NEWFOUNDLAND & LABRADOR

CARING FOR OUR *Special Places*

A FRAMEWORK

BUILDING A FRAMEWORK

The province of Newfoundland and Labrador—part island and part mainland—covers a vast area on the northeastern edge of North America. It is located near the convergence of the warm Gulf Stream and much colder Labrador Current, its geology has been formed by the collision of tectonic plates and volcanic activity, and its terrain has been strongly influenced by glaciation. This unique set of geological and oceanic characteristics has directly influenced the province's natural biodiversity—the plants, animals, and ecosystem communities found here.

Biodiversity protection is widely recognized as a global priority. Yet no one can claim to understand completely how nature works. So how do we design a network of protected areas in Newfoundland and Labrador that will adequately preserve all of our biodiversity? By creating a system of parks and reserves using a three-component framework. It is a framework that is based on scientific research, sound conservation practices, and an understanding of the processes of ecological systems. And it's a solution used in various forms around the world.

A three-component system of protected areas allows us to create a safety net that can truly protect our biodiversity. Each element performs a different function.

The three components in the framework are:

COMPONENT 1: Large reserves (more than 1,000 km^2) that set aside habitat for large, wide-ranging mammals, and are designed to capture complete ecosystems and parts of more than one ecoregion.

COMPONENT 2: Areas of 50 to 1,000 km^2 that preserve representative portions of all ecoregions or ecodistricts not adequately captured in Component 1 reserves.

COMPONENT 3: Small reserves (less than 50 km^2) that protect exceptional natural features—seabird colonies or fossil sites, for example—not captured in Component 1 or 2 reserves.

Many types of protected areas exist in the province. Some—but not all—work as part of the component system. Whether or not an area fulfills the criteria of the three-component framework depends on its size, the type of natural elements contained within its borders, and the level of protection it provides.

In Newfoundland and Labrador, provincial wilderness reserves and some large national parks can serve as Component 1 reserves. Ecological reserves and some provincial parks (depending on their size and location) can be considered Component 2 reserves. Federal migratory bird sanctuaries, provincial parks, wildlife reserves, and ecological reserves may serve as Component 3 reserves.

Photos top to bottom: Black bear, red pine, Northern gannets.

GLOSSARY

Biodiversity: Short for "biological diversity," or the variety of all species, from micro-organisms to high-level mammals, and the ecological processes and systems they are part of.

Ecological integrity: Having the characteristic types and quantities of native species, biological communities, and supporting natural processes associated with a particular natural region, all of which are functioning with typical rates of change.

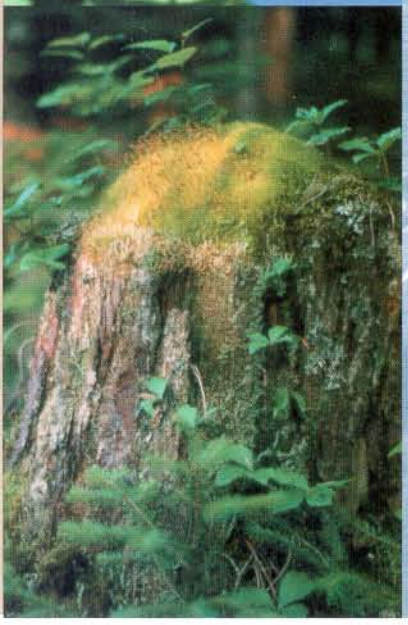
Ecotones: Areas of rich biological diversity that occur where ecoregions meet. Ecoregions blend together, so their edges have representative plants, animals, and features of all neighbouring regions.

Ediacaran Period: Period of time between 600 million and 543 million years ago. This is the period when the first soft bodied multicellular life appeared in the oceans.

Enduring features: The characteristic, predominant physical features (such as heights of land, rock types, topography) or biological features (vegetation patterns and species—birch or spruce forest, for example) of an ecoregion's landscape profile.

Landscape profile: A two-dimensional cross-section of a representative portion of an ecoregion. Every landscape profile has physical and biological features that differ from ecoregion to ecoregion. A landscape profile typical of the Corner Brook ecodistrict (and found within the Little Grand Lake Provisional Ecological Reserve), for example, includes alpine heath at the highest elevations, birch-aspen stands on scree, and lower alder swamps.

Wilderness: A natural area, together with its naturally developed plant and animal life, that is essentially undisturbed by human activity.



WHAT ARE ECOREGIONS?

Ecoregions—sometimes called natural regions—are areas that have distinctive, recurring patterns of soil development and vegetation that are determined and controlled by local climate and geology. Landforms and geology affect soil types and drainage, which also influence the distribution of plant species, and in turn, animals.

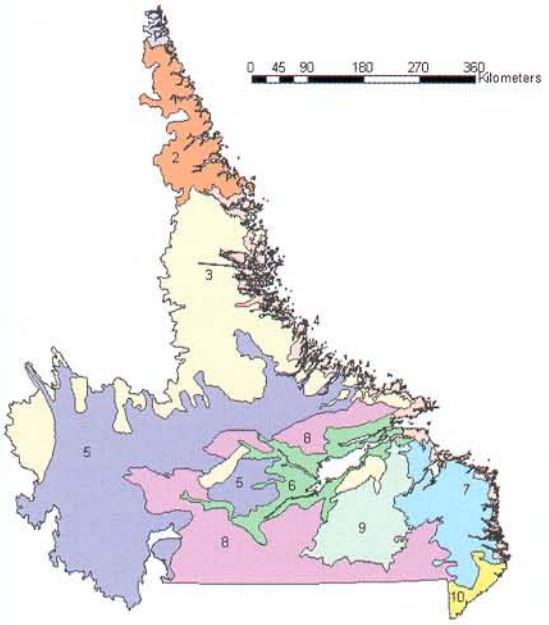
THE ECOREGIONS OF NEWFOUNDLAND AND LABRADOR

Dr. A.W.H. Damman's assessment of the combinations of physical, biological, and climatic features in Newfoundland and Labrador is the foundation for the province's ecological classifications. His work, and the further studies of Susan J. Meades (see *Natural Regions of Newfoundland and Labrador*, 1991), divide insular Newfoundland into nine ecoregions, and Labrador into ten.

Damman also identified 21 ecodistricts—or sub-categories of some ecoregions—all of which are on the island. (More research is required to identify ecodistricts in Labrador.) These smaller areas, which differ slightly from each other in geology and geomorphology (how surface landscape features were formed), mean the province has 35 natural regions requiring adequate ecoregion protection.

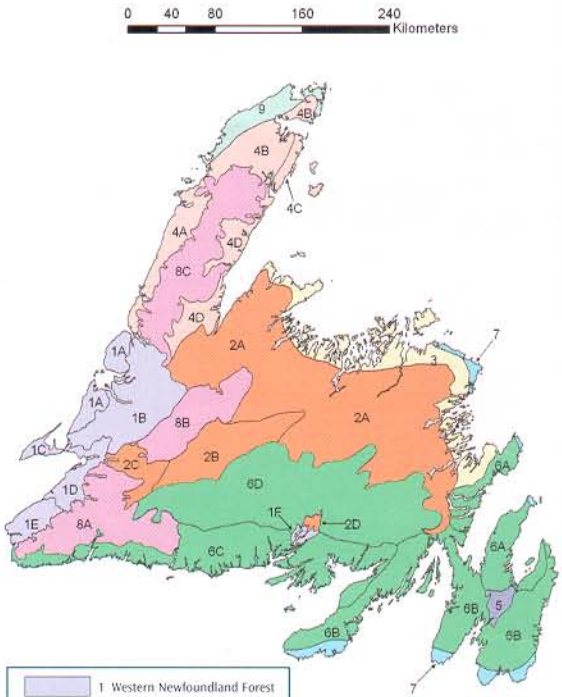
The unique features of the province's ecoregions and ecodistricts provide habitat for 1,466 species of vascular plants, 15 native and 12 introduced mammals on the island, 37 native and three introduced mammals in Labrador, and approximately 154 species of birds that breed here. There are thousands of invertebrate species (insects and worms), fungi, and algae, and countless micro-organisms all of which are vital to the health of our ecosystems. Because of the location and geographic area of the province, many plant and animal species attain their northern or southern limits here.

Ecoregions of Labrador



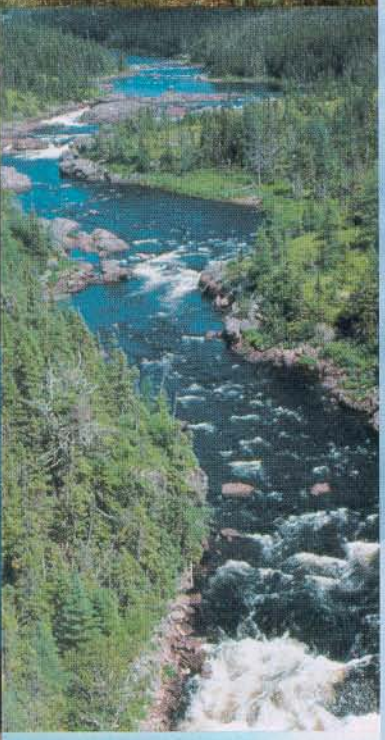
1 Low Arctic Tundra (Cape Chidley)
2 Alpine Tundra (Torngat)
3 High Subarctic Tundra (Kingurutik-Fraser)
4 Coastal Barrens (Okak-Battle Harbour)
5 Mid Subarctic Forest (Michikamau)
6 High Boreal Forest (Lake Melville)
7 Mid Boreal Forest (Paradise River)
8 Low Subarctic Forest (Mecatina River)
9 String Bog (Eagle River Plateau)
10 Forteau Barrens

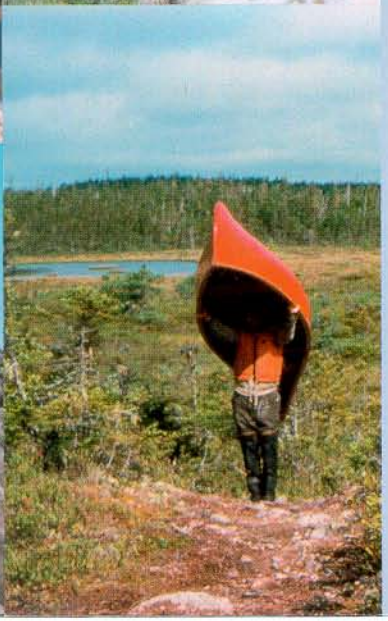
Ecoregions of Newfoundland



1 Western Newfoundland Forest
2 Central Newfoundland Forest
3 North Shore Forest
4 Northern Peninsula Forest
5 Avalon Forest
6 Maritime Barrens
7 Eastern Hyper-oceanic Barrens
8 Long Range Barrens
9 Strait of Belle Isle Barrens

Photos top to bottom: Mistaken Point, tiger swallowtail, lichen on tree stump.





BIG SPACES FOR BIG SYSTEMS

Component 1 reserves are the largest elements in our protected areas framework. Their size enables them to provide the best protection for wilderness and biodiversity, maximizing ecological security.

The area and location of Component 1 reserves are determined using the habitat needs of a high-level, wide-ranging native mammal species. Ideally, this animal is at the top of the food chain, and so its habitat contains a variety of natural ecosystems.

In Newfoundland and Labrador, using the top mammal in the food chain—the black bear in Newfoundland or the wolf in Labrador—is problematic or impossible. There is simply not enough data about these animals' populations and ranges to draw reserve boundaries with certainty. Caribou, on the other hand, have for the most part been carefully studied. So our Component 1 reserves have been identified using caribou as the defining wide-ranging animal. A close association exists between wolf and caribou population densities, so it is hoped that using caribou safeguards critical parts of wolf habitat in Labrador as well.

The three major caribou types in the province are Labrador barren-ground caribou, Labrador woodland caribou, and Newfoundland woodland caribou. This means six Component 1 reserves are needed in the province—based on protecting two herds of each type.

The following criteria are also critical for designing effective Component 1 reserves:

- they should be based on herds in areas of least development or disturbance, to better preserve pristine ecosystems
- they should include calving grounds, areas of post-calving aggregation, rutting areas, winter range, as much summer range as possible, and any other areas that are important for the herd
- the habitat of each herd should be contained inside one reserve or one system of connected reserves, not in smaller, unconnected areas that capture rutting, calving, and wintering areas separately—thus the overall area requirement of more than 1,000km^2
- wherever possible, these reserves should include areas important to other species, particularly wide-ranging animals. The potential recovery from near-extinction of some endangered species, such as wolverine or Newfoundland marten, can be enhanced by Component 1 reserve design that takes their habitat needs into account.

COMPONENT 1 RESERVE IN ACTION

Bay du Nord Wilderness Reserve

The Bay du Nord Wilderness Reserve's purpose is to protect enough habitat to maintain the Middle Ridge caribou herd (representing the Newfoundland woodland caribou). It will be able to do so fully when the adjacent Middle Ridge Wildlife Reserve's status changes to Wilderness Reserve, protecting the herd's calving area. At 15,000 strong, the Middle Ridge herd is the largest herd on the island and, unlike many woodland herds elsewhere in Canada, it is healthy and thriving. The combined area of the two reserves is 3,513 km^2.

The Bay du Nord Wilderness Reserve preserves the Bay du Nord River and its tributaries in pristine condition—one of the reasons it has been nominated as a Canadian Heritage River—as well as extensive lakes, ponds, and river systems. As do many Component 1 reserves, it also contributes to ecoregion protection because a representative example of the Maritime Barrens ecoregion (Central Barrens ecodistrict) is within its borders. The reserve protects the habitat of Canada geese, plus many other species of plants and animals, helping to maintain viable long-term populations.

Photos top to bottom: Marsh, Bay du Nord River, canoeist. Above, stag caribou.

ECOREGION PROTECTION

To fulfill its role in the framework, a Component 2 reserve must capture all of an ecoregion's or ecodistrict's enduring and definitive features. In some cases, it must also capture distinctive combinations of features (such as the rich forest on limestone that is characteristic of the Northern Peninsula Forest ecoregion– Beaver Brook Limestone ecodistrict). The size of a Component 2 reserve—from 50 to 1,000 km²—must also be sufficient to ensure the ecological integrity of the area.

The lines marking one ecoregion from the next are never as well-organized on the ground as they can be on a map. The distinctive characteristics of an ecoregion appear most frequently at its core. Near its edges—ecotone areas that can cover hundreds of square kilometres—elements of all adjacent ecoregions can be found. These are areas of high variety and biodiversity, but not generally areas that are representative of one single ecoregion.

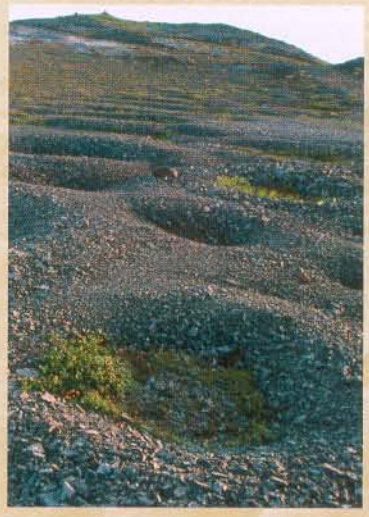
To make Component 2 reserves technically representative of a single ecoregion requires an analysis of each ecoregion's two-dimensional "landscape profile," which contains all the ecoregion's "enduring features"—or common, repeating geological or biological elements. In the Central Newfoundland Forest ecoregion, for example, which is protected in part in the Little Grand Lake reserve system, enduring features include moss forests, dwarf shrub heath, fern forests, basin bogs, and others.

COMPONENT 2 RESERVE IN ACTION

Little Grand Lake Provisional Ecological Reserve

This reserve, located in western Newfoundland, is part of a tri-reserve system designed to protect core habitat of the endangered Newfoundland marten while giving adequate protection to three of the province's ecodistricts: the Western Newfoundland Forest–Corner Brook ecodistrict, the Central Newfoundland Forest–Portage Pond ecodistrict, and the Long Range Barrens–Buchans Plateau/Topsails ecodistrict. The Ecological Reserve covers 731 km² and it takes in the area where the three ecodistricts intersect. Adjoining it are a Public Reserve and a Wildlife Reserve which extend the Little Grand Lake reserve system to 1,417 km² and provide various levels of protection. The thick woods found in the two rugged forest ecodistricts—with their standing dead trees, fallen logs, woody debris, and overhead cover of older forests—make prime marten habitat. The Corner Brook ecodistrict is typified by underlying slate and limestone and nutrient-rich soils. The Portage Pond ecodistrict has more frequent basin bogs than elsewhere in the ecoregion. The reserve also completes the protection of a representative portion of the distinctive, windswept highland Long Range Barrens–Buchans Plateau/Topsails ecodistrict, where the tallest plants are the wind-stunted evergreens known as "tuckamore."

Photo above: Newfoundland marten.



SMALL RESERVES FOR SPECIAL PLACES

The smallest parts of the three-component framework are Component 3 reserves, which protect sites where the following natural elements occur:

- **rare plants or animals**—such as Long's Braya or the province's four rare tree species: white pine, red pine, and black ash on the island, and jack pine in Labrador
- **unusual biological richness**—such as seabird colonies
- **rare natural phenomena**—such as fossils

Component 3 reserves are useful when such features are not, or cannot be, protected in Component 1 or 2 reserves. Their size depends on the nature of the species or phenomenon they protect. The smallest include islands, fossil sites, and small, discrete plant or invertebrate communities.

The number of Component 3 reserves in the province will grow over time, reflecting new discoveries and changing needs, and responding to pressures on species exerted by human activity. Reserves are established in order of the significance, fragility, and endangerment of their special features—and whether or not they are protected elsewhere.

COMPONENT 3 RESERVE IN ACTION – RARE PLANTS

Burnt Cape Ecological Reserve

This reserve is one of the most important botanical sites on the island of Newfoundland. A short growing season, a severe climate, and low temperatures year-round give it some of the most arctic conditions on the island, and its exposed limestone is relatively uncommon. Burnt Cape is home to more than 300 plant species, many of which grow here because of the calcium-rich soil. Its 3.6 km² protects 35 rare species, including the endemic Burnt Cape cinquefoil and Fernald's Braya, and it marks the most southerly occurrence of several plant species. Post-glacial relicts found here include dwarf hawksbeard, moss campion, mountain avens, velvet bells, and alpine milkvetch. The reserve's primary purpose is to protect the rare and rich variety of plants on this part of the northern peninsula. It also protects an excellent example of the limestone barrens ecosystem, and provides unique opportunities for scientific research on rare plants in their natural habitat, and for public education.

COMPONENT 3 RESERVE IN ACTION – BIOLOGICAL RICHNESS

Gannet Islands Ecological Reserve

The Gannet Islands Ecological Reserve takes in a remote group of seven islands located off Sandwich Bay. They support the largest and most diverse seabird breeding colony in Labrador—more than 200,000 birds. Major inhabitants include razorbills (10,000 breeding pairs, the largest colony in eastern North America), Atlantic puffins (38,000 breeding pairs, the second largest colony in eastern North America), common murres (36,000 breeding pairs) and thick-billed murres (1,900 breeding pairs), black-legged kittiwakes, great black-backed gulls, and northern fulmars. Significantly, more than 200 harlequin ducks—a species of special concern in the province—moult here. It is the largest known concentration in eastern North America. (Gannets do not breed on the islands—the islands' name comes from a ship lost in the area in 1867.) The reserve area has the characteristics of the Coastal Barrens ecoregion, but at 2 km² is too small to be considered a Component 2 reserve.

COMPONENT 3 RESERVE IN ACTION – RARE NATURAL PHENOMENON

Mistaken Point Ecological Reserve

Mistaken Point Ecological Reserve is a fossil site of national and global significance. The late Precambrian (Neoproterozoic) volcanic and sedimentary rock exposed here include many levels with impressions of marine organisms that lived more than 565 million years ago, during the Ediacaran Period. There is an unusually large assortment of animals, and they are the only deep-water marine fossils of this age found anywhere in the world. They are also the oldest multi-cellular fossils on Earth. Unlike most fossil sites, this one contains soft-bodied creatures killed when fine volcanic ash settled on their aquatic habitat. The site, about five kilometres long and located at the southeastern corner of Newfoundland, has been protected for the use of scientists and educators since 1987. Originally a 3 km² site, it was extended by 2.7 km² early in 2003 to protect newly discovered fossils.

Photos top to bottom: Frost polygons and *Calypso bulbosa* at Burnt Cape, razorbill at Gannet Islands, fossil at Mistaken Point.

DESIGNING RESERVES THAT WORK

To attain habitat and wildlife conservation goals, the three-component reserve system must include reserves designed using the scientific criteria listed here. Some of these criteria apply to all three component types, some to only one or two.

1) Bigger is better.

Large reserves work better for many reasons. They protect complete ecological units, allowing natural functions to occur undisturbed. They avoid the problems of habitat fragmentation. They more easily resist catastrophes—by sheer size and because distinctive ecosystems are repeated inside their borders (duplication provides fail-safe insurance). They contain larger populations of species—making them less susceptible to extinction and better protecting recolonization sources. And they serve as more reliable benchmarks against which to measure environmental changes occurring elsewhere.

2) A circular shape is best.

The most protected area in any reserve is its centre, the area farthest from outside disturbances. Roughly circular reserves isolate their protected core area more effectively than elongated reserves. (The greater the radius of a circular reserve, the better the core protection.) The vulnerable outer edge of circular reserves—the area most affected by outside events—is also relatively much smaller compared to its overall area than it is in elongated or multi-pronged reserves.

3) Reserves should include areas with the richest biological diversity.

"Ecotone" areas contain elements of all bordering systems, and so have the highest degree of biodiversity. Large reserves should try to include such areas. Smaller reserves can protect specific biological hot spots—seabird colonies, river deltas, and salt marshes for example.

4) Adequate ecoregion protection requires more than one reserve.

This is the universally understood principle of not putting all the eggs in one basket. Duplicating ecoregion protection reduces the ecological cost if a reserve is lost, damaged, or fails to sustain itself. Duplication can also preserve diverse genetic stocks and increase the potential for naturally occurring animal or plant (via seeds and pollen) movement between areas.

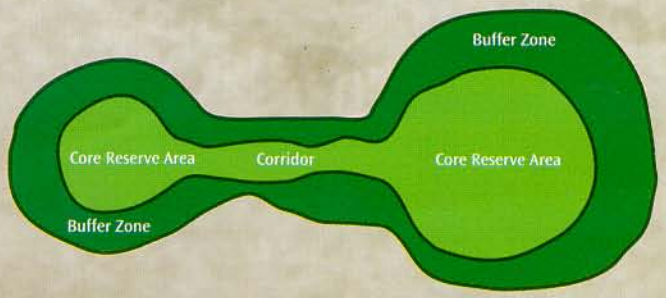
5) Reserve area and design should be based on ecological criteria.

Reserves must include enough critical habitat to sustain viable populations of plants and animals. Reserve boundaries can often reflect input from public consultations and discussion, but they must first respect the needs of the ecological systems they need to protect. And because nature cannot respond to humanity's concept of borders, some reserves may need to be joined by corridors or connecting areas of protected land or water, to facilitate wildlife movement.

6) No reserve is an island.

Even with the best planning, protected areas never function in isolation. Nearby land- water- and resource-use always have an influence. Reserve success may depend on the continued, integrated management of some resource-use and developmental activities. Some reserves may require buffer zones around their borders, in which the range of human activity is limited to those that do not damage the ecological integrity of the reserve. And networks of linked reserves may sometimes be needed to provide dynamic natural systems with adequate protection.

BUFFER ZONES AND CONNECTED RESERVES



In buffer zones, some compatible human activity can occur. Core areas provide more protection. Corridors provide safe places for wildlife to migrate.

Benefits of natural areas:

- biodiversity protection
- providing benchmarks for scientifically measuring the health of all our natural systems
- ecotourism opportunities
- providing places for educational and esthetic experiences for residents and tourists
- "insurance policies" against species loss through ecological disasters elsewhere

Photos: Interpretation and scientific research at Burnt Cape.

THE FRAMEWORK AND THE BIGGER PICTURE

The three-component framework for a Natural Areas System Plan allows us to feel confident that we have given the province's various ecological systems a good foundation for survival. But as with all such tools, it cannot do everything. It is one of several approaches to conservation and biodiversity protection that are being used today in the province, the country, and around the world.

WHY IS WILDERNESS PROTECTION NECESSARY?

Scientific study—even casual observation—can easily demonstrate that Newfoundland and Labrador's wilderness is not as vast as many of us still want to believe. In fact, because of the cumulative effect of a variety of human activities at home and far away, only small areas of pristine wilderness are left on the island portion of the province.

Environmental and climate alterations—local and global—affect our ecosystems, and the status of our plant and animal species reflects this. We have already lost a number of unique provincial species such as the great auk, Labrador duck, Newfoundland wolf, and the sea mink. The continued existence of 19 species is now considered to be at risk, and the pressures on natural habitats mount daily.

Does this mean continued resource development is bad? Of course not. Our economic future will no doubt always rely on and benefit from using our natural resources. But our natural environment—and all the species and processes it supports—needs protection to be able to sustain us, now and into the future. This protection should be considered one of the most important land uses of all, and establishing and maintaining a sound network of protected areas must be the foundation for future sustainable and responsible development in the province.

"The key to intelligent tinkering is to keep all the parts"

Aldo Leopold

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Cover photos, Top: Bay du Nord, clockwise from top left: Atlantic puffins, woodland caribou, autumn flora, fossils at Mistaken Point.

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