

**Wildlife Habitat and Land Stewardship Plan
for the
Thompson Forest**

Durham, New Hampshire



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for the
Thompson Forest
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Purpose of this Plan

The goal of this Stewardship Plan was to assess the current condition of the property and to guide the implementation of restoration and management activities to protect water quality, benefit wildlife and other ecological values, and determine recreational opportunities on the Thompson Forest. This was achieved by identifying and evaluating the soils, topography, plants, animals, habitats, water and wetlands, cultural features, environmental health, and landscape setting of the property.

This Wildlife Habitat and Land Stewardship Plan includes the following chapters and materials:

- ❖ **Chapter 1 – Property Description** describes the location, property history, deeds and associated documents.
- ❖ **Chapter 2 -- Ecological and Cultural Features** describes the landscape setting, topography, soils, water features, habitats, plants and animals, environmental health, and cultural features of the property.
- ❖ **Chapter 4 – Wildlife Habitat and Land Stewardship Recommendations** presents management actions to meet stewardship objectives: water quality, wildlife habitat, and recreation.
- ❖ **A set of maps is included as Appendix 1** to further illustrate the property features.
- ❖ **Appendices 2-10** provide additional background material and property documents.

A Local Source Water Protection grant from the NH Department of Environmental Services provided funding for this Stewardship Plan.

Chapter 1 Property Description

Location and General Description

The 54-acre Thompson Forest is located near the corner of Packers Falls Road and Wednesday Hill Road in Durham, New Hampshire. The Town of Durham acquired the property in 2016 and conveyed a conservation easement to the Southeast Land Trust of NH (SELT). The Thompson Forest has 2,000 feet of frontage on Wednesday Hill Road to the north and nearly 2,200 feet of frontage along the Wild & Scenic Lamprey River to the south.

A primary reason for conserving the property was to protect the drinking water supply for the Town of Durham and the University of New Hampshire. The Town and UNH maintain a water intake and pump station to withdraw water from the Lamprey River on an abutting 0.25-acre parcel. A gated, gravel access road leads from Wednesday Hill Road to the pump station along a 20-foot wide deeded right-of-way on the eastern edge of the Thompson Forest. A portion of a sand and gravel aquifer lies beneath the property and the eastern 33-acres of the property lie within the water supply intake protection area (see Baseline Documentation – Appendix 7).

This 54-acre parcel is the last remaining undeveloped piece of the original 200+ acre Thompson Dairy Farm. Historic photographs and current conditions indicate that the relatively flat northern half of the property was maintained as pastures or fields (see Appendix 9), which were abandoned at least 20 years ago (Kim Laughton, personal communication). The former fields are now in various stages of succession that include herbaceous openings, invasive-dominated shrub thickets, and early to mid-successional forest.

From the edge of the old pasture, the property slopes toward the Lamprey River. The southern half of the property is forested, dominated by mid-successional species including white pine and red oak. Aerial photos from the 1950s indicate that some of this forested area was also once cleared or used for pasture. A backwater area of the Lamprey River that juts into the property supports a wet meadow-shrub wetland. Several intermittent streams on the eastern side of the property flow into the Lamprey River.

There are no structures on the Thompson Forest. The pump station is located on the adjoining parcel owned by UNH. A dilapidated garage and associated material was noted on the baseline documentation and subsequently removed by the town prior to acquisition (SELT 2015; Duane Hyde, personal communication). The entire property is heavily infested with invasive shrubs, primarily autumn olive, multiflora rose, glossy buckthorn, Japanese barberry, and Asian bittersweet. The densest populations of invasives are around the old pasture, along the drainages, along the access road, and in the vicinity of the pump station.

The property has no existing trails or other cultural features on the property, except stonewalls that border the northern boundary along Wednesday Hill Road, extend along the eastern boundary, and in a few locations in the interior of the property.

History of the Property

From 1820 until the 1980s, two families—Griffiths and Thompsons—farmed and maintained homesteads on the land surrounding and including the present day Thompson Forest. In 1941, Everett and Blanche Thompson purchased the 200-acre Griffith Farm and established a large dairy herd. The Thompson family grew hay and silage corn and kept horses (UNH 2015). The farmhouse, outbuildings, and barns were located on the property north of Wednesday Hill Road and east of Packers Falls Road. In 1969, the farmhouse and barns burned in a devastating fire that ended full-time farming by the Thompsons.

After the fire, the Thompson family moved to Bagdad Road in town, but continued to hay some of the land for several decades. Beginning in the 1980s, portions of the farm were subdivided and sold for development (UNH 2015). The 54-acre Thompson property is the last remaining undeveloped piece of the original 200+ acre Thompson Dairy Farm.

Kim Laughton and her siblings inherited the property in 2014, when their mother, Shirley Thompson, passed away. Shirley was a well-respected member of the Durham community and instilled in her daughter, Kim, a conservation ethic and connection to the land that led the family to pursue permanent conservation of the property.

With the assistance of the Southeast Land Trust (SELT) and the Thompson family, the Town of Durham acquired the Thompson Forest from the Murell G. Thompson Revocable Trust, Kimberly Laughton Trustee, in 2016. The acquisition was funded through the following grants and contributions:

Transaction and Stewardship Costs:

- NH Department of Environmental Services Local Source Water Protection Grant
- Piscataqua Regional Estuaries Partnership/Great Bay Resource Protection Partnership
- Town of Durham and University of New Hampshire

Acquisition Costs:

- NH State Conservation Committee “mooseplate program”
- Land and Water Conservation Fund (LCWF), administered by NH Department of Resources and Economic Development (DRED)
- Town of Durham Water Fund (which includes University of New Hampshire funds)
- Lamprey River Advisory Committee (LRAC)

Warranty and Easement Deeds

Warranty Deeds

The fee interest in the 53.71-acre Thompson property was conveyed to the Town of Durham via warranty deeds in March 2016 (see Table 1, Appendix 4). The warranty deed was conveyed subject to flowage rights and a 20-foot right of way to Tax Map 14, Lot 8-5UNH, a parcel owned by the University of Hampshire and that houses a drinking water pump station and intake from the Lamprey River. The warranty deed and the

conservation easement deed provide reserved rights to UNH and the Town to maintain the infrastructure for the pump station, including the access road, utility line, and underground water pipes.

Conservation Easement Deed

The Town of Durham conveyed a conservation easement deed to the Southeast Land Trust of New Hampshire (SELT) subsequent to the fee acquisition in March 2016.

Sections of the easement deed most relevant to this Stewardship Plan are excerpted, paraphrased, and provided here. For the complete text of the conservation easement deed see Appendix 5.

Purposes for which the property was conserved:

- To protect Durham/UNH drinking water sources, surface and groundwater
- To protect the undeveloped 2,183-feet of frontage along the Wild & Scenic Lamprey River
- To protect wildlife habitat including floodplain forest, wet meadow/shrub wetland, and connectivity to other conserved land
- To conserve open space for productive forests and wildlife habitat
- To maintain scenic enjoyment for the public that travel by on the river or on the road
- To protect the property for low impact, non-commercial outdoor recreation
- To prevent any uses that will impair or interfere with all other purposes

Use Limitations:

- No industrial or commercial activities, except forestry
- No forestry within 25-feet of Lamprey River, unless agreed to in writing
- Any commercial forestry requires a forest management plan
- No agriculture
- No structure or improvements unless related to purposes
- No motorized vehicles
- No significant ground disturbance unless approved by DRED (LWCF)
- No posting of the property; shall be kept open to the public for, pedestrian and bicycle, non-motorized, non-commercial, outdoor recreational and educational purposes as will have minimal impact on the property, such as hiking, mountain biking, wildlife observation, and cross-country skiing, but not camping; grantor (landowner) retains right whether to allow hunting and reserves right to post during forest management activities

Reserved Rights

- Use of motorized vehicles to maintain and manage the property
- To allow for installing, maintaining, and replacing underground water pipes and related infrastructure associated with the drinking water supply along the 20-foot right of way

- To maintain and replace any infrastructure related to the Town/UNH water system within the “Water Supply Improvements Reserved Right” as shown on the survey plan
- To create and maintain trails for low-impact, non-commercial outdoor recreation
- Landowner (grantor) must notify SELT (grantee) in writing at least 30 days before any of these activities are undertaken
- To construct and maintain a parking area with permeable surface for up to 6 parking spaces, with prior written approval from SELT

Notice of Grant Requirements

The Town of Durham is bound by a project agreement as part of the funding from the Land and Water Conservation Fund that states the property must not be converted to other than public outdoor recreational uses (see Appendix 6).

Table 1. Documents and reference information related to the Thompson Forest.

Document/Reference Information	Date Recorded	Registry of Deeds and/or Prepared By
Durham Tax Map 14 Lot 8-3; 53.71 acres	-----	(Appendix 2)
Conservation Easement Plan (Boundary Survey)	12/30/2015	Plan No. 111-24; Prepared by Eric C. Mitchell & Assoc. Inc 10/23/2012 (Appendix 3)
Warranty Deed (Shirley Thompson Trust to Durham)	3/29/2016	BK 4368 PG 0777 (Appendix 4)
Warranty Deed (Murell Thompson Trust to Durham)	3/29/2016	BK 4368 PG 0780 (Appendix 4)
Conservation Easement Deed	3/29/2016	BK 4368 PG 0784 (Appendix 5)
Baseline Documentation Report	2/2016	Prepared by SELT (Appendix 7)
Notice of Grant Agreement (LWCF)	3/29/2016	BK 4368 PG 0868 (Appendix 6)
20'-wide ROW to UNH Tax Map 14 Lot 8-5UNH	1/28/1969	BK 853 PG 252

Chapter 2 Ecological and Cultural Features

Landscape Setting

Durham is home to the University of New Hampshire and according to the 2010 US Census its population was 14,638. The town is situated on the southern edge of Strafford County in the coastal region of New Hampshire. In the coastal plain, land sits just tens of feet above sea level; low, gently rolling hills are the norm; marine sediments are common; and gneiss and schist (not granite) are the typical bedrock. The forests of this area lie in a transition zone. To the south grow more oak, hickory, and other southern “Appalachian” species, and to the north and at higher elevations forests begin to shift to northern hardwoods and spruce and fir.

Figure 1. New Hampshire’s Coastal Watershed.

Lamprey River Watershed

The Thompson Forest lies within the Lamprey River watershed, one of the watersheds that are collectively known as New Hampshire’s “coastal watershed” (Figure 1). The Lamprey River begins on the slopes of Saddleback Mountain in Northwood and meanders more than 50 miles through eight towns before it reaches the McCallen Dam at the mills in Newmarket (Figure 2). The Lamprey River drains an increasingly populous watershed of 212 square miles or 135,680 acres; it is the largest watershed and the longest river that flows into the Great Bay Estuary, one of the most significant inland estuaries along the entire East Coast.

Historically, the Lamprey River supported large populations of river herring, sea lamprey, American shad, American eel, and Atlantic salmon. Dams constructed for industrial and commercial purposes have long blocked or limited fish passage upstream. The McCallen Dam, site of the first natural falls on the Lamprey, separates the tidal portion of the river from the freshwater portion. A Denil fish ladder on this dam enables alewives, American eels, sea lamprey, and American shad to move upriver. Blueback herring do not use the ladder and have been seen spawning below the dam. Three and a half miles upstream of McCallen is the Wiswall Dam in Durham, originally constructed in 1835. That dam was upgraded in 2011, which included the installation of a fish ladder. A third dam at Wadleigh Falls in Lee has been breached, but under typical flow conditions, its remnants still constitute a barrier to upstream fish movement. The Thompson Forest lies about one-half mile upstream of the Wiswall Dam.

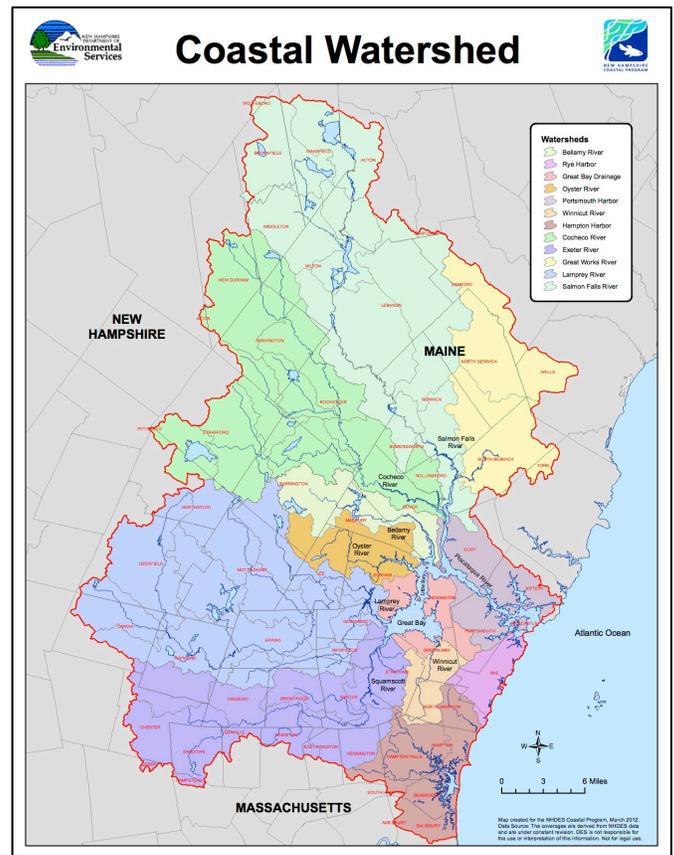
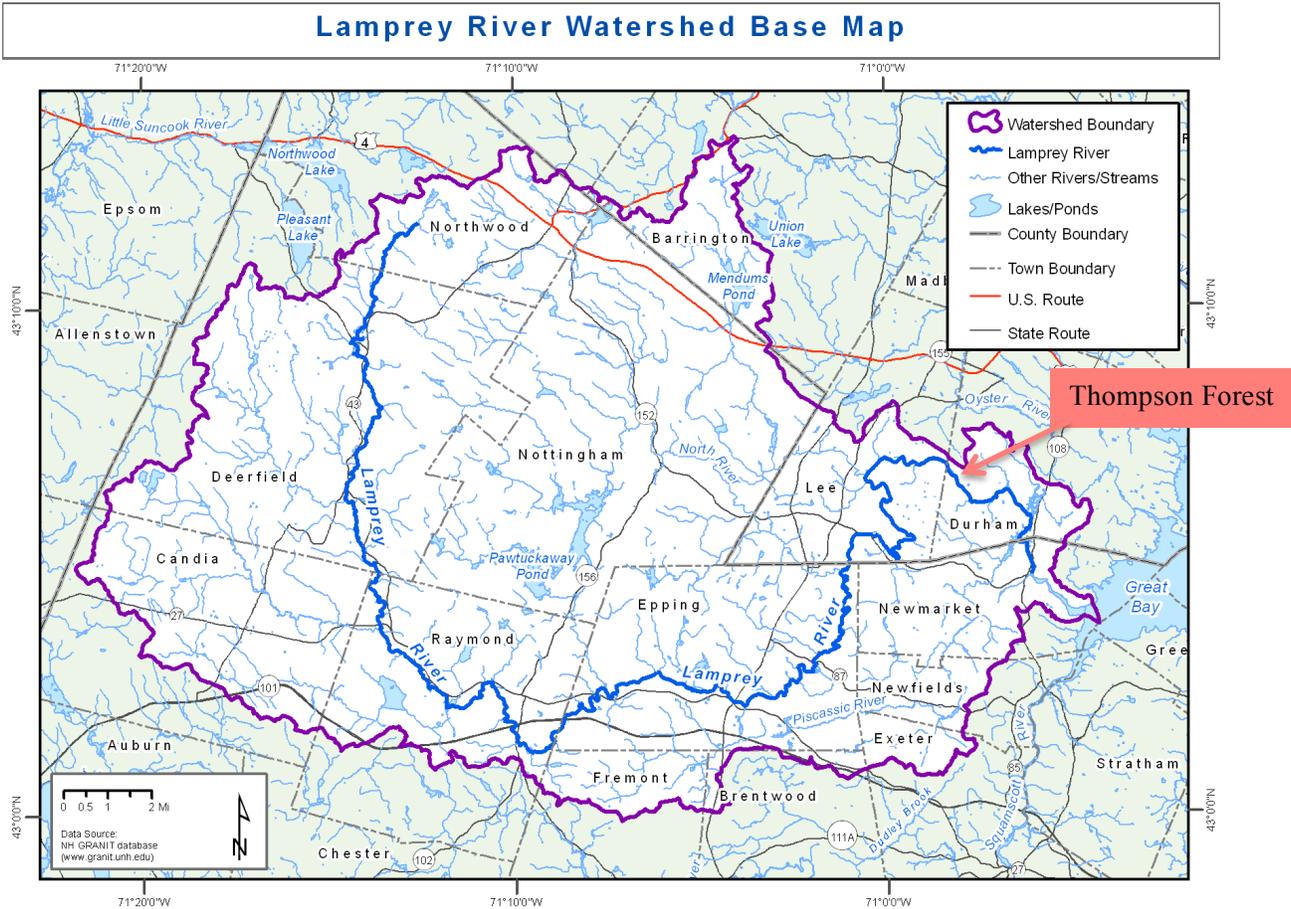


Figure 2. Lamprey River Watershed (from 2010 Carbon Solutions New England: <http://100yearfloods.org/resources/>)



River Designations

On November 12, 1996, Congress designated an 11.5-mile segment of the Lamprey River as a recreational **Wild and Scenic River**. This designation extended from the Lee town line (bordering Epping) through Lee and Durham to the confluence with the Piscassic River in Newmarket. An additional 12-mile segment of the Lamprey River, from the Lee/Epping town line to the Bunker Pond Dam in Epping, was added to this designation on May 2, 2000, increasing the Wild & Scenic River designation to 23.5 miles.

A recreational river in the National Wild and Scenic Rivers Program (administered by the National Park Service) is one that is readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past. The Lamprey River Advisory Committee (LRAC), with members from all four towns, has the principle responsibility for development and implementation of a long-range management plan and reviews and comments on projects that could impact the river. LRAC contributed funds to the conservation of the Thompson Forest.

The Lamprey River and its tributaries--North Branch, Pawtuckaway, North, Little and Piscassic Rivers--were nominated to the **NH Rivers Management and Protection Program (RMPP)**. Twelve miles of the Lamprey River in Lee and Durham were accepted into the program in 1990. Up-river towns worked to expand that designation to the entire river and all its tributaries; the designation was approved by the State in 2011.

For more information on the Lamprey River see <http://des.nh.gov/organization/divisions/water/wmb/rivers/index.htm>

Conservation Lands Network

The juxtaposition of the Thompson Forest in related to other conserved lands is mentioned here to provide a broader context in which to consider potential management objectives on the Thompson Forest (see map of Nearby Conservation Lands in Appendix 1). This is especially relevant when considering wildlife and their habitats since most wildlife species travel across ownership boundaries. In addition, aquatic species are affected by upstream land uses and any habitat restoration, management, and uses on the Thompson Forest can in turn affect the quality of riverine habitats. Also, there could be future opportunities to connect recreational trails to other lands that lie to the north and east.

Several other key parcels have been conserved along the Lamprey River, both upstream and downstream of the Thompson Forest, including:

- Dunham CE (50 ac) held by SELT (across the river)
- Verette CE (113 ac) held by Town of Lee (upstream)
- Wellington CE (111 ac) held by NRCS-WRP (upstream)
- Burrows CE (28 ac) held by SELT (downstream)
- Spang CE (91 ac) held by NRCS-WRP (downstream)
- Wiswall Dam (2.5 ac) and Weeks (19 ac), owned by Town of Durham (downstream)

A large network of conserved lands and other open space lies not far to the north and east of the Thompson Forest, including:

- Misty Meadows CE (63 ac) held by the Town of Lee
- Fogg CE (86 ac) held by Town of Durham
- Carriage Trail Estates Open Space (60 ac)
- Oyster River Forest (172 ac) and Spruce Hole Bog Conservation Area (42 acres) owned by the Town of Durham; includes NRCS-WRP easement
- UNH College Woods (298 ac) and West Foss Farm (338 ac), owned by USNH

Conservation Focus Areas and Important Habitat

Lower Lamprey River Conservation Focus Area

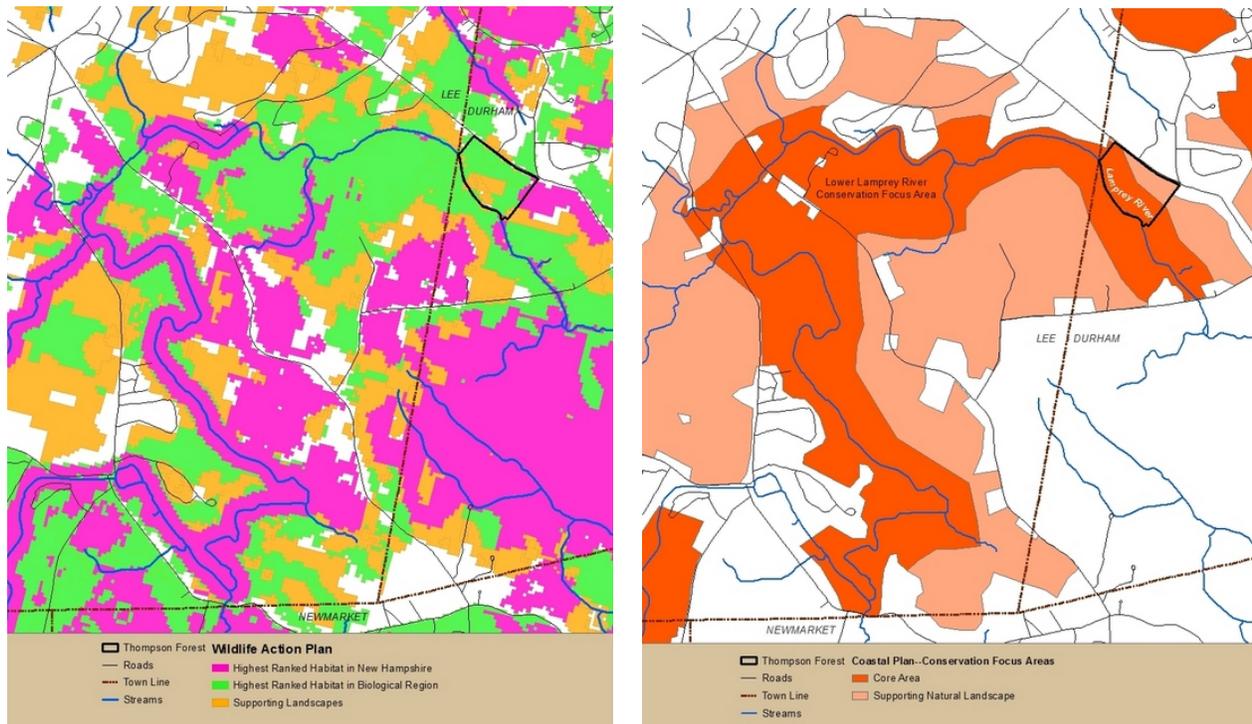
In 2006, The Nature Conservancy, Society for the Protection of New Hampshire Forests, and the Rockingham and Strafford Regional Planning Commissions published *The Land Conservation Plan for New Hampshire's Coastal Watersheds* ("The Coastal Plan") (Zankel et al. 2006). The authors identified 75 Conservation Focus Areas that comprise over 190,000 acres or 36% of the coastal watersheds that are of exceptional significance for living resources and water quality. The Thompson Forest is core area and supporting landscape within the Lower Lamprey River Conservation Focus Area (Figure 3).

Highly Ranked Wildlife Habitat in New Hampshire

Since wildlife don't recognize ownership or political boundaries it is useful to see how a particular property fits into the larger landscape of wildlife habitats. To identify areas of statewide importance for wildlife, the NH Fish and Game Department (NHFG) analyzed the condition of broad habitat types, based on biological, landscape, and human factors that were impacting the habitat. Biological factors included rare plant and animal species and overall biological diversity. Landscape factors included size of habitat and how close it was to other patches of that habitat. Human impact factors included density of roads around the habitat, dams, recreational use, and pollution.

Most of the Thompson Forest falls within what the New Hampshire Fish and Game Department (NHFG) Wildlife Habitat Action Plan identified as 'highest ranked habitat in the biological region,' and the remainder is considered "supporting landscape" (NHFG 2015; Figure 3).

Figure 3. Below left: The Thompson Forest in relation to highly ranked habitat from the NH Fish and Game Department based on the Wildlife Action Plan (NHFG 2015). Below, right: The Thompson Forest in relation to the Coastal Plan's Lower Lamprey River Conservation Focus Area (Zankel et al. 2008).



New England Cottontail Initiative Focus Area

The New England cottontail (*Sylvilagus transitionalis*) is a native rabbit that has declined significantly throughout its range. As recently as the 1960s, these rabbits were found throughout southern and central New Hampshire. Today, only a few remnant populations, occupying less than 25% of their historic range, remain in the state (Ferguson 2013).

The New England cottontail is listed as an endangered species in New Hampshire and is the focus of a range-wide partnership to restore the rabbit (<http://newenglandcottontail.org/>). This cottontail depends

on dense, woody cover such as shrub thickets, shrub swamps, brushy areas near wetlands, utility and railroad corridors that are shrubby, young regenerating forests, and potentially reverting gravel pits. Unlike eastern cottontails, they do not occur on lawns, golf courses, or active farmland. Mature forests also do not provide suitable habitat as it lacks a dense understory. If you can't walk through it then it is probably good New England cottontail habitat! The Thompson Forest is within the historic range of the New England cottontail and lies within a focus area for New England cottontail restoration (Figure 4 and 5).

Figure 4. New England cottontail conservation focus areas in New England and New York. The Thompson Forest lies within the Seacoast (NH) focus area (From Fuller and Tur 2012).

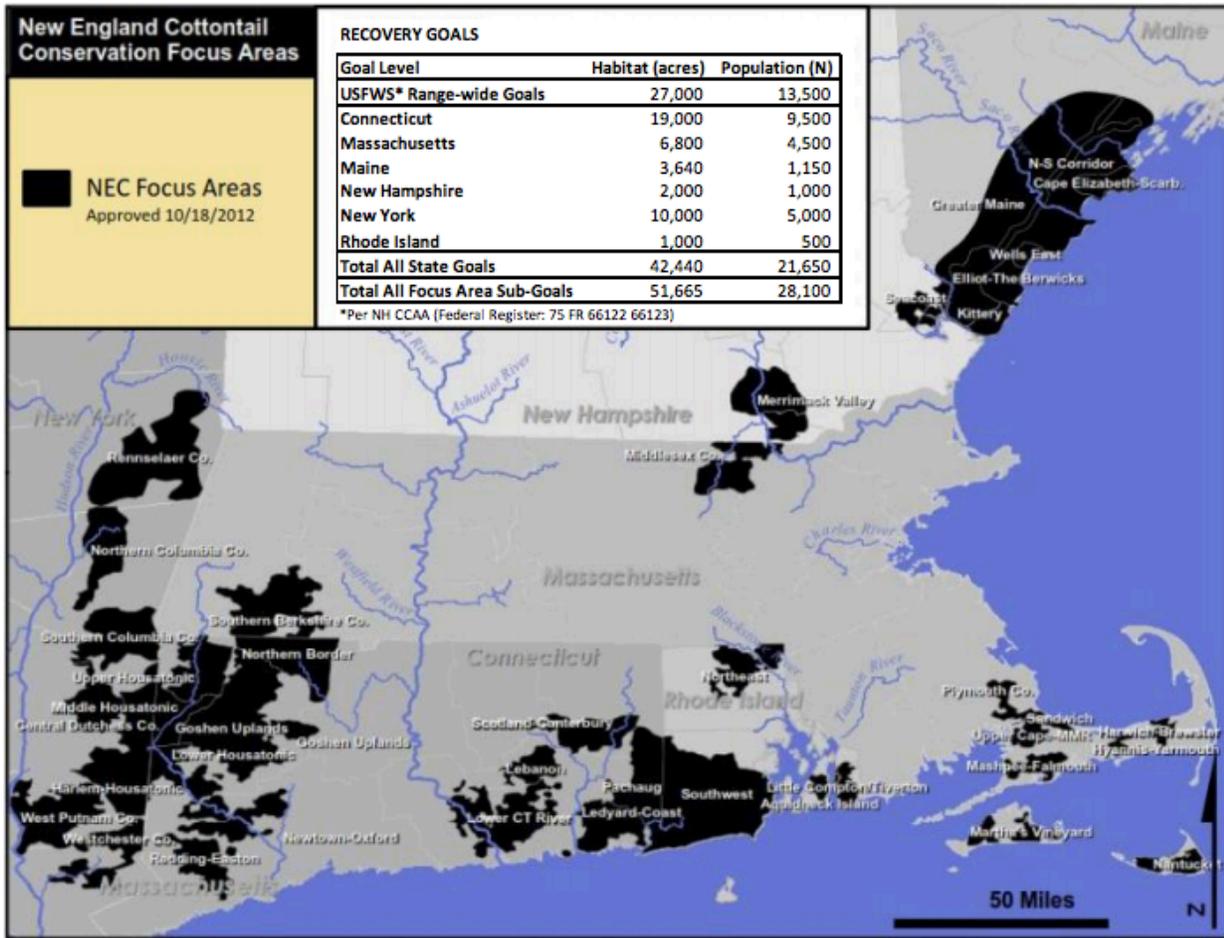
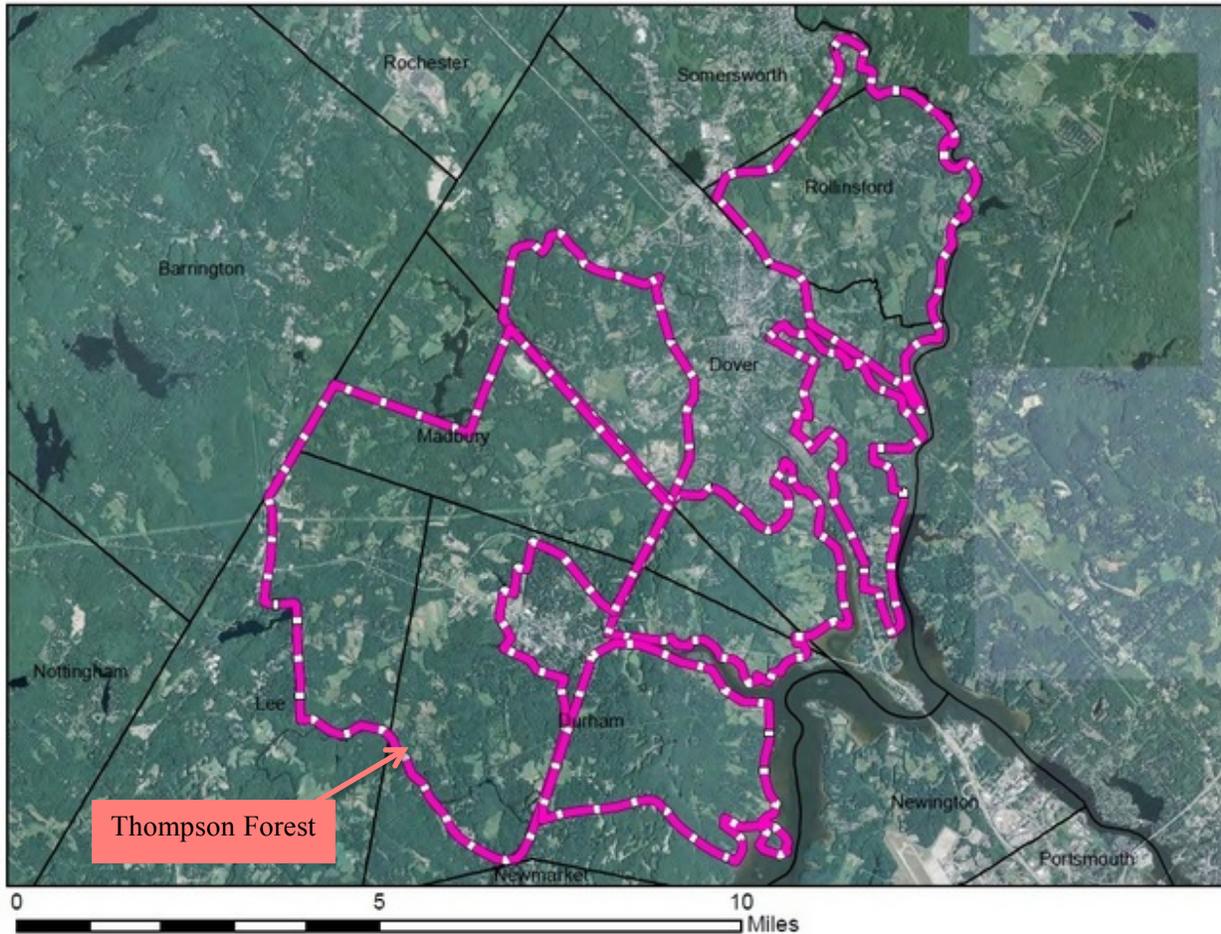


Figure 5. New England cottontail seacoast (NH) focus area (Haley Andreozzi, UNH Cooperative Extension, personal communication).



Source Water Protection Area

One of the purposes of the Conservation Easement is to protect the drinking water supply for the Town of Durham and the University of New Hampshire. The Thompson Forest includes an approximately 19-acre portion of a sand and gravel aquifer from which the Town of Durham-UNH withdraws drinking water on a nearby property. In addition, on the abutting 0.25-acre parcel, the Town of Durham-UNH water system has a pump station and associated improvements to withdraw water from the Lamprey River that is used to recharge the aquifer and to supply the Durham-UNH water treatment plant. Nearly the entire property is located within the Source Water Protection Area for this intake, and approximately 33.5-acres of the property is within the Water Supply Intake Protection Area. See the Baseline Documentation report in Appendix 7 for a map of these water protection areas.

Topography and Soils

The northern half of the Thompson Forest lies at about 100 feet above mean sea level (msl). The property drops down to about 60 feet msl along a terrace next to the Lamprey River. The terrace rises a few feet

about the river.

Table 2 lists the individual soil types found on the Thompson Forest; these are also depicted on the Baseline Conditions Soil Map (see Appendix 1). The soils are mostly well or excessively well drained (Paxton, Buxton, Suncook, Windsor, Gloucester)—47 acres, except for two pockets of poorly drained soils (Mixed Alluvial, Swanton)—5.5 acres.

More than half of the Thompson Forest has **Paxton** soils, which are well drained loamy soils, very deep to bedrock. They formed in till, derived mostly from gneiss or schist. These are some of the best farm soils in the state, due to a restrictive compressed sandy layer that is about two feet below the surface. This forces water to stay within the plant root zone. The Paxton soils on the Thompson Forest underlie the area that was maintained as pasture, when the Thompson’s kept a large dairy herd on the property.

Buxton silt loam is a prime farmland soil and underlies an eastern section of the property. Seasonal wetness and slow permeability are characteristics of this soil type. **Suncook** soils are very deep, excessively drained sandy soils formed in alluvial sediments. They are typically nearly level soils on floodplains and subject to occasionally flooding. The excessively drained **Windsor** soils are located in the southeast corner of the Thompson Forest. These very deep soils were formed in sandy outwash. A small pocket of **Gloucester** soils is located in the northeast corner of the property, at the entrance to the access road. Gloucester soils are very deep, somewhat excessively drained sandy tills.

The **mixed alluvial** is poorly drained with a high water table; they are often associated with floodplain forests. On the Thompson Forest these soils underlie the scrub shrub wetland habitat along the Lamprey River inlet. A few acres of poorly drained **Swanton** soils are found along the east-central property boundary.

Table 2. Soils for the Thompson Forest (USDA 2001).

Soil Symbol	Soil Name	Slope	Parent Material	Drainage	Farm Soils	Total Acres
PdB	Paxton very stony fine sandy loam	3-8%	Coarse till	Well drained	Local importance	18.5
PdD	Paxton very stony fine sandy loam	15-25%	Coarse till	Well drained	Local importance	11.5
BzB	Buxton silt loam	3-8%	Marine	Moderately well drained	Prime	6.5
Sk	Suncook loamy sand	----	Alluvial	Excessively drained	Local importance	6.3
MI	Mixed alluvial land, wet	-----		Poorly drained	-----	4.5
WfB	Windsor loamy fine sand, clay subsoil variant	0-8%	Outwash	Excessively drained	Prime	2.8
GIB	Gloucester fine sandy loam	3-8%	Till	Somewhat excessively drained	Statewide importance	1.4
SwA	Swanton fine sandy loam	0-3%	Marine	Poorly drained	Local importance	1.0

River, Streams, and Wetlands

Lamprey River and Riparian Habitat

The designation of the Lamprey River as a nationally recognized Wild & Scenic River and in the NH Rivers Program recognizes the ecological, cultural, and recreational significance of the river and associated streams, wetlands, and uplands (LRAC 2013). The Thompson Forest includes approximately 5.2 acres of the Lamprey river bed (see property survey – Appendix 3; The surveyor assumed that the Lamprey River is non-navigable and the boundary is therefore to the thread of the river). This stretch of the Lamprey River is characterized as deep and sandy with broad floodplains (NHFG 2012).

A 2012 fish survey of the Lamprey River by NH Fish and Game concluded that the river continues to support healthy fish communities, but it might be reaching a tipping point due to increasing impervious surfaces and resulting pollution in the watershed (NHFG 2012). The permanent conservation of the Thompson Forest and its 2,200 feet along the Lamprey River is an important step in helping to sustain the ecological health of the river.

On the Thompson Forest the riparian habitat along the river includes the wooded upland terrace bordering the river and the backwater wetland. A wide, naturally vegetated riparian area helps maintain water quality and healthy soils, filters sediments, and provides flood protection. Streamside vegetation also maintains cooler temperatures and provides habitat and food for aquatic life in the main stem of the river (LRAC 2013).

Scrub-Shrub and Emergent Marsh Wetland and Floodplain Forest

A narrow but important wetland habitat extends from just upstream of the water intake-pump station to an inlet (backwater area) that continues along the north side of the river terrace to the western property boundary. This is likely an old oxbox (abandoned river channel) of the Lamprey River. This wetland is a mix of floodplain forest, shrub wetland, emergent marsh, and open water. A few silver maples and red maples form the overstory in the floodplain forest. A diverse mix of herbaceous and shrub plants grow throughout the wetland along with areas of open water and aquatic plants.

Native shrubs within this wetland system include winterberry, silky dogwood, highbush blueberry, maleberry, speckled alder, meadowsweet, steplebush, and arrowwood. Wetland plants include several ferns (cinnamon, sensitive, royal), tussock sedge (and other sedges), horsetail, skunk cabbage, spotted touch-me-not, tall meadow-rue, cattails, and pickerelweed, among many other plants.

This mosaic of habitats—upland terrace, shrub thickets, emergent marsh, floodplain, and riverine—provides cover, food, and spaces for many wildlife species. A loud chorus of breeding American toads was heard in the emergent marsh at the river's edge. Canada geese, wood ducks, mergansers, and belted kingfisher were seen at the river/marsh interface. Song sparrows and common yellowthroats sang from their nesting territories in the shrub thickets. Spring peepers and tree frogs called from their positions in the shrub-forest wetland. This mix of wetland habitats is also suitable habitat for the suite of turtles found within the Lamprey River.

A large patch of invasive Japanese barberry dominates the understory at the head of this wetland. Glossy buckthorn, multiflora rose, and barberry occur in varying densities at the mouth of the inlet and in the floodplain forest.

Intermittent Streams

Several intermittent streams in the eastern reaches of the Thompson Forest flow into the Lamprey River. Although these small streams seem inconspicuous and unimportant, they are a valuable component of the property's aquatic and riverine habitats. Due to past land uses (primarily cattle grazing and other farm uses), these headwater streams are heavily degraded with dense populations of invasive shrubs and deeply eroded slopes at the lower ends near the Lamprey River.

The health of larger streams and water bodies (such as the Lamprey River, Oyster River, and Great Bay Estuary) is dependent on the health of smaller streams and wetlands farther up in the headwaters of a watershed. These small headwater streams often make up 80 percent of the stream network in a region and include both seasonal and year-round streams. Headwater streams may begin as trickles, seeps, or depressions that overflow and are often not named or mapped. Yet, the quality and integrity of these headwater streams is critical to downstream habitats. Water flowing from the land into the stream carries insects, leaves, soil, branches, and other material that are the start of a food chain. The upper reaches of a watershed also store water, recharge groundwater, and reduce the intensity and frequency of floods (American Rivers and the Sierra Club 2007).

The importance of small, headwater streams cannot be overstated. According to NHFG (2012), the future water quality in the lower Lamprey River will depend largely on the protection of headwater stream habitat in the upper subwatersheds.

Upland Habitats

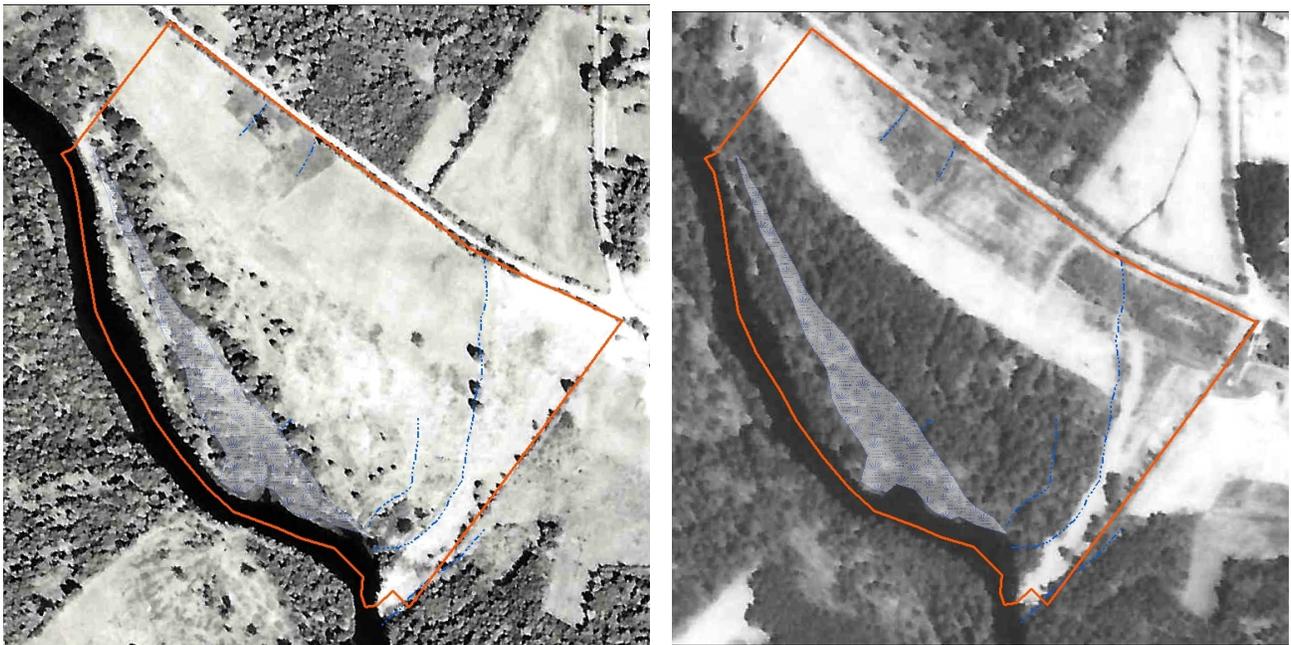
Old Pasture

The grassy meadow in the northwest corner of the Thompson Forest is the most visible remnant of the Thompson dairy farm. The Thompsons stopped mowing this area about 20 years ago (Kim Laughton personal communication). This old pasture is now a mix of grasses, herbs (e.g., goldenrod, milkweed, aster) and scattered eastern red cedar, sumac, raspberries, ground juniper, and is rimmed by dense invasive shrubs dominated by autumn olive, multiflora rose, buckthorn, and honeysuckle. The thickest stands of invasive shrubs are along the northern and eastern boundaries of the grassy opening.

Early successional habitat includes fields, shrub thickets, and young forest, such as is on the Thompson Forest. This habitat is by its nature dynamic and transitional. The proportion of the landscape in an early successional stage varies over time depending on natural and human disturbances. In the heavily developed southeast corner of New Hampshire land use changes and development have greatly limited the amount of this habitat in the landscape as well as the ability of natural disturbances and human management to create and maintain such habitat conditions.

The juxtaposition of grassy meadow, native shrubs, and young forest in the northwest corner of the property provides an opportunity to manage for wildlife species that depend on these habitats. The challenge is on enhancing and managing the native species, while systematically removing the invasive shrubs. Currently, many early and mid-successional habitat dependent species are using this part of the property, including the invasive thickets. Commonly seen or heard this spring in the meadow-shrub area included cardinal, catbird, and blue-winged warbler. Other species using the adjoining woodland are mentioned below. Shrub thickets are particularly important to the endangered New England cottontail. Although it is not known to occur on the property, it is within its historic range and within a state focus area as noted above.

Figure 6. Aerial photos of Thompson Forest in 1953 (left) and 1993 (right) showing extent of cleared forest, backwater wetland, Lamprey River, and intermittent streams.



Woodlands

Most of the Thompson Forest is in various stages of forest succession subsequent to farm abandonment. Historically, the broad forest type was likely Appalachian oak-pine forest, but includes features of hemlock-hardwood-pine forests too. American beech, which is common in most hemlock-hardwood-pine forests, is nearly absent here, but hemlock grows on the property especially along the river terrace and uphill from the wetland. Also, black cherry is found in the forest bordering the old pasture. Several large white oaks (characteristic of Appalachian oak-pine) are located just inside the woods south of the old pasture. A large boulder sits nearby; likely this was a scenic spot where the previous owners opted to leave the large oaks.

Presently, the Thompson Forest is dominated by mid-successional species—white pine, red oak, and red maple—as a result of past land uses. The forest between the old pasture and Wednesday Hill Road appears to be 25 to 40 years old. The stand is a mix of hardwoods (bigtooth and quaking aspen, red maple, paper and gray birch, red oak) and white pine. This woodland has extremely sparse ground cover and

almost no coarse woody debris on the forest floor. However, the thick stands of young pine and the mid-successional open forest are providing habitat for wildlife. I found the most wildlife sign in this area, including snowshoe hare tracks, deer tracks and winter beds, ruffed grouse and woodcock sightings, coyote and turkey tracks and scat, and other birds (e.g., black and white warbler, wood thrush, veery, rose-breasted grosbeak, chestnut-sided warbler).

The woods between the old pasture and the Lamprey River is dominated by white pine, about 50 to 75 years old, with some red oak, white oak, black birch, and hemlock. This slightly older forest has very sparse midstory and little ground cover. Some fallen trees provide coarse woody debris, but it is still of low volume. A few large white pines are found along the river terrace and wetland edge. A stand of white pine and hemlock uphill from the backwater wetland showed heavy sign of winter deer use.

The river terrace supports the most diverse ground cover and shrub layer and least amount of invasive plants on the entire Thompson Forest. Likely it is because this area was not cleared for pasture or was abandoned farther back in time (as evidenced from the aerial photos dating back to 1940). Some of the understory and ground cover plants include high and low bush blueberries, ground cedar, winterberry, partridgeberry, clubmosses, and bracken fern. Signs of beaver along the river terrace include trails leading to and from the river and chewed hardwoods.

Wildlife and Plant Observations

A systematic inventory of all plants and animals was not completed as part of this planning effort. However, I've compiled a list of plants and animals observed during my site visits (see Appendix 10). Undoubtedly there are many more species on the property than are currently documented. The species list can be augmented as more people begin to visit the property, especially after habitat management is implemented and trails constructed.

Rare Species

The New Hampshire Natural Heritage Bureau (NHNHB, Bureau) tracks rare species and exemplary natural community locations throughout the state. Appendix 8 includes a report from the NHNHB (2016) that documents the known rare plants and animals and exemplary natural communities for the Thompson Forest. Although no rare species or exemplary communities are known to occur on the property, more than a dozen rare plant and animal species, as well as three natural communities, are known to occur within a mile of the property (NHNHB 2016).

Some of the species listed in the NHNHB report (e.g., turtles, fishes, plants) benefit from the permanent conservation of the Thompson Forest, which has more than 2,000 feet of frontage on the Lamprey River and associated wetlands and floodplain.

Wildlife Habitat Features

Wildlife need food, water, cover, and space to live and reproduce--collectively known as their *habitat*. Each species has unique habitat requirements, and the presence of a given species in an area varies

depending on the availability of the habitat that they depend on. Wildlife *food resources* include aquatic and upland plants, fruits, seeds and nuts, insects and other animals, and nectar. All wildlife require *water*, almost daily, yet aquatic organisms clearly depend on it more than upland species. *Cover* provides protection from weather and predators and sites for nesting, resting, travel, and other activities.

The juxtaposition of food, water, and cover determines the wildlife community that occurs in a given area. The ability of wide-ranging animals to move across the landscape—known as wildlife connectivity—is also important. The location of the Thompson Forest in relation to other conserved land and the Lamprey River provides opportunities for wide-ranging wildlife to travel across the landscape to forage, to disperse, and to find mates. This includes species that we might not expect to endure in this developing landscape, such as moose, black bear, bobcat, and fisher. These are some of the forest-dependent species that often travel long distances during the course of a year and might occur on this property at least sometime during the year.

Wildlife species diversity and abundance in a given area is often dependent on elements of *habitat structure* such as horizontal and vertical habitat diversity; the presence of cavities, other nest trees, and woody debris; and the variety of food resources. These features are described below for the Thompson Forest.

- ***Horizontal vegetation diversity***

This refers to the horizontal arrangement of different plant communities (including type and age) in a given area. The Thompson Forest has a mix of habitats: early and mid-successional upland forest, old pasture meadow and shrub thickets, intermittent streams, river terrace, emergent and shrub wetlands, floodplain forest, and riverine.

- ***Vertical vegetation diversity***

Vertical diversity refers to the extent of layering within a forest or other habitat. Layering within a forest includes the arrangement of ground cover (lichens, moss, ferns, herbaceous plants), vines and shrubs, and trees (including sizes and ages). More vertical layers create a greater diversity of habitat, which typically supports more wildlife diversity. Vertical and horizontal structure that is varied, lush, and “messy” is a boon to wildlife. Forests with little ground cover, dead wood, shrubs, and understory have fewer wildlife species. Natural (storms, fire, wind) and human disturbances (e.g., logging) often result in greater vertical vegetation diversity as new growth emerges in sunlight and forms a dense understory. This is one of the habitat limitations on the Thompson Forest, primarily due to the past land uses including cattle grazing. In time, natural disturbances will lead to greater vegetation diversity.

- ***Cavity trees (live and dead and dying) and other nest trees***

More than two-dozen birds and mammals depend on tree cavities for nesting, roosting, or denning. These species require a range of cavity tree size classes and rely on a mix of dead or partially dead standing trees (called “snags”) as well as live trees with cavities. In addition, a mix of softwood and hardwood cavity trees will benefit more species. Woodpeckers, chickadees, and nuthatches are primary excavators (i.e., they make the holes), while others use existing holes. One species, the brown creeper, nests under the loose bark on standing dead or dying trees and some bats roost beneath loose bark. Some species require large trees for nesting. These include broad-winged hawk, red-tailed hawk, and barred owl. Exposed perches along forest and wetland edges are important to some wildlife species including flycatchers, kingfishers, and hawks.

Typical cavity tree sizes (in diameter at breast height or dbh) required by various wildlife species are listed below (Bennett 2010). Many of these species are likely to occur on the property at least sometime during the year, given the presence of existing cavity trees and snags.

6-8"

black-capped chickadee
 downy woodpecker
 Eastern bluebird
 tufted titmouse
 house wren

6-12"

brown creeper
 hairy woodpecker
 yellow-bellied sapsucker
 white-breasted nuthatch
 northern flying squirrel

12-18"

great-crested flycatcher
 northern flicker

>18"

barred owl
 fisher
 gray squirrel
 porcupine
 long-tailed weasel
 pileated woodpecker

>24"

big brown bat
 little brown bat
 gray fox
 raccoon

- ***Dead and down woody material***

Dead and down woody material (often called “coarse woody debris”) on the forest floor is important for many reasons. Woody material in various stages of decay includes logs, stumps, branches, upturned roots, and tree falls. These provide wildlife habitat, serve as nurse logs for regenerating plants, and contribute to nutrient cycling. As with cavity trees, the larger the fallen log or stump the greater the biological diversity. Decaying wood supports many insects and other invertebrates, which are food sources for shrews, woodpeckers, and black bears. Snakes, fisher, and weasels hunt among the woody debris. Many species including mice, voles, salamanders, snakes, chipmunks, red squirrels, weasels, and black bear use coarse woody debris for cover, den sites, or escape areas. Mosses, fungi, and lichens are often associated with decaying wood. Fallen logs and other woody debris are also important in aquatic environments, for turtles, fish, and other aquatic organisms. As noted earlier, the Thompson Forest is impoverished of coarse woody debris.

- ***Hard and soft mast and other food resources***

The availability of food resources for wildlife is a key component of their habitat needs, and often varies seasonally. Breeding birds depend on a flush of insects to feed their young nestlings, while later in summer and into fall and winter they switch to berries, nuts, and seeds. Deer and other browsers rely on herbaceous vegetation during the growing season and woody growth in winter. Other mammals such as coyote, fox, and fisher prey on other animals as well as eating fruits when available. Seeds are favorites of squirrels, nuthatches, mice, and voles.

Fruits, nuts, and seeds from woody plants that are food for wildlife are collectively known as “mast.” *Hard mast* includes the array of nuts and seeds, which are typically high in fat, carbohydrates, and protein, a food source that is both high in energy content and available into the winter. *Soft mast* includes fruits and berries such as cherries, raspberries, blueberries, winterberry, grapes, apples, and the fleshy fruits of other trees, shrubs, and vines. Soft mast is more perishable and is often high in sugar, vitamins, and carbohydrates. These fruits are a source of moisture for wildlife during drought years, and are a crucial energy source for some migrating songbirds.

A diversity of hard and soft mast producing trees, shrubs, and vines is important. Different mast species are available at different times of year, which is critical to wildlife. The major mast species on the Thompson Forest include red and white oak acorns, aspen and alder catkins, cones from pine and hemlock, and fruits of blueberries, sumac, raspberries, winterberry, dogwoods, viburnums, wild apple trees, and other shrubs.

The open areas--especially the old pasture and emergent wetland--dominated by herbaceous plants are important seed producers or food for pollinators such as bees. These openings are also critical insect sources for birds that are feeding nestlings and fledglings. Deer graze in grassy openings, while turkeys and grouse will bring their broods into these openings.

Environmental Health

Environmental health, or *ecological integrity*, can be measured in several ways, such as the quality and quantity of surface waters, degree of erosion and runoff, amount of impervious surface, quality of air, and presence of forest pests or invasive species. Some environmental stressors, such as mercury deposition, air pollution, extreme weather events, and climate change, are large in geographic scope and largely outside the influence of land stewardship decisions on individual ownerships. The most significant environmental stressor on the Thompson Forest is the high density and widespread occurrence of invasive shrubs. This and other aspects of environmental health of the property are described below.

Phase I Environmental Site Assessment

Exeter Environmental Associates, Inc completed a Phase I Environmental Site Assessment of the property in 2015 for the Southeast Land Trust. That assessment found no “recognized environmental conditions” associated with the property. They did find near the western side of the access road a 20’ x 20’ dilapidated garage with four drums of unknown contents and other miscellaneous debris both inside and outside. Exeter Environmental recommended that the garage and its contents be removed (see Appendix 9 for the excerpts of the assessment report; a full copy of the report is provided digitally with this Stewardship Plan). The location of the shed is noted on the Conservation Easement Plan (see Appendix 3).

The garage/shed and its contents were removed by the Town of Durham as part of this land conservation project, according to the Baseline Documentation prepared by SELT (2016). The baseline report further states that due to wet clay soils a stone apron (14’ x 65’) had to be installed to allow heavy equipment in to remove the materials. SELT (2016) further states: “Located south of the former shed toward the Lamprey River are two small debris piles in close proximity to each other. The debris pile closest to the former shed consists of metal and wood debris and measures approximately 6 feet wide by 30 feet long. The next debris pile is a little further south and consists of two pipes. One pipe is made of metal and is approximately 12 inches by 32 inches and the second appears to be made from asbestos according to the Phase 1 Environmental Assessment and measures approximately 36 inches by 46 inches. The Durham Public Works Department indicated that this type of piping was used by the Town as part of the drinking water distribution system. Due to the soil conditions experienced in the removal of the shed, it is not practical or advisable to use machinery to remove these materials. The only other debris noted on the Property are several metal buckets along the bank of the easternmost intermittent stream.”

Land Disturbance and Erosion

Evidence of the past history of the Thompson Forest as a dairy farm is slowly disappearing as forest grows back on much of the land that was once pasture. However, the intermittent streams in the eastern portion of the property that flow into the Lamprey River are deeply incised at their lower ends. Historical photos show that the land was cleared around these streams all the way to the river and likely resulted in higher runoff and erosion.

The construction and maintenance of the access road and related infrastructure for the pump station has resulted in recent disturbance of this region of the property. Most recently the Town of Durham removed the dilapidated shed mentioned earlier, which required the installation of a stone apron that remains in place, as it would result in even more disturbance if removed. Some of the soils along the right of way are poorly drained and pockets of wetland are found along the access road. The road also runs close to one of the intermittent streams, and particularly at the lower end are inundated with a dense mass of invasive shrubs.

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 it was commonly known about their invasive qualities. Others came in via international commerce. Many invasive plants appear first in disturbed areas such as along roadsides and trails, in gravel pits, or edges of fields. They can be moved along roadways by plowing, mowing, roadwork, landscaping, as well as by animals.

The New Hampshire Invasive Species Act states that *“no person shall knowingly collect, transport, sell, distribute, propagate or transplant any living or viable portion of any listed prohibited invasive plant species including all of their cultivars, varieties, and specified hybrids.”* For more information on New Hampshire’s invasive species program see <http://agriculture.nh.gov/divisions/plant-industry/invasive-plants.htm>

As noted earlier, Invasive plants, primarily a suite of shrubs and one vine, are widespread on the Thompson Forest. Many of these invasives took hold and spread after the pasture/field was no longer mowed or grazed, starting about 20 years ago (personal communication, Kim Laughton). The large invasive shrubs around the old pasture are likely further spread by songbirds and mammals that eat the

fruits. Other areas on the property that are heavily infested with invasive plants, include along the access road and the near the pump station, in and along the drainages, and at the headwaters of the wetland drainage. Invasives (particularly glossy buckthorn,) are expanding downslope from the old pasture into the forest. Invasive removal is needed prior to or in conjunction with any habitat management or trail construction.

Table 3. Non-native invasive plants found on the Thompson Forest.

Common Name	Scientific Name
Asian bittersweet	<i>Celastrus orbiculata</i>
Autumn olive	<i>Elaeagnus umbellate</i>
Bush honeysuckle	<i>Lonicera spp.</i>
Common buckthorn	<i>Rhamnus cathartica</i>
Glossy buckthorn	<i>Frangula alnus</i>
Japanese barberry	<i>Berberis thunbergii</i>
Multiflora rose	<i>Rosa multiflora</i>

Cultural/Historical Features

Property Boundaries

A boundary survey was completed for the Thompson Forest in 2015 (see Appendix 3). It shows the stonewalls that form the northern (also bounded by Wednesday Hill Road) and eastern property boundaries. The southern boundary follows the thread of the Lamprey River. The western boundary has no natural landmarks, such that signs could be posted to clearly delineate that boundary line.

Several breaks in the stonewall along Wednesday Hill provide access for potential parking and trails.

Right of Way and Access Road

A gated, gravel access road that ranges in width from approximately 10 feet to 12 feet is located along the property’s eastern boundary, providing access from Wednesday Hill Road to the Durham-UNH water system pump station. The access road is located within a deeded 20 foot wide right of way described in a deed recorded in the Strafford County Registry of Deeds in Book 853, Page 252 and is shown on the boundary survey. Located along the access road and within the right of way are four utility poles and an overhead utility line that provides power to the pump station.

The boundary survey for the property found that a portion of the rip-rap underground piping, manhole, valves, and other underground improvements associated with the pump house were located within a mowed area on the Thompson Forest (see Appendices 3 and 5). The conservation easement includes a reserved right so these underground improvements can be maintained, repaired, replaced, and/or expanded within the area shown as “Water Supply Improvements Reserved Right” on the property survey.

The property previously included a shed/garage located near the western side of the access road (see property survey for location). The Town of Durham removed the shed and its contents, which included a boat, restaurant equipment, barrels, and other miscellaneous material. A stone apron, approximately 14 feet wide by 65 feet long, had to be installed in order to get the necessary equipment in to remove the materials. The stone apron remains.

Historic Resources

According to the New Hampshire Division of Historic Resources, the property is considered “extremely sensitive” because of the high likelihood of uncovering Native American archaeological artifacts. Presumably this is related to the frontage along the Lamprey River. The conservation easement requires that the Town notify the NH Department of Historical Resources (and NH Natural Heritage Bureau) before any significant ground disturbances take place (see references in Appendix 8).

Chapter 3 Wildlife Habitat and Land Stewardship Recommendations

Land Stewardship Objectives

The purpose of this Wildlife Habitat and Land Stewardship Plan was to assess the soils, topography, plants, animals, habitats, wetlands, cultural features, environmental health, and landscape setting of the property as a means of guiding the stewardship activities on the property.

The Thompson Forest was conserved with the help of several partners including the federal Land & Water Conservation Fund, NH moose plate program and DES source water protection program, Lamprey River Advisory Committee, Durham water fund, and UNH. A review of the fundraising documents, the easement deed, and project agreements that led to the permanent protection of the property provided some direction on how to manage the property. In addition, I met with several town, land trust, and LRAC representatives to discuss water supply protection and potential public access issues (e.g., trails and parking).

From these guiding documents and conversations, the following primary land stewardship objectives were developed:

- To protect water quality, including the surface water in the Lamprey River and the groundwater that contributes to the town's aquifer recharge area and is a source of drinking water.
- To protect important fish and wildlife habitat, particularly riparian areas and wetlands associated with the Lamprey River.
- To enhance and maintain public access for low impact recreational uses such as walking, x-country skiing, and snowshoeing.

The following stewardship recommendations were developed to meet the stewardship objectives listed above based on the site capabilities and existing conditions of the Thompson Forest. The recommendations are summarized in Table 5 and shown on the Stewardship Recommendations Map in Appendix 1.

General Stewardship and Monitoring

Recommendations:

- Periodically walk the property boundaries to maintain boundary signs, to assess stewardship needs such as invasive plant control and erosion prevention, and ensure good relations with neighbors. This ideally occurs in collaboration between the Town of Durham and SELT, when the Land Trust conducts its annual (or periodic) easement monitoring.

- Town officials – Land Stewardship Committee, Conservation Commission, and Public Works Director -- should together annually review the stewardship activities, including habitat management, public use (parking, trails), and access road/pump station management. Notify the Southeast Land Trust (easement holder) of any proposed activities. Before initiating any habitat or trail work, jointly develop a ten-year maintenance plan, using the guidance provided in this Plan.
- Install conservation easement signs, especially along the western property boundary, which has few natural landmarks denoting the boundary.
- Provide information about the Thompson Forest on the town website including copy of Stewardship Plan, conservation easement deed, maps, and related documents.
- Engage community members and other volunteers in stewardship of the property that can include sign maintenance, invasive control, trail construction and monitoring, and other volunteer workdays. With the assistance of The Stewardship Network: New England, plan volunteer workdays that are fun, effective, and community building.
- Avoid introducing any non-native, invasive species that are prohibited by the State of New Hampshire and the NH Department of Agriculture for more information on invasive plants: <http://www.agriculture.nh.gov/divisions/plant-industry/invasive-plants.htm>.
- For any new plantings consider the following sources of native plants or check with the Natural Resources Conservation Service and Rockingham County Conservation District on the source of plants:
 - New Hampshire State Forest Nursery (<http://www.nhnursery.com/>)
 - New England Wildflower Society (<http://www.newenglandwild.org/>)
 - Pierson Nurseries, Inc (www.piersonnurseries.com)
 - Many local nurseries now carry native plants

Water Supply Protection

Protecting the water quality in the Lamprey River and the integrity of the water pump station is a paramount stewardship goal. The gated gravel road in the right-of-way on the eastern boundary of the Thompson Forest controls access to the water intake and the pump station. This area of the property is further limited to public access due to extremely dense populations of invasive shrubs in the area between the intermittent stream that flows from Wednesday Hill Road to the Lamprey River and the access road. At the lower end, this invasive thicket is nearly impenetrable.

Recommendations:

- Place a water supply protection sign on the gate.
- Place a small sign at the river's edge near the pump station to alert boater's of the water supply protection area and that it is closed to public access.
- Follow the recommendations below under Habitat Enhancement (invasive plants) to determine if the invasive shrubs should be removed and the area restored to native vegetation in the area between

the intermittent stream and access road. This evaluation and any stewardship action are not recommended until year 9 of this Plan. Any work in this area should be in coordination with the Public Works Department and UNH.

Habitat Enhancement

As noted already, the biggest stewardship challenge on the Thompson Forest is the density and extent of invasive shrubs. Removal and control of these invasives will need a well-planned and sustained effort over a 10-year period. This requires setting priorities on which areas to tackle first and identifying the strategies needed for invasive removal. It will also require identifying funding sources for hiring contractors to assist with the initial, high priority invasive removal sites and galvanizing volunteers to assist in other areas. Since one of the focal wildlife species for this area is New England cottontail, funding sources should be available to assist with some of this work.

A summary of habitat enhancement recommendations is provided at the end of this section.

New England Cottontail

The state endangered New England cottontail relies on shrub thickets and young forest for food and cover. Preferred food includes bark, twigs, leaves, fresh fruits, buds, flowers, grasses, rushes, and sedges. In spring and early summer they eat the tender shoots of grasses and herbs; later they shift to fruits, and then to a winter diet of bark, twigs, and buds. Some of their preferred foods include raspberry, blackberry, highbush and lowbush blueberry, winterberry, spiraea, silky dogwood, and willow (see Figure 7 for a complete list).

New England cottontails are extremely susceptible to predation from coyotes and foxes, as well as fisher, weasel, domestic cats, owls, and hawks. The cottontail does not survive well in small patches of habitat (less than 6 acres) and does much better in patches of 25 acres or larger (Arbuthnot 2008). To ensure suitable habitat for the cottontail a mix of shrub thickets, herbaceous patches, and young forest is needed on the Thompson Forest juxtaposed with other nearby lands with similar habitat features. Following removal of the invasive plants in the old pasture, the site could be augmented with native shrubs and small trees.

Early Successional Habitat

Early successional habitat—meadows, shrub thickets, young forests—is beneficial to a range of wildlife, not just cottontails. Hare, grouse, woodcock, turkey, many songbirds, fox, coyote, and deer, among other species were observed in these habitats on the Thompson Forest. Map 6 shows an area of about 15 acres that is proposed as a management area for early successional habitat. Some of the habitat conditions are already present: meadow and young to mid-successional forest. Removal of the large invasive shrubs followed by replanting with natives will provide sustained habitat for these wildlife, although these conditions will require ongoing management (e.g., mowing of meadow, periodic cutting of larger trees, and patch cuts of the early-mid successional forest).

Figure 7. Preferred foods of New England cottontail (Arbuthnot 2008).

Preferred Foods of the New England Cottontail (from Arbuthnot 2008)		
<u>Shrubs & Vines</u>	<u>Herbs & Grasses</u>	<u>Trees</u>
raspberry	goldenrod	red maple
blackberry	rushes	aspen
dewberry	clovers	gray birch
winterberry	lance leaf plantain	apple
willow	chickweed	choke cherry
maleberry	sheep sorrel	black cherry
highbush blueberry	wintergreen	sugar maple
lowbush blueberry	buttercup	oaks
silky dogwood	wild strawberry	white birch
native roses	cinquefoil	yellow birch
spiraea	violet	black birch
chokeberry		beech

Invasive Plant Control

The first management strategy on the Thompson Forest is to plan the invasive plant removal and control over a 10-year period. This requires a yearly intervention and use of different strategies depending on site conditions and size and density of the shrubs. Similar to the approach at the nearby Oyster River Forest, I would focus on mechanical removal and avoid use of herbicide given the proximity to the Lamprey River and the drinking water intake.

I recommend the following priorities and timeline:

Year 1: OLD PASTURE

- Remove the invasive shrubs in the eastern half of the old pasture. This should involve the same technique as used by the contractor Forest Savers on the Oyster River Forest: grub out, grind up, and mulch the large invasive shrubs. Care is needed at the eastern edge of this management area where it abuts an intermittent stream. Prior to the removal, flag any plants to be retained including raspberry patches, ground juniper, eastern red cedar, sumac, wild apple trees, dogwoods.
- Re-plant with native shrubs such as: highbush blueberry, chokeberry, spiraea, raspberry, American hazelnut, American elderberry, arrowwood viburnum, winterberry, pussy willow.

Year 2: OLD PASTURE

- Remove invasives and replant the invasive shrubs in the western half of the old pasture following same procedures as in year 1.
- Include removal of patches of some native hardwoods, north of the pasture, including mature aspens to regenerate these species.
- Plant a row of native shrubs/small trees along the western property boundary to provide a screen to the abutter's house.

Year 2: OLD OXBOW HEADWATERS and ROADSIDE CULVERT

- Remove large, dense population of Japanese barberry at the headwaters of the old oxbow (wetland).
- Remove small cluster of invasives at headwaters of intermittent stream, just east of proposed parking area (at culvert).
- These two sites are best tackled by a hardy crew of volunteers (barberry has many sharp spines). Pile the barberry on site, above potential floodwaters. The invasives near the culvert/road could be removed offsite for disposal at the town transfer station (but NOT composted).
- At barberry site, replant with natives such as silky dogwood, arrowwood, highbush blueberry, witch-hazel, red maple; plant a cluster of highbush blueberry at culvert site.

YEAR 3: WOODS BORDERING OLD PASTURE

- With the help of volunteers begin removing the moderately dense stand of glossy buckthorn seedlings/saplings growing in the forest understory in areas south of the old pasture. Hand tools, such as weed wrenches, are needed. Pile buckthorn onsite.
- Also with the help of volunteers, scour the early-mid successional forest north of the old pasture for invasives and remove with hand tools. If possible, remove these invasives to the transfer station for disposal (but NOT composting). Some of the larger invasive shrubs in this area could be plucked out by a contractor during treatment of the old pasture in years 1 and 2.

YEAR 4: WOODS BORDERING OLD PASTURE

- Continue the invasive removal in woods bordering old pasture.
- Monitor and photo document all areas treated in years 1-3 and remove any remaining invasives.

YEAR 5: RIVER INLET/WETLANDS/FLOODPLAIN FOREST

- Initiate removal of invasives in the river inlet, floodplain and associated wetlands.
- Replant with native plants as needed.

YEAR 6: RIVER INLET/WETLANDS/FLOODPLAIN FOREST

- Continue removal of invasives in the river inlet, floodplain and associated wetlands.
- Replant with native plants as needed.

YEAR 7: RE-CHECK TREATED SITES

- Conduct reconnaissance of all sites treated in years 1-6; remove any invasives found; photo document progress.

YEAR 8: INTERMITTENT STREAMS

- Initiate removal of invasives in the intermittent streams.
- Replant with native plants as needed, especially to restore stabilize lower sections near Lamprey River.
- Consult with NH Fish and Game and NH DES about adding coarse woody debris to stabilize the banks and create better habitat.

YEAR 9: INTERMITTENT STREAM (Wednesday Hill Road to Lamprey River)

- Continue removal of invasives in the intermittent streams.
- Replant with native plants as needed, especially to restore stabilize lower sections near Lamprey River.

- Evaluate feasibility of invasive plant removal in the area between intermittent stream and pump station access road. Develop a plan for restoration and water supply protection before initiating invasive removal in this area.

YEAR 10: EVALUATION AND UPDATE PLAN

- Evaluate progress on invasive plant control in years 1-9.
- Develop a new 10-year plan for invasive control, native plantings, other management; include summary of invasive removal and native planting completed in years 1-9.

Invasive Plant Recommendations:

- Follow the 10-year schedule of invasive plant removal described above.
- Use mechanical tools (tractors, weed wrenches, other hand tools) for invasive removal; avoid use of herbicides.
- Rely on contractors to tackle the large invasive infestations. Engage volunteers in removal of smaller infestations and monitoring for new infestations.
- When feasible pile invasive plants onsite, but outside flood zones; otherwise remove plants safely to town transfer station for proper disposal (NOT composting). Avoid moving invasive plants around the property as potential for dispersing seeds, fruits, roots, or vegetative parts is high. Best to make piles closest to their source.
- Remove invasives prior to installing trails or parking and before any mowing or forest cutting.
- Develop a restoration plan before removing invasives, such as planting native shrubs (species, density, etc) similar to plan for Oyster River Forest. Invasive removal by Forest Savers at Oyster River Forest seemed most effective in the Fall, when uprooting, shredding, and mulching was most effective, followed by planting.

Other Habitat Recommendations:

- Manage approximately 15-20 acres as early-mid successional habitat as shown on the Stewardship Recommendations Map (Appendix 1). This includes a mix of meadow, shrub, and early to mid successional forest.
- Retain the area of meadow that is dominated by grasses, goldenrods, milkweed and other herbs. Mow this once every 1-2 years in September or October.
- As part of clearing the invasives in and around the old pasture, cut some of the young/mid-successional forest to regenerate the mature aspen, as shown on stewardship recommendations map.
- Arrange a site walk with staff involved with the New England cottontail initiative (e.g., NHFG, UNH Cooperative Extension, NRCS) to discuss details of proposed early-mid successional habitat strategy and funding. Although the cottontail would be a focal species of management, I recommend that the

habitat strategy be suited to a suite of species mentioned above as well as pollinators (bees, butterflies) and other native insects and spiders.

- No forest management is recommended in this 10-year plan, except to enhance the early to mid-successional habitat around the old pasture.
- Except for the proposed invasive plant removal, stream restoration, and native plantings, leave a 300-foot uncut (no forest management) buffer along the Lamprey River.
- Forest management to enhance early to mid successional habitat around the old pasture should follow the guidelines in Good Forestry in the Granite State (Bennett 2010), with a particular emphasis on:
 - Protecting seeps and intermittent streams
 - Diversifying the vertical forest structure
 - Encouraging aspen regeneration
 - Maintaining and managing for mature mast trees including red and white oak; retain any large mast trees, including oaks, black cherry, wild apples, eastern red cedar
 - Retaining live and dead cavity trees, snags, and other large den or nest trees
 - Enhancing and maintaining coarse woody debris in woods

Parking, Trails, and Public Uses

The Thompson Forest was conserved, in part, to provide low impact outdoor recreation. Although creating parking and trails is not mandated in the Land and Water Conservation Fund grant agreement, the community would like to provide a trail connection between the Oyster River and the Lamprey River. The Land Stewardship Committee recommended a parking area for up to 4 vehicles. On a site walk in May 2016 with town and LRAC representatives, we identified a trail destination on the Lamprey River suitable for a picnic table and pullout spot for canoeists/kayakers that also protects the ecological integrity of the eastern end of the upland terrace and associated wetlands and drinking water intake.

At least the first year of invasive plant removal and habitat restoration should occur before any trail construction is begun. A 10-year plan for stewardship and maintenance should include plans for trail construction and maintenance as well as monitoring for erosion or other environmental degradation.

A trail leading from the parking area to the Lamprey River provides an opportunity for environmental interpretation of the ecological and cultural importance of the Thompson Forest and environs, especially related to protecting water quality and the Lamprey River and interpreting habitat restoration efforts.

Recommendations:

- Include parking and trail construction in the recommended 10-year stewardship and maintenance plan.

- Create trails after year 1 of invasive plant removal and habitat restoration.
- Create permeable parking area for up to 4 cars just inside stonewall, as shown on the Stewardship Recommendation map (Appendix 1). This could be done in year one in conjunction with the initial invasive removal by a contractor.
- Design and install trails as recommended on Stewardship Recommendation Map (Appendix 1). Adjust location and layout as needed based on the site conditions at the time. Trail should be suited to year-round use for pedestrian and mountain biking. Install a bridge where trail is proposed to cross the wetland.
- Erect a kiosk at the parking area that includes information on the kiosk and trail maps that inform visitors of allowed public uses on trails: walking, snowshoeing, x-country skiing, mountain biking, but no motorized vehicles except for management purposes. No camping, fires, or horseback riding.
- Place a picnic table and interpretive signs at trail terminus on the Lamprey River including at the boat pullout to inform visitors of sensitivity of site and to avoid disturbance beyond trail terminus.

References

American Rivers and the Sierra Club. 2007. Where rivers are born: the scientific imperative for defending small streams and watersheds.

Andreozzi, H. 2016. UNH Cooperative Extension Wildlife Outreach Program Coordinator, Durham, NH, personal communication.

Arbuthnot, M. 2008. A landowner's guide to New England Cottontail habitat management. Environmental Defense Fund.

http://newenglandcottontail.org/sites/default/files/NEC_LandownersGuide.pdf

Bennett, K. P., editor. 2010. Good forestry in the Granite State: recommended voluntary forest management practices for New Hampshire (second edition). University of New Hampshire Cooperative Extension, Durham, New Hampshire.

Exeter Environmental Associates, Inc. 2015. Phase I Environmental Site Assessment, Thompson Trust Property, Wednesday Hill Road (Tax Map 14, Lot 8-3) Durham, New Hampshire.

Fuller, S. and A. Tur. 2012. Conservation strategy for the New England cottontail (*Sylvilagus transitionalis*).

http://www.newenglandcottontail.org/sites/default/files/conservation_strategy_final_12-3-12.pdf

Lamprey River Advisory Committee. 2013. Lamprey Rivers management plan.

<http://www.lampreyriver.org/about-us-2013-management-plan-draft>

New England Cottontail: <http://newenglandcottontail.org>

New Hampshire Department of Agriculture. 2011. Guide to invasive upland plant species in New Hampshire. New Hampshire Department of Agriculture and New Hampshire Invasive Species Committee, Concord, New Hampshire.

http://extension.unh.edu/resources/files/resource000988_rep1134.pdf

<http://agriculture.nh.gov/divisions/plant-industry/invasive-plants.htm>

New Hampshire Department of Environmental Services:

<http://des.nh.gov/organization/divisions/water/wmb/rivers/index.htm>

New Hampshire Fish and Game Department. 2012. Lamprey River Watershed fish survey. Concord, New Hampshire. A report to the Lamprey River Advisory Committee.

http://www.lampreyriver.org/UploadedFiles/Files/fish_survey_report_website.pdf

New Hampshire Fish and Game Department. 2015. New Hampshire wildlife action plan. Concord, New Hampshire. <http://www.wildlife.state.nh.us/wildlife/wap.html>

New Hampshire Natural Heritage Bureau. 2016. Report for the Thompson Farm. [A copy is included in Appendix 8]

Sperduto, D., and B. Kimball. 2011. The nature of New Hampshire. University Press of New England, Lebanon, New Hampshire.

Southeast Land Trust of New Hampshire. 2016. Town of Durham #1 (Thompson) Conservation Easement, Durham, New Hampshire Baseline Documentation Report. Exeter, New Hampshire.

2010 Carbon Solutions New England: <http://100yearfloods.org/resources/>

University of New Hampshire. 2015. An inventory of natural and cultural resources, Thompson Farm Conservation Property, Durham, New Hampshire. Produced by the students of Land Conservation Principles and Practices NR 735/835, Department of Natural Resources and the Environment, University of New Hampshire, Durham, New Hampshire.

Fergus, C. 2013. Saving a New England native. Northern Woodlands Magazine. Corinth, Vermont. http://newenglandcottontail.org/sites/default/files/research_documents/N.%20Woodlands%20Article.pdf

U.S. Census Bureau. 2010. United States 2010 census. Washington, D.C.

Zankel, M. C., C. Copeland, P. Ingraham, J. Robinson, C. Sinott, D. Sundquist, T. Walker, and J. Alford. 2006. The Land Conservation Plan for New Hampshire's Coastal Watersheds. The Nature Conservancy, Society for the Protection of New Hampshire Forests, Rockingham Planning Commission, and Strafford Regional Planning Commission. Prepared for the New Hampshire Coastal Program and the New Hampshire Estuaries Project, Concord, New Hampshire; www.rpc-nh.org/coastal-conservation.htm