

Teacher Resource Booklet

*Companion to CPAWS New Brunswick's
"Watch Your Paws" Biodiversity Conservation
Educational Activities*



Section A. Biodiversity Conservation in New Brunswick Suggested Topics for Discussion or Assignments

Some terms that might be useful to go over with the class:

Species - A group of organisms that look similar and are capable of interbreeding to produce fertile offspring. The Species is the most detailed level of the standard category breakdown of living organisms.

Habitat – “A habitat is more than just a place that wildlife calls home. It’s a space that’s uniquely suited to an animal’s needs through the arrangement of food, water, shelter, and cover. It’s the place that offers appropriate “life range” for young and old alike.” ¹

Ecosystem – Consists of a group of living organisms (plants, animals and micro-organisms) interacting among themselves and with the environment in which they live (soil, climate, water and light)². The interactions among many species and their habitats form an ecosystem.

1. **What does the word “biodiversity” mean?**

Break this word into two parts for the students: “bio” means life and “diversity” is a synonym for variety. Examples: *Every time a species goes extinct, we lose some of our biodiversity;* and *Different ecosystems, such as forests, or oceans, or wetlands, contribute to our province’s biodiversity, by providing the kinds of habitats that many different species can live within.*

2. **Why is biodiversity important to New Brunswick? Why is it important to You?**

Remind students about some of the reasons why biodiversity is important, which they learned about when the CPAWS Educators came to the class.

Write the following categories on the board: Biodiversity belongs; Biodiversity helps us heal ourselves; Biodiversity keeps natural areas together; Biodiversity attracts tourists; Biodiversity helps life to continue on Earth; Biodiversity gives us food and resources; Biodiversity helps preserve cultural diversity.

Ask students to choose one of the categories and draw pictures or write a research report about why biodiversity is important to them, and/or why it is important to New Brunswick.

3. **How can we conserve Biodiversity in our province? Classroom discussion - could be followed by assignment, group projects or quiz.**

In class, brainstorm with students ways that we can help conserve biodiversity in New Brunswick. What can students do themselves? What do they need adults to do for or with them?

Possible answers:

- we can establish parks and protected areas in natural areas where many wildlife species live, to make sure wildlife have some places where they will always be able to find habitat that they need;
- we can provide habitats for wildlife in our backyards and cities by planting trees and shrubs, and keeping green spaces like forest, wetlands and rivers;
- we can make sure that we don’t disturb the places where wildlife build nests or raise their young (example: some wildlife can be scared off their nests by loud noises);
- we can be careful when we are outdoors and not chase or move wildlife;



Marten

Photo courtesy of US Fish and wildlife service: Erwin and Peggy Bauer

¹ Hinterland Who’s Who. <http://www.hww.ca/en/glossary/habitat.html>

² Natural Resources Canada. 2010. Forest Ecosystems of Canada.

- e) we can be careful how much paper and other natural resources we use, and make sure to recycle as many products as possible, to control the amount of natural resources that are removed from ecosystems to provide products for us;
- f) we can make sure we reduce pollution as much as possible – conserve energy and water, reduce or eliminate use of toxic chemicals, make sure any toxic chemicals we use don't get released into the environment.

Protected Areas in New Brunswick
(4.5% of the province is in protected areas and parks)

Examples of some of the Protected Natural Areas in New Brunswick³

Black River
Caledonia Gorge
Canaan Bog
Canoose Flowage

Grand Lake Meadows
Jacquet River Gorge
Kennedy Lakes

Loch Alva II
Nepisiguit
Spednic Lake

New Brunswick Provincial Parks

Sugarloaf
Mount Carleton
De la République
Mactaquac
Herring Cove

The Anchorage
New River Beach
Parlee Beach
Murray Beach

Val Comeau (privately managed)
Hopewell Rocks
Oak Bay (privately managed)
Saint Croix (privately managed)

National Parks in New Brunswick

Fundy National Park

Kouchibouguac National Park



³ A map of the Protected Natural Areas in New Brunswick can be found on CPAWS New Brunswick's web site: <http://cpawsnb.org/campaigns/protected-natural-areas>

Section B. Biodiversity at Risk - Suggested Topics for Discussion or Assignment

1. Have you ever heard of the term endangered species? What is an endangered species in danger of? Can you name some endangered species in New Brunswick? Draw a poster or make a diorama of a New Brunswick endangered species and its habitat.

Answer: An endangered species is in danger of becoming extinct (no longer existing in the world), or of being extirpated (lost from a certain place, such as a province or country).

2. Write a page / do a project / organize an event about an endangered species that lives in New Brunswick, telling why it is endangered and what we need to do, or are doing, to help protect it.

Or

Write a page / do a project / organize an event about an ecosystem that is rare or endangered in New Brunswick, describing why it is endangered, and what we can do, or are doing, to protect that ecosystem and its inhabitants.

Or

Write a page / do a project / organize a fair or display about how climate change is impacting biodiversity, and what actions we should take to make sure that nature is able to withstand the impacts of climate change.

The following information may be helpful to you in creating assignments or projects with your class about wildlife, habitats and biodiversity.

Endangered Species in New Brunswick

Species Listed under the New Brunswick *Endangered Species Act*, or Listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered in New Brunswick^{4 5}

Animals

Birds: Eskimo curlew; Piping plover; roseate tern; Red knot; Bald eagle; Harlequin duck; Peregrine falcon

Fish: Atlantic Bluefin Tuna; Atlantic Cod (southern population); Atlantic salmon, (Inner and Outer Bay of Fundy populations); cusk; porbeagle; striped bass (Bay of Fundy pop'n); white shark; winter skate

Reptile: Leatherback sea turtle

Insects: Maritime ringlet butterfly; Cobblestone tiger beetle

Mammals: Canada lynx; Little Brown Myotis; Northern Myotis; Blue whale; Tri-colored Bat; North Atlantic right whale



Canada lynx



Bald eagle

Plants

Anticosti aster
Bathurst aster
Furbish's lousewort
Pinedrops
Pipewort
Quillwort
Gulf of St. Lawrence aster
Twayblade
Butternut tree
Furbish's lousewort

Lichens

Boreal felt lichen

⁴ As of autumn, 2017. For more information on these species, or recent updates to the list, please see the New Brunswick government web site: http://www2.gnb.ca/content/gnb/en/departments/erd/natural_resources/content/wildlife/content/SpeciesAtRisk.html

⁵ As of autumn, 2017. For more information or recent updates to the list, go to: <https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife.html>

Endangered Ecosystems in New Brunswick

There is no official list of endangered ecosystems in New Brunswick. The following are examples of ecosystems that are becoming rarer in our province, or are threatened:

Salt marshes (coastal wetlands that are filled and emptied by the tides) – New Brunswick has lost over 65% of the original salt marshes, mainly due to burying, draining or diking for coastal development or farming.

Wildlife that live in salt marshes: permanent residents in the mud of the marsh, such as molluscs and mud worms; land-based wildlife such as short-eared owl, foxes, hawks, mice, shorebirds and insects; marine dwellers such as crabs, spawning fish, young fish, and seasonal migrants, such as breeding ducks. **Way to conserve it** – protect it from development, either by making it a protected area or zoning it as green space in municipal development plans.

St. John River Valley Hardwood Forests – originally located in the richest soil areas in the river valley from Woodstock to Perth and into Maine, most of these rich Appalachian hardwood forests were cleared for farming, and only 1% of the original land base still has this kind of forest. The forest is known for its combination of sugar maple, beech, white ash, yellow birch, and ironwood, along with butternut and basswood. It is home to plants such as trout lily, red trillium, yellow violet and a large number of rare plants and mosses. **Way to conserve it** – strictly protect it where it still exists on public land; work with landowners to make sure they know how to voluntarily manage it if it is on their land.



Old-growth forests – The amount of old-growth forest in New Brunswick is not tracked, however the provincial government estimates that about 4% of our province's Acadian forests are in the oldest stages of their development. This compares to estimates of approximately 30% to 40% old-growth before our province was settled by Europeans. **Wildlife that live in old forests:** marten (member of the weasel family), goshawks, barred owls, flying squirrels, white-breasted nuthatches, Blackburnian warblers. **Ways to conserve it** – make sure some of the best and largest examples are designated as parks or protected areas; make sure that forest management always leaves patches of old forest on the land.

Estuaries – Estuaries are the places where rivers flow into the ocean, where freshwater and saltwater mix to provide rich habitats for a wide variety of fish, birds, mammals and bottom-dwelling crustaceans and invertebrates. Rivers pick up pollutants such as nitrogen from various sources (fish farms, agricultural fertilizer run-off, sewage outfalls, fish plant effluent) as the water flows out to the ocean, making estuaries a collection point for all of this pollution. An overload of nitrogen causes blooms of algae to grow, which use up oxygen as they decompose, choking out other native plant and animal life. New Brunswick estuaries highly impacted by nitrogen pollution include Cocagne, Bouctouche, Baie Ste-Anne, Lemègue, and L'Etang Inlet. **Ways to conserve it** – protected areas; urban green spaces; wide tree buffers along streams and rivers; limit amount of discharge from pulp mills, industrial farms, sewage treatment and fish plants.

Inner Bay of Fundy Atlantic Salmon Rivers – The population of wild Atlantic salmon that live in rivers surrounding the inner Bay of Fundy is listed an endangered species in Canada. Many of the rivers that empty into the inner Bay of Fundy have dams or causeways which interfere with the free flow of water and salmon, or have been otherwise developed. These rivers include Big Salmon, Crooked Creek, Petitcodiac and Alma Rivers. **Ways to conserve them:** remove barriers if possible, establish wide treed buffer zones along rivers and streams, establish protected areas around headwaters.

Climate Change and Biodiversity – What's the Connection?

Climate change will have significant impacts on the natural world, food webs and nutrient cycles. In turn these may reduce the viability of the ecosystems that support wildlife and our human communities. Coastal areas will see a rise in sea levels, with greater flooding and storm surges. Periods of drought and heat waves will be accompanied by severe storms. River levels will fluctuate with increased flooding and drought, leading to erosion of banks. Growing conditions for gardens, crops and forests may become harsher, even as the growing season may expand.

Plants and animals are generally able to adapt to small changes in their environment. However certain things determine how well they can respond, including:

- **Time – how fast do changes happen?** - Many species can adapt to changes quickly, either by migrating to more suitable habitat or altering their patterns. Other species, especially plants, require longer periods to adapt. If the pace of change is too quick for species to respond positively, they risk extinction.
- **Genetic variability – how strong is the species to start with?** - If there are more individuals in a species, it is more likely that the species as a whole will survive, through simple evolution. Species that are currently endangered have lower genetic variability.
- **Are new habitats available?** - To adapt, many species may have to change from their current habitat to new ones in order to survive. In an increasingly developed landscape, safely finding new habitat may be very difficult.
- **Are food sources around when needed?** - Change in temperature affects how early in the year animals produce young, hibernate and migrate, and when plants bloom and fruit. As species adapt at different rates, it is likely that some animals may not be able to find suitable food sources at the right time, interfering with reproduction and survival rates.

Many species currently listed as “Species at Risk will” face increased risk of extinction, and other species not yet on the list may be added, due to changes in their habitat. For example:



- ⌘ The **Southern twayblade plant** is found in and around black spruce bogs. As the climate changes, bogs are at risk of drying up or remaining dry for longer periods. Prototype **quillwort plants** live on the bottom of spring-filled lakes, in water that is cool and clear. The coming changes in climate may result in these lakes being shallower, warmer and more polluted.
- ⌘ **Piping plover** feed and nest on the gravel-sand beaches of eastern and southern New Brunswick. Increases in sea-levels and erosion due to storm surges will result in less beach habitat, fewer suitable nesting sites, and likely less successful nesting, with fewer young surviving.
- ⌘ **Atlantic salmon** need unpolluted cold streams and rivers for spawning. Dramatic changes in water levels because of alternating droughts and severe storms, plus overall temperature rise, serve to further endanger the salmon.
- ⌘ The **pollinators**, such as butterflies and bees, help produce many of our food supplies. They may find that changes to flowering seasons do not correspond to their life cycles, resulting in downward spirals for many pollinators. This could have serious negative consequences for our food supplies, our farmers and our economy.

In times of uncertainty, like climate change, it's all about resilience and diversity!

The more we conserve the wide variety of ecosystems and all the different kinds of species, the more easily our human habitat, and wildlife habitat, will be able to bounce back from climate change impacts.

What Can We do to Reduce the Impact of Climate Change on Biodiversity?

- ✓ New and larger **parks and protected areas**, free from development, will help provide the safety net to protect ecosystems and wildlife from the combined impacts of climate changes, development pressures, habitat loss, and pollution.
- ✓ **Species at Risk recovery plans** should evaluate the combined impacts of climate change, habitat loss, and pollution on species at risk and their habitats, and ensure plans include actions to reduce or eliminate those impacts.
- ✓ **Protecting coastal habitats** - beaches, salt marshes, cliffs and dunes - by establishing development-free areas, and buffering those natural areas from the impacts of development, will allow coastal systems to continue to provide habitat for native and migratory wildlife, in addition to protecting our communities from storm surges and flooding.
- ✓ **Managing forests** to conserve diversity and resilience, by conserving older forests, multiple canopy and understory layers, and the widest variety of native tree and plant species, will continue to help provide the ecological services we need.
- ✓ Conserving or restoring **buffer zones along streams, wetlands, and rivers**, with trees, shrubs and plants, to keep rivers cool, and prevent erosion and flooding. To provide the best protective function, these buffer zones should not allow any development or removal of trees.

Section C. *Watch Your Paws* – How to Act Responsibly in Nature

1. *How can we behave responsibly while in nature?*

Ask students to find a creative way (posters, photos, collage, poems, essays, article in school newspaper / website, organize a hike) to describe how they behaved the last time they were in a natural area (in a park, the woods, on a river or lake, a trail near their home, at the seashore).

What kinds of things did they do to help conserve the nature around them? (Hints for things to do: take photos of things you enjoy, stay on the trail, make sure campfires are totally out before leaving, take all litter out with you, enjoy wildlife at a distance, and learn about the plants and animals you are seeing).

What kinds of things did they do in the past that they won't do again? (Hints for things not to do: littering, scaring / chasing wildlife, breaking branches or bark off trees, pulling up plants, making too much noise).

Ask students to **organize an exhibit in the school** of their projects, or **organize an outdoor activity** where they model the Watch Your Paws behaviours, to help raise awareness among their classmates.

Additional Resources for Teachers

Please visit the CPAWS Southern Alberta chapter web site for free teacher resources that describe a wide range of other biodiversity and conservation activities that can be used in class (under the heading "Free Resources for Educators"):

(<http://cpaws-southernalberta.org/campaigns/education>)

Please ask CPAWS NB if you would like more advice on how to change activities to highlight New Brunswick areas and issues. The resources on the CPAWS Southern Alberta website are available in English only.



***Walking in the Grand Lake Protected
Natural Area***

Roberta Clowater photo.



This teacher resource has been produced by the Canadian Parks and Wilderness Society, New Brunswick Chapter (CPAWS NB) and program partner, Cogent Consortium Inc., as part of our “Watch Your Paws” education program. First produced September, 2007, updated in 2017.
For more information, please visit our web site:

www.cpawsnb.org

*CPAWS New Brunswick
180 St. John Street, Fredericton, NB E3B 4A9
Phone: 506-452-9902; Email: cpawsnb@nb.sympatico.ca*

CPAWS NB gratefully acknowledges the funding provided for this project by:

**The New Brunswick
Environmental Trust Fund**



The New Brunswick Wildlife Trust Fund



TD Friends of the Environment Foundation

