention (*properly called The Convention on Wetlands of International Importance*) is an international treaty signed in Ramsar, Iran in 1971. The treaty is intended to support conservation of wetlands and their resources such as wild rice or fish. Signing countries, including Canada, agreed to protect wetland sites of international significance.

Learn more online: www.ramsar.org

The Hudson and James Bays are linked to three of Canada's 37 Ramsar sites:



HUDSONIAN GODWIT

Michael C. Fox

1 MCCONNELL RIVER

This site is also designated as a Migratory Bird Sanctuary under the management of the Canadian Wildlife Service.

TOTAL SITE AREA:

- 32,800 hectares

DOMINANT WETLAND TYPE:

- Intertidal marsh – includes salt and freshwater marsh

BIOLOGICAL VALUE:

- Breeding area for waterbirds

SOCIAL AND CULTURAL VALUES:

- Subsistence hunting and fishing
- Habitat
- Nature conservation

2 SOUTHERN JAMES BAY (MOOSE RIVER AND HANNAH BAY)

This site is also designated as a Migratory Bird Sanctuary under the management of the Canadian Wildlife Service.

TOTAL SITE AREA:

- 25,290 hectares

DOMINANT WETLAND TYPE:

- Intertidal mud, sand or salt flats

SUMMARY OF BIOLOGICAL VALUES:

- Staging, breeding, moulting area for waterbirds

SUMMARY OF SOCIAL AND CULTURAL VALUES:

- Traditional culture
- Current scientific research
- Subsistence hunting

3 POLAR BEAR PROVINCIAL PARK

This site is also designated as a Provincial Park under the management of Ontario Parks.

TOTAL SITE AREA:

- 2,408,700 hectares

DOMINANT WETLAND TYPE:

- Non-forested peatlands – includes shrub or open bogs, swamps, fens

SUMMARY OF BIOLOGICAL VALUES:

- Staging (pre-migration resting and feeding), breeding, moulting area for waterbirds
- Important for mammals, marine mammals, fishes, amphibians
- Important to maintain the geographical range of a plant species and/or community

SUMMARY OF SOCIAL AND CULTURAL VALUES:

- Traditional culture
- Current scientific research
- Non-consumptive recreation
- Subsistence and sport hunting and fishing

Challenges to sustainability

Climate change

Influenced by an excess of greenhouse gases, climate change is expected to hit the north very hard. Changes in seasonal patterns and rising sea levels could disrupt longstanding life stages and activities of wild plants and animals. For example, sea ice in western Hudson Bay is receding about 14 days earlier than in the past. As a result, polar bears come off the ice from winter feeding with less fat, reducing reproductive success. This is a concern because females breed on average only every three to four years and the reproductive rate for these bears is very low.

Creeping range changes are possible for wildlife as northern zones become more temperate. There may be significant changes in the location of the tree line (where the treeless tundra begins) or the ranges of amphibians and insects. As the health, diversity and range of northern ecosystems (including wetlands) alter, hasty adaptation will not be possible for all plants and animals.

Learn more online: Wapusk (Cree for white bear) National Park
www.pc.gc.ca/pn-np/mb/wapusk/index_E.asp

Hydroelectric development

The James Bay Project in Quebec, one of the biggest engineering efforts in history, is the site of massive hydroelectric power development. The Cree people in the area have voiced objections to the project in the past due to concerns about its effects on waterways. The elevated flow of freshwater each spring from rivers dilutes the saline content of the bay waters and is vital to preserve the biodiversity of coastal wildlife communities. Developments that alter this flow can substantially change the habitats of marine mammals, fish and migratory birds.

Learn more online: Hydro Quebec's Virtual Visit
www.hydroquebec.com/visit/virtual_visit/index.html

Pollution

Migratory birds, marine mammals and predators at the top of the food web are vulnerable to pollutants in aquatic ecosystems. Through long-range transport on air currents, pollutants that originate far south can be deposited in the north. As well, toxic methylmercury has been released from the ground by flooding for reservoirs.

Some chemicals will bioaccumulate with potential health effects. The uptake of persistent, or non-biodegrading, contaminants from the water, sediment and food sources is called bioaccumulation. Toxic metals and chemicals can be taken up by wildlife during feeding and then move through the food web to top predators such as beluga whales or raptors. Over time, as the contaminant is distributed throughout the aquatic food web, it affects every living creature within it, including humans.

Learn more online: Biology Online
www.biology-online.org



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POLAR BEAR



Diana Ulfendrup/Corbis



LESSER SNOW GESE More than four million Lesser Snow Geese gather noisily along the coastal marshes of the lowlands each spring and autumn. Since the 1970s, numbers of this species have more than doubled and put new pressures on their northern habitats. The foremost reason for the population growth is that modern agricultural methods leave behind a limitless food supply for the birds. Waste grain remains on fields in southern farming regions over the winter months. As a result, Snow Geese have very high survival rates and are in excellent physical condition each spring for producing and raising more and more young birds.

Major breeding colonies exist at Cape Henrietta Maria, Akimiski Island and Arviat. The gregarious birds rely on the roots of marsh plants for a large portion of their diet. In some colonies, high concentrations of feeding birds have stripped the ground of edible plants – threatening the ability of the habitat to support this species and others that share the sites.

Learn more online: Hinterland Who's Who
www.hww.ca See Bird Fact Sheets



Arlene Gault

Wetlands mean biodiversity

All of life is interconnected through a complex food web – each species depending on another to survive. Any change in a wetland that affects one species of plant or animal will have ripple effects throughout the ecosystem.

Plants absorb the sun's energy and pass it on to herbivores. Carnivores eat other animals for energy, while omnivores eat either plants or animals. When plants and animals die, their remains are eaten by scavengers or settle on the bottom of the wetland to provide food for bacteria, invertebrates and other decomposers.



People are part of the food web



The Hudson and James Bay Lowlands are the traditional home of Cree people. The *Omushkegowuk* (muskeg or swamp people) were first travellers, moving around the region to trade and hunt mammals, birds and fish. Seasonal influences such as weather and migration shaped their lives.

The arrival of geese signalled the welcome onset of spring, a season of plenty. The hunt for migratory birds, particularly geese, has long sustained the Cree people's diet and community life. Today, some 10,000 Cree people live in the lowlands, still retaining many historic values and customs.

Cree words for geese:

- **Niska** (Canada Goose)
- **Wawao** (Lesser Snow Goose)
- **Apishtiskish** (Atlantic Brant)

Know your waterbirds

ADAPTED FROM *Lowland: Old Ways, New Ways*
Partners in Change Education Services
Mushkegowuk Council
Tel: 705-658-4222
www.mushkegowuk.ca



Waterbirds and biodiversity

A large variety of waterbirds live and migrate through the Hudson Bay Lowland. Waterbirds share certain characteristics: a double layer of feathers, webbed feet, monocular vision and oil glands. But each species has distinctive adaptations that fit a unique niche in the aquatic environment (Shoveler's bill, Merganser's bill, Swan's neck and the position of Loon's legs).

Biodiversity is the complex relationship of all living things in the environment. Biological diversity includes genetic diversity; species diversity and community or ecosystem diversity.

- **Genetic diversity** supports individuals within a species to maintain reproductive vitality, resistance to disease, and the ability to adapt over time to changing conditions.
- **Species diversity** represents the range of evolutionary and ecological adaptations of individuals in a species to a particular environment.
- **Community or ecosystem diversity** represents the collective response of species to different environmental conditions – in the case of the Hudson Bay Lowland, a subarctic environment.



RESEARCH IN THE LOWLANDS Each spring, volunteers for a wildlife monitoring program called the Ontario Breeding Bird Atlas head out into the field – some as far north as Hudson Bay. With binoculars, tape recorders and notebooks at the ready, a small group of bird experts fly in to remote locations to camp in the wilderness and record evidence of breeding activity for as many bird species as possible.

In Canada, Ontario was the first province to publish a complete atlas, based on data collection from 1981 to 1985. What's inside the Atlas is a series of maps, one for each of the nearly 300 species of birds known to breed in the province. The project continues intermittently so that every 20 years, a new Atlas can provide an up-to-date, accurate "snapshot" of the status and distribution (places they can be found) of all bird species that breed in Ontario.

Visit the Atlas Web site: www.birdsonario.org

Threats to biological diversity are: species extinction, habitat destruction, fragmentation of habitat (i.e., fragmentation occurs when a large tract of habitat is broken into smaller pieces by factors such as roads, pipelines, human development or fire), degradation of habitat (i.e., the quality of the habitat is affected; for example, if silt is allowed to run-off into a stream, making it unsuitable for certain species of fish), and the introduction of non-native species.



LEARN ABOUT WATERBIRDS

- Observe the different features of a waterbird in nature, especially those features used in identification (e.g., field marks), and learn the terms that are used to describe them. Guidebooks can provide help in exploring correct terminology.
- Examine images (photographs, video or illustrations) of waterbirds and try to identify as many different species as possible. Which characteristics are shared? Which characteristics are unique? Review guidebooks to try to identify all of the waterbirds that nest in or migrate through the Hudson Bay Lowland.
- Draw or paint a species in life-size silhouette, showing the bird flying, swimming and feeding. Focus on the markings and body parts that make that species distinct from all others. Note any differences between males and females, or adults and juvenile birds.
- List the attributes that most waterbirds share. Identify the distinctive traits that enable individual species to exploit different niches. Write a detailed description of the appearance and actions of one species of waterbird and share it with the class.
- Ask the class: What does biodiversity mean? Use a dictionary or other source to answer the question. Discuss the benefits of biodiversity to people.



Resources WOODLAND CARIBOU

A starting point that leads to dynamic Web sites and tools to learn more and discover real activities that can protect Canada's wetlands.

- Canada's Aquatic Environments: www.aquatic.uoguelph.ca
- Canada's Species at Risk: www.speciesatrisk.gc.ca
- Canadian Biodiversity Information Network: www.cbin.ec.gc.ca
- Climate Change and Wildlife: www.ec.gc.ca/envirozine/english/issues/i18/feature1_e.cfm
- Ducks Unlimited Canada Resources for Students: www.ducks.ca/resource/students/index.html
- ePALS Classroom Exchange: www.epals.com/projects/ducks_unlimited
- Grand Council of the Cree Community Photo Album: www.gcc.ca/gallery/gallery.htm
- Local Environment Web site: www.envcree.ca/index-framset.htm
- Plant Watch North: www.emannorth.ca/plantwatch/main.cfm
- Taiga Net: www.taiga.net
- Take Action on Climate Change: www.climatechange.gc.ca
- Take the Waterfowl Quiz: www.on.ec.gc.ca/wildlife/ehjv/waterfowl-e.html
- Nature of Water: www.ec.gc.ca/water/en/nature/wetlan/e_wetlan.htm
- Nature Watch: www.naturewatch.ca/english
- Waterfowl Biology: www.ducks.org/conservation/waterfowl_biology.asp
- Youth and the Environment: www.ec.gc.ca/youth/index_e.cfm



CURRICULUM LINKS

This poster has been designed to complement the Ontario and Pan-Canadian curriculum in the Grade 10 Science course, specifically the Biology portion – Sustainability of Ecosystems. There are links to other secondary school courses and a few are listed below.

- **Grade 10 Academic Science:** Sustainability of Ecosystems
- **Grade 10 Applied Science:** Ecosystems and Human Activity
- **Grade 11 Academic Biology:** Diversity of Living Things
- **Grade 9 Academic Geography:** Human-Environment Interactions, Space and Systems, Understanding and Managing Change, Methods of Geographic Inquiry
- **Pan-Canadian Science Curriculum Project**

Contacts



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E-mail: Wildlife.Ontario@ec.gc.ca
Web: www.on.ec.gc.ca/wildlife

Aussi disponible en français sous le titre: Les terres humides, c'est la vie
Les Baies ternes de la Baie d'Hudson et de la Baie James



Ducks Unlimited Canada
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