



Natural Heritage Hikes

Deboullie Public Reserve Lands

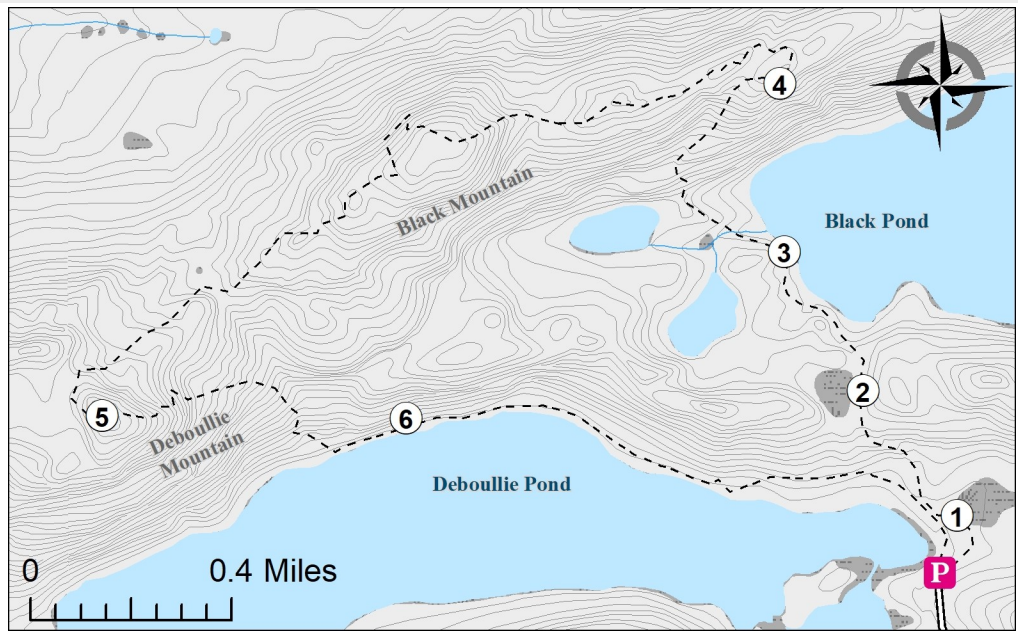
Black Mountain Loop Trail - 5.5 miles round trip, strenuous

The Deboullie Public Reserve Lands are ecologically significant, containing high quality examples of forest and wetland natural communities typical of Northern Maine, as well as rare habitats and species. These lands are also an important bulwark against some of the harmful impacts of climate change in northern Maine, they contain: climate 'refugia' for boreal/arctic species that require cold-climate conditions; a variety of topography and landform, providing a diversity of habitats; mature forest that contributes to carbon sequestration; and these lands are part of a connected landscape for species movement and migration. In this heritage hike, we will highlight the importance of the Deboullie Public Reserve Lands for climate mitigation and adaptation.

Getting There

Access is via gravel logging roads.

Please visit the Maine Bureau of Parks and Lands website for [more information](#).



① **Northern Hardwoods Forest** - 68.83706, 46.96563

Mature forest has important ecological benefits, including wildlife habitat and carbon sequestration.

At the trailhead, we enter an area of [Northern Hardwoods Forest](#), dominated by sugar maple, yellow birch, and American beech. Northern Hardwoods Forest is one of northern Maine's two most common upland forest types (the other type is spruce-fir forest). This area is part of the Deboullie Ecological Reserve, where the forest is managed for ecological and recreational values, not timber. This Northern Hardwoods Forest is mature, but not old growth, with most trees between 75-125 years old. Forest components that are important for wildlife habitat including cavity trees and large coarse woody debris (fallen logs) are abundant in this forest stand.

In addition to providing habitat, old forests are valuable for their role in mitigating the harmful effects of climate change. Old forests trap significant

Large dead trees provide wildlife habitat, and also contribute to carbon sequestration. Some of the carbon in this snag will be stored in the soil by fungi and other wood rotting organisms.



Sap from a red spruce tree.

Naturalist's Notes



Maine's indigenous people made use of spruce pitch for its medicinal qualities, as adhesive, ointments, and chewing gum. In the 1800s, spruce pitch was commercialized and it was still sold at retailers including L.L. Bean late into the 20th century. Spruce gum is made from dried spruce sap and was the original chewing gum.

amounts of carbon, reducing atmospheric carbon dioxide—the primary greenhouse gas contributing to human-caused climate change. Trees accumulate carbon over the course of their lifespan, and larger trees sequester more carbon annually than smaller trees. Mature forests also accumulate significant quantities of carbon in their soils from rotting leaves, roots, debris and soil organisms. Recent studies indicate that northern forests sequester twice as much carbon in soils as aboveground. Old forests are now recognized as carbon sinks, accumulating more carbon than they lose through decay and respiration¹. Carbon sequestration is one of many solutions that are required to mitigate some of the harmful impacts of climate change.

② Spruce– fir forest - 68.84102, 46.96923

A common forest with an important climate history.

[Spruce-fir forest](#) occurs in areas of the Deboullie Lands with poor soils and cooler microclimates, including moist valleys and rocky ridges. This stand is approximately 50-70 years old. The Deboullie Ecological reserve was last harvested for timber in the mid-late 1970s, but the age trees in this stand is a result of spruce budworm damage — a native insect pest with episodic outbreaks that affect spruce and fir.

The history of spruce and fir in Maine after the retreat of the Laurentide Ice Sheet (which covered Maine under a mile of ice until ~12,000-13,000 years ago) is also a story of climate change. Since the retreat of the continental ice sheet, there have been many changes to Maine's climate. Spruce and fir were some of the first tree species to migrate into Maine after the ice sheet melted, but during a period of roughly 11,000 to 8,000 years ago, sudden warming favored warm-weather species such as oaks and pines. These species replaced spruce and fir, which became rare to absent from much of the state, and only were found at high elevations, in coastal settings, or other 'refugia' where cool, moist climates persisted. Roughly 1,000 years ago, the climate began to cool and spruce and fir expanded their ranges to their present extent². The Deboullie Public Reserve Lands may become a refugia for spruce and fir in our current period of human-caused climate change.

③ Black Pond - 68.84430, 46.97325

An important fishery and the concept of climate 'refugia'.

The ponds at Deboullie have some of the best cold water fish habitat in Maine. While brook trout are the anglers' primary quarry, Black Pond also contains a subspecies of Arctic charr. Arctic charr (also known as blueback trout or blueback charr) is a cold water fish in the salmon family, closely related to brook trout and lake trout. It is found throughout the northern polar regions of the world. Both anadromous (sea-run) and freshwater resident ("land locked") populations of this fish occur in North America. Arctic charr populations in Maine are found in deep, cold, well-oxygenated lakes. These



Clean, cold water in the ponds at Deboullie supports one of the best brook trout fisheries in Maine.

Photo: Richard Joyce.

¹Anderson, M.G. 2019. Wild Carbon: A synthesis of recent findings. Northeast Wilderness Trust. Montpelier, VT USA.

²Barton, D., A.S. White, and C. Cogbill. 2012. The Changing Nature of the Maine Woods. University Press of New England, Lebanon NH.



The Black Pond overlook.

populations are genetically distinct from Arctic charr found in other parts of North America. In Maine, the Arctic charr is a relatively small, slow-growing fish that eats mostly plankton and rarely reaches 16 inches in length. Major threats to this species include competition and predation from introduced and stocked species and habitat degradation from the cumulative impacts of activities such as silviculture, road building, and shoreline development. Land-locked Arctic charr are found in 14 lakes and ponds in Maine, including four on the Deboullie Reserve; Black, Gardner, Pushineer, and Deboullie Ponds.

Climate refugia are areas that are buffered from climate change, enabling the persistence of ecological resources. The deep, cold water of Black Pond provides refuge for isolated populations of Arctic charr. As the northernmost char ponds in Maine, Black Pond may continue to support Arctic charr as the climate warms.

④ **Black Pond Overlook** - *68.84447, 46.97809*

From this vantage point, we can see the landscape's variability.



The fire tower at Deboullie provides expansive views from Katahdin to Quebec.

A key concept in estimating natural resilience to climate change is a site's [landscape complexity](#). Landscape complexity is a function of topography and elevation which can cause a site to support many microclimates. Varying microclimates can provide maximum habitat diversity for the array of species that currently exist at a site.

From this vantage point, the topographic variation at the Deboullie Public Reserve Lands is apparent. While the south facing slopes may provide warmer habitats, north facing gullies are buffered from summer temperature extremes. A [recent analysis by The Nature Conservancy](#) indicates that the Deboullie Public Reserve Lands contain some of the greatest landscape complexity in Aroostook County, due to the variety of rolling terrain, and wetland and aquatic habitats that occur here. This means that Deboullie is more likely to retain its current assemblages of species as the climate warms than other less diverse landscapes.

⑤ **Fire tower— big view** - *68.87303, 46.96855*

At the summit, we get a sense of the extent of Maine's north woods.



Deboullie Mtn., viewed from Deboullie pond.

A second key concept in estimating resilience to climate change is to evaluate a site's connectedness to other habitats. Though we are already seeing some species shift their ranges to adjust to changing climatic conditions, there is a lot of uncertainty about how species will respond in the future. It is well understood that if connections to other habitats are lost due to fragmentation from development, land conversion to agriculture, or unsustainable timber harvesting, these species range shifts may not occur, leading to a loss of biodiversity.

From the height of the Deboullie Mountain fire tower, one can appreciate the connectivity of Maine's north woods. From the tower one can see the full ex-



Base of the rock slide at Deboullie Pond.

tent of the forest connecting Katahdin to beyond the Canadian border. If this expanse of forest remains as forest, and is not converted to other land uses, then species will have a better chance of being able to migrate across through the landscape as they adapt to climate change.

⑥ **The ‘rock glacier’** - 68.86024, 46.96847

The Deboullie slide is a relic from a period of global cooling.

‘Tumbledown’ is a common place-name for several Maine mountains. In English, this term means dilapidated or crumbling. However, ‘tumbledown’ is also a literal English translation of the French ‘déboulé’ used to describe rock slides. ‘Deboullie’ is an adaptation of this French word, which was given to this area because of the expansive rock slides below the Public Reserve Lands’ low summits.

Recent [research](#) on the Deboullie rock slides indicates that they may be a result of a different climate change event— global cooling that occurred during a period of time known as the ‘Younger Dryas’ period which occurred shortly after the Laurentide Ice Sheet retreated from Maine. During this period, cooling temperatures allowed extensive permafrost to develop in these talus fields, causing them to deform and move downslope. Because they develop a shape resembling glacial ice, these formations are called ‘rock glaciers.’ Though temperature loggers indicate that sporadic permafrost still occurs in some of these rock fields, the permafrost is now insufficient to allow for glacier-like movement of these rock formations.

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Natural Heritage Hikes is a project of the [Maine Natural Areas Program](#) in partnership with the [Maine Trail Finder](#) website.

For more Natural Heritage Hikes, please visit www.mainetrailfinder.com.

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Map sources: Maine Office of GIS, Esri