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1. Introduction

This plan was approved by the UNH Committee on Woodlands and Natural Areas 3/2010

This document is written as both an overall resource assessment of and descriptive strategy of specific management steps to be taken in the forested areas of the Burley-Demerritt and Dudley Lot Properties.

Inclusion of these two properties within one management document is based upon their proximity to each other. The woodland portions of these properties border the broader Burley-Demerritt agricultural field complex but do not share a common forested boundary. This distinction creates special management situations and challenges that both properties would share and so therefore make it opportune to partner them in this way.

These are working forests managed to maximize educational and research opportunities. Minimization of ecological impact, maintenance or creation of wildlife habitat and demonstration of good land stewardship are all overarching principles that drive decision making. Management strategies and timber harvesting operations are geared towards practicality, sustainability and applicability to contemporary and long-term research programs.

A note about proposed management activities:

Discussions within the College of Life Sciences and Agriculture have suggested that woodlot management on these properties may be tied in with the Sustainable Agriculture Research and Education (SARE) grant funded program umbrella. This may require an adjustment of our management approach. On most properties, harvesting goals would be within the context of an allowable cut for all woodland properties. This entails property specific stand entry intervals of once every 20 years, cutting the allowable cut for that year. Under the SARE umbrella, we instead would have a yearly or biyearly harvest under an allowable cut specifically for the farm; this would then be a portion of our yearly or biyearly allowable cut. Operable acreage and volume per acre estimations suggest we could conservatively harvest 50-60 cords of wood per year sustainably; of this about 2/3 to ¾ would be low grade and available for conversion to any number of desired products (wood chips, shavings, etc.) for use by the dairy. This option may be discussed in greater detail in later iterations of operations documents for these properties.


- Provide and maintain diversity in vegetation, age classes, and stand types for educational and research use.
- Support and coexist with broader College/University goals in relation to the Organic Dairy and SARE program at Burley-Demerritt farm and other agricultural operations.
- Limit impact from woodlot and agricultural operations on important cultural, historical (Demerritt homestead) and environmental (extensive Lamprey River frontage) elements of the property.
- Manage stands at a level of intensity appropriate to the site potential for timber production.
- Design management operations in such a way as to increase the utility of the property by wildlife.
• Support current limited recreational use as allowed and acceptable by Organic Dairy and agricultural management (e.g. snowmobile trails and specific permitted hunting).

1b. Contextual management issues

These properties are important assets to the local and regional communities. The historical and conservation value of this property is important to the Town of Lee and its citizens. The conservation value and preservation of the Lamprey river resource is important to the Town of Lee, its citizens and other regional water conservation and protection groups. Within a two mile radius of the farm, nearly 1/5 of all land is under conservation protection status (source: Granit Data website). The Lamprey river is designated as wild and scenic and has been indentified by multiple land and water conservation groups as an invaluable resource, and has been designated under the New Hampshire Rivers Management and Protection Program (RMPP).

These factors require that a measured approach to management will include consideration to these other stakeholders and possibly public education sessions about management decisions and actions.
2. Historical and Current Use

This plan addresses the forested areas of the Burley-Demerritt and Dudley Lot properties. Multiple research programs utilize the non-wooded (i.e. Agricultural) areas of Burley-Demerritt and Dudley Lot Properties but will only be discussed where they interact with those programs/uses described within this plan.

2a. Historical

The Burley-Demerritt property has been farmed since the 1700’s and was owned by this family until sold to the University (NR 735/835, 2008). Agricultural use has been continuous under University ownership. Management of the woodlot portion of the property is unknown although the relative abundance of stonewalls implies past agricultural use. Age of the trees (80-85 years) also suggests former open field/pasture that has reverted to woodland.

The Dudley Lot property has a similar agricultural history. Owned by the Dudley family until 1985, anecdotal history reveals that the woodlot had been cleared in the winter of 1954 (Wellington personal communication 2010), aging of trees in this area @ 65-75 years of age supports this. Other management by the University is described below.

2b. University Current and Past Use

The University acquired the Burley-Demerritt property using funds from the Whidden fund in 1969 to satisfy objectives identified in the Land Grant charter and status as an Agricultural Experiment Station. The Dudley Lot was acquired in 1985 under the same guidelines.

Research

Former woodlands based research has included recent programs with the following foci:

2009 ABER/McDowell USDA-SARE Grant – quantifying nutrient, carbon, and energy budgets for the farm and woodlot areas, with the goal of determining whether the system can be close to self-sufficient in all three areas.

Lamprey River Hydrologic Observatory (McDowell)

Outwintering Cow Study (Past)
Wild Turkey Ecology Study (Past)

Note: Unique Research Opportunities

UNH’s ownership of property (Saddleback) on the Lamprey very close to its headwaters creates an interesting research opportunity given access to the river at both sites.
Education
Hundreds of University of New Hampshire students have used these properties as an outdoor classroom. The proximity of this area to the campus allows a quick trip for lab sessions. Forestry classes from both two and four year programs use this property regularly for lab sessions.

Forest management
Woodlands office records show a single harvest on the Burley Demerritt Property in the winter and spring (1/15 thru 4/4) of 1986, volumes are summarized below:

<table>
<thead>
<tr>
<th>Product</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Pine Sawtimber</td>
<td>233 MBF</td>
</tr>
<tr>
<td>Softwood Pulp</td>
<td>222 CDS</td>
</tr>
<tr>
<td>Firewood</td>
<td>71 CDS</td>
</tr>
<tr>
<td>Hardwood Logs</td>
<td>3.9 MBF</td>
</tr>
<tr>
<td>Red Pine Sawtimber</td>
<td>.8 MBF</td>
</tr>
<tr>
<td>Hemlock</td>
<td>16.2 MBF</td>
</tr>
</tbody>
</table>

Est. Total Volume 800 cds or 200 tons

16 acres acre of the Dudley lot were cleared for field conversion at the same time ("E" on map 5). Delays in the project resulted in the field remaining partially stumped and unfinished. Part of this field was designated as wetland and halted by DES for that reason.

Recreation
Hunting.
Snowmobile use.
Lamprey river recreation.
3. Physical attributes

3a. Property descriptions

*Please see the map section of this document*

These woodlands are within the transitional forest region of New England which is part of the larger Eastern deciduous forest biome. These classifications are defined by vegetation composition which is a direct result of different climate zones. In terms of eco-regions, these properties lie on or near the boundary of the Gulf of Maine Coastal Plain and Gulf of Maine Coastal lowland subsection of the Lower New England section. These are distinguished from others by underlying bedrock types and overlying soils (Sperduto 2004) These properties are also both a direct watershed to the Lamprey River as well as part of the larger Piscataqua-Salmon Falls Watershed and are the highest ranked wildlife habitat by condition according to the NH State Wildlife Action Plan (2005).

Located entirely in the town of Lee NH, these properties are a little over 6 miles from UNH’s Durham campus and located off of Lee Hook Road. As you drive along Lee Hook road, the combination of woods and fields on these and adjoining properties provide a unique glimpse into what surrounding areas in Durham and Lee would have looked like in their agricultural past.

On the western edge of these properties the Lamprey River provides an equally picturesque boundary. Winding northerly in this section, the river defines the entire westerly boundary. Along this 2 mile edge, a number of backwaters are flooded during spring and other high water times. These create interesting upland islands that increase diversity of both vegetation and wildlife.

Soils on both properties are rated fair to good for woodland productivity. Much of this can be attributed to the influence of the river. Details of specific soils, including those of riverine origin, can be found in section “3b. soils”.

These two properties are linked by a snowmobile corridor maintained by a local snowmobile group, the “Lee snow travelers”. The trail enters Dudley Lot (see map 14) via private trail on the northeast side (“A” on map 14) as well as public trail on the northwest side (“B” on map 14) and exits to the field to the south (“C” on map 14). It travels across the edge of the agricultural fields, entering the wooded section of Burley Demerritt on its northeast side (“D” on map 7), crossing the small stream then joining UNH’s forest access road (“E” on map 7). It follows the forest access road for approx. ½ mile, then turns off (“F” on map 7) into the wooded section, mostly paralleling the river for another ½ mile to exit the southwesterly corner of the property (“G” on map 7).

3a.1 Dudley Lot

The Dudley Lot property is 105 acres in size. The woodlot portion of the property is 40 acres and is bordered by UNH agricultural fields to the south/southeast and is bordered in the north and east by Lee Hook road for 1700’. The northern boundary proper is shared with a private owner. Approximately 12 acres of Dudley lot are either wetlands or bordering wetlands and are therefore mostly inoperable for forest management activities.

The Dudley lot property has little topographical relief. In the lowest section of the property, (“D” on map 14) Cassie creek runs through a red maple swamp that forms a rough boundary of the northern edge of the currently cultivated agricultural fields. From this swamp, the creek runs easterly, immediately under Lee Hook, a considerable distance to a beaver
impoundment, then down and to the Lamprey River. This larger wetland complex creates an interesting connection back to the Lamprey where the river loops south again.

As noted before, a 10 acre front portion of this property was cleared for fields in 1985. When it was discovered that some sections were too wet the project was halted. This area is now young forest. Areas where stumps and debris had been pushed into windrows now have interesting pit/mound topography. Flanking this wedge of new woodland to the north and the south are two fields of 4 and 2 acres (Dudley field A [DFA] and Dudley field B [DFB] (see map 14) map respectively). These are mowed periodically to keep them open but remain somewhat shrubby and undefined. Sandwiched between this field-early woodland-field section to the east and the river to the west is the woodlot portion of the property.

The woodlot portion of the property has a gentle slope down to the river and away from Lee Hook Road and the higher ground of the ag fields to the south. The occurrence of vernal pools and pocket wetlands increases in areas closest to the river. The distinction between these and river backwater sections becomes blurred as your proximity to the river increases. At certain times of the year and during high precipitation periods it is clear that some wooded areas become flooded or stand alone as islands; this unusual riparian zone undoubtedly increases diversity of both vegetation and wildlife.

An uncommon characteristic of the Dudley lot is a small depression located within 100’ feet of the river, host of 2 considerable black gum stems (27.3 “ and 16.8” D.B.H.). Black gum is known to grow to over 500 years in age. It would be interesting to know whether the individuals we find along these two properties are related to those in the better known swamp further up the drainage.

3a.2 Burley Demerritt Farm

The Burley Demerritt Farm is 203 acres; approximately 130 of these acres are wooded. Of these, nearly 17 acres are wetlands or bordering wetlands and are therefore mostly inoperable for forest management activities.

Generally, the farm buildings and associated areas occupy the highest ground of the property. From here, the ground generally slopes down and towards the river; in general there is very little topographical relief, although some small drainages are sources for the few intermittent streams that can be found. The Lamprey River plays an extremely important role in the physical structure of the property; a large portion of which is within the floodplain of the river or borders backwaters that flood during high water. The peninsulas that are created by these events are populated mostly by species found in upland areas of the property. Where these “islands” interact with flood zones, unusual seasonal herbaceous material can be found. As with Dudley lot, these areas of interaction undoubtedly increase diversity of both vegetation and wildlife.

Some uncommon features of this woodlot include a 1.5 acre muck and peat swamp (“A” on map 8), located in the northern end and draining northerly to the Lamprey via a small stream. Nearby this is a group of large silver maples, growing within the Lamprey river flood plain (“A” on map 13). Several red maple swamps can be found on the property, one of considerable size (10 Acres) that may act as a river buffer to the agricultural fields on the southeastern edge. This swamp is the origin for a free running stream that meanders south and eventually finds the lamprey (“A” on map 10). An unusually large and vigorous 32” Shagbark hickory was found in stand 4 within 200 feet of the river. (“B” on map 13) A single ≈16” Black gum stem was found perched atop one of the flood plain peninsulas (“C” on map 13).
3a.3 The Lamprey River

Originating at a point close to and running through UNH’s Saddleback Mountain property in Northwood, the Lamprey runs for 47 miles before reaching Great Bay. Classified a Wild and Scenic River and UNH’s frontage as part of a section identified by the state under the New Hampshire Rivers Management and Protection Program (RMPP) for special consideration, the management approach of both Burley-Demeritt and Dudley Lot should be carefully crafted so as to both protect and enhance the resources that the river provides – drinking water, wildlife habitat, wetland structure, recreational activities, and others.
3b. Soil Descriptions and site quality

See map 3 Burley Demerritt soils and map 4 Dudley lot soils for a layout of the soils on these properties; agricultural areas are not discussed here.

These properties offer a productive combination of soils of riverine, glacial and marine origin. The majority soils on the woodland portions of these properties are rated high relative value in their ability to produce woodland crops (USDA 1973). All soils are also rated either fair or good for growth of grasses and wild herbaceous plants for wildlife use. Other than those areas dominated by either scantic (or other marine) soils or intermittent streams and other wetland micro-sites, soil types do not restrict activities that require heavy equipment. In limited areas where this is a potential concern, work could be accomplished while the ground is frozen to reduce the risk of soil disruption.

Average Site Index ratings are listed following each species designation within the specific soil descriptions (e.g. White pine[79] would be a site index of 79 for this species). For a breakdown of treatment and stand areas see the map section and operations section of this document.

**Acton very stony fine sandy loam (AdB , AcB) (glacial till)**
These soils are rated good for pine[65] upland oaks[60] and northern hardwoods[55]. There is a slight chance of windthrow and equipment use limitation on these soils. These soils are highly productive for forest crops and produce conditions that are good for open land types of wildlife. Stand 10 on Burley Demerritt has a small area of Acton soils.

**Charlton fine sandy loam (CfB, CfC, CsB) (glacial till)**
These sites are rated good in their productivity for white pine[65], upland oaks[59] and northern hardwoods[55]; current site conditions support this. Operability is good on these soils. These can be found on the fringe areas of stand 4 and stand 9 where woodland meets agricultural field on Burley-Demerritt Farm.

**Deerfield loamy sand (DeA, DeB) (fluvial)**
These sites are rated good in their productivity for white pine[65], upland oaks[59] and northern hardwoods[55]; current site conditions support this. The composition of these soils somewhat limit accessibility, especially in the construction of woods roads.

Stand one on Burley Demerritt is entirely Deerfield soils. Other areas of this soil type include middle portions of Burley Demerritt stand 4 on the strip between the ag fields and the river and where Burley Demerritt stand 3 meets stand 7c.

These soils can be found on Dudley Lot stand 4.

**Hinckley loamy land (HbE, HaA, HaB ,HaC) (glacial outwash)**
These soils are rated fair for pine[55] upland oaks[50] and northern hardwoods[50]. These soils can be found where Stand 2 and 7c meet the agricultural fields on Burley-Demerritt Farm.

**Hollis-Charlton (HcB, HcC, HdB) (glacial till)**
These soils are rated fair for pine[55] and upland oaks[50] and good for northern hardwoods[55]; current site conditions support this. Limitations on operability range from moderate to severe while windthrow risk in general is moderate. Limitations with this soil are generally related to rockiness; this can be mitigated through careful skid road and harvest unit layout. Windthrow risk can be lessened through appropriate harvesting methods.
These common soils are found on Dudley lot in stands 1, 2, 3 and 5 and on Burley Demerritt in stands 2, 3, 4 and 6.

**Leicester (Lea, LeB, LrA) (glacial till)**
These sites are rated good in their productivity for white pine[65] and upland oaks[59] and fair for northern hardwoods[50]. Due to poor drainage quality, areas that include these soils may have seasonal challenges to equipment access. These soils are only found in stand 7e on Burley Demerritt Farm.

**Mixed Alluvial (MI)**
This soil is a mixture of different types of soils and soil materials found in stream bottoms, floodplains and backwaters. Common vegetation would include red maple and wetland plants, grasses and sedges. These areas are mostly wet and can create a barrier for management although they are productive in terms of availability of diverse vegetative growth for wildlife. These soils are found in stand 8 on Burley Demerritt Farm.

**MUCK AND PEAT (Mp)**
These areas consist of organic matter in deposits from 1.5 to 10 feet deep. These areas are inoperable. Muck and peat is an important natural resource in terms of the diversity of vegetation and accompanying wildlife habitat it offers. This uncommon soil is found in the swamp in stand 6 on Burley Demerritt farm.

**Ondawa (On) (fluvial)**
These soils are well drained soils found on the flood plains of major rivers. Ondawa series soils are rated good in their productivity for white pine[65], upland oaks[59] and northern hardwoods[55]; current site conditions support this. Operability is good on these soils, they are found in Burley Demerritt stands 6 and 8.

**SAUGATUCK LOAMY SAND (Sb) (glacial outwash plains)**
These soils are rated good for pine[65] and fair for upland oaks[50] and northern hardwoods[50]. These soils have a high water table and are poorly drained. There are severe limitations on equipment use and high likelihood of windthrow due to their poor drainage qualities. These soils can be found on Burley Demerritt in stands 7c, largely in stand 3 and in a small edge of stand 4.

**Scantic Silt Loam (Sca, ScB) (marine)**
Scantic soils are not well drained and therefore limit management due to susceptibility to windthrow and poor support for woods roads and equipment use. In general, these areas have been removed from consideration in terms of operability; in places where this is not the case, work areas are not those susceptible to pooling water.
These soils are rated fair in their productivity for both white pine[55] and northern hardwoods[50] and poor for upland oaks[44]; current site conditions support this. Scantic soils are often associated with wet sites, and are found on Burley Demerritt in stand 6, 7b and 10.

**Sutton (SnB, SuB) (glacial till)**
Sites with these soils are rated good in their productivity for white pine[65], upland oaks[59] and northern hardwoods[55]; current site conditions support this. These have
moderate permeability and moderate water capacity; these soils are rated very high for productive forestry. These can be found on Burley Demerritt stands 4 and 6.

Swanton (SwA) (marine)
These soils are rated fair for pine[55] and northern hardwoods[50] and poor for upland oaks[55]. There is great risk of windthrow in these areas and limitations on equipment use. Although adapted well to wildlife use, this soil is not well suited for growth of timber. These soils can be found in the core of Dudley in portions of stands 1, 2, 3, and 5. In Burley Demerritt they can be found where stand 6 meets ag fields to the north and in a small southern section of stand 4.

Windsor loamy sand and loamy fine sand (WfB, WdA) (fluviatll)
These soils are rated fair for pine[55] and upland oaks[50] and good for northern hardwoods[55]. The qualities of this soil type do not limit use of equipment. These soils can be found in large portions of stands 4 and 6 on Burley Demerritt Farm.
3c. Wildlife

These properties lie within an area designated as highest ranked wildlife habitat by condition according to the NH State Wildlife Action Plan (2005). Habitat types available on these properties and related species of concern are listed in Appendix 2 “Habitats and related species of concern on Dudley and Burley Demerritt properties”, this information was summarized from a table supplied by Jim Oehler of NH Fish and Game.

3c.1 Current Wildlife Habitat Assets on Burley-Demeritt and Dudley lot

It has been found that by far, the majority (over 59%) of the species found in New England use a combination of non-forested, forest and water habitat types than those that use single habitat types (only 17%) (Degraaf et al 1992). It has also been found that 64% of all species have a home range of 10 acres or less (Degraaf et al 1992). Through careful placement and diversification (in size, species, structure and age) of habitat management blocks, moderately sized wooded areas such as those found on Dudley Lot and Burley-Demerritt farm can be optimized for their utility by wildlife.

With mature woodland, younger regenerating forest, river frontage and associated riparian zones, a multitude of forested wetlands of various sizes, open meadow and fields all within close reach of each other, these properties represent a broad representation of excellent wildlife habitat resources. Described within each property specific section are elements that fall outside of those benefits normally associated with the habitat conditions listed above. Mostly, how expected common species (such as those observed below) of wildlife occupy and utilize this property will not be the focus. Instead, this document will concentrate on how expected uncommon species may utilize these properties, and how we may shape our management goals for their benefit. For readers who have interest, a comprehensive listing of common wildlife species and their related habitat types can be found in Degraaf et al (2006).

Personal observation during the timber inventory and associated field visits provided direct evidence of the following common wildlife species:

Snowshoe hare (track, sign)
Fisher (track)
Coyote (track)
American woodcock (observed)
White tailed deer (observed, sign, track)
Gray squirrel (observed)
Red squirrel (observed)
Beaver (recent sign)
Ruffed grouse (track)
Porcupine (den)
Crow (observed)
Raccoon (track)
Turkey (track)
Herring gull (observed)
Canada goose (observed)
Red-winged blackbird (observed)
Blue jay (observed)
Hooded merganser (observed)
3c.2 Wildlife Assets – Context

As one contiguous block, Dudley Lot and Burley-Demerritt have a number of large scale features that contribute to a considerably diverse wildlife habitat portfolio. It is generally accepted that larger and less fragmented woodlands provide greater wildlife benefit. Burley Demerritt is a considerably large piece that is supplemented by woodland across the Lamprey river to the south and west and to a lesser extent stretching beyond the boundary line to the south. Although Dudley lot is smaller, when taken in context with the neighbor to the north’s larger block as well as a considerable piece across the river to the southeast, it also represents a fairly larger piece of unbroken woodland. Within a two mile radius (8000 ac) from the center of these properties, nearly 1/5 of all land is under conservation protection status (source: Granit Data website).

One of the major wildlife resources that these properties share is the Lamprey River. The river hosts a number of fish species and supports a richly populated and diverse riparian zone. The backwater portions of the Lamprey provided excellent habitat for a variety of mammals and amphibians. The river and riparian zone compliment wooded areas as a migration corridor, food and water source and nutrient supply to surrounding floodplain areas.

The brook floater mussel and the American brook lamprey have been identified as two of New Hampshire's species in greatest need of conservation by the NH wildlife action plan (2005), have known populations in Lee and are likely found in the Lamprey river. Species of concern that would use the floodplain portion of these properties are the Cerulean warbler, Blanding’s turtle, ribbon snake, spotted turtle and wood turtle.

3c3. Wildlife assets adjacent/related to but not on UNH property

The assets described below provide elements that when combined with the special features of the wooded sections and ag sections of UNH’s property create opportunities for a wider variety of wildlife species, especially those with greater range. These include:

- A 30 acre beaver impoundment/swamp located due east of Dudley lot, accessed by Cassie brook. (“A” on map 2)
  Blanding’s turtles have been identified as a species of concern, and may use elements of this beaver impoundment in combination with wetland and upland areas of Dudley lot. Other species that may benefit from this mix would include great blue heron.

- 100’s of acres of open/maintained hay and crop fields within 1 mile radius of both properties.
  A number of species have been identified as species of concern by NH’s wildlife action plan (2005), have known populations in Lee and are likely to benefit from the large open agricultural fields. These include the Eastern meadowlark and grasshopper sparrow.

3c.4 Wildlife Assets specific to the Dudley Lot

Please see map 14 and 15

In addition to the Lamprey river and associated backwaters, other wetland areas such as those designated in stand type five (red maple dominant) are populated by a great number of wetland associated shrubs like winterberry holly, high-bush blueberry, and red osier dogwood
that provide excellent sources of soft mast. Running water and seep areas surrounding these wetlands are an important winter resource.

The young (=25yr old) thick growth of stand type two ("E" on map 14) provides a strong year round visual and sound barrier to Lee Hook Road for wildlife either populating the wooded areas of Dudley lot or using the flood plain or river corridor as a means for movement between larger (UNH and non-UNH) tracts of property. The dense structure within the stand benefits those species that utilize early-successional habitat conditions and is unlike any other block of vegetation on the property. Mature trees in adjoining stands will benefit those species that utilize high perches. A number of shrub species including highbush blueberry, hazelnut, rubus, and alder provide important mast. Winter surveys have shown that a great number of low hardwood stems had been browsed by hare and it is likely that some of the small white pine thickets growing here are used for multi-season cover. The unintentional pit/mound topography has two beneficial results:

- The artificially created depressions act as vernal pools and provide similar benefits.
- The piled stumps, soil and old vegetation provide low areas to be used for travel cover and also make excellent premade mounds to use as dens.

Species identified by the New Hampshire Wildlife Action plan as species of concern, have known populations in Lee and would use the combination of wetland edges, shrubby and early successional growth include American woodcock, ruffed grouse and Black racer. Golden winged warbler and whip-poor-will may also utilize the younger woodland and shrubby portions of these areas. Additionally species that would use this as a part of a wetland /upland /shrub-/grassland combination would include the Eastern hognose snake and wood turtle.

Stand three and areas of stands four, five and six all have a strong hemlock component. This dense canopy and regeneration layer provide important thermal cover during the winter. Stripping of young hemlock along the edges of the river suggest that in recent years deer have used this area for that specific reason.

Stands one and four both have healthy populations of mature, hard mast producing hardwoods; red oak, white oak, and to a lesser extent shagbark hickory. Upland parts of these stands have younger hardwood growth (possible browse) in the understory including young oaks, red maple and shrub species like maple leaved viburnum, high-bush blueberry and witch hazel. The taller and dominant white pines of this area contribute vertical structure to the area and provide food source for a number of wildlife species including squirrels, mice and prcupines. The proximity of some of these larger trees to the river suggests the possibility (although not high probability) of Osprey or Bald Eagles using these as nesting sites (Yamasaki 2003). Both of these species have been known to utilize the river downstream and both have been identified as two of New Hampshire’s species in greatest need of conservation by the NH wildlife action plan of 2005.

3c5. Wildlife specific management suggestions for Dudley Lot
- Retain large “supra-canopy” white pine in close proximity to the river as potential nesting sites for osprey and Bald Eagle.
- Recover (in blocks of 2 acres every 3 years) 80% of the total area of stand 1 to keep this area in perpetual early successional growth (the other 20% is wetland). These actions will specifically benefit species that use early successional growth like American woodcock.
- Maintain substantial no-cut buffer along river, vernal pool and backwater sections.
- Maintain areas of dense hemlock thicket.
- Place two small patchcuts within stands 6 and 3 as they meet the agricultural field to provide a soft transitional edge and small early successional area. These patches should also meet edges of stand 5 (red maple swamp) to form brushy component between these two areas.
- Implement invasive plant/pest monitoring and control efforts.
- Work with UNH farm managers to delay mowing activities on some portions of the fields to allow for ground nesting birds, while still allowing farm managers to accomplish their primary agricultural objectives. Pursue a field management strategy to maximize the use of these fields; time field mowing and adjust mowing techniques to benefit reptile use.

3c.6 Wildlife Assets specific to Burley-Demerritt

Wetland areas that hold standing water, such as the vernal pools and muck and peat swamp in stand 6 (“B” on map 8) backwater sections and vernal pools in stands 4 and 8 (“C” on map 8) are excellent resources for the range of wildlife that have been observed here as well as a number of potential amphibians. Edges of these wetlands and other wetland swamps host a diversity of shrubs and herbaceous plants (eg. sensitive fern) not found elsewhere on these properties, providing a source of soft mast and browse. The greatest density of snags and cavity trees can also be fund within these wetlands.

Species identified by the New Hampshire Wildlife Action plan as species of concern, have known populations in Lee and may benefit from these wetland areas include the ringed boghaunter, blue-spotted/Jefferson salamander, Blanding’s turtle, smooth green snake, and American Woodcock.

Woody browse can be found in the regenerating sections of stand 6 where it meets the river floodplain (“D” on map 12). Although a limited resource, beaver have been taking advantage of this sapling sized growth. Other older regenerating hardwoods should come into increased hard mast production within the next 20 years. Current areas of high hard mast production (“E” on map 12) include areas of mature oaks (and occasional shagbark hickories) such as in stand 6 (esp. at the edge of backwater sections) and along the fringe areas of stand 9, where digging for acorns was noted this winter. These larger hardwoods also have great potential to provide future cavities; this condition can be observed in some stems that fringe the terrace above the floodplain.

Thick pine and hemlock growth in stands 4, 6 and 9 provide year round cover and food for a number of species. Mature trees of these species are providing roosting spots for resident turkeys as well as for various raptors.
Stand 10 provides a variety of shrubby/old field growth not found anywhere else on Burley-Demerrit. It is likely that species like ruffed grouse, snowshoe hare, and American woodcock use the combination of shrubby field, wetland edge and aspen clumps in various stages of development. Larger scale agricultural openings compliment this and other wooded areas, benefiting many wildlife species.

During the spring survey I noticed several schools of small fish in unbelievably small pools in the stream that runs through the northwesterly portion of stand three. It is likely that this is a common occurrence when the backwater floods in the spring, allowing access for these youngsters to reach further up the stream.

3c.7 Wildlife specific Management suggestions for Burley Demerritt Farm
- As with Dudley, retain dominant white pines within close proximity to the river. (benefit: Osprey, bald eagle)

When harvesting for silvicultural reasons in stand 6:
- Remove large groups (1/4 ac+) of low quality trees in proximity to the river to provide young woody re-growth to benefit beaver. (benefit: American woodcock)
- Favor mature or over-mature hardwood species for mast production and as cavity trees.
- Where safe, retain maximum number of snags.
- Retain Hemlock buffer along river; or, where ecologically sound, consider replacing some upland hemlock thicket using methods favorable to producing thick white pine regeneration. (see silvicultural goals)

In fringe areas of stand 9:
- Release hardwoods with large crowns for hard mast production.
- Retain most supra canopy white pines in this area as potential perch trees.
- Release vigorous apple trees. Pursue management actions (eg. release, fertilization) to make these trees more productive.
- Where available, retain shrubby meadow pockets as complement to open understory hardwood sections. (benefit: American woodcock, grouse)
In Stand 10 Old Field:

- Keep grassy opening/aspen thicket/shrubby mix.
- Regenerate aspen when mature.
  (benefit: American woodcock, grouse)
- Pursue management strategy with Farm managers to manage elements in adjoining fields (shrubby edge, riparian zone management, invasive plant strategy, etc.). in harmony with field management strategies in Dudley lot.
  (benefit: Black racer, wood turtle)

In stand 3:

- Protect riparian zones and stream banks of stand 3 by increasing harvest buffers, overbuilding any necessary crossings and limiting entry to winter or very dry summer only.

In all stands:

- At time of harvest implementation, identify areas of ½ to 1 acre in size that could be converted to provide early successional/young forest habitat; these areas would ideally be areas of low future timber value, currently financially mature and/or in strategic location to supplement other actions.
- Work with UNH farm managers to delay mowing activities to allow for ground nesting birds. Pursue a large field management strategy to maximize the use of these fields for all wildlife species while also meeting silvicultural objectives.
3d. Invasive plants and pests

Please see Appendix 1 for a list of all trees and woody plants found during recent inventory. A broad description of native vegetation is found in section 4 “timber inventory”.

3d.1 Invasive plants

Although not widely invaded, these properties have representative communities of the laundry list of non-native invasive plants that are often found in this region:
- European (Berberis vulgaris) and Japanese barberry (Berberis thunbergii)
- Glossy buckthorn (Rhamnus frangula)
- Morrow’s honeysuckle (Lonicera morrowii)
- Autumn olive (Elaeagnus umbellate)

Areas of highest invasive stem density are stands 2, 3, 7b, 7c and 10; this is almost entirely in the form of glossy buckthorn. Most red maple swamps and forested wetlands on these properties have small areas of invasives. Scattered barberry clumps can be found throughout the two properties. Individual stems of Russian Olive and honeysuckle and small patches of glossy buckthorn can be found along the margins of the two fields on Dudley Lot and at Burley-Demerritt farm in stand 10 and along most other field margins. A considerable number of scattered glossy buckthorn stems can be found on Dudley Lot within the 25 year old stand at the front of the property.

From the Woodlands Office perspective there are two main concerns regarding invasive species:
1. It is generally accepted that invasion by foreign species is a detriment to normal ecosystem function.
2. Any shrub monoculture that persists indefinitely in an understory limits the ability to regenerate favorable tree species; this interrupts timber production.

Although we do not currently have a set policy on invasive control, operations proposed within this plan will address any known or anticipated problems as part of projections of stand development.

3d.2 Invasive pests

At the current time the greatest perceived insect pests are the Asian Longhorned Beetle, Hemlock Woolly Adelgid and Emerald Ash borer. The relative absence of ash removes our concern for the Emerald ash borer. ALB has a number of potential host areas, (red maple swamps) although the current vector for invasion here seems absent. HWA is of highest concern for this property, given the proximity to water, the abundance of migratory birds and prevalence of multiple age classes of hemlock.

The importance of hemlock to the water resource (shade, root and physical structure, snowpack retention) and general ecosystem health makes these properties a priority in terms of a strong monitoring and treatment program. The organic dairy status disallows the use of pesticides; a large population of HWA would be virtually impossible to halt using mechanical means. Small populations may be halted through early detection and mechanical removal methods.
3d3. Invasive control suggestions

The status of the organic dairy limits the use of herbicide or pesticide on either property. Since this is the most expedient (known) method of removing populations of unwanted plants and pests, it is imperative that action be taken to halt the spread throughout these properties. To do this we should:

- Perform invasive plant survey to qualify populations.
  - In teams, layout transects with a spacing of 50’. Map areas according to parameters below. Treat areas at time of detection that are appropriate using weeding methods.
  - Identify populations as “uncontrollable”, “controllable with effort” and “treatable at time of detection”.
    - “Uncontrollable” would describe areas greater than an acre in size with multiple age classes present and greater than 500 stems per acre.
    - “Controllable with effort” would describe populations that could realistically be weeded by a crew of three in a week’s time. This would be an area that is < 3 acres that has less on average than 500 stems per acre.
    - “Treatable at time of detection” would describe areas of 5 acres or more with <20 stems per acre.

- Prioritize treatment areas.
  - Start with areas that can be controlled with effort and progress inward towards populations that cannot be controlled. Although birds can spread seed outward from here, this helps remove the self advancing front of invasive plant populations. Continuous efforts over years should concentrate on this advancing front.

- Perform invasive pest survey to qualify populations.
  - At the current time there are no known occurrences of HWA. Since immediate manual treatment of effected stems is required, early detection is an imperative. High risk areas should be limited to those utilized by migratory birds, specifically areas immediately adjacent to the river. By carefully sampling all Hemlock trees immediately along the river, HWA should be detected early enough for appropriate treatment.
4. Timber inventory

4a. Methods

*Please see the map section of this document*

The inventory data used here was acquired during a cruise in the winter of 2008-2009.

Sampling Method: Big BAF Variable plot (1 every 2.5 acres) for overstory trees. Count trees were identified using a prism with a BAF of 20; measure trees are determined using a prism with a BAF of 55. Regeneration was noted but not measured. Some fringe areas that would not be included in timber prescriptions were observed but no measurements were taken.

4b. Property wide measurements

*Please see the map section of this document*

**Dudley Lot**

<table>
<thead>
<tr>
<th>BA/Acre:</th>
<th>116 sqft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Per Acre:</td>
<td>200</td>
</tr>
<tr>
<td>Mean DBH:</td>
<td>13.6”</td>
</tr>
<tr>
<td>Total operable acres:</td>
<td>28</td>
</tr>
<tr>
<td>Average total biomass volume per acre:</td>
<td>115 tons</td>
</tr>
</tbody>
</table>

Cores were taken from two mature white pines at opposite ends of the property. Both trees were dominant healthy trees. Based upon height measurements and site index ratings for the soils where these trees were situated the trees should be roughly 65-70 years old. From a conversation with Dick Wellington, a local resident, these lots were cleared in entirety in the mid 1950’s. Core measurements produced ring counts of 58 (on lower quality soils) and 61 (on higher quality soils). This implies that the dominant trees today were already established, possibly as advanced regeneration when the area was cut or that coring results were somewhat inaccurate. Regardless, stand age can be estimated at 65-75 years old.

Dominant and co-dominant hardwood and hemlock ages should be similar to pine but are somewhat confounded by the presence of stumps and young growth in and around the field edges. I theorize that where hemlock and in some cases red oak are dominant in the canopy, (stand 3) that these trees were a younger age class that came in under the regeneration (pine) that resulted from the cutting in '54. These trees were subsequently released through an intermediate cutting of pine that is not in our records.

**Burley-Demerritt**

<table>
<thead>
<tr>
<th>BA/Acre:</th>
<th>136sqft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Per Acre:</td>
<td>240</td>
</tr>
<tr>
<td>Mean DBH:</td>
<td>12.7”</td>
</tr>
<tr>
<td>Total operable acres:</td>
<td>107</td>
</tr>
<tr>
<td>Average total biomass volume per acre:</td>
<td>146 tons</td>
</tr>
</tbody>
</table>
Three trees were chosen in stand 6 as a general example of tree age for Burley Demerritt. Two dominant white pines were cored and estimated at 85 years of age. One of these trees was growing relatively slowly at 15 rings per inch, the other faster at 10 rings in the last inch of the core. One red oak, a dominant in its age class, was estimated at 45 years old. This tree was growing rather swiftly, an inch in the last eight years.

4c. Stand level assessments and management suggestions : Overview

Please see the map section of this document

The woodlots on Burley Demerritt farm and Dudley Lot have excellent access, level operable ground and premium site conditions for growing timber. Although preservation of the Lamprey River resource is the priority, the observance of buffers and Best Management Practices can allow us to aggressively pursue timber management goals. Both of our bread-and-butter species, red oak and white pine, grow well here and all steps should lead to the development of high quality crop trees and perpetuation of these species. In hand with this, harvest layout can be designed in such a way as to optimize wildlife habitat improvement while meeting other goals. As a resource to the forestry and natural resource departments, these properties represent an excellent educational and research opportunity relating resource management and ecosystem health.

A note about buffers:

NH state law requires a buffer to the river of 150’ where no less than 50% of the basal area is removed. It is proposed within this document that there be (at the minimum) an additional 50’ no cut zone along the Lamprey river as well as any backwater or obvious floodplain sections. Larger buffers may be used where flooding is a concern, of any substantial topographical relief or in situations where the wooded area is buffering the river from agricultural activities (like in the southern half of stand 4).

The deviation from this self imposed restriction may include steps such as treatments of invasive pests. Hypothetically, our organic farm designation restricts us to mechanical treatments for pests. In regards to HWA, this would mean removing all infected stems and scattering/burning the foliage. This may require cutting within this buffer and possibly other additional required measures that at this time are unknown.
4d. Dudley Lot Stand level assessments and management suggestions

*Please see Map 15 Dudley Lot stand types*

### 4d.1 Stand 1 – White pine dominated mixed wood stand

**Natural Community type**: Hemlock-Beach-Oak-Pine

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>SE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA/Acre</td>
<td>109 sqft</td>
<td>10 SE %</td>
</tr>
<tr>
<td>Trees Per Acre</td>
<td>90</td>
<td>0 SE %</td>
</tr>
<tr>
<td>Mean DBH</td>
<td>15</td>
<td>12 SE %</td>
</tr>
</tbody>
</table>

Dominant tree species in order of prevalence (basal area ft/ac): White pine (65), N. Red Oak (13), Eastern hemlock (11), red maple (9), black oak, paper birch, shagbark hickory, sugar maple, white oak, yellow birch (<10 sqft/ac).

Regeneration and woody shrubs: White pine, highbush blueberry, Eastern hemlock, American beech, blue beech.

Invasive shrub species: Japanese barberry.

Stand 1 is 10 acres in size; mostly it is a band of land running roughly north to south and central to the property. One finger of this stand is sandwiched between the larger northern field and the abutting property owner, extending out northwesterly, to eventually touch Lee Hook road. Another small section is sandwiched between Stand 2 and 3 to the south. Important to this stand are the high quality dominant white pine of fair to good timber quality, and in lesser numbers the good to very good quality red oak stems. Future species composition will remain the same under careful management; several areas of excellent young hardwoods and advanced white pine regeneration have already taken hold. Although most upper canopy trees have large, full crowns and appear vigorous, the fruiting body of red rot (*Phellinus pini*) has been noted on a single mature pine; presence of this on a single stem often alludes to a number of trees within the stand being infected.

This stand has greatest short term management potential of all at Dudley. Current average white pine DBH is 17” with an estimated white pine sawtimber volume of 4-5MBF/ac and red oak sawtimber volume of 1 mbf/ac. Total merchantable biomass estimate is 118 tons per acre. Average stumpage value per acre can be conservatively estimated at $1000/ ac using current stumpage values.

The ground here is level and mostly dry. The area has close proximity to the field which is an excellent access for log landing and equipment movement. The size of this stand may limit
silvicultural options if harvested as a single unit. Volume and opportunities in surrounding stands should increase commercial viability of appropriate/acceptable harvesting approaches.

Management Suggestions:
Harvest of this stand could occur at any time and should be within the next 10-15 years. The operation should be a combination of small and single tree selection. The site conditions and operation type would be suited to most types of harvesting systems/approaches and would focus on removing roughly 1/2 of the total volume. The resulting structure will benefit those wildlife species that utilize partial open canopy conditions, defined as 30 to 70 percent crown closure (Degraaf et al 2006). Silvicultural goals will be to regenerate pine and strengthen the residual stand for final harvest in the next entry (25-30yrs) Focus for removal for pine should be (in order of priority):
- Stems that will release promising white pine and hardwood advanced regeneration.
- Trees that have poor/fair quality butt log sections with no chance for future grade advance.
- Co-dominant, intermediate or suppressed pines of the dominant age class that are competing with potential leave trees.
- Small groups that hope to introduce regeneration of favorable species.
- Trees obviously affected by red rot.
Focus for removal of other species should be:
- Removal of poor quality or overabundant (species specific) hardwood stems.
- Individual stems that are competing with trees of greatest future timber or wildlife value.

Leave trees will be of the highest quality white pine, well spaced for growth and located for logging access and should act as:
- Seed trees for future regeneration.
- Harvest volume that will make viable the first commercial thinning of the next age class (approx. 30 years from now.)
- Vertical structure that will remain through at least the next two harvest entries. (this would be a small # of trees per acre).

Other leave trees will include:
- High valued (timber) hardwoods (red oak).
- Hard mast producing mature hardwoods (shagbark hickory, oaks.)
- Trees with obvious current wildlife use (den, nest).
- Trees with greatest future potential wildlife use; this is based upon location and frequency. eg. we would not leave 6 oaks in a group that have been fatally damaged by blowdown but we may leave one or two). This may include the occasional white pine wolf tree.
-Snags; the limited number of snags available require that all snags should be left if these do not pose a danger to the harvesting contractor.

4d.2 Stand 2 Mixed hardwoods

*Natural Community type: Hemlock-Beach-Oak-Pine*

<table>
<thead>
<tr>
<th>BA/Acre:</th>
<th>226</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Per Acre:</td>
<td>2600</td>
</tr>
<tr>
<td>Estimated average DBH:</td>
<td>4-6“</td>
</tr>
</tbody>
</table>

Basal area, trees per acre and average DBH were estimated through the measurement of four 1/100 acre fixed radius plots.

Dominant tree species in order of prevalence: Gray birch, red maple, paper birch, pin cherry, white pine, aspen, American Elm, red oak.
Dominant regeneration and woody shrubs: Highbush Blueberry, white pine, spiraea, black birch, eastern hemlock, red maple, rubus, sumac, alder, shadbush.
Invasive shrub species: Glossy buckthorn, autumn olive, honeysuckle

Stand two is ten acres in size and bordered on the northern and southern sides by fields. It abuts Lee Hook road to the east and stand one to the west. The dominant vegetation is ~25 years old and about 30-40 feet tall. Gray birch is highly dominant and is overtopping potentially valuable future regeneration (white pine, red oak). Recent weather events have not been kind to the short lived hardwoods (gray birch and pin cherry) and there are many areas that have groups of 10 to 20 stems bent over or snapped off. The understory is fairly open but occasionally clotted by small patches of rubus and other sparse shrubby growth.

Management suggestions:
The current value of this stand is for its use by wildlife. If allowed to mature naturally it would take considerable time for it to develop commercially. The uneven topography will continue to be inconvenient for mechanical harvesting equipment detracting from the prospects for future value (↓).
Given these circumstances we should:

- Implement actions as prescribed in the wildlife section of this document:
  - Recover in blocks of 2 acres every 3 years, 80% of the total area of stand 1 to keep this area in perpetual early successional growth. (the other 20% is wetland). Couple the initial entry with harvesting operations in Stand one and others; this will require the use of a whole tree harvesting operation and a flexible contractor.
Enlist the harvesting contractor to smooth some upland areas at time of harvest (skidder blade) to ease the transition of this stand to one that is more productive and operable.

4d.3 Stand 3 Hemlock dominant mixed wood stand

*Natural Community type : Hemlock-Beach-Oak-Pine*

<table>
<thead>
<tr>
<th>BA/Acre:</th>
<th>140 sqft (SE 16%)</th>
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</thead>
<tbody>
<tr>
<td>Trees Per Acre:</td>
<td>247 (SE 0%)</td>
</tr>
<tr>
<td>Quad Mean DBH:</td>
<td>16.2” (SE 18%)</td>
</tr>
</tbody>
</table>

Dominant tree species in order of prevalence ( basal area ranking): Eastern hemlock (60) White Pine (45), Red Maple (25), Red Oak (7.5), Shagbark hickory (2.5).

Dominant regeneration and woody shrubs (>100 stems per acre): White ash, sugar maple, red oak, quaking aspen, highbush blueberry, American beech. Witch hazel.

Invasive shrub species (>100 stems per acre): Japanese barberry. Russian olive at the edge of the ag field to the south.

Stand 3 (5 acres) sits above and is surrounded (except on its eastern edge) by the lower and wetter sections of stand type 5. This appears to be a former white pine stand, that when thinned some time ago, released the suppressed regeneration and encouraged the developing dense hemlock understory. Currently, the main canopy is dominated by good quality pine, towering above a layer of fair quality hemlock with an average diameter of 18”. The limited light that this canopy allows perpetuates thick hemlock regeneration and little else. Scattered through the stand are some larger (but mostly poorer quality) hardwoods, red maple mostly. Some of these are finally succumbing to the strong canopy competition and have died off, creating some useful wildlife contributions to the area.

**Management suggestions:**

At time of harvest in adjacent stands, thin freely throughout the stand. Efforts should be made to maintain the current swath of thick hemlock cover that exists along the northeastern edge of the stand where it borders stand 5. Focus should be on promoting growth in the highest quality dominant hemlock and white pine stems. Introduction of one large patch may be helpful to introduce young white pine thicket adjacent to current hemlock regeneration. In the event of HWA infestation, this may serve as the next best equivalent for wildlife cover and is undoubtedly a better commercial bet for the future. Additionally, this patch could be situated to act as a soft edge to the agricultural fields to the south, creating a transition zone for wildlife that use both these fields and mature woodland.
4d.4 Stand 4- Red Maple dominated mixed wood stand

*Natural Community type: Hemlock-Beach-Oak-Pine*

| BA/Acre: | 144sqft (SE 8%) |
| Trees Per Acre: | 401 (SE 0%) |
| Mean DBH: | 7.7 “ (SE 3%) |


Dominant regeneration:
Invasive shrub species (>100 stems per acre):

This stand is 4 acres in size and has about 650’ of frontage on the Lamprey river. There are several low wet areas here. The dominant tree structure is primarily red maple and hemlock although where the stand meets others the mix goes towards more dry types (oak/hickory). Several excellent quality red oak stems can be found scattered throughout, in fact most mature hardwood value is high; this includes the larger diameter red maple. A dense hemlock thicket is the predominant understory tree and very little else in the form of regeneration can be found.

Management Suggestions:

* Observe 50 foot no cut zone immediately along the river and additional 100’ buffer behind this where 50% or less basal area is removed; deviations from this are discussed in section “4a2. buffers.”. All management for timber production purposes will be limited to where this stand mingles with others, and how these edges will be treated will depend upon the management objectives of those stands.

* Snowmobile trails should be monitored for ATV use and path deviations should be discouraged given how close the path comes to the river in this section.

* Efforts should be made to make periodic HWA surveys: see invasive pests section 3d2.
4d.5 Stand 5 Red Maple swamp

*Natural Community types:*
- Red Maple – Sphagnum basin swamp
- Red maple – sensitive fern swamp
- Red maple flood plain forest
  
  *(components of all variants can be found)*

**BA/Acre:** 106 sqft (11% SE)

**Trees Per Acre:** 196 (SE 0%)

**Mean DBH:** 11.4 (13SE %)

Dominant tree species in order of prevalence (basal area ranking): Red Maple (43), Eastern hemlock (20), white pine (23), red oak (9), black gum, black birch, n red oak, paper birch, shagbark hickory, American elm (<3)

Dominant regeneration and woody shrubs: sheep laurel, male berry, spirea, highbush blueberry, maple-leaved viburnum, red osier dogwood and winterberry holly

Stand 5 is 9 acres of red maple swamp that originates where Cassie brook flows under Lee Hook Road. This stand follows the brook down to the river and wraps around to meet an additional wet area, fed by water originating at the edge of the agricultural fields. Although red maple is the dominant hardwood, other dry site hardwoods are found along the edges of this stand where it meets upland and where it appears some small scale harvesting was done at the boundary with stand 6. Most areas of this stand are inoperable due to saturated soil conditions. This creates some barrier to the management of the section of stand 6 that lies closest to the river but does not impede access otherwise.

This stand has the greatest diversity of understory shrubs, mostly due to the wet conditions found here. Species include sheep laurel, male berry, spirea, highbush blueberry, maple-leaved viburnum, red osier dogwood and winterberry holly. Unique herbaceous material includes cattails, sensitive fern as well as a variety of unidentified ferns and mosses.

**Management suggestions:**

Protect the diversity of shrubs growing within these areas for the many benefits they can offer. The greatest threat to this is an invasion by non-native shrubs and plants, which, in this area would most likely mean glossy buckthorn. Wetland soils and organic farm designation require that any control mechanism be mechanical; this means that early detection is a key to the achievement of this goal. See invasive plants section 3d1. for an outline on the proposed approach.

Most areas of stand 5 are inoperable to equipment. Any management should be limited to the margins where this stand mingles with others and should follow the goals defined in those adjoining stands.
4d.6 Stand 6 White Pine

BA/Acre: 102sqft (SE 13%)
Trees Per Acre: 110 (SE 0%)
Quad Mean DBH: 17.0” (SE 38%)

Dominant tree species in order of prevalence (basal area ranking): White Pine (73), Red Maple (16) Eastern hemlock (9), Red Oak (9).
Dominant regeneration and woody shrubs: white pine red oak, sugar maple and blue beech.

Invasive shrub species: Japanese barberry

Stand 6 is two 2 acre sections of high quality large diameter white pine stems with some fairly high quality red oak scattered throughout and on the fringes of the stand. One section (6a) sits on the edge of the ag fields at the far southeastern portion of the property. The other (6b) is located on the western edge and middle of the property and is isolated mostly by the wet areas of stand 5. Regeneration is white pine red oak, sugar maple and blue beech.

Basal area scarring and uniform spacing of stems in 6a suggests a stand entry roughly 20 years ago. Most stems here have over one 16’ sawlog section of good to excellent condition. 6b has similar quality but no compelling evidence of management; the trees are not as large/vigorous and do not have residual logging damage. There is nearly 8 mbf of pine sawlog volume per acre and an additional 65 tons (all other products) of biomass per acre. Total stumpage value at current market prices would be approximately $1200 per acre.

Management suggestions:
Harvest both sections conservatively, esp. in areas within the 50 foot no harvest and 150’ basal area zones as described in stand 4. Intensity of harvest should be roughly half of all volume in zones farthest from the river, decreasing removal volumes directly relative to proximity to the river. Use single tree and small group selection to harvest those stems that are financially mature while also providing for the development of high quality red oak stems. As with stand three, development of some small patch cuts near the agricultural fields both adds to potential volume for a harvest and develops some elements important to wildlife. Harvest operations should be coupled with those in adjacent stands to increase commercial viability.
<table>
<thead>
<tr>
<th>Species</th>
<th>Product</th>
<th>Approx Volume/ac</th>
<th>Approx Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Oak</td>
<td>Sawlogs</td>
<td>4 mbf</td>
<td>$250</td>
<td>$1000</td>
</tr>
<tr>
<td></td>
<td>Pallet/Tie</td>
<td>3 mbf</td>
<td>$100</td>
<td>$300</td>
</tr>
<tr>
<td>All other</td>
<td>Roundwood</td>
<td>42 tons</td>
<td>$1</td>
<td>$42</td>
</tr>
<tr>
<td>All other</td>
<td>Biomass (opt.)</td>
<td>21 tons</td>
<td>$1</td>
<td>$21</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>98 tons</td>
<td></td>
<td>$1363</td>
</tr>
</tbody>
</table>

4e. Burley Demerritt Stand level assessments and management suggestions

4e.1 Stand 1 Red Oak [2 ac]

*Natural Community type: Hemlock-Beach-Oak-Pine*

BA/Acre: 120 sqft (17 % SE)
Trees Per Acre: 191 (SE 0%)
Quad Mean DBH: 10” (SE %)

Dominant tree species in order of prevalence (basal area ranking): Red Oak [60], red maple [20], white ash, white pine [13], aspen, sugar maple [7].
Dominant regeneration and woody shrubs: Blue beech, blueberry, white pine.

Volume/Value for major species and overall volume synopsis*:

This 2 acre area is a unique section of woods that is bordered on three sides by river, river flood plain and agricultural field. It is a curious area made up primarily of high to very high quality red oak stems; a few impressive red maple stems can also be found. Tree vigor and outward appearance of dominant tree health are in line with the excellent site characteristics attributed to fluvial soils. Along the small section of stream you can find the expected species: white ash, sugar maple; basswood. Low growing space is occupied by blue beech, high bush blueberry and white pine. Ground cover is low-bush blueberry and partridgeberry.

Management suggestions:

This stand is too close to the river for any substantial management. Single tree selection could be performed at the time of other harvest but should be extremely limited (<10 TPA removed). These mature oaks are excellent hard mast producers and are therefore an excellent wildlife resource.

*This table is for illustrative purposes. Volumes are rounded and are of major species. Stumpage values are based on current market prices and do not reflect the entire range of possible products.*
4e.2 Stand 2 Plantation Scotch pine, red pine [1 ac]

*Natural Community type: Hemlock-Beach-Oak-Pine*

This stand is approximately an acre in size. This area is part of what was a larger plantation of Scotch pine and red pine; some of the original area has been converted back to pasture as part of the organic dairy. This stand was planted in the 40’s or 50’s for erosion control (Oxford, Weyrick, Booska personal communication 2010). White pine is also a dominant tree in the mature age class but may have come in through natural regeneration.

Regeneration is limited to hardwoods: red oak, red maple and some white oak. Glossy buckthorn has come in in small pockets in some upland sections and can be found in greater densities along the margin with stand 7c.

Management suggestions:

This plantation should be thinned to retain the presence of healthy scotch and red pine specimens, favoring these over the white pine growing amongst them. These pocket plantations add a bit of diversity to the property and should be kept viable for future research or educational purposes. Access will be required through the main field and this operation will either have to be coupled with other efforts or managed as an internal harvest due to low potential for return.

4e.3 Stand 3 White pine dominant with mixed wood [5 ac]

*Natural Community type: Hemlock-Beach-Oak-Pine*

| BA/Acre: | 166sqft (SE 11%) |
| Trees Per Acre: | 209 (SE 0%) |
| Quad Mean DBH: | 11.7” (SE 5%) |

Dominant tree species in order of prevalence (basal area ranking): White pine [107], red maple [33], black cherry [8], eastern hemlock [7], red oak [5], American elm, aspen, black oak, gray birch [2].

Dominant regeneration and woody shrubs. Red maple, highbush blueberry, red oak, white pine, aspen. Glossy buckthorn in dense patches. Occasional barberry bushes can be found as well.

**Volume/Value for major species and overall volume synopsis**:

<table>
<thead>
<tr>
<th>Species</th>
<th>Product</th>
<th>Approx Volume/ac</th>
<th>Approx Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>White pine</td>
<td>sawlogs</td>
<td>4mbf</td>
<td>$125</td>
<td>$500</td>
</tr>
<tr>
<td>All species</td>
<td>roundwood</td>
<td>98 tons</td>
<td>$1</td>
<td>$97</td>
</tr>
<tr>
<td>All species</td>
<td>biomass(opt)</td>
<td>49 tons</td>
<td>$1</td>
<td>$49</td>
</tr>
<tr>
<td>Total/ac</td>
<td></td>
<td>[167 tons]</td>
<td></td>
<td>$646</td>
</tr>
</tbody>
</table>

* This table is for illustrative purposes. Volumes are rounded and are of major species. Stumpage values are based on current market prices and do not reflect the entire range of possible products.
This stand is 5 acres in size and located on the southeastern edge of the property. It borders stand 7c and agricultural fields to north and west. To the south and west it is bordered by stands 9 and 4. A small stream runs in a southwesterly direction through the entire western half of the stand, fed by water originating in the agricultural fields to the west and the upwelling of water within stand 7c; this stream eventually finds the Lamprey through the southernmost backwater section.

The land is mostly level here and as you move away from the brook it becomes more operable, although the brook and its riparian zone will prove a barrier to management. Although white pine is dominant here, groups of hardwoods cluster together (aspen) and around some of the lower wet areas (red maple, American elm). Others grow as single stems (black cherry), remnants of agricultural field reversion to woodland.

The white pine (mean diameter 14”) quality is poor to fair in the northerly portions of this stand, but it becomes better (fair to good) as you near the river. Some scattered high quality red oaks (mean diameter 15”) can be found in the upland sections. In areas where some of the aspen is dying and shearing off, glossy buckthorn is starting to take hold; this is true throughout the stand wherever disturbance related openings are present; desirable regeneration is scarce.

Management Suggestions:

The only access to this stand will be through the agricultural operations to the north and west requiring that landing areas be located within these fields or in fringe areas of stand 9. Any operations should include a comprehensive invasive control strategy, including but not limited to controlling the abundant patches of glossy buckthorn.

Invasive issue aside, this area has good potential for a small scale harvest that could improve growing stock as well as benefit wildlife. This 5 acre block can be considered in two smaller units/management approaches:

Northern section:

Harvest all trees outside of the riparian zone. Individual stems of the dominant species are of poor quality here; stand replacement is necessary to satisfy timber management goals. Some green retention in the form of desirable seed or wildlife trees (black cherry) may be left though. Large patch cuts will also supplement wildlife habitat improvement goals; large groups of aspen will regenerate in clumps and openings should be large enough to produce a sizeable block of early successional growth. Future management may include maintaining this area as shrubby field/meadow.

Southern section:

Remove up to 1/3 of white pine and up to ½ competing hardwoods using single tree and small group selection methods. Focus should be on removing the lowest quality trees that are competing with those that have greatest potential for future timber value. Retain some large diameter old field pines and those of greatest height near the river as nest trees (as mentioned in wildlife section) as well as winter roost trees for turkey (esp. near seeps and stream section). Observe 50’ no cut zone and 100’ additional ½ basal area zone.

Other:

Any harvest in this section should be designed so as to include operations to benefit fringe areas of stand 9 as well as upland sections of the southernmost sections of stand 4.
Species | Product | Approx Volume/ac | Approx Value | Total
--- | --- | --- | --- | ---
White pine | sawlogs | 4 mbf | $150 | $600
Hemlock | sawlogs | 2 mbf | $75 | $150
Mixed hardwood | sawlogs | 1 mbf | $150 | $150

<table>
<thead>
<tr>
<th>All other</th>
<th>Roundwood</th>
<th>Approx Volume</th>
<th>Approx Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other</td>
<td>Biomass (opt.)</td>
<td>75 tons</td>
<td>$1</td>
<td>$75</td>
</tr>
<tr>
<td>All other</td>
<td>Biomass (opt.)</td>
<td>38 tons</td>
<td>$1</td>
<td>$38</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>[148 tons]/ac</td>
<td></td>
<td>$1013</td>
</tr>
</tbody>
</table>

BA/Acre: 169.2 sqft (SE 4%)
Trees Per Acre: 309.5 (SE 0%)
Quad Mean DBH: 12” (SE 12%)

Dominant tree species in order of prevalence (basal area ranking): Eastern Hemlock [58], White Pine [57], red maple [24], red oak [7], black birch, shagbark hickory [6], black cherry, white oak [2], American beech, apple, aspen, black oak, blue beech, paper birch, white ash, yellow birch (or less)

Dominant regeneration and woody shrubs: Eastern hemlock, white pine, red oak, red maple, blue beech, black birch, paper birch, highbush blueberry

Invasive shrubs/plants: Barberry.

Low growth: Partridgeberry, wintergreen, lowbush blueberry.

Volume/Value for major species and overall volume synopsis*:

Stand four largely comprises the riparian zone to the backwater sections of the Lamprey as well as the river proper. It also occupies an approximate ten acre section of high ground central to the property. In general, hemlock density is highest near the river; where the stand mingles with stand type 6, white pine becomes more dominant.

In areas of highest hemlock canopy dominance, regeneration is

* This table is for illustrative purpose and are based on current market prices and do not reflect the entire range of possible products.
limited to that species; little else can regenerate in this shade. Very dense, nearly pure pockets of hemlock occupy the little bit of slope near the river. It appears that during the last harvest, the contractor made some small forays into this part of the stand, releasing some of the better hemlock. Central to this stand (and mostly untouched) are some of the larger, better individual trees that have been part of the main canopy since before the last harvest, unlike their punier relatives farther up the hill and away from the river.

Where this stand adjoins the quality pine stand we see the success of past work. Harvesting in small group and single tree selections, they left a (= 5 acre) patch of excellent quality white pine. As an unexpected benefit, some of the hemlock poles that had been struggling in the understory were released as well and appear to have gained some vigor and girth (some small sawtimber trees).

Management suggestions:

Although not wetland, a 10 acre portion of this stand is rendered virtually inaccessible by red maple swamp stand 7d as well as flood plain sections further downstream from here. Even if these areas were easily accessible and mostly dry, the value of this strip as a buffer to the agricultural operations to the north and east is immeasurable. This area should be left as permanent reserve.

In areas nearing stand three to the south, access could be gained to a portion of upland although timber value is low to moderate timber. At the time of harvest layout and establishment of overall goals, potential impact to wetlands should be weighed against the achievement of that operation’s objectives.

In upland areas that adjoin stand 6, harvesting goals should mimic those in that stand. In upland areas away from stand 6, less advanced red oak regeneration can be found, therefore, regeneration of a valuable timber species should be a goal of the next harvest. This will likely come in the form of aggressive removal of the stratified hemlock layer that was released in the 80s (in various sized groups) as well as removal of 1/3 or greater of the dominant white pine canopy. These operations should be coupled with those in stand 6.

Dense areas of hemlock thicket (esp. those near river and backwater sections) should be carefully maintained for benefit to the river as well as for the dense cover it provides to wildlife.
4e. 5 Stand 5 Mixed hardwood –White pine [11 ac]

_Natural Community type: Hemlock-Beach-Oak-Pine_

<table>
<thead>
<tr>
<th>BA/Acre:</th>
<th>110 sqft(SE 9 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Per Acre:</td>
<td>300 (SE 0%)</td>
</tr>
<tr>
<td>Quad Mean DBH:</td>
<td>12.7&quot; (SE 17%)</td>
</tr>
</tbody>
</table>

Dominant tree species in order of prevalence (basal area ranking): White pine [43], red maple [33], red oak [20], black oak [5], white ash, black birch, grey birch, paper birch, white oak [<5].

Dominant regeneration and woody shrubs: Highbush blueberry, white pine, white oak, red oak.
Low growth: Lowbush blueberry, partridgeberry, wintergreen, licopodium.

**Volume/Value for major species and overall volume synopsis**: *

<table>
<thead>
<tr>
<th>Species</th>
<th>Product</th>
<th>Approx Volume/ac</th>
<th>Approx Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>White pine</td>
<td>sawlogs</td>
<td>3 mbf</td>
<td>$150</td>
<td>$450</td>
</tr>
<tr>
<td>Mixed hardwood</td>
<td>sawlogs</td>
<td>1 mbf</td>
<td>$150</td>
<td>$150</td>
</tr>
<tr>
<td>All other</td>
<td>Roundwood</td>
<td>43tons</td>
<td>$1</td>
<td>$43</td>
</tr>
<tr>
<td>All other</td>
<td>Biomass (opt.)</td>
<td>21 tons</td>
<td>$1</td>
<td>$21</td>
</tr>
<tr>
<td>Total</td>
<td>[84 tons] / ac</td>
<td></td>
<td></td>
<td>$1013</td>
</tr>
</tbody>
</table>

Up and away from the river, this area is mostly flat and bordered on most sides by stand type 6, which it shares some characteristics with. The difference between the two is that in the last stand entry, the mature white pine appears to have been harvested more vigorously here, producing a young diverse stand of regenerating hardwoods. Primarily pole sized quality red oak and red maple, this area has promise. Underneath these hardwoods an additional, new age class of white pine has started.

Although this area has excellent access and is level, it does have some limited wet areas. Water moving down from the old landing (“G” on map 5) becomes organized and feeds the stream that is the creator of stand 7a. Similarly, several wet “fingers” originate in low area throughout this stand, also eventually draining downward to that same stream that eventually finds the Lamprey to the north.

Management suggestions:

At time of proposed operations in stand 6 and 4 (10-20yrs) this area should be of density to require thinning. Using uniform crown thinning methods, a “best-tree” (instead of “best-species”) approach should be used to promote a diverse range of quality hardwood stems. In cases where groups of poorly formed stems can be found, and there is established white pine or other favorable regeneration, large group selections could be used to promote the new growth. This stand is maturing beyond “high” utility for wildlife but should begin to provide resources like hard mast by the time of next stand entry. Stand conditions do not provide opportunities for early successional management at this time.

---

* This table is for illustrative purposes. Volumes are rounded and are of major species. Stumpage values are based on current market prices and do not reflect the entire range of possible products.
4e.6 Stand 6 White pine – mixed wood(27 acres)

Natural Community types:   Hemlock-Beach-Oak-Pine
                           Highbush blueberry –sweet gale-meadowsweet shrub thicket

BA/Acre:           130sqft(SE 5%)
Trees Per Acre:    190 (SE 0%)
Quad Mean DBH:     13.7” (SE 5%)

Dominant tree species in order of prevalence (basal area ranking): White pine [88], red maple [16], red oak [10], eastern hemlock [6], black birch [4], American beech, American elm, basswood, aspen, black birch, black cherry, black oak, paper birch, shagbark hickory, sugar maple, white oak [1 or less].

Dominant regeneration and woody shrubs: Witch hazel, blue beech, American beech, red oak, black birch, hemlock.

Volume/Value for major species and overall volume synopsis*:

<table>
<thead>
<tr>
<th>Species</th>
<th>Product</th>
<th>Approx Volume/ac</th>
<th>Approx Value</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>White pine</td>
<td>sawlogs</td>
<td>6 mbf</td>
<td>$150</td>
<td>$900</td>
</tr>
<tr>
<td>Mixed hardwood</td>
<td>sawlogs</td>
<td>1 mbf</td>
<td>$150</td>
<td>$150</td>
</tr>
<tr>
<td>All other</td>
<td>Roundwood</td>
<td>64tons</td>
<td>$1</td>
<td>$64</td>
</tr>
<tr>
<td>All other</td>
<td>Biomass (opt.)</td>
<td>32 tons</td>
<td>$1</td>
<td>$32</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>[131 tons]/ac</td>
<td></td>
<td>$1146</td>
</tr>
</tbody>
</table>

This stand occupies most of the higher ground in the northwestern portion of the property. A good portion of this borders the flood plain of the river or for a small part the river proper. Where this stand meets stand one there is a 1.5 acre muck and peat swamp which hosts a diversity of wetland shrub species. Water organizes itself within the swamp and exits the swamp as a stream, which quickly joins the stream that originates in stand 7a, and then finally the Lamprey to the north. The swamp is fed by two wet areas to the south and west and in the direction of the river. Although this stand type stretches across a large area and encompasses many different soil types it can be generally said that:

- Areas nearer the river tend to have a higher percentage of hemlock; both overtopped older trees and regeneration.
- White pine in areas on the northern tip of the property is lower quality and of lower vigor.
- White pine in areas central to the stand are less abundant but of good to very good quality.

* This table is for illustrative purposes. Volumes are rounded and are of major species. Stumpage values are based on current market prices and do not reflect the entire range of possible products.
The dominant tree species in this area is white pine (mean D.B.H. 17”); sampling shows average growth for pine her at .3 inches per year (Aber 2008) Other major species include red maple (mean D.B.H. 11”“) hemlock (mean D.B.H. 11”) and red oak (mean D.B.H. 17”). The majority of this area was treated in the harvest of the mid-80’s. At that time, it appears that they used a combination of group selection and single tree harvesting techniques. The results are a number of interesting comparative examples of harvesting approaches (or lack thereof). Areas that were not treated show former stand conditions in the absence of treatment.

In areas of large group selection that had advanced regeneration, red oak has emerged as an excellent future resource. Multiple pockets of single-stemmed pole-sized and larger red oak have thrived and will be the dominant overstory trees in the next rotational group.

In areas of small group selection oak also benefited but lags in development behind other areas of oak in this new age class. It is unclear as to whether it is because this oak was not yet established at time of last cut or that the size of the gap has influenced how other hardwoods (which are more prevalent in these areas) were able to better compete.

In areas that were untreated, groups of 4-10 larger diameter white pine are clumped together. Among these groups 25% are generally dominant, fair to good quality trees. The other 75% are generally lower quality co-dominant, intermediate or suppressed trees that are probably much like the groups that were thinned out in other areas during the previous harvest.

Management suggestions:
Maintain 50’ no cut buffer to the river proper, and a 50 ft basal area limit buffer on river backwater sections according to law. Maintain 150’ (from the river proper) basal area limit.
This stand is progressing towards red oak dominance. The next stand entry within 10-15 years should focus on promoting the growth and development of this stand toward that goal. To do this the following steps should be taken:
In microsites where no regeneration is present, remove remaining clusters of mature white pine (group selection of 3-10 trees.)

In area where hardwoods would benefit, remove low quality single white pine leave trees that were relics of the last harvest.

In areas where future red oak crop trees are present, remove competing:
- hardwoods of same age group (and lesser quality) and
- older mature white pine.

Leave a number of high quality white pine stems to be grouped with next commercial harvest of red oak (30-50 years) or left as heirloom trees. Heirloom trees could be either white pine wolf trees or specimens of excellent form; regardless they should be wind-firm and in strategic locations for retention.

4e.7 Stand 7 Red Maple Swamp
Natural Community: Red maple-sensitive fern swamp

BA/Acre: 106 sqft (SE 13%)
Trees Per Acre: 230 (SE 0%)
Quad Mean DBH: 11.8” (SE %)

Dominant tree species in order of prevalence (basal area ranking): Red maple [44], white pine [33], red oak [9], shagbark hickory [6], American elm, black birch [4], whit ash, basswood, black oak, hop hornbeam [<3].

Dominant regeneration and woody shrubs: Red maple, nannyberry, autumn olive, winterberry holly, highbush blueberry, male berry, red osier dogwood, speckled alder, northern wild raisin.

Low growth and herbaceous material: Sheep laurel, sensitive fern, lowbush blueberry.

Woody biomass volume estimate: 55 tons/acre.

In total these five areas make up about 20 acres. They share a predominance of red maple as a dominant tree species, wet soils and expected accompanying vegetation types. They are subtly different from each other though and are separated away from the larger stands in which they are housed because they provide interesting and beneficial pockets of diversity. Although these stands are mostly composed of red maple, the substantial amount of edge they have with upland stands provides a nice mix of drier species, mostly white pine, red oak and black oak. All of these sites host a number of soft mast producing hardwood shrubs not found in other stand types as well as low herbaceous cover only found in wet areas (eg. sensitive fern).

7a. This is a tiny red maple swamp that separates the ag fields from stand five. Wet conditions within this stand can partially be attributed to a small stream that originates in stand 7b, flows through here and eventually becomes the delineation between the agricultural fields and stand 6. Eventually this stream joins up with water exiting the muck and peat swamp in stand 1.

This stand is noteworthy in that:
It provides considerable diversity of vegetation to this part of the property. It may be a barrier to management if intentions are to ever access here from the field side.

Its slightly different from the other red maple swamp; notably it has a considerable population of nannyberry, sensitive fern (implying enrichment) and more elm and ash than the other wet sections on the west side.

It currently hosts some invasive plants (autumn olive); these wet edge areas are often entry points for invasive plants.

7b. This swamp is fed by water originating above stand 10 but also undoubtedly is affected by water spilling over the agricultural fields from stand 7d. It has similar composition to the other swamps although small ½ ac areas of white pine islands are scattered throughout. It acts as an interesting transitional area between abutting landowners, field areas in stand 10 and the mature forested blocks of wetland to the west.

7c. This is the largest red maple swamp area, approx. 10 acres. It receives runoff from the upper main agricultural field sections of the farm and also appears to be a source of water for the small stream that runs out and through stand 3, eventually joining the Lamprey river. This is a typical red maple swamp, with grassy tussocks supporting shrubby growth; highbush blueberry, sheep laurel and winterberry holly. Unfortunately, a substantial population of glossy buckthorn is also present, especially where this stand mixes with stand 3 and plantation stand 2.

7d. This swamp is a wet strip that collects water from the agricultural fields as well as from a small stream that originates uphill in the agricultural areas. The saturated soils here create an effective barrier to management of portions of stand 4; it also undoubtedly acts as a filter for some of the nutrient rich runoff that would come from the agricultural fields above.
7e. The origin of this swamp appears to be from groundwater. Enough water is produced by this upwelling that during wet periods it flows across the farm lane and into the farthest pasture, eventually finding the low spot of stand 7b.

Management suggestions:
A primary goal should be to protect the diversity of shrubs growing within these areas for the many benefits they can offer. The greatest threat to this is an invasion by non-native shrubs and plants, which, in this area would most likely mean glossy buckthorn; in fact sections of 7c are already invaded to levels where control is unlikely. Wetland soils and the organic dairy require that any control mechanism be mechanical; this means that early detection is a key to the achievement of this goal. See invasive plants section 3d3. for an outline on the proposed approach.

Most areas of stand 7 are inoperable to equipment. Any management should be limited to the margins where this stand type mingles with others and should follow the goals defined in those adjoining stands.

4e.8 Stand 8 Lamprey River Flood plain and backwater
Natural Community : Red maple floodplain forest (components of low/medium/high variants are present)

<table>
<thead>
<tr>
<th>BA/Acre:</th>
<th>134 sqft(SE 7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees Per Acre:</td>
<td>178 (SE 0%)</td>
</tr>
<tr>
<td>Quad Mean DBH:</td>
<td>14.4” (SE 9%)</td>
</tr>
</tbody>
</table>

Dominant tree species in order of prevalence (basal area ranking): White pine [55], red maple [40], sugar maple [11], hemlock [8], red oak [6], paper birch [5], white oak [3], black birch, black cherry, black oak, shagbark hickory [<2].
Dominant regeneration and woody shrubs: Blue beech, white pine, red osier dogwood, witch hazel, barberry (Japanese and European), shagbark hickory, red maple, sugar maple.

90% of UNH frontage on the Lamprey river lies within this stand type. Included in this are elevational levels from riverbed level to approximately 4-5 feet above. Lowest areas (referred to here as “backwater”) are flooded annually while some of the higher areas show little evidence (w/20 years) of being flooded. During annual seasonal river highs backwater sections are flooded and upland areas are temporarily separated from the rest of the property as islands. This greatly benefits diversity in that these islands are populated with upland tree species but also have an enormous proportion of relational “wet edge” area for all sorts of interesting and diverse vegetation to take hold. At the tip of one of these island peninsulas and right on the edge of the river I located a single black gum stem.

The vegetation here plays an important role in such things as bank stabilization, wildlife cover and perch/nest/roost trees, river shading and more. Low growth and regeneration includes hemlock and a number of wetland associated shrub species.

Management suggestions:
Coupled with the proposed reserve in stand type 4, this area should mostly remain undisturbed. Limited areas of entry will be either due to activity proposed in adjacent/upland stands or linked to activities outside normal timber harvesting activities; these may include but would not be limited to invasive control activities or research driven management.

4e.9 Stand 9 Field fringe areas

Tree species present: White pine, red oak, black oak, white oak, sugar maple, red maple, black cherry, shagbark hickory, apple.

Invasives: Glossy buckthorn, Japanese barberry.

These areas are separated from other stands by a 4’ tall wire fence. They were not sampled as part of the original cruise for this reason. Although the fence is a dividing line, it appears that it was installed within the forested area, creating a portion of the agricultural areas that remained uncleared. A good portion of this is seasonally wet, making it inappropriate for crop or hay field. In the upland section of this treed area there are a number of older apple trees. An electric fence has been set up at the tree line, preventing livestock from entering here.
These areas are mostly the last bit of relief from the upper ag fields before the ground settles into the broader flood plain area. This area has by far the greatest intensity of deer usage; the fence seems to have very little effect on their ability to access these areas.

A number of large open grown white pine can be found in here as well as some surprisingly good quality hardwood; some red oak and black cherry stems have good timber potential. The most unusual aspect of the tree composition is the number of apple trees sprinkled about; quantities are high enough to suggest a former orchard (>20 trees).

Management suggestions:

Areas of this stand may be useful as access points into other stands (specifically 3). Operations focused in other stands may allow us to put some effort into the development of this area. Focus should be on nurturing some of the higher quality hardwoods stems (both for future timber and for hard mast development) and thinning around and increasing the vigor of the apple trees for their utility to wildlife. Some small areas could be cut as patches to provide a soft edge/shrubby mix for wildlife as well (esp. Aspen patches). Periodic mowing of invasive shrubs and others to retain some shrubby/meadow/grass mix may be useful.

4e.10 Stand 10 Old field management areas

Tree species present: Aspen, white pine, red oak, white oak, black oak, red maple, shagbark hickory, black cherry.

Shrubs: Autumn olive, alder, nannyberry, glossy buckthorn
Low growth: Lowbush blueberry, juniper.

These areas, like those in stand 9, appear to be abandoned and reverting to woodland. This seems to be a wise decision given the abundance of wet areas including that surrounding the small stream that acts as a barrier to entering the small field area. Within these wet areas are a mix of wetland species: sensitive fern, nannyberry, northern wild raisin. A marked transition from stand 7C to this field is drawn by a substantial alder thicket and then change over to upland shrubs and tree species; birches, multiflora rose, autumn olive, aspen, red oak and alternate leaved dogwood. Some upland fringe areas have small patches of juniper.

Two patches of aspen are working into the edge of the field; a younger patch to the west about 10-20 years old and a larger group (40+) years old on the northern edge. Beyond this to the north is a small swampy drainage and then a wooded upland buffer to the farm itself. Within this buffer are some high quality and vigorous aspen and red oak stems. Along the property line and in fringe areas are some low quality white pine and mixed hardwood stems.

Management suggestions:

It is likely that some wildlife species that use early successional and old field habitat are already using this area; American woodcock, snowshoe hare, grouse. To keep this area useful for wildlife it should be periodically mowed using the front mounted rotary mower; the goal being to maintain an even mix of thicket/shrub/grassy openings. The same species that benefit from other early successional habitat will also benefit from vigorous young aspen thickets. To enhance this resource, the larger patch of aspen should be harvested to promote regeneration;
harvesting in areas immediately adjacent to this stand that have other species may help increase total aspen cover.

In addition to this, small identified pockets of invasive shrubs should be removed before they become dominant; low current densities suggest that pulling larger shrubs with equipment may be the most expedient and successful method (esp. in accordance with the organic dairy).
4c. General Management considerations

4c.1 Access, landings, timing.

**Dudley Lot**
Access for harvesting and or/mowing type operations could be either through Dudley field A ("F" on map 14) or along the edge of the agricultural fields to the south. Although not required by soil types, harvesting during the winter will limit soil disturbance. This would be most necessary if using the edge of agricultural fields for skidding.

Landings or log yards should use Dudley field A. This requires that harvest in the farthest stand be brought through the center of the property. Doing this in the winter will reduce the headaches that the wetland crossing ("G" on map 14) may cause.

**Burley Demerritt Farm**
Although access can be through the farm operation it creates some challenges. Truck traffic may conflict with farm workings and create delays for both parties. Fencing may have to be adjusted to allow for tractor trailers. Although soils in this woodlot do not seriously limit equipment usage in the summer, harvests may have to be timed for winter to reduce impact on the farm operations.

Two different landing locations are likely. The northwestern part of the woodlot will best be served at the landing ("G" on map 7) used in '85 or slightly past this. Although the old landing is mostly cleared, it's not that large, does not provide an easy place to back and is bordered by wet areas just to the south. Moving the landing in several hundred feet ("H" on map 7) may make harvesting further northward into the property (where higher valued wood is) more desirable, in addition, we may be able to escape the wet area found at the old spot and reduce the chance for delays and disturbance. Use of either landing will require the installation of two culverts on the farm lane bordering stand 7e as well as substantial fill to that section ("I" on map 7).

To access the southern section, mostly stand type three, a landing may be located in the fringe area of stand type 9, for example “J” on map 7. Although this requires that we access directly through the agricultural field to the north, it puts the landing right at the area to be harvested. Careful location of this and the wetland crossing to access stand three will ensure that delays and disturbance are kept at the bare minimum.

4c2. Increasing educational and research use of the property.
To increase the usefulness of this woodlot for research and education it may be useful to expand our proposed landing area into a parking area for 3 to 4 vehicles. Access to the central portion of the woodlot requires a walk that some classes may not have time to make. Given approval by the dairy, this improvement should occur at the time that the access road is improved. Conflicts may arise from the need to modify current fencing to allow for this to happen.
4c3. Snowmobile corridor management

During the inventory, several potential problem areas were noted where snow machines were crossing wetlands. Although it appears that the caretakers of the path have been keeping up with most of these, sturdier crossings may be in order to insure little or no disturbance is caused.

In particular concern is a stream crossing on Burley-Demerritt (“H” on map 7) where a new route is being pursued due to a seasonal stream that has made the roadbed its home. Although snowmachines are light on path surfaces, new routes eventually become multi-use, leading to the increased impact of a trail paralleling an old one. The establishment of one permanent route needs to be pursued and fixed to reduce the erosion that is currently occurring.

In the future signs should be installed restricting ATV use; the proximity of this trail to the river makes it necessary to restrict any actions that could cause erosion or allow for foreign materials to enter the river.
5. Operations overview

5a. Operations goals
Although this plan in its essence seeks to alter the current vegetative makeup, it is assumed that the overall productivity of the property for use in education will be heightened. This can only be stated assuredly knowing that:
- there are currently no known long-term research sites in place that require a moratorium on management. This includes the measurement plots as set forth by the SARE grant.
- the site conditions are not so unique that classes that use this area for its present structure cannot easily find those conditions within this property or other local university properties.

Most operations will be centered on the goal of improving both the value and diversity of our timber resource. The Woodlands office should produce additional documentation for harvest strategies as needed. It should be noted that factors outside of these two properties will play a role in implementation of harvesting. Specifically, timing of other harvests and how these affect our sustainable cut guidelines may change the years in which we implement the treatments prescribed here. Other goals include:

Maintain plantations and make space available in anticipation of needed future planting space.
Maintain recreational and management access through regular road and trail work.
Nurture management relationships with town conservation commission and other abutting landowners.
Maximize wildlife habitat goals.
Where appropriate, implement (1) ½ acre early successional opening per stand during other operations (with up to 10% per property)
Implement research based vegetative manipulations based upon newly established or anticipated need.

5b. Management challenges
A potentially considerable challenge is public issue regarding timber harvest. In past operations we have sometimes (not always) found that if the event is well publicized and site visits are provided, it turns into an important outreach and education opportunity instead of a potential public relations problem. Each major operation should have a well publicized walk through and related meeting with the Town Conservation commission. Letters of notice are often sent to abutting landowners as well.
5c. Proposed stand entry dates

At time of stand entry, this operations plan should be amended to describe the specific harvest. Proposed operations here are tentative and will change in accordance with current management regime.

Immediate/Ongoing (2010-)

Pursue funding for invasive plant/pest management program.
All stands/both properties: Implement invasive plant/pest management strategy.
Repair road and consider implementing landing/parking area on Burley capable of also holding vehicles so classes and researchers can more easily use this property.

Pursue access road/snowmobile path correction at problem stream crossing.

Implement field maintenance efforts in stand 10 on Burley Demerritt (and on surrounding areas if allowed).

2012
Burley-Demerritt. Harvest in stand 3 and 9 following implementation of invasive control strategy.

2013/2014
Inventory as part of CFI grid.

(2015-2020)
Dudley Lot. harvest stands 1,3, and 6 as prescribed.
Begin stand 2 recovery efforts on ≈5 year interval.

2020-2025
Burley-Demerritt harvest stands 4, 5 and 6 as prescribed

2025
CFI Re-inventory

5d. Operations conclusion

Proposed operations are based upon current conditions and will be adapted to fit University goals, contemporary management protocol and market conditions at time of implementation.
Map 1 Burley-Demerritt farm and Dudley Lot – entire property and woodlot sections
Map 2 Burley-Demerritt farm and Dudley Lot – key details
Map 3 Burley Demerritt soils
Map 4 Dudley Lot soils

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<th>Symbol</th>
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<tbody>
<tr>
<td>W</td>
<td>WATER</td>
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<tr>
<td>SwA</td>
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<tr>
<td>DeB</td>
<td>DEERFIELD LOAMY SAND</td>
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<tr>
<td>HcC</td>
<td>HOLLIS-CHARLTON FINE SANDY LOAMS</td>
</tr>
<tr>
<td>HcB</td>
<td>HOLLIS-CHARLTON FINE SANDY LOAMS</td>
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</table>
Map 5 Burley Demerritt Farm: features with aerial
Map 6 Burley Demerritt Farm: features
Map 7 Burley Demerritt Farm with key details
Map 8 Burley Demerritt Farm – wetland detail
Map 9 Burley Demerritt Farm – wetland detail with aerial
Map 10 Burley Demerritt Farm – wetland detail; discussion
Map 11 Burley Demerritt Farm stand types
Map 12 Burley Demerritt Farm stand types – discussion
Map 13 Dudley Lot key features
Map 14 Dudley Lot stand types

Dudley Lot Stand Type Map
1 WP/MXD wood [d’”]
2 Mixed Hardwood [a/b ‘”]
3 EH/WD [d’”]
4 RM/MXD wood [c’]
5 RM swamp [b’]
6 WP [d’”]
DFA 4 ac field
DFB 2 ac field
Appendix 1: Trees, shrubs and woody plants observed at Burley-Demerritt Farm and Dudley lot.

### Indigenous tree species

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<tr>
<th>Tree Name</th>
<th>Scientific Name</th>
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<td>American Beech</td>
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<td>Carpinus caroliniana</td>
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<td>Black Cherry</td>
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<td>Black Oak</td>
<td>Quercus velutina</td>
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<td>Black Birch</td>
<td>Betula lenta</td>
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<td>Eastern Hemlock</td>
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<td>Hophornbeam</td>
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<td>Pitch Pine</td>
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<td>Quaking aspen</td>
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<td>Pinus sylvestris</td>
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### Indigenous woody plants and shrubs

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<td>Arrowwood</td>
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<td>Gray dogwood</td>
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### Non-native trees, woody plants and shrubs

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<td>Japanese barberry</td>
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<td>Morrow’s honeysuckle</td>
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<td>Multiflora rose</td>
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<td>Winged burning bush</td>
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## Habitats and related species of concern on Dudley and Demerritt properties

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<th>Wetlands</th>
<th>Peatland</th>
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<th>Grass</th>
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* Known populations in Lee
** Known populations in town immediately adjacent
*** Potential populations in Lee

The information provided in this table is summarized from a table compiled by Jim Oehler, NH Fish and Game wildlife biologist.
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