A little NATURAL HISTORY OF NORTHERN GEORGIAN BAY
by
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Georgian Bay
Georgian Bay has been described as the sixth Great Lake but, in fact, it comprises the eastern portion of Lake Huron. Manitoulin Island to the north and the Bruce Peninsular to the south effectively isolate Georgian Bay from the remainder of Lake Huron. Between Manitoulin Island and the north shore of Lake Huron lies the North Channel which is connected narrowly with Georgian Bay both at the town of Little Current, and on the north side of Great Cloche Island near Dreamer's Rock, at Swift Current which was the passage originally used by the Voyageurs as they traded furs by canoe. To the south, Manitoulin Island is separated from the northern tip of the Bruce Peninsular by Main Channel. This is the only other connection between Georgian Bay and the main portion of Lake Huron.

Northern Georgian Bay may be defined as that portion of the bay that lies between Parry Sound and Killarney. Its coastline, if one ignores the numerous channels, islands and embayments, stretches for approximately 150 km and because of its coastal characteristics it provides excellent cruising water for kayakers.

Geology
Georgian Bay owes its characteristics to both an old and fascinating geological history, considerable sculpting of the the rock surface by very recent glacial events, and the deposition of glacial debris in the form of till and outwash.

Collins Inlet at the northern end of Georgian Bay separates Philip Edward Island from the mainland. A major fault system, the Grenville Front passes through the western end of the inlet, at the mouth of Chikanishing Creek. This geological structure is of both considerable importance and of considerable interest. It is of importance because it separates the Superior Province and Southern Province of the Precambrian Shield from the Grenville Province to the south of the fault. It is of interest because the faulting, or fracture zone, can be traced northeastward all the way to the southern tip of Greenland and was caused by the collision of the western side of South America ( in the area of what is now Peru) with southern Labrador some two billion years ago when the continental plates as we know them today were arranged in the form of a 'supercontinent' called Gondwana.

The resultant movement of one side of the fault against the other caused supplemental faulting and a high degree of metamorphism; alteration of the rock owing to both heat, 650-750°C, and pressure,
6000-9000 times atmospheric pressure. Moreover, because the earth's crust was cracked, molten material was extruded towards the surface in the form of the Killarney Batholith. An example of the gneissic granite rock of this batholith is visible at the mouth of Chikanishing Creek.

To the south of the Grenville Front is the Grenville Province that is composed of both rocks of molten origin (igneous rocks) and of rocks made up of fine material deposited by and in water (sedimentary rocks). These rocks have undergone both metamorphism and folding; again, as continental plates rammed into one another. The result of this folding resulted in a Syncline (Fig. 1) composed of alternating layers of the materials of igneous (orthogneiss, pink and red in colour) and sedimentary (paragneiss, alternating pink and grey layers) origin. A syncline can be imagined as being like the bow of a canvas-covered canoe in which the layers of rock are shaped just like the planking but in which the entire bow is filled up with planks of different hardness. With time, the softer rocks (paragneiss) erode away more quickly than the harder rock (orthogneiss) leaving a landscape that resembles a corrugated iron roof. The final touches to this landscape were provided by the impact of glaciation (see below). The effects of this differential hardness between the two types of gneiss is evident along the south side of Philip Edward Island because stream channels and the deeper bays are in areas of paragneiss where the weathering, erosion and glacial scouring of the softer rock has been more pronounced (Fig. 2).

Figure 1. Schematic diagram of Anticlines, Synclines and Faults. (Taken from Robertson and Card, 1972).
The effect of this pattern of banding is evidenced almost continuously as one's route down Georgian Bay changes from a generally eastern to a generally southern direction. All the way down this coast the islands trend parallel to the main coast line. These islands are all formed from the more resistant orthogneiss and the deep channels in between correspond to the more easily eroded paragneiss (Fig. 3). Frequently this pattern is interrupted by bands of very dark, igneous rock (diabase) that have been intruded into the existing, older, metamorphic rocks. Such layers are called dikes.
The Michigan Basin formed as a result of sinking of the earth's crust over a 20 million year period, which is very rapid movement in geological terms. The reason is unclear. The result, however, was to cause the various layers to take on the shape of shallow, nested bowls such that the oldest (Ordovician) rocks are presently exposed at the surface in a band that begins around Kingston, passes through Midland, parallels the Georgian Bay coastline, and is found again on Grand La Cloche Island just north of Little Current. These rocks form the Limestone Islands. The next band, which is also Ordovician but younger, covers the area roughly delimited by Oshawa, Toronto, Hamilton, and north to Newmarket. It then continues as a narrow band through Collingwood and northern Manitoulin. The next layer is of Silurian age and forms the famous Niagara Escarpment that runs from Niagara Falls up through the Bruce Peninsular and the south side of Manitoulin Island.

Although the metamorphic rocks of the mainland was also covered by layers of sedimentary rock, the layers were much thinner and these have all been eroded away. Because the older rock was relatively flat, however, the erosion of the limestone has left an almost perfectly straight shoreline that runs from Midland to Byng Inlet.

**Glacial History**
The present landscape reflects not only the erosional processes over geological time but the very recent affects of glacial activity. The northern hemisphere Pleistocene glaciation that began a mere 3 to 4 million years ago resulted in the Precambrian Shield, and the Grenville Province being overrun, at least three times, by an ice sheet that exceeded a kilometre in thickness. These ice sheets had their origin in the region that is presently occupied by Hudson Bay and Labrador. Not only did the movement of each ice sheet cause tremendous erosion but also left debris in the form of basal till and moraines. As the ice melted, glacial rivers carried material in the form of outwash that may be found as sand and gravel deposits, and in large, rounded cobbles. Sand beaches are rare in northern Georgian Bay but the evidence of cobbles are frequently seen beneath you in the water as you paddle along. Some of these rocks are a metre or more in diameter and give one pause for thought as to the enormous volume of glacial meltwater that was necessary to carry and tumble them along. On the smooth, glacially-scoured rocks one will frequently find evidence of "chatter marks". These manifest themselves as a row of shallow, crescent-shaped depressions that resulted from a piece of 4

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rock, imbedded in the base of the ice, catching on the bedrock beneath it and because of the immense pressure, chipping out the surface. This is often repeated several times until the piece of rock breaks up and is no longer effective.

A one-and-half to two kilometre-thick sheet of ice imposes an incredible pressure on the earth's crust. The crust 'floats' on the molten material of which most of the earth is composed, rather like a pie crust on its filling. The weight of the ice sheet depressed the earth's crust by as much as 200 m over a very large area. When melting of the last ice advance took place, between 13,000 and 8,000 years ago in our region, and the front of the ice sheet retreated northward, two things happened. First, the front of the ice sheet itself acted as a dam for the vast volumes of water flowing southward off the ice sheet as the ice melted. The result was the formation of Glacial Lake Agassiz which encompassed all of the present Great Lakes and extended westward to include Lakes Winnipeg and Winnipegosis. Second, as the earth's crust was relieved of its weight it began very slowly to rebound. The process of isostatic rebound, as the process is called, is not gradual but occurs in a series of 'jumps' as stress builds up and is suddenly relieved. The result is that the lake that was impounded to the south of the ice progressively became shallower as the earth rebounded. At the same time, with each 'jump' the shoreline was eroded by wave action and beaches were established. On a clear day when Manitoulin Island is visible one can see some of these prominent beach lines looking like giant steps.

Another effect of the rebound was to force the impounded water to drain east rather than south as is now the case (Figure 4). That drainage corresponded to what is now the basins of the Whanapitae, the French, the Pickerel, the Still, the Magnetawan, the Key and the Naiscoot Rivers. All these rivers now flow westward into Georgian Bay but some 4000-6000 years ago these rivers and the land between them were flooded and the drainage was eastward into what is now the Ottawa River. The gorge of the French River was carved during this time.

Figure 4. a) Entire Great Lakes Basin covered by the ice sheet. g) Retreat of the ice front led to damming of the melt water to form lakes that were both larger and deeper than presently. h) With recession of the ice the principal drainage was eastward from Georgian Bay. As glacial rebound continued with recession of the ice, the uplift caused the eastward flow from Lake Huron to be cut off and for all flow to be directed into Lake Erie.

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From the point of view of those travelling the water trail through Georgian Bay the legacy of the Pleistocene Ice Age is the ice-scoured topography of smooth rocks and islands that gives the area its beauty and character, and the thin layer of glacial till and outwash that has given rise to soil for plant growth. One is reminded of how shallow the soil is each time that one attempts to dig a latrine (Fig 5).

Figure 5. A) Landscape freshly covered with ice. B) Scouring leads to erosion of the more prominent features and entrainment of glacial debris. C) Final ice-free landscape. Prominent features have been ground down and glacial debris lodges in the depressions.

Weather and Climate
The majority of Georgian Bay has a July average water temperature of between 16 and 18° C. Although precipitation in summer for Lake Huron occurs with a frequency of 5% during daylight hours one can expect a somewhat higher frequency close to shore owing to topographically-induced rain events. As elsewhere in the Great Lakes, thunderstorms are always a possibility and should be respected not only because of the waves generated by high winds but also because of the danger from lightning. The southeasterly trend of the Georgian Bay coastline often causes winds to be funnelled from a northwesterly direction. In areas with a long fetch from the west such as Little Current to Collins Inlet, Point Gereaux to Bustard Island, and Byng Inlet to Hangdog Point, heavy seas can build up.

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Although the nature of the northern Georgian Bay coastline, with its hundreds of islands and thousands of rocks, offers protection to the kayaker, there are a number of other factors that should be borne in mind and for which the paddler should be prepared. They are as follows:

- Prevailing winds are predominantly onshore
- Winds may be funneled between islands giving rise to strong, gusty winds
- Shoaling of the lake bottom begins from 2 to 8 km offshore which can result in steep waves
- During periods of high winds narrow channels between islands and within island groups can generate wind set-ups and seiches of 1 metre or more
- Advection fog can occur with little or no warning.

In spite of this ominous list of potential hazards northern Georgian Bay is still one of the safest areas in which to paddle. Nevertheless, a measure of safety is added when one is forewarned and hence forearmed to the sorts of conditions that may develop during periods of bad weather.

"....and I tell these kids a hundred times, don't take the lakes for granted...."

Stan Rogers - from the song "White Squall"

Vegetation
Northern Georgian Bay is in a climatic zone that is influenced both by latitude and by the effects of a large body of water; namely, Lake Huron. Not only does the lake act to moderate temperature extremes but also the vegetation on islands and on the adjacent mainland is subjected to the full force of the prevailing winds. As a result there is a general northward extension of plant species but at the same time one finds numerous examples of the effects of exposure.

Because the soils are shallow, plant distribution is affected both by a lack of moisture and a limited nutrient supply. The result is that there are often very marked changes in plant species composition within a very short horizontal distance. The tendency is for soil conditions to be either dry or saturated at the shoreline and where water is impounded in shallow basins. The richest growth occurs in small valleys where soil has accumulated and soil moisture loss is reduced because of the shading provided by the walls of the valley.

In very general terms one can categorize the vegetation into a number of habitat types whose characteristics are dictated by the overall environmental conditions.

A. Upland forest
Dominated by trees, shrubs and herbs that can withstand drought. Typical species are: red oak, jack pine, red pine, red maple and blueberry.
B. Lowland forest
Dominated by trees shrubs and herbs that require more moist conditions. Typical species are: white pine, red maple, sugar maple, white birch, yellow birch, mountain ash, mountain maple, blueberry, huckleberry, bluebead lily (yellow clintonia), Canada mayflower, starflower and bunchberry.

C. Evergreen scrub
This vegetation type tends to occur in shallow areas with impeded drainage. The typical species is common juniper.

D. Rock crevices
Rock crevices are occupied by plants that are both agressive and opportunistic. Typical species vary from place to place but are likely to include: blueberry, juniper, goldenrod, meadowsweet, red chokeberry, winter holly and the dry-site sedges and rushes.

E. Rock basin
These basins, which can vary from a metre to several metres in diameter, are typified by internal drainage and rainwater as their only source of moisture. Typically these are bogs and hence are dominated by peat mosses and heaths such as leatherleaf, sheep laurel, velvet leaved blueberry and low sweet blueberry. Other bog species such as sundew and cranberry are often also found associated with the peat. Somewhat drier depressions will be dominated by star moss rather than peat moss.

F. Shoreline flats
These areas are defined by the lake shoreline and may receive water directly from the lake or by wave splash. Typical species are: leatherleaf, meadowsweet, blue toadflax, boneset, and rushes and sedges, and emergent species such as arrowhead, pickerelweed and spike rush.

G. Glacially-scoured rock
Here there is little or no soil, and it is here that lichens predominate. Away from the erosive effects of pounding by waves one finds the caribou lichens, often in extensive mats. Nearer the water the rocks are dominated by crustose lichens that adhere to the rocks like splashes of paint. The most conspicuous of these is the orange lichen Xanthoria and the pale green Lecanora. Also found here are foliose species such as the brownish-black rock tripe and the large, round patches of the green Parmelia.

H. Shallow water emergents
All the species in this habitat grow in protected areas such as bays and inlets where the water is sufficiently shallow to permit rooting in the bottom sediments. Typical species include: water lilies,

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pondweeds, arrowhead, and pickerel weed.

**Fauna**
The species, density and distribution in the region are typical of central and eastern Ontario with two major differences; the presence of wapiti (elk) that have been introduced in the general area of the French River, and the use of the profusion of off-shore islands as a pathway for many migratory bird species. The larger animals such as timber wolves, brush wolves (coyotes) moose, deer and black bear are all present. Both black bears and racoons cross from the mainland to islands readily so that the same care to protect food and garbage needs to be exercised as elsewhere. The weasel family is well represented in that otter, mink, ermine and possibly fisher are present. Otter scat can frequently be found near the water and often contain large quantities of crayfish remains. Mink may be seen frequently, either alone or as families, swimming from island to island or bounding across open rock surfaces. Other aquatic animals are the beaver and muskrat.

The solitude offered by the islands has given rise to their use as colonial nesting sites. For instance, at least two heronries of great blue herons are known to be active. Birds of prey that one is likely to see are bald eagles and merlins. Several species of warblers, finches and sparrows nest on the islands and adjacent mainland. On almost every island one can count on hearing the common yellow throat, white throated sparrow and the yellow rumped warbler.

**Bibliography**

*(The author admits openly to having plundered shamelessly from most of the material listed below.)*


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List of commonly-found plants for Northern Georgian Bay, Ontario

**Trees**
- Pinaceae (Pine Family)
  - White pine
  - Red pine
  - Jack pine
  - Tamarack
  - White spruce
  - Black spruce
  - Balsam fir
  - Eastern white cedar
  - Salicaceae (Willow Family)
  - Trembling aspen
  - Betulaceae (Birch Family)
  - White birch
  - Speckled alder
  - Fagaceae (Beech Family)
  - Red oak
  - Ulmaceae (Elm Family)
  - American elm
  - Rosaceae (Rose Family)
  - Black cherry
  - Mountain ash
  - Aceraceae (Maple Family)
  - Red maple
  - Sugar maple

**Shrubs**
- Cupressaceae (Cedar Family)
  - Common juniper

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Solomon's seal  
*Polygonatum pubescens*

Iridaceae (Iris Family)  

Blue flag  
*Iris versicolor*

Orchidaceae (Orchid Family)  

Small purple fringed orchis  
*Platanthera psycodes*

Ranunculaceae (Buttercup Family)  

Marsh marigold  
*Caltha palustris*

Thalictrum dasycarpum

Meadow rue  
*Corydalis sempervirens*

Fumariaceae (Fumewort Family)  

Pale corydalis  
*Tridentalis borealis*

Primulaceae  

Starflower  

Droseraceae (Sundew Family)  

Drosera oblongifolia  
*Drosera rotundifolia*

Spatulate-leaved sundew  

Round-leaved sundew  

Polygonaceae (Buckwheat Family)  

Virginia knotweed  
*Tovara virginiana*

Sheep sorrel  
*Rumex acetocella*

Santalaceae (Sandalwood Family)  

Geocaulon lividum

Saxifragaceae (Saxifrage Family)  

Saxifraga virginiensis

Early saxifrage  

Grassulaceae (Stonecrop Family)  

Sedum acre

Stonecrop  

Leguminosae (Pea Family)  

Vicia americana

Purple vetch  

Hypericaceae (St. John's wort Family)  

Hypericum perforatum  
*Hypericum kalmianum*

Hypericum virginicum (var fraseri)  

Common St. Johnswort  

Marsh St Johnswort  

Rosaceae (Rose Family)  

Three toothed cinqefoil  
*Potentilla tridentata*

Rough cinquefoil  
*Potentilla norvegica*

Marsh cinquefoil  
*Potentilla palustris*

Balsaminaceae (Touch-me-not Family)  

Impatiens capensis

Touch-me-not  

Violaceae (Violet Family)  

Viola lanceolata

Lance-leaved violet  

Onagraceae (Evening primrose Family)  

Oenothera biennis

Evening primrose  

Araliaceae (Ginseng Family)  

Aralia hispida

Bristly sarsaparilla  

Cornaceae (Dogwood Family)  

Cornus canadensis

Bunchberry  

Balsaminaceae (Carrot Family)  

Achillea millefolium

Yarrow  

Pyrolaceae (Shinleaf Family)
Indian pipe
Primulaceae (Primrose Family)
Monotropa uniflora

Swamp candles
Asclepiadaceae (Milkweed Family)
Lysimachia terrestris

Swamp milkweed
Convolvulaceae (Morning glory Family)
Asclepias incarnata

Ivy-leaved morning glory
Verbenaceae (Vervain Family)
Ipomoea hederacea

Vervain
Campanulaceae (Bluebell Family)
Verbena hastata

Common bellflower, Harebell
Campanula rotundifolia

Cardinal flower
Lobelia cardinalis

Brook lobelia
Lobelia kalmii

Deadly nightshade
Scrophulariaceae (Figwort Family)
Solanum dulcamara

Cow wheat
Melampyrum lineare

Cut leaved water horehound
Lycopus americanus

Purple gerardia
Gerardia purpurea

Small-flowered Gerardia
Gerardia paupercula

Blue toadflax
Linaria canadensis

**Herbs (cont.)**
Compositae (Daisy Family)

Slender white aster
Aster junciformis

Canada goldenrod
Solidago canadensis

Lance-leaved goldenrod
Solidago graminifolia

Plantain-leaved pussytoes
Antennaria plantaginifolia

Boneset
Eupatorium perfoliatum

**Emergent aquatics**
Alismataceae (Water plantain Family)

Arrowhead
Sagittaria latifolia

Araceae (Arum Family)

Water arum
Calla palustris

Pondetariaceae (Pickerelweed Family)
Pondetaria cordata

Pickerelweed
Sparganiaceae (Burreed Family)

Sparganium fluctans

Floating-leafed burreed
Cabombaceae (Watershield Family)

Brasenia schreberi

Water shield
Nymphaeaceae (Water lily Family)

Nuphar variegatum

Bullhead (or yellow) water lily
Nymphaea odorata

Fragrant water lily
Nuphar microphyllum

Small pond lily
Sixty

Typhaceae (Cattail Family)

Common cattail
Typha latifolia
Cyperaceae (Sedge Family)
Inland sedge Carex interior
Elliptic spikerush Eliocharis tenuis

Aquatics
Halagoraceae (Water milfoil Family)
Alternate-leaved milfoil Myriophyllum alternifolium

Hydrocharitaceae (Frogbit Family)
Canada pondweed Elodea canadensis
Pondweed Potomogeton crispus

Lemnaceae (Duckweed Family)
Duckweed Lemna minor

Grasses
Bluejoint Calamagrostis canadensis
Redtop Agrostis gigantea
Wooly panic grass Panicum lanuginosum

Ferns
Polypody Polypodium virginianum
Sensitive fern Onochlea sensibilis
Spinulose wood fern Dryopteris spinulosa
Virginia chainfern Woodwardia virginiana

Mosses and Liverworts
Haircap moss (Star moss) Polytrichum commune
Peat moss Sphagnum sp
Broom moss Dicranum sp
Red-stemmed feather moss Pleurozium schreberi
Cushion moss Leucobryum glaucum
Liverwort Bazzania, Locophoria?

Lichens
Caribou lichen Cladina rangiferina
Cladina mitis
Cladina uncialis
Star lichen Cladonia stellaris
Xanthoria parietina
Caloplaca sp
Candelariella sp
Parmelia cumberlandii agg.
Map lichen Rhizocarpon geographicum
Lecanora sp
Lecidia sp

Mammals or mammal signs observed
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**Provisional list of birds known or believed to nest in the area**

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</tr>
<tr>
<td>Great blue heron</td>
<td>Ardea herodias</td>
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<tr>
<td>American bittern</td>
<td>Botaurus lentiginosus</td>
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<tr>
<td>Canada goose</td>
<td>Branta canadensis</td>
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<tr>
<td>Mallard</td>
<td>Anas platyrhynchos platyrhynchos</td>
</tr>
<tr>
<td>Black duck</td>
<td>Anas rubripes</td>
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<tr>
<td>Common merganser</td>
<td>Mergus merganser americanus</td>
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<tr>
<td>Red breasted merganser</td>
<td>Mergus serrator</td>
</tr>
<tr>
<td>Turkey vulture</td>
<td>Cathartes aura</td>
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<tr>
<td>Bald eagle</td>
<td>Haliaeetus leucocephalus</td>
</tr>
<tr>
<td>Merlin</td>
<td>Falco columbarius columbarius</td>
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<tr>
<td>Ruffed grouse</td>
<td>Bonasa umbellus</td>
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<tr>
<td>Spotted sandpiper</td>
<td>Actitis macularia</td>
</tr>
<tr>
<td>Ringbill gull</td>
<td>Larus delawarensis</td>
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<tr>
<td>(Birds cont.)</td>
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<tr>
<td>Herring gull</td>
<td>Larus argentatus</td>
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<tr>
<td>Common tern</td>
<td>Sterna hirundo hirundo</td>
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<tr>
<td>Caspian tern</td>
<td>Hydroporgne caspia</td>
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<td>Whip-poor-will</td>
<td>Caprimulgus vociferus</td>
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<td>Pileated woodpecker</td>
<td>Dryocopus pileatus</td>
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<td>Wood Pewee</td>
<td>Contopus virens</td>
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<td>Crow</td>
<td>Corvus brachyrhynchos</td>
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<tr>
<td>Raven</td>
<td>Corvus corax</td>
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<td>Black-capped chickadee</td>
<td>Parus atricapillus</td>
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<td>Winter wren</td>
<td>Troglodytes troglodytes</td>
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<tr>
<td>Robin</td>
<td>Turdus migratorius</td>
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<tr>
<td>Veery</td>
<td>Catharus fusciscens</td>
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<tr>
<td>Redwing blackbird</td>
<td>Agelaius phoeniceus</td>
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<td>Boattail grackle</td>
<td>Cassidix mexicanus</td>
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<td>Cedar waxwing</td>
<td>Bombycilla cedrorum</td>
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<td>Red eyed vireo</td>
<td>Vireo olivaceous</td>
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<tr>
<td>Yellow warbler</td>
<td>Dendroica petechia</td>
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<tr>
<td>Chestnut-sided warbler</td>
<td>Dendroica pensylvanica</td>
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<tr>
<td>Common yellow throat</td>
<td>Geothlypis trichas</td>
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<tr>
<td>American redstart</td>
<td>Setophaga ruticilla</td>
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<tr>
<td>Yellow rumped warbler</td>
<td>Dendroica coronata coronata</td>
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<table>
<thead>
<tr>
<th>Bird Species</th>
<th>Scientific Name</th>
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<tr>
<td>Pine warbler</td>
<td><em>Dedroica pinus</em></td>
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<tr>
<td>Prothonotary warbler?</td>
<td><em>Prothonotaria citrea</em></td>
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<tr>
<td>Song sparrow</td>
<td><em>Melospiza melodia</em></td>
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<tr>
<td>White throated sparrow</td>
<td><em>Zonotrichia albicollis</em></td>
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<tr>
<td>Chipping sparrow</td>
<td><em>Spizella passerina passerina</em></td>
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</tbody>
</table>

**Provisional list of adult butterflies**

- Monarch
- Red Admiral
- Skipper
- Hanson's hairstreak
- Common Little Blue
- Cabbage
- Wood nymph
- Copper
- Tiger swallow-tail

### Glossary of terms

- **Advection fog** - the production of fog when warm, moisture-laden air passes over water that is cold enough to cause condensation.
- **Basal till** - unconsolidated fragments of rock, sand and silt held within the ice of a glacier and deposited on the landscape during melting of the ice.
- **Basalt** - a volcanic rock of dark colour made up mainly of the minerals pyroxene or amphibole, and feldspar.
- **Batholith** - a mass of igneous rock such as granite which solidified deep within the earth, and which occupies an area greater than 100 km².
- **Channelling** - the tendency of the wind to follow the axis of a channel or be steered by sloping land, resulting in a change in direction.
- **Diabase** - a dark, mafic (containing magnesium and iron) intrusive igneous rock, basaltic in nature, and usually characterized by blade-shaped feldspar crystals.
- **Dike** - a tabular mass of intrusive igneous rock cutting across older rock.
- **Fault** - A fracture or zone of fractures along which the wall rocks have been displaced.

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Feldspar - common rock-forming minerals such as orthoclase, microcline, and plagioclase, made up of calcium, sodium, potassium, aluminum, and silica
Fetch - the distance which winds blow over water from a given direction
Granite - igneous rock made up mainly of one or more feldspars, and quartz, with lesser amounts of either mica, or hornblende, or both. It is usually found in batholiths, and is a felsic (iron + silica) rock with a high silica content
Gneiss - a metamorphic rock containing bands rich in granular minerals alternating with bands rich in platy, or micaceous minerals
Igneous rock - rock formed by the crystallization of magma (molten rock from beneath the Earth's crust)
Limestone - a sedimentary rock made up largely of the carbonate mineral calcite and derived from the exoskeletons of marine organisms
Metamorphism - the adjustment in the mineralogy and texture of a rock in response to heat and pressure imposed on the rock when it is buried at depth in the Earth's crust
Moraine - deposit of unsorted glacial debris at the sides or terminus of a glacier
Outwash - transported glacial debris that has undergone rounding and sorting by the action of glacial meltwater
Paleozoic - The Era of geologic time which extended from 570 to 225 million years ago
Plate - a portion of the Earth's mantle that is floating on molten magma. Each continent is made up of one or more plates.
Pleistocene - The Epoch of geologic time between 3-4 million and 10,000 years ago during which the last ice age occurred.
Seiche - the oscillation of water in a lake that follows a wind set-up
Syncline - a fold in which the fold limbs slope towards each other to form a trough-like structure
Wind set-up - the process whereby strong winds blowing down the length of a lake cause water to 'pile up' at the downwind end, raising water levels there and lowering them at the upwind end of the lake