

The Big Woods-Jenness Pond Region of Northwood and Beyond



A Story of Water, Wildlife, Woods, People, and Place



I grew up playing and working in these woods. I want my kids and future generations to enjoy the open spaces too. It is important that we educate people about their surroundings and find ways together to care for the land for the future. As a fireman I see things that are beyond control, but sometimes certain actions--preventable measures, education, willingness to adapt, and taking care of yourself--can help prolong a healthier and stable life. The same is true for the environment around us. If we educate ourselves, and others, about impacts to the environment, then we can take measures now that maintain healthy land and water, and not when it is critical and we need a 911 call.

Nikolas Bassett, Northwood Fire Chief, resident of Jenness Pond watershed

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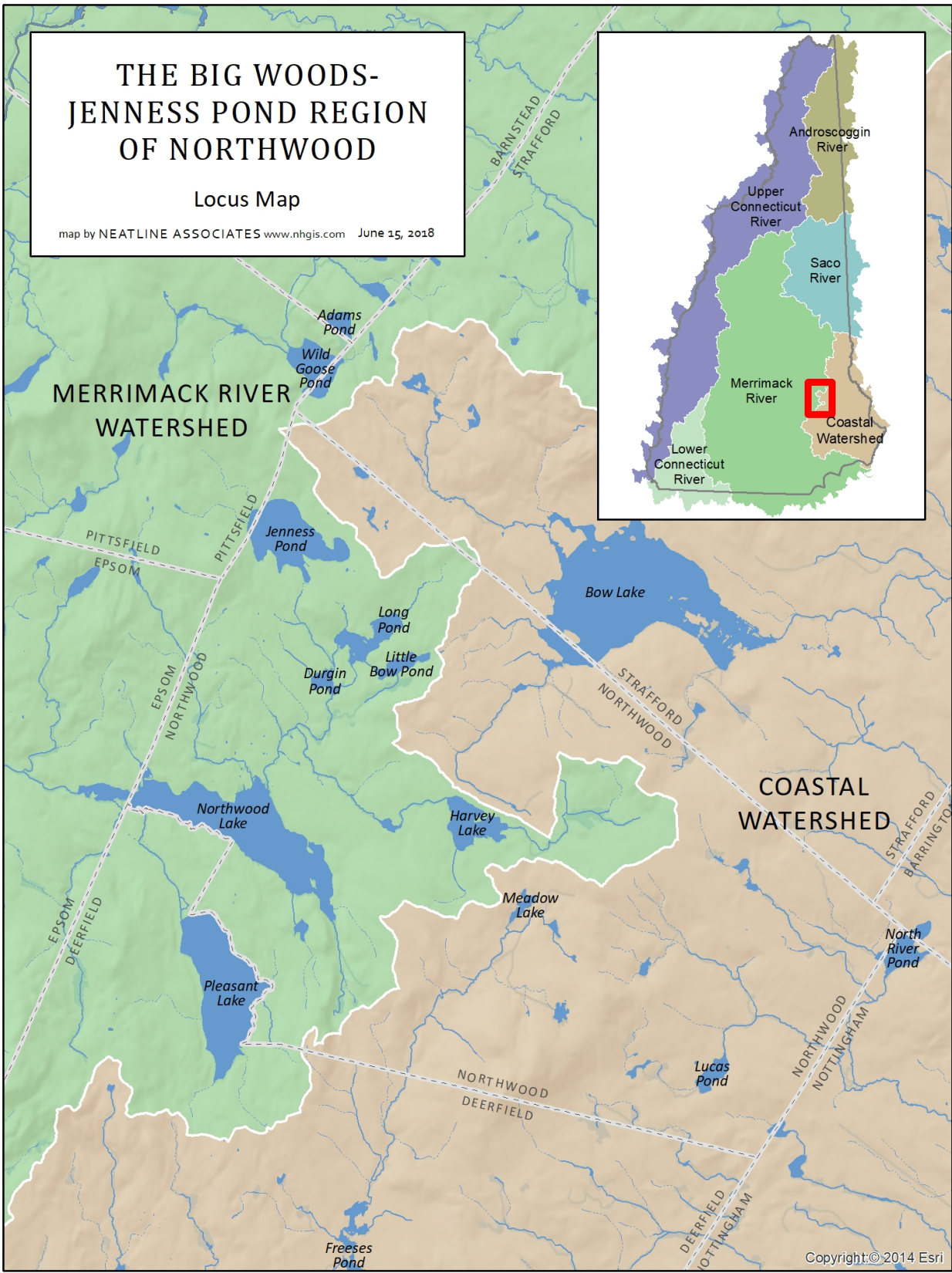
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THE BIG WOODS- JENNESS POND REGION OF NORTHWOOD

Locus Map

map by NEATLINE ASSOCIATES www.nhgis.com June 15, 2018



Introduction

The northwest corner of the Town of Northwood, New Hampshire, is hilly, wooded, and punctuated with fields and a network of ponds, streams, and wetlands. A low ridge that winds its way through this region forms a major watershed divide. To the west of the divide, water drains into the Merrimack River Watershed, via Northwood Lake, Little Suncook River, and Suncook River. To the east of the divide, water flows into Bow Lake, which forms the headwaters of the Isinglass River, part of the Coastal Watershed. All waters from this area eventually reach the Gulf of Maine.

Native Americans used these waterways for travel and sustenance for thousands of years. The first settlers arrived in the 1760s, venturing from towns near the coast to this ridge of land between Portsmouth and Concord, a “tract of country long known as North Woods,” according to the Reverend E.C. Cogswell (1878). In the spring of 1762, Solomon Bickford from Lee reached the northwest corner of Nottingham, the area now known as Northwood Narrows. Bickford, and others who followed, marshaled the power of water to process wood, wool, and grains. These first settlers pushed for independence for the “North Woods of Nottingham,” leading to the Town of Northwood’s incorporation in 1773.

Generations of families have remained in these “North Woods.” More recent arrivals are drawn to these same waters and woods, for inspiration, enjoyment, and livelihood. While the water-powered mills are long gone, some residents continue to extract resources from the land, including firewood, lumber, other wood products, and raise crops, animals, and hay. The importance of this rural landscape to Northwood residents—the forests, ponds, streams, wetlands, fields, scenic vistas, villages, farms, and historic buildings—is enshrined in the Town’s Master Plan. Large, undeveloped woodlands are recognized as especially important, including an 1,800-acre area without roads or other development known as the Big Woods that lies between Jenness Pond and Bow Lake.

In the fall of 2006, several landowners near Northwood Meadows State Park began conversations about land management among ownerships. They recognized that one parcel is not an island unto itself and that wildlife travel across property boundaries. The Northwood Area Land Management Collaborative (or NALMC), centered on more than 4,000 acres south of Route 4 in Northwood, grew out of those exchanges. This voluntary, grassroots group of landowners and community members gather to share information, connect with their land, learn from each other, and work together on common projects, building a land ethic for the lands and waters in the NALMC region (NALMC 2016).

NALMC encourages neighbors to look beyond their stonewalls and inspires others to build community. In 2016, landowners in the Big Woods-Jenness Pond region of Northwood began meeting and sharing stories about their place, their lands, waters, and neighborhoods. This story—*The Big Woods-Jenness Pond Region of Northwood and Beyond: A Story of Water, Wildlife, Woods, People, and Place*—grew out of those conversations, and encompasses about 7,000 acres in the northwest corner of Northwood and bordering communities. Through this story, we seek to share information and raise awareness among current and future landowners and the broader Northwood community about the land, water, woods, and wildlife within this “North Woods” region.

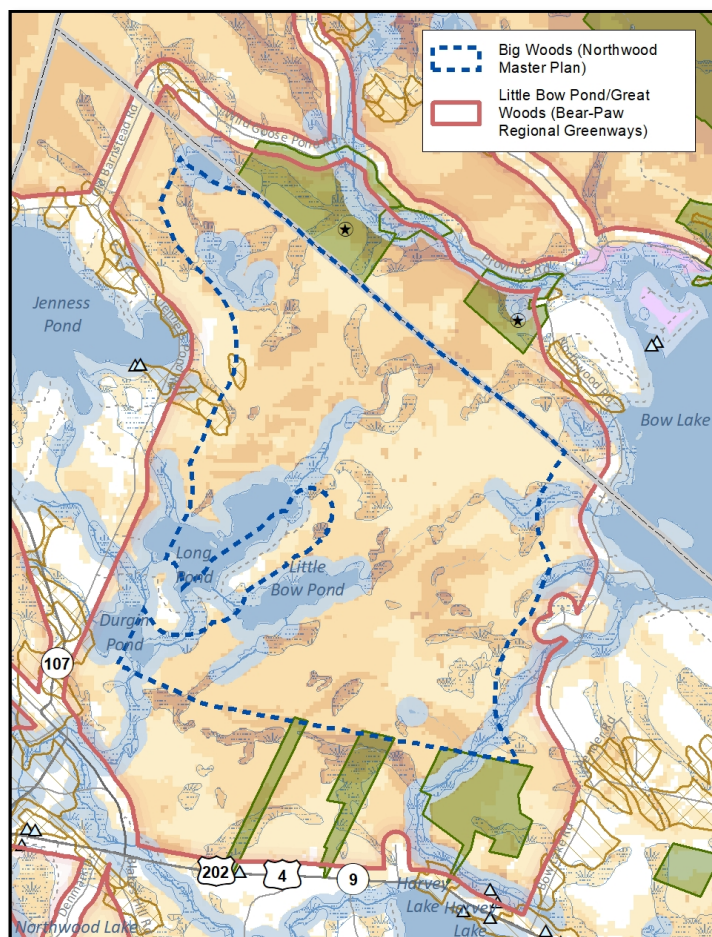
The Big Woods

Large tracts of forest, unbroken by roads, houses, or other development, are becoming increasingly rare in southeastern New Hampshire. Blocks of 1,000 acres or more are considered regionally significant. The Town of Northwood's Master Plan identifies three such significant areas worthy of conservation consideration: Northwood Meadows/Saddleback Mountain, Acorn Ponds, and Big Woods. Public and private landowners in the Northwood Meadows/Saddleback Mountain area—the NALMC region—have conserved a significant portion of that landscape, with much of it open to public access with a large network of trails.

Bear-Paw Regional Greenways, a regional land trust, identified the Big Woods area as a high priority forest block for wildlife conservation values. The area they called Little Bow Pond/Great Woods encompasses 3,325 acres and harbors 8.6 miles of streams, 492 acres of undeveloped riparian habitat, 379 acres of wetlands, and 123 acres of south-facing slopes that are of benefit to wildlife (Bear-Paw Regional Greenways, 2008, 2014).

As noted, the Town of Northwood Master Plan recognizes the ecologically important Big Woods, which is a subset of Little Bow Pond/Great Woods area. In the Master Plan, the Big Woods is defined as follows: a line 1/4 mile inside of Jenness Pond Road, Barnstead Road, and Wild Goose Pond Road (Strafford) to the west; the Northwood/Strafford town boundary to the north; a line 1/4 mile inside of Bow Lake Road to the east; and the power line easement to the south. A corridor 1/10th of a mile wide along the existing Long Pond Road is excluded from this area because it is already developed (Town of Northwood 1998, 2004). This 1,800-acre area is still largely undeveloped and is mostly open for people to walk and explore, hunt and fish, thanks to the generosity of the private landowners who own nearly all of this land.

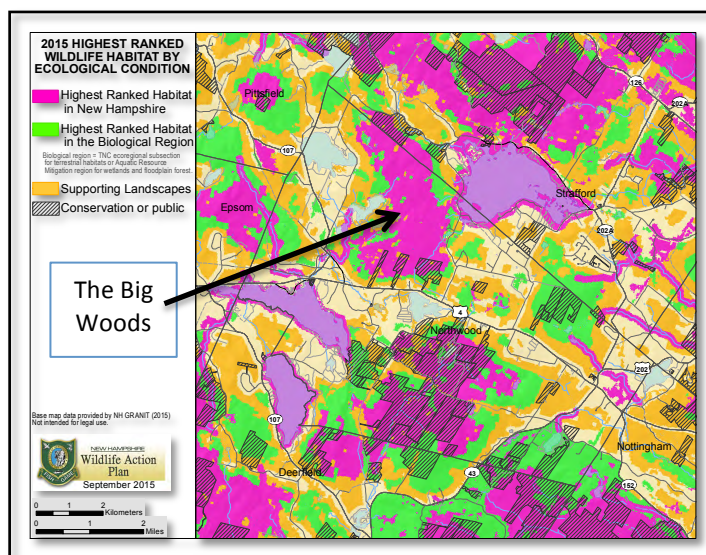
The Big Woods—and other large undeveloped areas—is important for many reasons. It supports a diversity of interconnected ponds, wetlands and brooks that wind through a rolling, upland forest of oak, beech, hemlock, and pine. This expanse of water and woods provides secure travel corridors for wide-ranging wildlife such as bobcat, fisher, bear, and moose. It offers enough space for wildlife with large territories, including northern goshawk, great horned owl, and barred owl. Several species of bats of conservation concern in the state, including the eastern red bat and hoary bat, roost and give birth to young in trees and hunt over wetlands and water; the Big Woods offers potential secure habitat for these summer visitors to New Hampshire.



Map is from the 2014 Bear-Paw Regional Greenways Natural Resource Inventory; green polygons are conserved parcels.

Based on these wildlife and other ecological values, the New Hampshire Fish and Game Department (NHFG 2015) considers the Big Woods some of the highest-quality wildlife habitat in the state. The mix of habitats includes Appalachian oak-pine and hemlock-hardwood-pines forests, peatlands, marsh and shrub wetlands, swamps, ponds, and streams. A portion of the Big Woods was likely never farmed due to its remoteness and rocky terrain, and in places it feels as remote as when the first settlers arrived in the 1700s. However, nearly all of the Big Woods is susceptible to development pressure; only a few acres are conserved.

Development (residential, commercial, industrial) is one of the most significant risk factors to the State's wildlife and habitats. It fragments habitat into small, unconnected parcels. Songbirds, small mammals, and other wildlife species are more susceptible to mid-sized predators such as fox, raccoon, and skunk in fragmented habitat. These "generalist" predators adapt better to and are more common around human settlements. Habitat blocks crisscrossed with residential roads and houses expose wildlife to high rates of road mortality, increase conflicts with humans and pets, result in increased contaminated runoff, and offer more opportunities for invasive plants to spread to natural areas.



The Big Woods, as a large, undeveloped open space, offers other benefits. It retains rural character, preserves scenic beauty, provides outdoor recreation space, encourages sustainable forestry, and protects water quality—for people and aquatic life. This large, roadless tract sustains many natural processes: cycling nutrients and water, keeping air clean, and remaining resilient in the face of disturbances such as ice storms, major rainfalls, and high wind events.

Three beautiful ponds are within the Big Woods: Long Pond, Little Bow Pond, and Durgin Pond. Long Pond is a 90-acre water body averaging 30-feet deep that supports warm water fishes including largemouth bass, bluegill, chain pickerel, and brown bullhead. A winding private dirt road leads from Jenness Pond Road to the southern shore of Long Pond, where year-round and summer residents enjoy swimming, fishing, boating, and nature viewing. The watershed of Long Pond is about 900 acres. Two hills—labeled as Richardson Hill on topographic maps—climb to over 700 feet on the north side of the pond, providing a scenic backdrop from the water below.

The James Tree Farm encompasses most of the scenic forested 36-acre Little Bow Pond shoreline, one of the last undeveloped natural ponds in southeastern New Hampshire. The 17-acre Durgin Pond lies entirely within the James Tree Farm bounds and is favored by anglers and waterfowl hunters as well as migrating ducks, beavers, and other wildlife. Its shores remain wild despite its close proximity to Route 107.

Beaver Wetlands, Swamps, Peatlands, and Vernal Pools

Beaver are a prominent and key wildlife species throughout the Big Woods and in other watersheds in the region. This industrious rodent builds dams to provide access to food, protection from terrestrial predators, and shelter in winter with underwater access to their lodges. As strict vegetarians, beaver feed on a variety of aquatic plants, especially water lily tubers and the shoots, twigs, leaves and bark of woody plants. The bark, particularly the inner bark of trees and shrubs, is an important food, especially in winter. Aspen, birch, alder, and willow are particular favorites.

Beaver-influenced wetlands are often dynamic, cycling through successional stages from flooded stream (pond) to marsh, shrubland, sapling, and swamp, and then back to pond. Beavers may abandon an area when their preferred food plants become scarce. With beaver gone, their dam begins to break and the pond or wetland drains. In the nutrient-rich muck, herbaceous plants flourish, forming “beaver meadows.” Over time, shrubs and trees begin to dominate the area, eventually creating ideal habitat again for beaver.



Beaver-chewed trees at edge of Durgin Pond.

Other wildlife that benefit from beaver-created habitats also cycle through these changing habitat conditions. Wood ducks, tree swallows, flycatchers, woodpeckers, great blue herons, and other birds nest in the standing trees that are killed or injured by beaver flooding adjacent uplands. Emergent and floating-leaved wetland plants attract invertebrates that are favored by wood ducks and other waterfowl when they are rearing their young broods. Ducklings feed mostly on larvae of flies, caddisflies, mayflies, and other insects. Adult ducks eat the seeds of bur reed, sedges, pondweeds, and other aquatic plants, as well as insects and other invertebrates. Turtles, frogs, newts, dragonflies, river otter, muskrat, mink, and moose also use the emergent marshes. Shrubby wetland edges are home to song sparrow, common yellowthroat, swamp sparrow, catbird, and red-winged blackbird.



Common yellowthroat

In addition to the open-water, marshy habitats, the Big Woods region supports a patchwork of associated swamps and peatlands. Red maple-dominated swamps occur in isolated basins with saturated organic soils or are headwater swamps fed by groundwater seepage. The understory is often a mix of tall shrubs, including highbush blueberry and winterberry. Peatlands are formed by partially decayed organic material, typically *Sphagnum* moss that forms deep layers. The water is acidic, low in nutrients and oxygen, and thus decomposition is very slow. Distinctive plants, such as carnivorous pitcher plant and sundew, grow in peatlands (also known as fens). Other plants include sedges and dwarf shrubs including leatherleaf, sheep laurel, and sweet gale. Most of the peatlands and swamps in the Big Woods region are integral to and well buffered by other natural habitats.



Vernal pools are ephemeral (temporary) wetlands that fill in spring from rainfall, snowmelt, or rising groundwater. Some pools also fill in the fall after autumnal rains. These pools are typically small in size, ranging from less than one-tenth acre to more than 2 acres. Size, however, is not always an indicator of the importance of a vernal pool to the animals that live there. Most vernal pools completely dry out by the end of summer and therefore cannot support fish populations, which makes these pools safe for breeding amphibians.

Right: Spotted salamander eggs in wetland in the Big Woods.



Left: Adult spotted salamander; image from Aveo and Harris Center 2018.

These small wetlands typically harbor fairy shrimp, wood frogs, and spotted salamanders. Smaller organisms such as bacteria, fungi, zooplankton, caddisfly and other insect larvae, crustaceans, and insects are all food for the larger animals. Wood frogs and spotted salamanders travel to vernal pools in the spring to breed, and then spend the rest of the year (11+ months) in the uplands, typically within 1,000 feet of the pool. Canopy shade, deep leaf litter, and fallen trees and stumps are used by frogs and salamanders as cover and therefore are important habitat features in the upland surrounding a vernal pool. Because they are small and dry out during the year, vernal pools are often overlooked, but they are important wetlands. The best time to take note of them is in the spring, when they fill with snowmelt and when frogs and salamander eggs are noticeable. Making note of vernal pool locations on maps will help ensure their continued protection.

To the east of Bow Lake Road is the scenic and popular 1,149-acre Bow Lake, headwaters of the Isinglass River within the Coastal Watershed. To the west of Bow Lake Road, within the Big Woods region, are several headwater streams to Bow Lake: Buzzel's Run, Sherburne Brook, and several unnamed. Sherburne Brook is one of the major inflows to the Lake and has a watershed of 1,535 acres. The Brook begins in the southeast corner of the Big Woods area, at Northwood Center near the junction of Bow Lake Road with Route 4. It winds west passing under Bow Lake Road and then Faculty Way before turning northeast. Before reaching Bow Lake, Sherburne Brook passes under Youngs Crossing, flows into an Old Mill Pond, and then under Bow Lake Road once again before continuing its route to Bow Lake.

A larger, scenic, perennial stream called Buzzel's Run parallels Province Road in Strafford and forms a major inlet in the northwest corner of Bow Lake. Several private landowners have conserved their land along Buzzel's Run. Two other small, unnamed headwater streams flow from the Big Woods east under Bow Lake Road and then into the lake. Each of these small streams is associated with one or more upstream wetlands.

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Bedrock, Soils, and Topography

South-central New Hampshire sits at the northern edge of the Eastern Deciduous Forest, a vast region that covers eastern North America south of the St. Lawrence River. This is the domain of white pine and hemlock and various hardwoods, including maples, birches, oaks, and beech trees. Mixed in with these dominant trees you will also find black cherry, white ash, ironwood, hop hornbeam, bigtooth aspen, red spruce, and red and pitch pines. The underlying bedrock consists of granite and metamorphic rock types, including schist and quartzite, that are resistant to weathering and tend to produce acid soil conditions typical of this region.

At a finer scale the distribution of trees and other plants reflects local variations in topography, soil types, and land use history. For example, steep, rocky southern slopes tend to have lots of red oak, which excels where conditions are relatively dry and warm. In contrast, hemlock prevails on steep northerly slopes or on rocky, more poorly drained soils such as along streams or rocky ridges. Land use history, including farming, farm abandonment, and logging, as well as major storms, affect forest composition as much or more than the physical traits of the land itself. For example, white pine is common on recently abandoned farm fields, and in areas where logging and site features favor pine regeneration.



Rock outcrops and ledge are prevalent throughout this region.

The hilly, variable topography is evident as you drive the roads through this region. Slopes vary from flat ground to nearly 25 percent on the hill slopes. The undulating landscape of wetlands, woods, and fields also reflects the variety of soil types. Underlying the various wetlands are poorly drained, mucky peat soils derived from partially decayed organic material. The most common soil type is Chatfield-Hollis-Canton complex, a well-drained, rocky soil of hills and ridges, an indication that much of this ground is suited to pasturing but not crops. However, the next most common soil types—Paxton, Woodbridge, and Canton fine sandy loams—are well-drained, farmland soils of drumlins, moraines, and hills, although even some of these are very stony.

Transitional Habitats

Most active farms have disappeared, but some landowners continue to maintain hayfields, pastures, and meadows. A utility corridor that runs east-west offers a pathway for snowmobiling and provides shrubby habitat that is used by many wildlife, especially during the summer nesting season. Major windstorms often leave behind a mess for a landowner, but yield a tangle of new growth that benefits wildlife. These transitional habitats—so called because without management they will revert to forests over time—provide another important component of the landscape. Shrublands are especially beneficial amid a mostly forested landscape. Thirty-six species of songbirds, such as song sparrow, common yellowthroat, indigo bunting, and prairie warbler, depend on shrub habitats, which include beaver wetlands, overgrown or shrubby fields, rights-of-way, regenerating clearcuts, and even gravel pits. When gravel pits are completed they are often reclaimed to prevent erosion and protect water quality. This is important, but the strategies used can be tailored to benefit turtles, snakes, beetles, and other wildlife that prefer disturbed, sandy, open areas.

James Tree Farm

The 385-acre James Tree Farm is situated in the midst of the Big Woods and is central to the history and ecology of the area. For six generations the James family has stewarded this land, managing its forests, maintaining undeveloped fields, woods, and shorelines that protect the extensive network of streams, wetlands, and pristine ponds, and allowing people to walk, fish, and hunt on the land. For more than 230 years, the James Tree Farm has remained productive, providing sustainably harvested lumber and other wood products, while offering solitude for visitors to its pristine waters and diverse habitats for wildlife. In 1992, it was recognized as the New Hampshire Tree Farm of the Year.

James Stevens James was born in Boston in 1755, son of a sea captain who died at sea. He brought his family and settled north of the Narrows in 1779. With his wife Rebecca, they raised 11 children, cleared land, farmed, built structures, worked hard, ran a sawmill, and helped establish the Town of Northwood. In 1839, at age 19, their grandson Samuel Shepherd James began keeping a daily journal of his life in Northwood. His last entry was October 14, 1907; he died November 2 that year at age 87. The James Diaries now resides at the New Hampshire Historical Society.

Thursday, Jan 9, 1902. Fair, pleasant day. I took care at the barn and picked over beans. Orrin and Charles Small cut and put in ice. Cut it on Durgin Pond and put it in the ice house across the meadow and the field on a sled. They cut and put in 62 cakes ice, about 16" thick.

From the Diaries of Samuel Shepherd James

In 1999, in recognition of the James family's contribution to the Town, the Northwood Historical Society transcribed and printed Samuel Shepherd's 1902 diary (Bailey 1999). The James Diaries offer a look back into the 19th century lives of the families living in and around and north of the Northwood Narrows. James writes about births, deaths, and marriages, the weather, having tea with visitors, cutting firewood, surveying lots, churning butter, sorting beans, cutting ice blocks, traveling by sleigh or buggy or stagecoach, harvesting cranberries, haying, thrashing oats, planting crops, helping with the washing, among hundreds of other notes about life then. His diary tells of cutting tall, straight white pines as mast trees for sailing ships and transporting lumber by horse-drawn sled to Dover, where it was shipped by rail to Boston and beyond. The 1896 Victorian-style James home (now apartments) is modeled from similar homes that the Jameses saw on their trips to Dover.

The James Tree Farm encompasses an exceptional network of brooks and wetlands and has over two miles of water frontage on three ponds: Long, Little Bow, and Durgin. Historically, the main outlet from Little Bow Pond flowed east toward Bow Lake. However, canals and dams built between Long Pond and Durgin Pond changed the direction of flow, such that water from Little



Little Bow Pond

Bow Pond sometimes flows west. A strange situation indeed since this dynamic straddles the major Merrimack-Coastal watershed divide.

Durgin Pond was originally a wet meadow. In the 1850s, Samuel Shepherd James had canals built connecting the meadow to Long Pond to regulate water flow and levels for propagating and harvesting cranberries, which were sold for the market in Boston. The James family also built a stone dam at the outlet to Durgin Meadow, changing it from a meadow to a pond. The stone dam and the two canals, which were hand dug and blasted through ledge, remain much as they were in the 1800s. In an earlier time, James Stevens James and others built a water-powered sawmill downstream of Durgin Pond that was operated until about 1900; remnants of the mill are still visible just south of the James' property line.



Photo above: Remnants of dam at outlet on Durgin Pond.

Photo left: One of two canals hand dug and blasted by the James family to bring more water to Durgin Pond for growing cranberries.

In 1907, Orrin James, the son of Samuel Shepherd and his wife Martha, inherited the James Farm and continued to manage the property, while Orrin continued working fulltime as a surveyor and civil engineer for the New Hampshire Highway Department. Orrin was mentioned often in the James Diary. He and his wife Abbie had no children, but were fond of their nephew Maurice who spent summers on the farm helping Orrin, and so they left the farm to him in 1948. Maurice James cared deeply for the land and the family heritage and has passed that on to his children and grandchildren. Within a year of his ownership, Maurice James engaged professional woodland managers to guide him in stewarding a healthy forest, a legacy that continues to this day.

“Maurice was a very kind and thoughtful man and committed to doing the right thing for the forest,” said Charlie Moreno, consulting forester who has worked with the James family since 1983. “He was respectful of people and the land, hosting many classes and field trips to view the land management practices.” Maurice pursued a career in engineering, but he always came back to the farm. Phil Auger, former UNH Cooperative Extension county forester, says, “The James Tree Farm has been a role model of good stewardship and long-term forest management for Coe Brown, Town of Northwood, and other landowners.”

Thursday, Jan. 23, 1902. Fair and pleasant. It thaws some today, ice and snow about all gone. Orrin and Small did work in the house and in the afternoon took a cartfull and a half a cart full of ashes from the cellar to the canal field and spread them on the ground. I went to the Whitmore lot and cut hoop poles and hooped a wash tub. In the afternoon took care at the barn. Nathaniel Emerson and F.E. Trickey came to our place. Orrin wrote a deed for them.

From the Diaries of Samuel Shepherd James

The easternmost parts of the James Tree Farm are more remote and rocky. Many of the property’s largest, remnant old trees still grow here. Some of these trees are more than 200 years old and include hemlock, white pine, red oak, and white oak, a living legacy back to the time when the Jameses first worked this land. The western and southern sections of the property reveal stonewalls, barbed wire, and other relics of a farming history.

A white pine stand with pine seedlings regenerating in the understory on the James Tree Farm.



Watershed Connections

A watershed is an area of land bounded by mountains, hills, or ridges (the highest points of elevation), where all the surface water within drains into the same river, lake, or pond. Watersheds can be large or small; smaller watersheds (or subwatersheds) are subsets of larger watersheds. The ridgeline that separates two watersheds is called a drainage divide.

We all live in a watershed, or actually many watersheds at different scales. For example, if you live on Jenness Pond, you are part of the Jenness Pond watershed. Water from Jenness Pond eventually flows into Northwood Lake and then to the Little Suncook River, so you are also part of that watershed. And likewise, the Little Suncook flows into the Suncook River and then to the Merrimack, so that is two more watersheds, increasing in size as you move downstream.

Watersheds connect us to our neighbors. Everyone living in the northwest corner of Northwood has a private well and relies on the natural processes of filtering and recharge of groundwater to maintain a source of clean drinking water. Activities on the land, such as malfunctioning septic systems, excessive fertilizers on lawns, or oils and other pollutants in stormwater runoff, can affect the health of groundwater and surface water. Watersheds also connect us to people living downstream. Northwood sits at the top of a major watershed divide, so downstream communities are affected by the actions here, where waters begin a long, meandering journey.

Maintaining water quality, preventing erosion, and avoiding flooding is largely dependent on land use practices within the watershed. Studies show that water bodies become degraded as impervious surfaces--pavement, buildings, concrete, severely compacted soils, and other hard structures--increase beyond ten percent. Impervious surface increases the volume of stormwater runoff and reduces groundwater recharge--the amount of water that seeps into the ground. This results in more frequent flooding, higher flood peaks, lower base flow in streams, and lower water tables. Thus, maintaining much less than ten percent impervious surface is key to maintaining a healthy watershed.

Small streams and wetlands in the headwaters of a watershed often begin as trickles, seeps, or depressions that overflow, are often not named or mapped, and are often overlooked. Yet, the quality and integrity of these headwater streams is critical to downstream habitats. These small headwater streams may make up 80 percent of the stream network in a watershed and are a critical link between land and water. Water flowing from the land into a stream carries insects, leaves, branches, and other material that are the start of the food chain for aquatic life.



A wooded riparian area along Flat Meadow Brook.

The exchange between land and water occurs in a transition zone along the edges of stream channels and around pond or wetlands edges, called a riparian area. Connectivity between stream channels, stream bottoms and banks, and the riparian area is important to protect water quality and aquatic habitats. Maintaining a natural stream channel and associated riparian habitat of tangled roots, fallen tree limbs, shrubs, trees, and herbs is key to sustaining the health of these waters. Similarly, maintaining natural habitats of sedges, flowers, shrubs, and small trees along pond shorelines maintains a healthier water body. A shore of natural vegetation filters nutrients and sediments, absorbs floodwaters, stabilizes shorelines, and provides fish and wildlife habitat.

The quality of shoreline habitat is one of the biggest influences on the presence and variety of wildlife that live in and around a water body. Lakes and ponds that are dominated by docks, rock-stabilized banks, lawns, beaches, houses, and heavy boat traffic will support far fewer wildlife than those bordered by some undeveloped shoreline and quiet backwaters. Fallen logs and trees in the water are important places for turtles to bask and areas for young fish to hide.

This story highlights several water bodies and their watersheds: Jenness Pond, Long Pond, Little Bow Pond, Durgin Pond, Flat Meadow Brook, Jenness Brook, Narrows Brook, Kelsey Brook, Shelburne Brook, and Bow Lake Headwaters. These are all within the greater Big Woods region. Table 1 lists the watershed size of each of these water bodies and shows how smaller watersheds are nested within larger watersheds. For example, Durgin Pond gathers water from 2,995 acres, including water flowing from Jenness Pond, Long Pond, Little Bow Pond, and its own headwater streams. Farther downstream, Narrows Brook drains water from 5,983 acres, including all of the Durgin Pond drainage as well as the Kelsey Brook/Harvey Lake subwatershed.

Table 1. Watershed sizes and road stream crossings for water bodies within the greater Big Woods region of Northwood.

Watershed	Watershed Size (Acres) ¹				Road Stream Crossings in Watershed
Flat Meadow Brook	1,556				6
Narrows Brook ²	5,983	784			8
Kelsey Brook ³		2,204			9
Durgin Pond		2,995	387		6
Jenness Pond			1,563		2
Long Pond			1,045	780	1
Little Bow Pond				265	0
Bow Lake Headwaters ⁴	~1,500				5
Sherburne Brook	1,535				5
¹ Watershed size calculated using USGS StreamStats					
² Narrows Brook gathers water from several upstream watersheds as indicated by each column					
³ Kelsey Brook flows out of Harvey Lake; above Harvey Lake the stream is known as Tucker Brook					
⁴ Bow Lake Headwaters within the Bear-Paw Great Woods Region only					

Table 2 provides additional information for Jenness, Long, Little Bow, and Durgin Ponds based on water quality data collected by the New Hampshire Department of Environmental Services (NH DES). Of note is the large watershed size and high flushing rate for the smallest of the four, Durgin Pond. Despite its small size, Durgin Pond collects a lot of water from upstream and flushes it through rapidly. The capacity of Durgin Pond, Narrows Brook, and their associated wetland complexes to absorb high flows, including flood events, is extraordinary and essential in preventing or limiting downstream flooding.

Table 2. Morphology and watershed data for Jenness Pond, Long Pond, Little Bow Pond, and Durgin Pond.

	Jenness Pond ¹	Long Pond ²	Little Bow Pond ³	Durgin Pond ⁴
Watershed Area (ac) ⁵	1,563	1,045	265	2,995
Surface Area (ac)	232	101	37	17
Shore Length (miles)	3.8	2.2	1.3	0.9
Max Depth (feet)	28	48	20	11
Mean Depth (feet)	9	15	11	3
Flushing Rate (yr ⁻¹)	1.6	1.2	1.2	92
Elevation (feet)	657	578	588	575
¹ Jenness Pond 2016 VLAP Report, NH DES ² Long Pond 2002-2003 NH DES Water Quality Report ³ Little Bow Pond 1989-1990 NH DES Water Quality Report ⁴ Durgin Pond 1999-2000 NH DES Water Quality Report ⁵ Watershed size calculated from USGS StreamStats				

Road Stream Crossings

The network of roads that traverses the Big Woods-Jenness Pond Region has been here for a long time, and the network of streams even longer. The two are intertwined; the roads and the streams are integral to the life of residents, summer visitors, and tourists. However, these junctures can have a huge impact on water quality, flooding, safety, aquatic habitat, and road maintenance budgets.

Whenever a road crosses a stream, a bridge or culvert made that crossing possible. Newer, well-constructed crossings allow streams and aquatic life to flow or pass freely under them. However, incorrectly sized, poorly placed, or damaged bridges and culverts can prevent fish and wildlife from moving up and downstream to find food, breeding areas, and other habitats (Maine Forest Service 2018). In addition, degraded crossings can cause excessive flooding, road washouts, and expensive maintenance, and they can be a safety hazard.

Culverts that are undersized relative to the natural width and depth of a stream tend to cause higher velocity stream flows that can prevent fish and other aquatic life from passing through. High water flows can also cause scouring immediately downstream of the culvert, which leads to “perching,” where the culvert ends up higher than the streambed, preventing passage by many fish and wildlife. Small culverts also restrict the natural flow of woody material that is an important structure for aquatic life in a stream. Instead, material clogs at the stream crossing and must be removed during road maintenance.

Fortunately, new designs for stream crossings are available that are safe, stable, reduce expensive erosion and washouts, and are fish and wildlife friendly. The ideal stream crossings are bridges and open-bottomed arches rather than pipe culverts. Whichever system is used, the following features make for a well-designed stream crossing:

- Use natural streambed for the bottom. If using a box or pipe culvert, bury it into the streambed
- Install a structure that is wide and high relative to its length. A structure should be a little wider than the natural stream bank width.

Table 1 lists the number of road crossings in each of the subwatersheds within our focus area. There are many crossings, and they vary in age, condition, and type. Ideally culverts or bridges are replaced and improved prior to a catastrophic event, which requires planning and funding. The Town owns two bridges in this region: Old Canterbury Road over Narrows Brook and Bow Lake Road over Sherburne Brook. Several state-owned bridges are located along Routes 4 and 107. The other crossings are variable-sized culverts, a few of which were replaced after severe 100-year flood events in recent years. The Bow Lake Road bridge over Sherburne Brook is 78 years old and reached the end of its useful life about 28 years ago. The bridge is on the State's red-list for being structurally deficient. The bridge and road are extremely deteriorated, necessitating weight restrictions. The Town of Northwood has applied for a large grant through the NH Department of Transportation to replace the bridge and upgrade the road (SRPC 2014, Town of Northwood 2016).



This open bottom box culvert on Harmony Road allows free flowing water and benefits aquatic life.



Concrete culvert, inlet to Jenness Pond



Metal culvert, Flat Meadow Brook, Old Turnpike Rd



Buzzel's Run Bridge, Northwood Road



Sherburne Brook Bridge, Bow Lake Road

Invasive Plants

The State of New Hampshire defines an “invasive species” as, *a naturalized, non-native plant taxon (species, subspecies, variety, form or cultivars) that invades native plant communities and proliferates, out-competes native species, disrupts ecological processes by threatening imperiled species and decreasing biological diversity. In addition, invasive species can also include plants, insects or fungi that cause economic harm to agricultural and forests crops or pose a serious health hazard.* In essence, it is any non-native plant, whose introduction causes or is likely to cause economic or environmental harm or harm to human health (NHDA 2006).

Invasive species typically have certain traits that give them an advantage over most native species. These traits include producing many offspring, early and rapid development, and being adaptable and highly tolerant of many environmental conditions. Studies show that invasives can reduce natural diversity, impact endangered or threatened species, diminish wildlife habitat, affect water quality, stress and reduce forest and crop production, damage personal property, and cause health problems.

Humans and wildlife often unintentionally transport invasive plants. Many were planted purposefully in the past for wildlife, erosion control, or as landscape plantings, before their invasive qualities were commonly known. Others came in via international commerce. Many invasive plants appear first in disturbed areas, such as along roadsides and trails, in gravel pits, or at the edges of fields. They can be moved along roadways by plowing, mowing, roadwork, landscaping, as well as by animals.

The NH Department of Agriculture maintains a list of prohibited plant species for the state. Several of these plants are present along roadways and waterways in Northwood, including Japanese knotweed, Japanese barberry, and Asian bittersweet. With a more thorough survey, likely others are present as well. Invasive plants are difficult to eradicate once established. These plants should not be sold or planted and attempts should be made to remove and properly dispose of small populations and stem the movement along roadways.



Invasive Japanese knotweed along Old Turnpike Road.

Jenness Pond Watershed

Jenness Pond shore owners appreciate this 232-acre quiet body of water located in the northwest corner of Northwood. They watch eagles and osprey catch fish and loon chicks try to fly and enjoy the sights of turtles basking in the warm sun and great blue herons feeding in the shallows. On an evening paddle, they might watch beavers repair their lodge or gather food. Bear, turkey, deer, bobcat, coyote, fox, and fisher all wander by the lake now and then, some more frequently than others. Anglers pursue warm-water fish, including smallmouth bass, largemouth bass, brown bullhead, and chain pickerel.

The 1,563-acre Jenness Pond Watershed straddles the Towns of Northwood and Pittsfield. A 2006 land use assessment of the watershed showed the following land covers: forested (61%), open water (17%), pasture/hay (8%), developed (6%), shrub and grassland (5%), and wooded wetland (2%) (Fry et al. 2011). The pond is mostly in Northwood, while much of the headwaters lie within Pittsfield. Two unnamed headwater streams flow into the pond on the western shore. Water flows out of the southern tip of Jenness Pond via Jenness Brook. From there, the brook winds around the west side of Browns Hill, under Jenness Pond Road and the private road to Long Pond, before flowing into Durgin Pond.

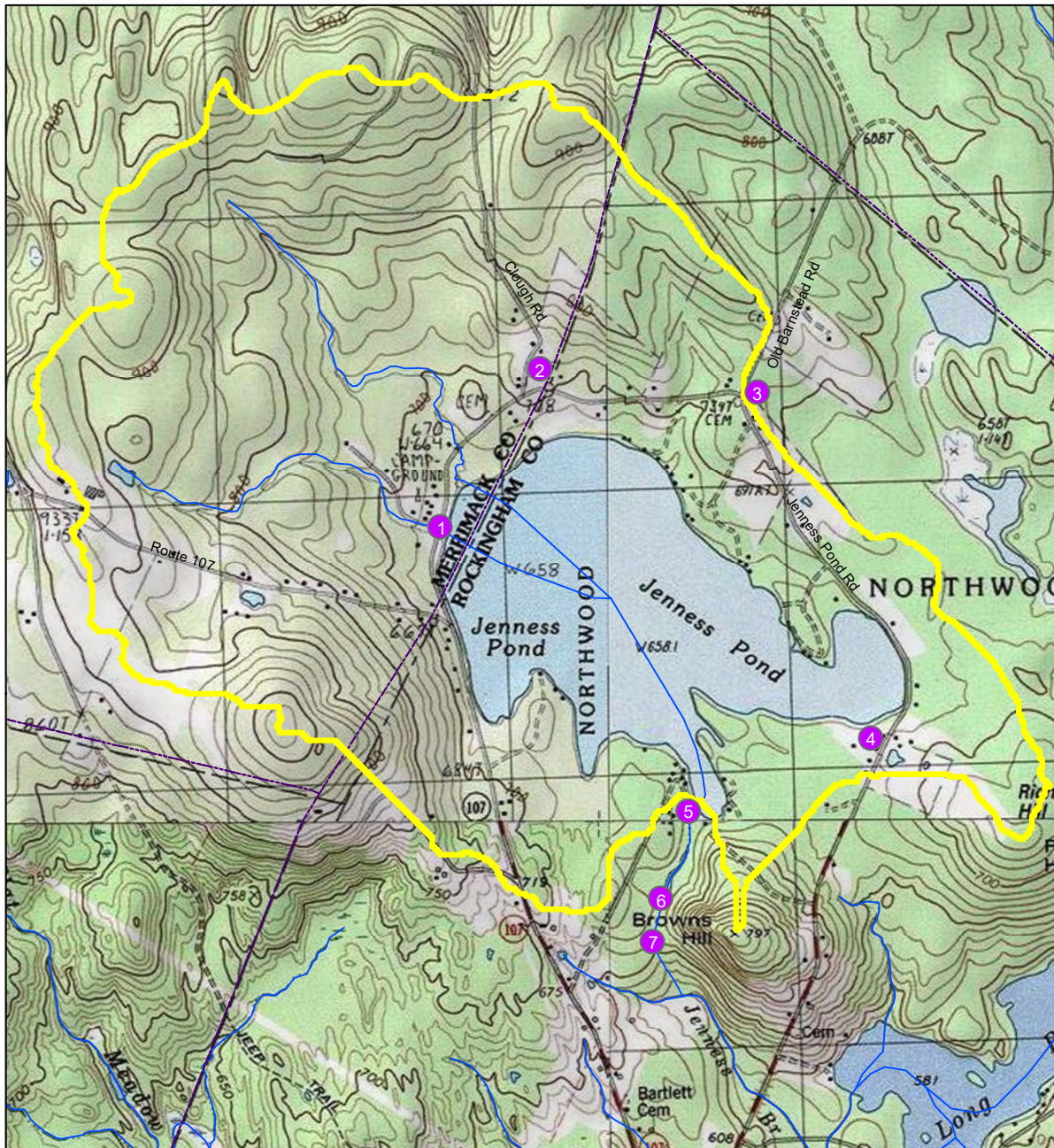
Since 1994, the Jenness Pond Shore Owners Association has been collecting water quality data for the pond as part of the state's Volunteer Lake Assessment Program (VLAP). It is a relatively shallow pond with a mean depth of nine feet; the deepest spot reaches 28 feet. Although well known as a beautiful pond with pristine water, the water testing reveals declines in several parameters over time (Table 3). Jenness Pond has a very low flushing rate, such that anything coming into the pond tends to stay longer and be at higher concentration levels than in similar lakes.

Pond clarity has declined in Jenness Pond since 2009, due to algal growth, and it is getting progressively worse. This is likely caused by high phosphorus loading in the watershed. Potential phosphorus sources in the watershed include farming practices, stormwater runoff, septic systems, and erosion of beach areas and steep slopes.

Lakeshore owners note areas in the pond that are no longer suitable for wading and swimming due to the depth of the muck. Elevated chloride levels in the watershed are likely due to runoff from road salt.



Boat launch on Jenness Pond.



Historic and Other Key Sites:

- 1 Boat Launch
- 2 Caleb Clough House, 1775
- 3 Brown House, 1770 (Meadow Farm B&B)
- 4 Watson House, 1848 (Lake Shore Farm)
- 5 Jenness Pond Outlet (water level control structure)
- 6 Historic stone dam
- 7 1950s Fish Barrier

Jenness Pond Watershed

Topographic Map

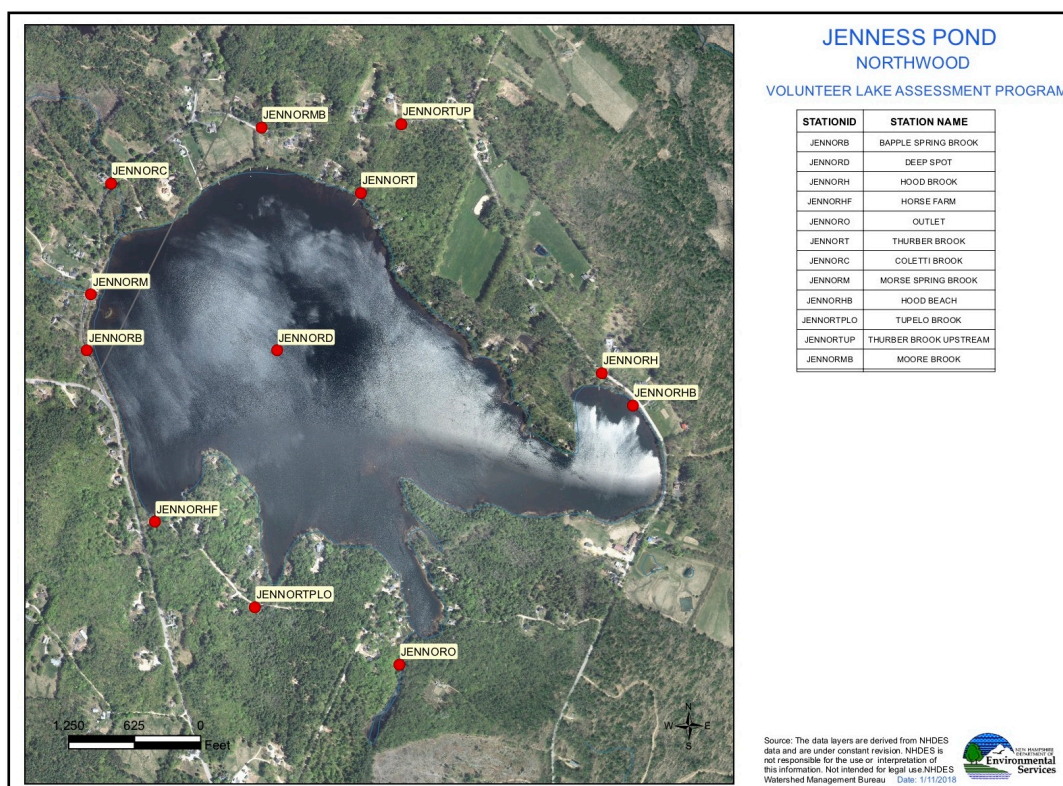
0 0.25 0.5 Miles



Table 3. Water quality data for 2016 and long-term trends based on Volunteer Lake Assessment Program (VLAP) volunteer monitoring (NH DES 2016).

Parameter	Description	Jenness Pond	Trend (1994-2016)
Chlorophyll-a (micrograms/liter)	Amount of microscopic plant life	3.88	Stable, but highly variable
Transparency (depth in meters)	Water clarity	3.6 – 4.2	Decreasing significantly
Total phosphorus (micrograms/liter)	The nutrient most responsible for microscopic plant growth; higher phosphorus levels often due to nutrient loading from watershed land uses	9-10	Stable, moderately variable
Chloride (milligrams/liter)	Elevated chloride levels often result from road salt runoff	18	Slightly elevated, especially in tributaries
pH	A pH below 5.5 is suboptimal for fish growth and reproduction; 6.5-9.0 is optimal	6.37	Slightly less than optimal, especially in tributaries
E. coli (coliform bacteria) (#/100 milliliter)	The state standard is < 406/100 mL for lakes and < 88/100 mL for beaches	20,000	Severely elevated levels. This is from a 2004-2005 sampling event; The source of the contamination is likely gone; water quality testing is planned for 2018
Cyanobacteria	A natural component of water bodies but excessive blooms can cause health problems	Slightly bad	A slightly bad bloom was detected in the pond in 2011

Map of Volunteer Lake Monitoring Program (VLAP) water quality sampling sites (Provided by NH DES).



The Jenness Pond Shore Owners Association includes about 50 households. In 2002, the Association launched a Lake Host Program to prevent the arrival of invasive aquatic plants such as milfoil. On summer weekends, the lake host greets people at the boat launch on the western shore to alert them to this plant and ways to stop its spread. These invasive plants grow quickly and choke out native plants. Once present in a water body, it is nearly impossible to eradicate and can reduce shorefront property values, degrade water quality, and affect recreation and aesthetic qualities. To curb the spread of these economically and ecologically damaging plants, the NH Legislature passed a law that prohibits the transport of any aquatic plants on recreational gear and related trailers, and goes further to require that boats and other water-containing devices be in the open drain position during transportation. In addition to lake hosts, NH Department of Environmental Services (DES) urges boaters to practice the “Clean, Drain, Dry” protocol, to ensure that their gear is free and clear of any potential invasive species or other contaminants. This involves three steps:

- CLEAN off any plants, animals, and algae found during your inspection and dispose of it away from a waterbody
- DRAIN your boat, bait buckets, bilges, and other equipment away from the waterbody, leaving your boat’s drain in the open position during transport
- DRY anything that comes into contact with the water

An earthen and stone dam was constructed about 1,000 feet below the outlet of Jenness Pond in the late 1700s to provide sufficient water pressure and flows for a downstream sawmill and grist mill. A noticeable berm along the western shore of Jenness Pond may be an artifact of the hydraulic action due to raising and lowering the water levels during that time (Steve Bailey, Personal Communication). During the 1980s some shore owners wanted lower water to provide more beach area and desired to lower the level of the dam. The issue was finally resolved when in 2014, the New Hampshire Legislature passed HB 1197, which authorized the Shore Owners Association to construct a dam at the natural outlet of Jenness Pond and to use the dam to seasonally control the water level in the pond. The dam is a simple pair of concrete abutments that hold an eight-inch plank. The top height was set to keep the water at a level conducive to successful common loon nesting. The plank is installed in April to restore the water level and removed in October to lower the water level to prevent spring flooding.

In 1958, New Hampshire Fish and Game fisheries biologists conducted a study of the fish in Jenness Pond, with a specific emphasis on estimating the population size of smallmouth bass. The results indicated a smallmouth bass population decline, which the biologists attributed to high numbers of yellow perch and common sunfish (both predators and competitors of bass), as well as a severe infestation of the bass tapeworm. To reverse this trend, they recommended a total reclamation (killing of all fish) of the pond, restocking with tapeworm-free bass, chain pickerel, brown bullhead, crayfish, and redbfin shiners, and installation of a fish barrier below the dam to prevent movement of “rough fish” into the pond (NHFG 1958). Apparently, these steps were taken, but likely were not successful; the fish



Fish barrier built on Jenness Brook in the 1950s.

barrier is still in place. Smallmouth bass were introduced into New Hampshire in the mid-1800s and are now widely distributed. Fisheries biologists now recognize that conclusions and recommendations from those early studies such as Jenness Pond erred in the favor of non-native species, at the expense of the native fisheries and diverse aquatic systems. The latter is now the approach to fisheries management, although bass remains a popular fish for anglers.



In 1774, a road was laid from the Northwood Narrows north to the west side of Jenness Pond and on to what is now Pittsfield. That same year, a road was built on the east side of Jenness Pond that led to what is now Strafford. These became Route 107 or Catamount Road and Jenness Pond Road, respectively. It is a beautiful drive around Jenness Pond, with views of fields, the pond, and several historic sites.

The first house on the spot now occupied by Lake Shore Farm was built in 1848 and is known as the Watson House. But the family arrived much earlier, when Rueben and Elizabeth Brown, who were among the first settlers, settled in the Jenness Pond District around 1789. Their grandson, Rueben Watson, built the 1848 house. Sometime in the late 1880s, the house was expanded to allow the first summer boarders, and in 1926 Lake Shore Farm Inn was established. Successive generations of the family owned and managed the property, with several renovations and expansions along the way. In 2012, Lake Shore Farm was sold to the Daniels family, who hope to carry-on the traditions of this historic site (Bailey 1976).

Farther north on Jenness Pond Road, at the corner with Old Barnstead Road is the Meadow Farm Bed and Breakfast. This 1770 home was originally built by Samuel Brown and remained in the same family for nearly 200 years. Doug and Janet Briggs restored the home and host guests on their 50 acres of woods and fields. The Caleb Clough house, built in 1775, is located north of the Pond at the corner of Jenness Pond and Clough Roads.



Photo by Jean Stimmell

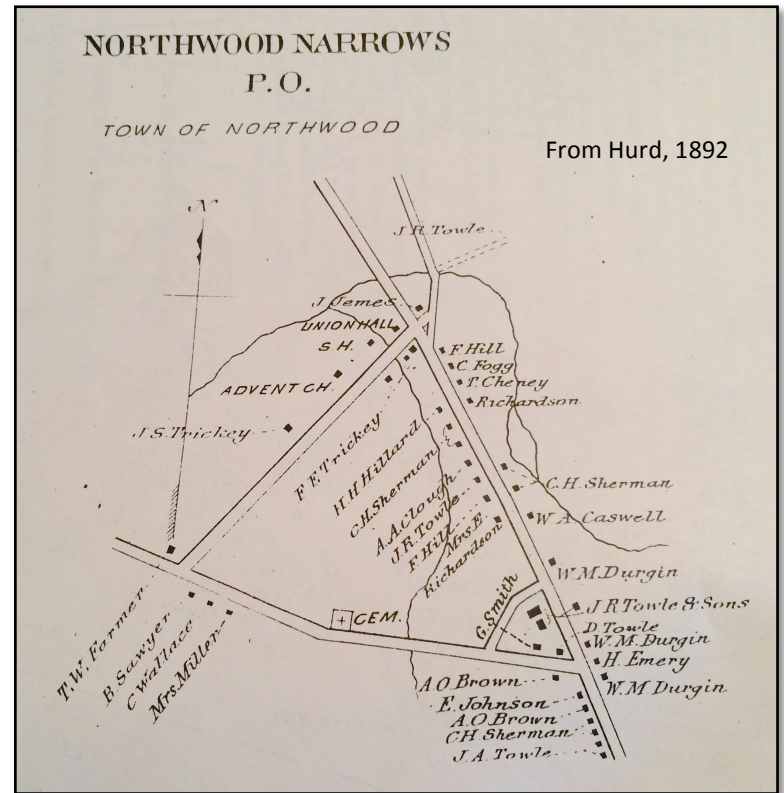
My particular focus of meditation is a small, unnamed island on Jenness Pond. Taking the longer cosmic view of an ancient Chinese sage, my island has been a cog in the whole evolution of our Planet Earth in which, in some vital sense, I have always been a part. I have passed by her almost daily for all my 71 years, always smitten by her shifting transformations. I walked by her daily to catch the school bus, often played and fished by her shores, and once fell through new ice, foolhardily trying to skate by her too soon...I watch Jenness Pond fill like a schist bathtub as the last ice age recedes; I see the first pioneer species of plants take root; I smile as the first snapping turtle shoves herself clumsily up on a rock to sunbathe...as the first blue heron spears a fish...the first indigenous people gather clams in the shallows of my island.

--excerpt from "Losing Myself in an Island", By Jean Stimmell, Concord Monitor, 5/24/2017

Northwood Narrows

In the spring of 1762, Solomon Bickford reached the northwest corner of Nottingham, the area now known as Northwood Narrows. Originally, the Narrows was the name given to the slender ridge of land lying between the streams flowing from Harvey Lake (Kelsey Brook) and Durgin Pond (Narrows Brook). Main Street runs along this ridge. Today, Northwood Narrows more broadly describes the western end of Northwood, near Route 4.

The early settlers found grassy meadows for cattle fodder, waterways for mills, streams and ponds full of fish, and woods wild with game. During the 150 years or more after it was established, Northwood's fortunes ebbed and flowed, first with mills and lumbering, then shoe factories and taverns with services to accommodate travelers who used the first New Hampshire Turnpike (now Route 4) from Concord to Portsmouth.



Northwood was a center of trade in the 1800s, but by 1900 the shoe industry (1840-1920s) had faded, railroads directed trade elsewhere, and by 1960, no businesses were left in the Narrows. By the 1890s, many mill workers had left to work in Massachusetts, but they then started bringing friends and family back to lakeshore camps and cottages. Later, the scenic lakes and ponds began attracting summer boarders, and Route 4 returned as an important route between Portsmouth and Concord.

Samuel Johnson built the first gristmill just below the confluence of the two streams, Narrows Brook and Kelsey Brook. Carding and fulling (cloth-making) mills were located here, too. In the late 1800s, Northwood Narrows also hosted a schoolhouse, two stores, a post office, and shoe manufacturing. People took the train from Boston to Epsom then rode by carriage to the Narrows. Locals brought their goods to the stores here to trade for the products. Samuel Shepherd James wrote in his diary on Monday, Sept 1, 1902: "I carried five lbs. of butter & 5 ½ doz eggs to Wm. H. Towle's, bought 50 cts worth of sugar, one lb. coffee, 2 lbs. crackers, 1 bag meal and one bag mixed feed."

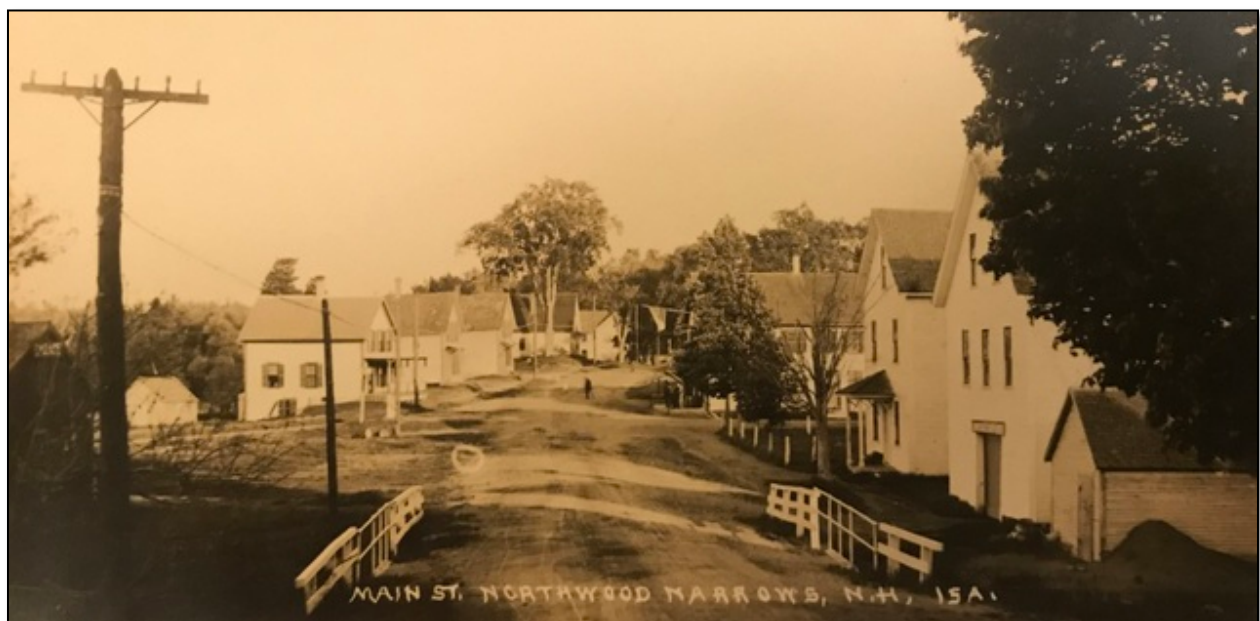


Historical photos (early 1900s) from the Northwood Historical Society:

Above: Bartlett Mill on Narrows Brook above Old Canterbury Road, forms a lake up to Main Street.

Right: The Bartlett Mill in the Narrows.

Below: A view of Main Street, across Narrows Brook. Community Center is second large white building on right.



During all this time, from 1762 when Bickford first arrived over the ridge until present day, Northwood Narrows has retained its historic and scenic character. In 1955, the Johnson's Dairy Bar opened on Route 4 above the Narrows. While currently undergoing a major expansion, the restaurant retains the iconic view across a field to the historic Canterbury Road Cemetery. Several old roads, including Old Canterbury Road and First Turnpike Road, are much as they were when first built, although development is creeping up the gravel roads. Several of the buildings documented in Hurd's 1892 map of the Narrows remain, including the Advent Church, Brookside School, Community Hall, and Post Office.



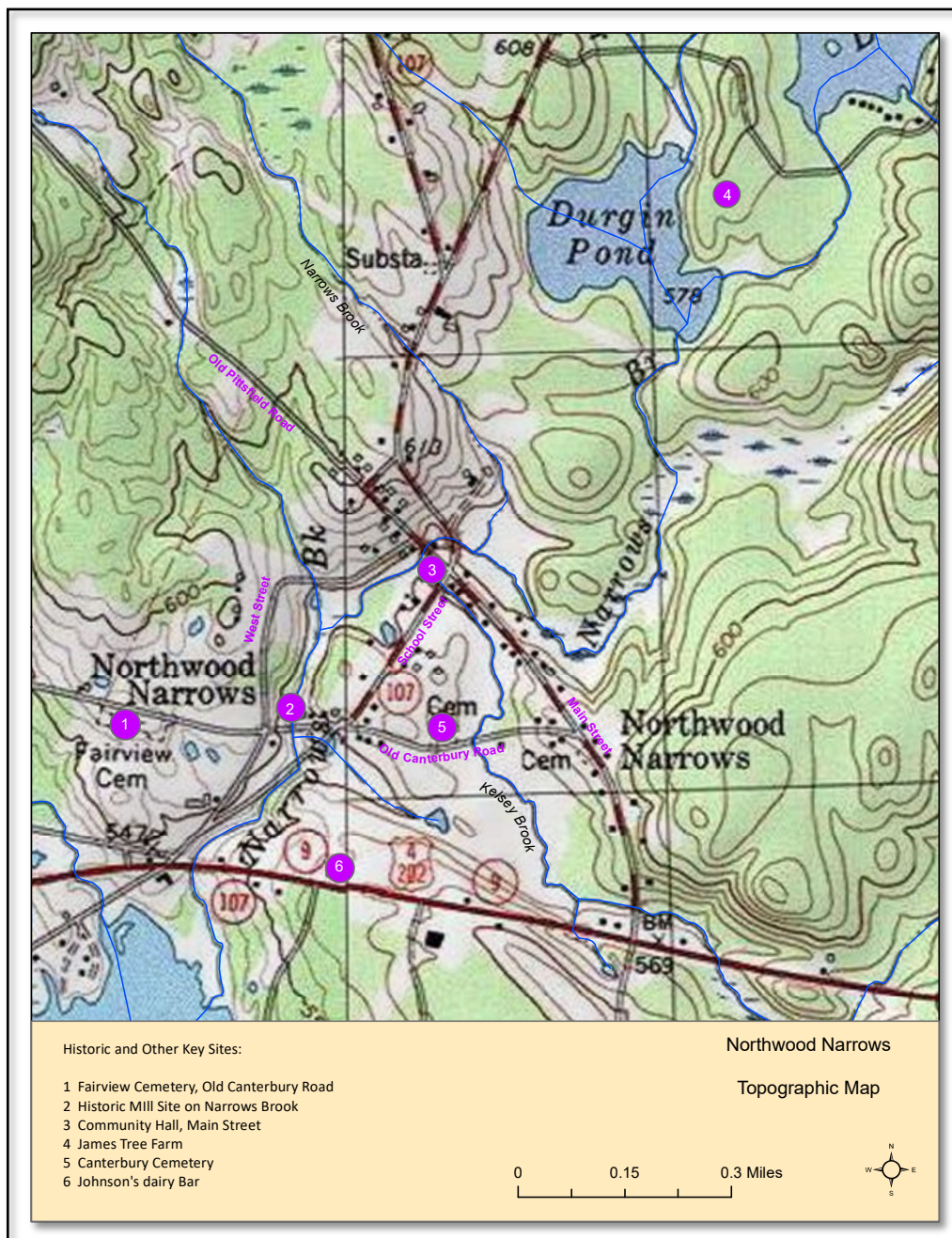
Left: Old Canterbury Road between School Street and Main Street, not far from Route 4, remains much as it was 200 years ago.

Below: The iconic view from Johnson's Dairy Bar across a field to the Canterbury Cemetery on Old Canterbury Road.



Narrows Brook

The main stem of Narrows Brook flows out of Durgin Pond, meanders through a long network of wetlands gathering more water from another tributary, and then flows under High Street and Main Street in Northwood Narrows. It is there, behind the Community Hall, where Kelsey Brook joins Narrows Brook. Another branch of Narrows Brook flows down from the region of Old Pittsfield Road and joins the main stem just upstream of the former Mill site. From there, Narrows Brook flows under Old Canterbury Road, School Street, Route 4, and finally reaches Northwood Lake 1.7 miles from the outlet of Durgin Pond.

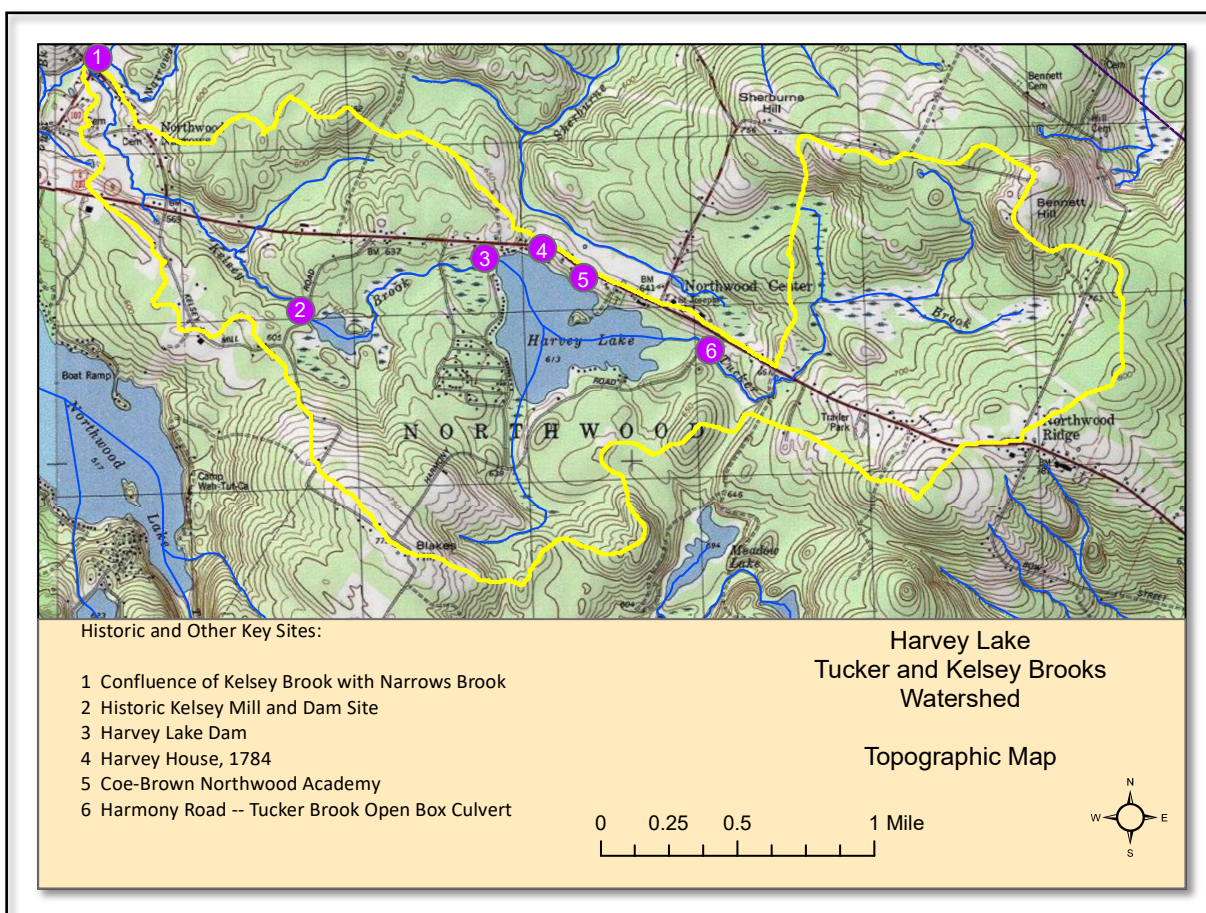


Harvey Lake – Tucker and Kelsey Brooks

Tucker Brook begins north of Route 4, between Ridge Road to the east and Bow Lake Road to the west. The Brook flows through marshy areas for about one mile, then flows under Route 4. In another $\frac{3}{4}$ mile, it flows into an eastern cove of Harvey Lake. The 116-acre Harvey Lake lies just south of Route 4 in Northwood Center. Coe-Brown Northwood Academy is located along the north shore of the lake. Harmony Road passes along its southern shore, and homes and camps are clustered on the western side of the lake. The 1784 Harvey House still stands along Route 4.

The Harvey Lake Watershed Association has a Lake Host Program, participates in the Volunteer Lake Assessment Program (VLAP), and has a Weed Watchers program, keeping an eye out for invasive plants.

Kelsey Brook flows out of the northwest corner of Harvey Lake, passes through several marshy areas, and in about $\frac{3}{4}$ mile flows under Kelsey Mill Road at the site of the historic Kelsey Mill. From there, Kelsey Brook flows northwest about 1.5 miles, passing under Route 4, Main Street, Canterbury Road near the Cemetery, and School Street, before reaching the confluence with Narrows Brook behind the Community Hall. The Harvey Lake-Tucker Brook-Kelsey Brook watershed encompasses 2,204 acres, a rather large watershed that extends several miles from the Ridge to the Narrows.



Flat Meadow Brook

The Flat Meadow Brook watershed encompasses 1,556 acres in the towns of Pittsfield, Epsom, and Northwood. Flat Meadow Brook begins near the junctions of Route 107 and Hills Road in Pittsfield and flows 3.5 miles to its outlet at Northwood Lake just west of Northwood Narrows. Three towns and two counties come together in the upper part of this watershed: The Towns of Pittsfield and Epsom in Merrimack County and the Town of Northwood in Rockingham County intersect just south of what some call Fogg's Hill—which forms the watershed divide between Flat Meadow Brook and Jenness Pond.

It is a mostly wooded watershed, with the larger landowners conducting periodic timber harvests. Beaver are active in this drainage, creating habitat for other wildlife. As with other stream systems in the greater Big Woods region, Flat Meadow Brook has numerous associated wetlands that help absorb flood waters, filter nutrients, and re-charge groundwater. Local residents enjoy the opportunity to explore the woods and wetlands, especially by snowshoe in winter, as most of the land is not posted.

On the easterly side of the watershed, Hills Road in Pittsfield runs southeast, becomes a Class VI road, and then just beyond the watershed boundary it becomes the Class V Old Pittsfield Road in Northwood. Most of the watershed in Pittsfield and Epsom is unfragmented by roads, houses, or other development. This lack of impervious surface helps keep the watershed healthy and allows natural systems to function to the benefit of downstream residents.

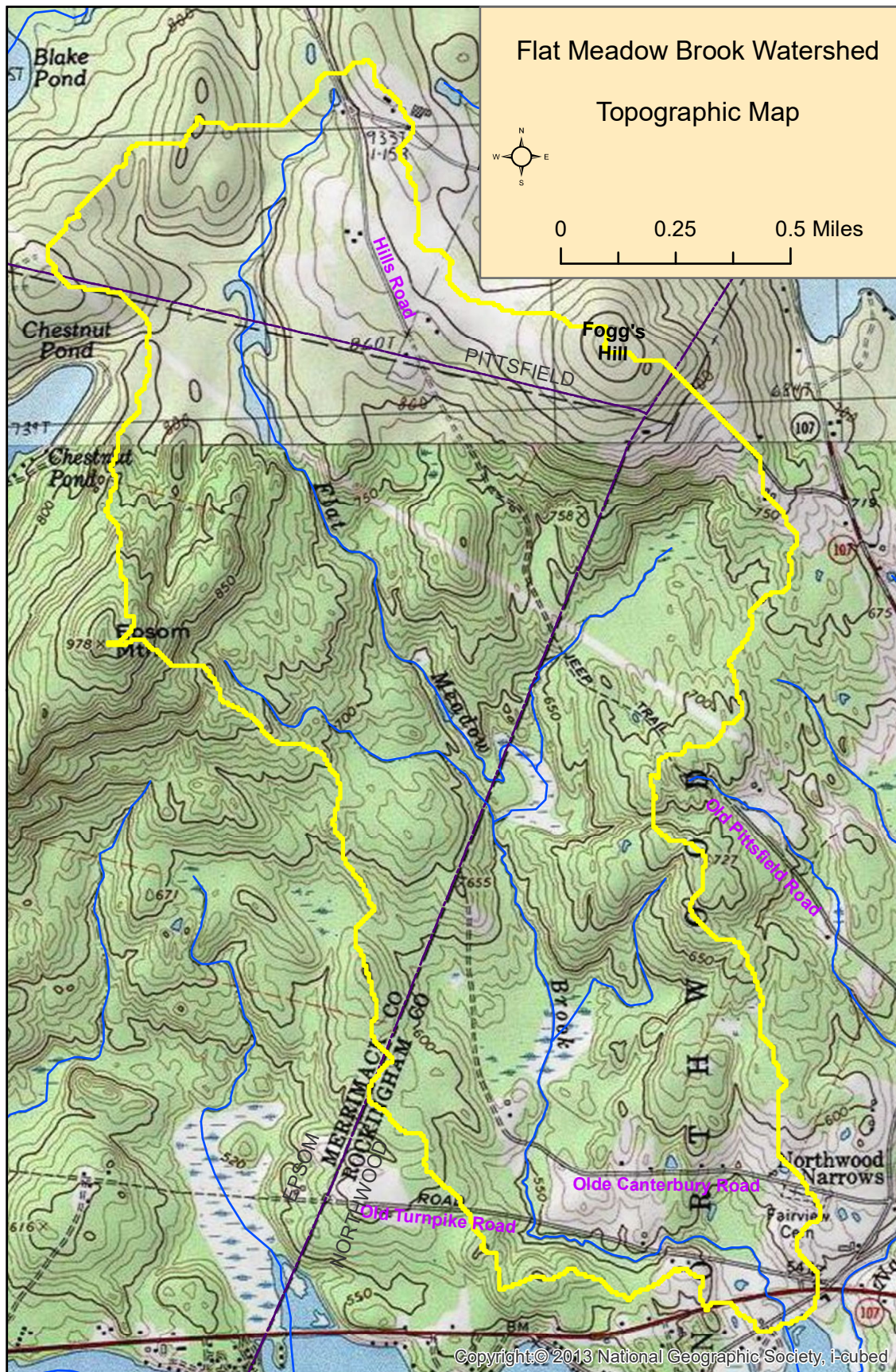
The southern section of the watershed in Northwood has most of the roads, which includes six stream crossings. Old Canterbury Road and Old Turnpike Road are east-west running Class V mostly gravel roads that turn into Class VI roads. The Fairview Cemetery is located on the height of land dividing the Flat Meadow and Narrow Brook subwatersheds. Farther south, Flat Meadow Brook flows under Route 4, then Lakeshore Drive, before flowing into Northwood Lake. Residential development is expanding in the Northwood region of the watershed, off Route 4 and along Old Turnpike Road and Old Canterbury Road.



Flat Meadow Brook in upper part of watershed in Pittsfield.



Flat Meadow Brook in lower part of watershed along Ye Olde Canterbury Road in Northwood.



Summary and Recommendations

The Town of Northwood sits atop a major watershed divide and thus does not lie downstream from any other community. A low ridge winds through the northwest corner of the town, forming the divide between the Merrimack River Watershed to the west and the Coastal Watershed to the east. This part of Northwood is hilly and wooded, with scattered fields and a network of ponds, brooks, and wetlands. Here too, historical mill sites and dams remain as a testament to the work of early settlers, who captured the power of water to produce food and fiber. The steep terrain, rock outcrops, and pristine ponds create an ambiance similar to New Hampshire's White Mountains region.

This story describes the lands and waters in this northwest corner of Northwood, encompassing the Big Woods-Jenness Pond region and beyond. Northwood's Master Plan highlights the ecological significance of the 1,800-acre Big Woods, an area unfragmented by roads or development and supporting a diversity of interconnected ponds, wetlands, and brooks that wind through a rolling, upland forest of oak, beech, hemlock, and pine. The Big Woods lie within a 3,325-acre block of habitat identified by Bear-Paw Regional Greenways as a high-priority forest block for wildlife conservation values.

The greater Big Woods region encompasses several beautiful ponds. These range in size from the 232-acre Jenness Pond, popular with year-round shore residents, anglers, and visitors, to the undeveloped shores of the 17-acre Durgin Pond and 37-acre Little Bow Pond. These lands and waters provide enjoyment, scenic vistas, inspiration, and recreation, as well as habitat for aquatic and terrestrial plants and animals, and clean water. Everyone in this region depends on groundwater for their drinking water and thus depends on their neighbors and community to employ best land use practices.

Nearly all the land in this region is privately owned, and most landowners have kept their land open for people to hike, snowshoe, hunt, fish, and explore. Some areas seem much as they were 200 years ago. In Northwood Narrows, several historic buildings remain, huge maple trees border Canterbury Cemetery, and Old Canterbury Road, still gravel, is within earshot of Route 4, yet feels unchanged. The Big Woods is still undeveloped, and some watersheds such as Flat Meadow Brook are largely unfragmented, but development is creeping in as more people discover this corner of Northwood.

These lands and waters have kept generations of families here and attracted more recent arrivals. Whether people have come here for family, retirement, livelihood, or other reasons, they all share in the beauty and benefits of this place. The Northwood Area Land Management Collaborative, or NALMC, has inspired landowners and community members to gather, share information, connect with their land, learn from each other, and collectively build a land ethic.

With Route 4 as the major thoroughfare between Portsmouth and Concord and the growing popularity of Northwood, development pressure in the Big Woods-Jenness Pond region will grow and create change. To maintain wild places, clean drinking water, scenic vistas, unfragmented woods, remote ponds, and healthy lands, landowners and community leaders can plan and guide future changes and protect shared values and resources. The following recommendations offer a few suggestions.

Protecting Ponds, Brooks, Wetlands, and Water Quality

- Encourage your neighbors within your respective watershed to follow Best Management Practices to prevent polluted runoff, minimize use of fertilizers and pesticides, prevent erosion, and maintain riparian habitat to protect surface and ground water. UNH Cooperative Extension offers several good resources:
 - “Landscaping at the Water’s Edge: An Ecological Approach”
http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
 - “New Hampshire Homeowner’s Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home”
<http://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf>
- Continue to support the Jenness Pond Shore Owners Association Volunteer Lake Monitoring Program (VLAP). Consider starting water-quality monitoring efforts in other watersheds by joining VLAP or the NH Volunteer River Assessment Program (VRAP) to gather water samples in the brooks and other ponds, which will help assess water quality, identify issues, and guide future planning. Contact: Ted Walsh, NH DES, 603-271-2083, ted.walsh@des.nh.gov.
- Continue to support the Jenness Pond Shore Owners Association’s efforts to control the introduction of invasive aquatic plants into Jenness Pond.
- Support the Town Road Agent and relevant committees in assessing use of road salt and consider steps to prevent or reduce runoff into the waterways. Assess other disturbed areas that may be contributing contaminants, sediment, or other pollutants into streams or ponds.
- Review the Town’s 2017 Hazard Mitigation Plan as it relates to improving road culverts that affect water quality. Host site walks within your respective watershed to understand existing road stream crossings and opportunities for improved culverts where needed and feasible. NH DES has funding for high-priority stream crossing improvements. Check out their website at www.des.nh.gov.
- Support Town of Northwood’s plan to replace the Sherburne Brook Bridge and upgrade Bow Lake Road in that area.
- Host informational meetings at the Community Hall on land and water stewardship topics. For example: Invite NH Fish and Game biologists to discuss water quality, culverts, fisheries, and fishing the Big Woods-Jenness Pond region. Contact John Magee, NHFG Fish Habitat Biologist, at 603-271-2744, john.magee@wildlife.nh.gov. Invite NH Department of Environmental Services (DES) staff to discuss watershed grants, stream crossing programs, invasive aquatic plants, and other water topics.
- Ensure that all septic systems are functioning properly and not creating any discharge into waterways or contaminating groundwater.
- Learn about the story of Wild Goose Pond and its Watershed available on the Pittsfield website at: http://pittsfieldnh.gov/wp-content/uploads/2016/04/Wild-Goose-Pond_Final.pdf. Out of that story grew a collaboration among neighboring landowners, most recently resulting in the permanent conservation of several properties. Similarly, visit the NALMC website (www.nalmc.net) and learn about their mission of “working together across our stonewalls” and how conserving public and private lands has helped protect the Upper Lamprey River watershed.

Maintaining Healthy Woodlands, Diverse Wildlife Habitats, and Large Unfragmented Forests

- UNH Cooperative Extension provides technical assistance to landowners and communities through site visits, workshops, and publications. Here are a few forestry and wildlife professionals and programs at Extension:
 - Andy Fast, Strafford County Field Specialist in Natural Resources, Andrew.fast@unh.edu, 603-841-6544
 - Matt Tarr, Wildlife Specialist, Durham, matt.tarr@unh.edu, 603-862-359
 - Haley Andreozzi, Wildlife Outreach Program Coordinator, haley.andreozzi@unh.edu, 603-862-5327
 - Taking Action for Wildlife: stories and guidance on managing for wildlife: <https://takingactionforwildlife.org/>; an email newsletter is available
- Monitor for invasive plants throughout the watershed. These often appear first in disturbed areas, along roads, trails, and waterways, and around ponds and fields. Invasive plants are often brought in on road or landscaping materials. When possible, know sources of clean fill and use on-site materials whenever possible. Do not put invasive plants in compost, as the seeds and roots remain viable. Ensure that new developments are not planting invasive plants on the state's prohibited list and that these plants are not sold at nurseries or at local plant sales. For more information on invasive plants, visit the NH Department of Agriculture at <https://www.agriculture.nh.gov/divisions/plant-industry/invasive-plants.htm>.
- In New Hampshire, private licensed foresters provide forest management guidance to landowners. They write management plans and oversee logging operations, while following best management practices to protect water quality, soils, and habitats. UNH Cooperative Extension maintains a list of licensed foresters. Contact Andy Fast for more information. Landowners may be eligible for financial assistance from the Natural Resources Conservation Service to cover costs of a management plan and implementation. Contact the NRCS Epping Field Office at 603-769-1587, 629 Calef Highway, Suite 203, Epping, NH 03042.
- NH Fish and Game (NHFG) and the Natural Resources Conservation Service (NRCS) have grant programs available to landowners, including farmers, to manage forests and wildlife habitats:
 - NHFG Small Grants Program: <http://www.wildlife.state.nh.us/habitat/small-grants.html>
 - NRCS landowner assistance: Keri Neal, District Conservationist, Epping, 603-734-9167
- Invite water, wildlife, soils, forestry, agricultural, or other resource professionals in to lead a walk or give a talk about a particular topic relevant to these watersheds.
- Learn about land conservation opportunities to help ensure continued protection of water quality, farmland, large forests, wildlife habitat, and other watershed values. UNH Cooperative Extension (Andy Fast) and local land trusts, such as Bear-Paw Regional Greenways (www.bear-paw.org) and Southeast Land Trust (www.selthnh.org) are good sources of information.
- Work with interested landowners to explore options for trails and trail networks, connecting with other regions including NALMC and adjoining communities.

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Site of historic Kelsey Mill on Kelsey Mill Road, Northwood, NH.