

# 3

# Natural Resources

*“There is pleasure in the pathless woods.”*

*-Lord Byron*

## Introduction

**Littleton’s abundant natural resources provide the community with clean air, clean water, and important habitat for wildlife. They also contribute to the Town’s rural character, economy, tax base, and recreation opportunities.**

The Town’s type and distribution of natural resources influences the location and type of development within the community. Unlike many other area towns that have substantial portions of their land in federal or state ownership, most land in Littleton is privately owned. Thus, the future of the natural resource base is dependent on decisions that are made at the town and individual level. This chapter will provide information on

the natural resources that exist in Littleton and provide recommendations on how to best protect the quality of these resources in the future while promoting environmentally sensitive development. The natural resources that are analyzed and presented in this section include climate, topography, soils, water resources, conservation land, forests and farms, wildlife habitat, and scenic views.

These natural resources create a complex network of green infrastructure that supports the residents of Littleton. Every effort should be made to recognize the value that this natural capital represents for Littleton, and to preserve and protect these resources for future generations to enjoy.

## CLIMATE

Climate is typically defined by the level of precipitation, temperature, and topography. Littleton's climate is largely a product of the Town's elevation, latitude, position in the Connecticut River Valley, and location on the east coast of North America. Cold, dry air masses originating in sub-arctic North America and warm, moist air from the Gulf of Mexico influence the climate, resulting in relatively cold winters and moderate summers. Littleton generally has its hottest temperature in July and the coldest in January. Precipitation is rather evenly distributed throughout the year; however, it varies annually.

### Extreme Weather Events

Like many communities throughout New Hampshire, Littleton must prepare for severe weather events that have been increasing in frequency in recent years, whether that be extended periods of dry, hot weather or extreme snowstorms, characterized as "northeasters" in the colder months. It's important to ensure proper preparation for extreme weather events in town by investing in long-range planning for natural hazards.

## Preparing for Climate Change

Greenhouse gas emissions from fossil fuels exacerbates climate change and its associated effects on a community's infrastructure, economy, and ecosystems. According to the U.S. Environmental Protection Agency, the two largest sectors contributing greenhouse gases are housing and transportation. The Town should invest in energy efficiency and energy infrastructure upgrades over time that reduce its dependence on fossil fuels.

The variety of seasons contributes to the character of the area, and the variety of recreational and economic activities available. Recognition of the role local activities, such as transportation, have on the global problem of climate change will help to preserve these distinct seasons and the industries and character they support.

## TOPOGRAPHY

Littleton's topography plays a major role in the location and impact of future development. *It's characterized by low-lying river valleys which cover approximately 60% of the town* and extensive steep slopes located around some of the



Above: The Ammonoosuc River in Littleton, NH  
Source: Resilience Planning & Design

higher peaks including Towns Mountain, Parker Mountain, Wheeler Hill, Eustis Hill, Albee Hill, Mining Hill, and Manns Hill. The higher peaks are more prevalent in the eastern part of Town.

Development at higher elevations on the peaks and lower hills in Littleton presents some challenges and impacts. Without thoughtful site design, development might disrupt the scenic character of these areas and create negative environmental impacts, such as erosion.

Although Littleton's low-lying river valleys are often the easiest areas to develop, they also contain floodplain areas, surface water bodies, and critical wetlands. Minimizing the impact of development in these areas is important. Littleton's variety of topography also contributes to wildlife habitat and recreational opportunities. Ensuring connections between these distinct areas will ensure the continued health of the organisms using them. The Appendix features a Steep Slopes map that shows topography in town.

## Steep Slopes

Littleton has extensive areas of steep slopes and complex terrain that limit development opportunities in areas of the town. There are approximately **3,550 acres, or 11% of the town, that have slopes greater than 25% grade.** Areas with steep slopes are inappropriate for development (in terms of new roads and building sites) due to the increased cost associated with developing in these areas and erosion hazard (see Highly Erodible Soils map).

Areas in Town with 15 to 25% slopes are also shown on the Steep Slopes map as they require engineering assistance to fit development proposals to the terrain, especially in the higher end of the slope range. Construction and maintenance of roads becomes costlier on steeper

slopes. Problems with erosion, stormwater runoff, and non-point pollution are also increased. **There are an additional 7,000 acres of land with 15 to 25% slopes.** This means that about a third of the town has slopes between 15% to 25% grade. Combined with slopes >25%, this resource limits the development potential in about one-half of the town.

**The majority of Littleton is covered in slopes of 8-15%** which are considered acceptable for development, though they require significant engineering and costly expenses to make it feasible.

## SOILS

There are over 1,000 different soils in the Northeast with over 70 of them represented in Littleton. Soils data provide insight into how well land in Town is able to support various land uses as different soil types have properties that affect permeability, wetness, and susceptibility to erosion.

Littleton's soils can be broken out in a number of categories including wetland soils, seasonally wet soils, floodplain soils, sand and gravel soils, shallow to bedrock soils, compact till soils, and deep loose till soils. More about these groups can be found in the Appendix. **The most prevalent soil types in town include the Tunbridge Rocky soils (25% of town), Peru sandy/stony loam (18.7%) and Berkshire loam (15.7%).** Property owners and local officials can obtain area specific soil information from the Grafton County Soil Survey and the Natural Resource Conservation Service (NRCS) Web Soil Survey.

## Productive Agricultural Soils

Productive agricultural soils are considered to be the most important soils in NH for cropping, hay and forage production, and specialized vegetable

and fruit production. These soils contribute to the local economy, protection of the Town's rural character, and the community's resilience and efforts should be taken to preserve them.

Littleton has 1,444 acres of these soils, or about 4.5% of the total land area of the town. **Currently, only 8% of these soils are protected from development.** According to National Land Cover Data (2011), about half of the productive soils are now in forest cover, and another 25% are developed for non-agricultural land uses. The Appendix includes a map of the productive agricultural soils in town.

### Highly Erodible Soils

Highly erodible soils are associated with susceptibility to erosion risk and are identified through the NRCS soil survey for Grafton County. These soils exhibit particle sizes and soil structure that is prone to erosion by storm water run-off if disturbed.

About 14,900 acres or 47% of Littleton has highly erodible soils, found in large, contiguous areas in every portion of Town. Nearly 3,200 acres, or 21% of all highly erodible soils in Littleton are found on slopes greater than 25%. **Slope and soil type affect how much water infiltrates into the ground and how fast water runs off.** The steeper the topography and the greater the rock and clay content in the soil, the faster the runoff and the greater the potential for flooding and soil erosion. Since the erosive power of storm water increases significantly with steeper slopes, these areas are of particular concern when contemplating future land development. New roads are a special concern as drainage from roads traversing steep slopes is difficult to control.

The soils within Littleton play a major role in the location and impact of future development in the

About **14,900 acres or 47%** of Littleton has highly erodible soils, found in large, contiguous areas in every portion of Town.

community. Locating new development in areas without water and sewer infrastructure requires taking a much closer look at the ability of the soils on the lot to handle a well and septic system discharge. Soil information should be used as a determinant of what constitutes an environmentally sound building lot to prevent degradation of the environment and negative impacts on abutting property owners.

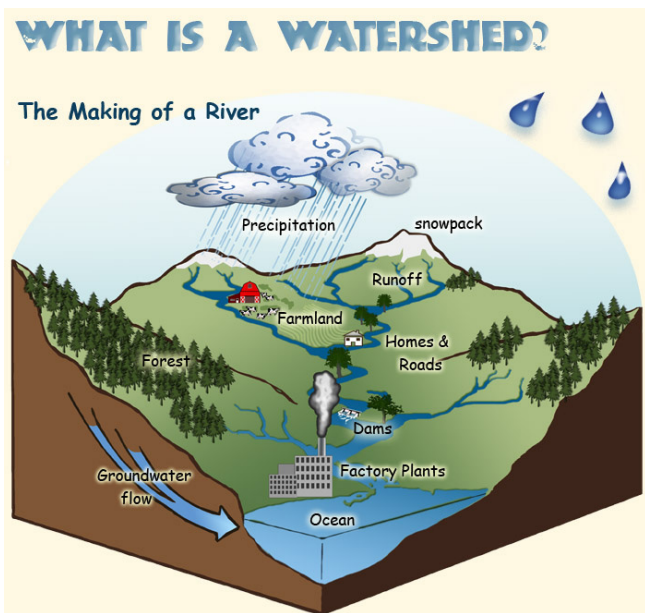
## WATER RESOURCES

Water is one of our most precious natural resources. Littleton has an abundance of surface water that provides economic, recreational, and ecological value to the town and region. However, with increased development and human activity, water resources can become depleted and of lower quality. This section of the Chapter will address surface water and groundwater related resources in Littleton.

### Watersheds

A watershed consists of the land area that drains into a particular surface water body, including its tributaries. Most watersheds contain several smaller sub-watersheds and eventually drain into the ocean. The western portion of Littleton drains directly into the Connecticut River basin, a major watershed, while the remainder of the town drains into the Ammonoosuc River, a sub-watershed. The size and physical character of a watershed, along with average annual precipitation and variations due to microclimates, influence the quantity of





Above: This diagram shows the anatomy of a watershed.  
Source: US Forest Service

water that is available to a community or region. It is important to recognize the impact of how individual and collective action can impact overall watershed health. Particularly since watershed health is related to the ability of surface and groundwater resources to be recharged.

## Surface Water

### RIVERS, STREAMS, AND BROOKS

In Littleton, the **Connecticut River** forms the entire western boundary of the town, about 16 miles long, and has a drainage area of over 1,600 square miles, with the State of Vermont on the opposite shore. This entire section of the river is part of the Fifteen-Mile Falls Hydroelectric project and consists of Moore Reservoir and Moore Dam as well as Comerford Reservoir and Comerford Dam, the Comerford dam is located in Monroe. Aside from the Connecticut River, there are over 50 miles of permanent streams. The **Ammonoosuc River** is technically a 4th order stream (which is medium sized). Approximately six miles of the river flow through Littleton. Historically, this river provided hydropower to the Downtown.

### LAKES AND PONDS

Littleton has **four lakes or ponds within its borders that are considered "Great Ponds"**, over 10 acres in size. They are Moore Reservoir, Partridge Lake, Reynolds Pond, and Comerford Reservoir. Please note that there is no difference between the term "lake" and "pond". These waterbodies are subject to the New Hampshire Shoreland Water Quality Protection Act which regulates activities within the Shoreland area and is enforceable by the Town and NH DES.

### MOORE RESERVOIR

**Moore Reservoir** is the largest body of water in Littleton and is the upper impoundment of three dams that make up the Fifteen Mile Falls Hydroelectric Project owned and operated by Great River Hydro. The Moore facility is the largest of the three impoundments and is the only one that can be used to significantly mitigate downstream flooding. The reservoir stretches eleven miles upstream of the 178-foot high dam which is located just upstream of the Route 18 Bridge. Land use around the reservoir is primarily forested, since Great River Hydro owns nearly all of the land along the shore.

### COMERFORD RESERVOIR

**Comerford Reservoir** is the second largest body of water in Littleton and is the middle impoundment of the three dams that make up the Fifteen Mile Falls project. The reservoir stretches eight miles upstream of the 170-foot high dam which is located in Monroe about one mile downstream of the Monroe/Littleton Town line. Land use around the reservoir is primarily forested, but includes residential and agricultural uses as well since most of the land is privately owned.

### PARTRIDGE LAKE

**Partridge Lake** is located at an elevation of 846 feet in the south-central portion of Littleton

along the Lyman town line. It drains to the south via Ogontz Lake and Ogontz Brook to the Ammonoosuc River in Lisbon. It is a natural pond with a small dam, which is actually located in Lyman. The 105-acre lake, of which about 100 acres is in Littleton, is heavily developed with over 70 seasonal homes and camps, many of which have been converted to year round use.

### REYNOLDS POND

Located about one-half mile northeast of Partridge Lake, **Reynolds Pond** is a very small body of water with a shallow depth and mucky bottom. With a small watershed, it is a natural pond with a small dam. Reynolds Brook flows to the north directly into the Connecticut River, entering at the Comerford boat launch.

## Wetlands

Wetlands are defined by NRCS hydric soils classifications of poorly and very poorly drained soils. They may consist of swampland, bogs, marshes, wet lowland areas, vernal pools, and

floodplains. In Littleton there are 103 different wetlands, consisting of 62 with poorly drained soils, 15 with very poorly drained soils, and 26 with soils of both drainage classes. **About 3,327 acres, or 10.4% of the Town has hydric soils that are poorly drained or very poorly drained.** There are no designated prime wetlands in Littleton.

The health of Littleton's wetlands is critical to the function of natural systems within the community. If they are destroyed or degraded, Littleton's water resources (quantity and quality) will suffer, and many animal species will disappear.

## Floodplains

Floods are a natural and normal occurrence in an area of high rainfall. During normal stream flow, water is carried in a river channel. But in times of high runoff, water rises over the banks and flows onto the floodplain. **The total acreage of floodplain in Littleton is 1,262 acres, or 3.9% of the town.** These floodplain areas are mostly



Above: Partridge Lake, Littleton NH  
Source: Peabody and Smith Realty

## Functions of Wetlands

Flood Control  
Erosion Control  
Water Quality  
Filtration  
Wildlife Habitat  
Recreation  
Aesthetics

along the Ammonoosuc River, and are located in close proximity to some of Littleton's most developed areas. A 100-year floodplain is an area that has a 1% chance of flooding in any given year, but recently in NH 100 year floods have been experienced with greater frequency.

Floodplain development poses flood damage risks to property owners, some of which can be mitigated with a properly implemented floodplain management program. Components of a floodplain management program typically include up-to-date floodplain mapping, public outreach, and floodplain development permitting, monitoring, and enforcement.

## Water Pollution

Point and non-point sources of pollution threaten the Town's water quality and can be caused by a variety of land use activities and practices. Point source pollution is linked to a specific pollutant or discharge point that can be identified and physically located. In New Hampshire, the NH Department of Environmental Services (NHDES) regulates industrial and municipal discharges and privately-owned wastewater management and wastewater treatment facilities which may have a potential impact on water quality due to a direct discharge to groundwater. A groundwater

discharge permit is required for such activity. Currently, there are no permitted groundwater discharges in Littleton. Another point pollution source in town is the municipal sewage treatment plant outfall, permitted by NHDES, which discharges treated effluent into the Ammonoosuc River.

Nonpoint sources are more difficult to document, trace, or identify since there is generally not a specific point of discharge. Some potential non-point sources are the result of temporary or short-term land uses, such as logging, construction, or agriculture operations. Others, such as stormwater runoff may be short in duration, but are continuous in nature. Waste disposal facilities (septic systems, landfills, junkyards, etc.), highway maintenance (sand, salt, and snow dumping), and hazardous waste also may contribute to nonpoint source pollution. The Town should consider best management practices, such as maintaining buffers along waterways, to ensure stormwater runoff is filtered before entering waterbodies.

## Water Supply

Within Littleton 2,888 acres, or **9% of the Town's land area, consists of sand and gravel aquifers**. The Appendix includes a Water Resources map that show where aquifers are located in Town. However, it is important to recognize that **only 14.8% of these aquifers are permanently protected**. There are three main aquifers in Littleton, identified in the report "Geohydrology and Water Quality of Stratified Drift Aquifers in the Middle Connecticut River Basins, West Central New Hampshire", all of which have relatively low transmissions and are therefore not considered high yielding. These include the Monroe II Aquifer, the Littleton Esker Aquifer, and the Salmon Hole Aquifer.



## FORESTS & FARMLAND

### Farmland

Agricultural lands add to the visual and habitat diversity of the landscape, and contributes to the character of the community. Traditional agricultural land use in Littleton today is minimal. Littleton has one remaining dairy farm, but no land is currently being tilled for corn, grain, or other row crops. As identified in the soils data, there is a limited amount of productive agricultural land available.

***These 819 acres of agricultural land, accounts for 2.5% of the total land area in Littleton.***

Farmland has decreased since the update of the 2004 Master Plan, where the approximate total area of farmland cover was 3.5% of the total land area.

The agricultural land in Littleton is most commonly used for hay production, grazing of livestock, or is “idle”, meaning kept open by “brush hogging” or mowing every year of two but not producing a crop. According to the National Land Cover Dataset (2011), 483 acres of farmland

is in pasture or hayfield. 353 acres are in crop cultivation. Within ten years, idle farms will be considered forested land if left unattended, with loss of views and valuable wildlife habitat. No inventory of new niche market agricultural operations exists for Littleton, but there is an opportunity to encourage growth in this small but critical land use.

Preserving the possibility of farming in the future adds to the sustainability and resilience of the community. If agricultural resources are developed over with homes and businesses, this land will no longer be viable for producing goods locally in the future. This could become a necessity if global food distribution systems change, and is already preferred as the local food movement has grown over the past decade. There is also an economic benefit when produce and products are generated locally, and the land does not require the high level of Town services that development demands.

### Forests

Protecting forests is incredibly important in maintaining the town’s character, protecting



Above: Hicks Farm Pastures produces pasture-raised pork and beef in Littleton.

Source: Hicks Farm Pastures



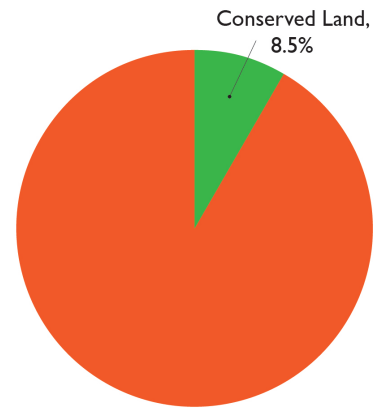
valuable industries, such as timber harvesting, and for preserving wildlife habitat, water quality, scenic values, and recreation opportunities. Forests also help with erosion control, air quality, and temperature regulation.

**Littleton is 84% forested, including 26,963 acres within the town.** In Littleton forests, northern hardwood predominates as the major type of tree present with white pine being a strong second. Much of the forest land in Grafton County is a mix of hardwood and softwood species including white pine, hemlock, red spruce, balsam fir, black spruce, beech, red maple, sugar maple, yellow birch, red oak, black cherry, white ash, and white birch.

Clear cutting and disregard of Best Management Practices (BMPs) can result in erosion and non-point source pollution that creates problems for abutters and the community. Critically important forest and agricultural resources should be pursued for conservation to ensure permanent protection. BMPs should be encouraged to protect forest health in non-protected areas.

## Conservation Land

Conserved lands are those lands protected for the foreseeable future through outright preservation by governmental or conservation organizations or through conservation easements. There are **2,717 acres of conserved land** per the GRANIT system's conservation and public lands dataset. This equates to about 8.5% of the town's land area. The largest area of conservation land in Littleton is part of the TransCanada owned lands by Fifteen Mile Falls, totaling to 2,400 acres managed by the New England Forestry Foundation. **The town has protected 125.6 acres of land and include areas such as Pine Hill Park, Dell's Park, and Kilburn Crag.**



CONSERVATION LAND IN LITTLETON

The Conservation Commission has identified the following specific areas that need permanent protection for a wide variety of natural resources, wildlife and recreation purposes.

- Parker Mountain (between Farr Hill Road and Broomstick Hill Road and Manns Hill)
- The higher elevations of Walker Mountain Ridge
- Town's Mountain
- Mount Misery
- Dalton Ridge-west end
- West Littleton

## Current Use

NH RSA 79A allows landowners to place certain types and sizes of land in a tax abatement program based on their current land use. There is ample open space in Littleton that is in current use, which is a temporary form of land protection. As the Town plans for its future and the protection of its resources, land deemed as critically important natural resources should be pursued for conservation.

# WILDLIFE HABITAT

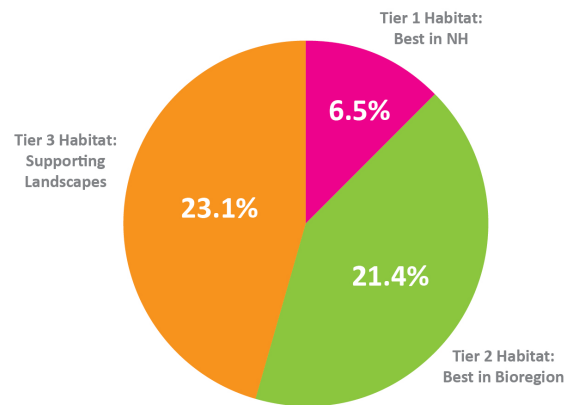
The NH Fish and Game Department’s Wildlife Action Plan (NHWAP) includes an extensive, science-based analysis of the condition of wildlife habitat for the entire state. The Appendix shows the Wildlife Action Map for the Town of Littleton. According to the NHWAP, wildlife habitat is ranked in 3 tiers. These include **Tier 1 (highest ranked habitat in state)**, **Tier 2 (highest ranked habitat in biological region)**, and **Tier 3 (supporting landscapes)** which protect integrity of Tier 1 & 2). Littleton falls within the Vermont Piedmont biological region, a small and environmentally unique ecological zone that is more like Vermont than the majority of New Hampshire. The Town has large areas of both Tier 1 and Tier 2 habitats which are currently both undeveloped and unprotected, especially in the northern half of the Town. There is 16,270 acres of priority wildlife habitat in Littleton falling in either Tier 1, 2, or 3 of the NHWAP. This equates to approximately 50% of the Town’s land cover. Only 1,427 acres, or 8.8%, of this priority habitat is permanently protected.

## Uncommon Habitats

The NH Fish and Game Department’s Wildlife Action Plan (NHWAP) has mapped numerous habitat types found in New Hampshire. Some of these are “matrix habitat types” that are quite common while others are “**patch habitats**” that are typically smaller in extent and scattered in distribution.

About 72% of habitat types in Littleton fall into the matrix habitat category, these being Northern Hardwood/Conifer and Hemlock/Hardwood/Pine forest habitats. **Patch habitats total about 12% of the Town’s land area**, and include ten specific habitat types, show in the table to the right. The remaining habitat types by percentage are developed land and water.

NH WILDLIFE ACTION PLAN  
PRIORITY HABITAT IN LITTLETON



Two-thirds of the patch habitat types are either Lowland Spruce/Fir or Grassland habitats. Lowland Spruce/Fir habitat is fairly common across the North Country, but not in Littleton. Grasslands are most often associated with farmed hay fields and pasture. The balance of the uncommon patch habitats is rare across New Hampshire with the exception of Appalachian Oak/Pine which is at the northernmost limit of its range in Littleton. With the exception of the Lowland Spruce/Fir component, all the patch habitats are small features and scattered widely across Littleton. Note that some larger parcels of land contain several occurrences

UNCOMMON HABITAT TYPES		
WAP Habitat Type	Total Acres	% Town Area
Lowland-Spruce Fir	1846.2	5.3%
Grassland	993	2.9%
Wet meadows/shrub wetland	388.1	1.1%
Rocky ridge	244.9	.7%
Cliff and Talus	187.9	.5%
Peatland	168.2	.5%
Northern Swamp	134.3	.4%
Floodplain Forest	75.9	.2%
Temperate Swamp	53.3	.2%
Appalachia oak-pine	23.1	.1%
	<b>4114.9</b>	<b>11.9%</b>

of these small habitat types, each with its own special plant and animal ecology.

## Wildlife Types

The diverse habitats of Littleton include wetlands and upland hardwood and softwood forest, all of which provide home to a diverse array of mammals, birds, amphibians, reptiles, and insects.

The better-known mammal species include moose, white-tailed deer, black bear, rabbit, squirrels, skunks, woodchucks, eastern coyote, beaver, muskrats, raccoons, otter, mink, bats, possum, red fox, fisher, and bobcat. Amphibians such as the spotted salamander, newts, toads, tree frogs, bullfrogs, and the morning spring peeper abound at the water's edge. Reptiles include four types of turtles and eleven species of snakes including garter, milk snake, and the back racer. Nearly 200 species of birds can be found in their various habitats in the area including hawks, 25 species of warblers, and many different species of finches, owls, and flycatchers. Many different types of waterfowl reside in the area including Canada geese, mallards, blacks, wood ducks, and mergansers. Blue heron can often be seen in streams and wetland areas.

## Habitat Fragmentation

Habitat is easily fragmented by new development. This disrupts the landscape and impacts wildlife movement and survival. Additionally, wildlife resources are critical to many recreational activities that support open space conservation (i.e. hunting, fishing, hiking, biking, and bird watching). The Town should continue **investing in land conservation initiatives that preserve corridors between habitats** and protect open space to facilitate the movement of animals in the region and locally.

## SCENIC VIEWS

Preservation of viewsheds is important to maintaining the rural and small-town character of the Town as well as maintaining Littleton's attractiveness to tourists and locals. A list of scenic views identified in the Littleton Natural Resources Inventory is located in the Appendix. Scenery and aesthetics, although subjective in nature, are significant natural resources that can be studied, analyzed, and protected. The NH Supreme Court has ruled that aesthetics is a legitimate local planning concern, contributing to quality of life, tourism, and economic development.



Above: A Barred Owl

Source: Ammonoosuc Conservation Trust