Functional Assessment of Wetlands throughout Lancaster, NH

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The Town of Lancaster – Lancaster Conservation Commission

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Introduction

Several wetlands throughout the Town of Lancaster have been identified, inventoried and assessed as part of a three-year region-wide study of wetlands.

In the spring of 2006 North Country Council, Inc. and Watershed to Wildlife, Inc. received a grant from the Upper Connecticut River Mitigation and Enhancement Fund for this three year study. During two recent projects; a four year Vernal Pool Inventory Study funded by the Upper Connecticut river Mitigation and Enhancement Fund, and a Regional Plan for the 51 towns in northern NH, a need to improve comprehensive wetland protection, restoration, buffer improvement, inventory, and assessment has become apparent. Many towns in southern New Hampshire have adopted methods to protect wetlands from development which is occurring at a rapid rate. In the North Country and these selected towns, there are still opportunities for proactive and sustainable management of these resources rather than the more common reactive management.

Watershed to Wildlife, Inc. (WTW) is a natural resource consultant company with wetland expertise. WTW provides natural resource inventories for municipalities, watershed management plans, wetland identification, assessment, classification, delineating and impact permitting, educational workshops, and wildlife studies. “It is the mission of WTW to help maintain the integrity of ecosystems while still achieving land management goals; as well as to promote an understanding of wetland and wildlife ecology, environmental impact, sustainable yield, adaptive management, and short and long range planning.” Both co-owners of WTW are NH Certified Wetland Scientists: Elise Lawson – CWS #233 and John Severance – CWS #240.

WTW has partnered with North Country Council (NCC), a regional planning commission serving 51 regional towns in northern New Hampshire providing services in planning, GIS mapping, and sustainability of natural resources. “It is the mission of NCC to encourage effective community and regional planning for the development of economic opportunity and the conservation of natural, cultural and economic resources. This will be accomplished by providing information, regional advocacy, technical assistance, community education, and direct service to the region, its organizations and political subdivisions.” Christine Walker, a Natural Resources Planner with NCC will assist Lancaster with their planning options.

Goal and Objectives

The goal of this project is to provide the Town of Lancaster with the ability to work towards protecting or conserving several diverse and critical wetland complexes throughout Town. The objectives are to:

1. Equip Lancaster to implement a program to adopt ordinances and Prime Wetland designations for protection of wetlands.
2. Provide tools for wetland protection to local Planning Boards, Select Boards, and Conservation Commissions who frequently contend with issues directly affecting wetlands.
3. Increase public awareness and education in relation to the importance of protecting wetlands through workshops and presentations.

This study enables the Town of Lancaster, if they choose, to designate Prime Wetlands through methods provided by the State of NH Department of Environmental Services, Wetlands Bureau. The New Hampshire Code of Administrative Rules sets standards for

designating Prime Wetlands, using those wetlands that are worthy of extra protection because of their uniqueness, fragility and/or unspoiled character. Chapter Wt700 of these Administrative Rules set the guidelines for designation as well as the permitting process for impacting of a designated Prime Wetland.

Methodology

Evaluating Existing Digital Data

Existing digital data was analyzed to determine which wetlands were to be evaluated in the field. Data evaluated included:

- 1992, 1998, and 2003 Digital Orthophoto Quadrangles
- United States Geologic Survey Topographic Maps (Digital Raster Graphics)
- Natural Resource Conservation Service (NRCS) soil maps
- U.S. Fish and Wildlife – National Wetland Inventory (NWI) data
- Wetlands digitized from 2003 Natural Resource Inventories conducted by Watershed to Wildlife, Inc.
- A prime wetlands study done by Lobdell Associates, Inc. in 1991

Using the above data sets, wetlands were assessed and ranked in the office to determine whether they should be inventoried further in the field. Several wetlands ranked higher than others, based on examining aerial photographs as well as criteria established in Chapter Wt 700 (Prime Wetlands) of the NH Code of Administrative Rules. Specifically, excerpts from the Rules state the following:

Wt 701.02 Identification of Wetlands for Consideration as Prime.

a. All wetlands greater than 2.0 acres in size in the municipality shall be identified. Wetlands smaller than 2.0 acres may be identified and included in the functional ranking.

Wt 701.04 Selection of Designated Prime Wetlands.

c. In addition to their relative ranking, wetlands designated as prime shall meet the following minimum criteria:
    1. The wetlands shall have the presence of hydric soils, hydrophytic vegetation, and wetlands hydrology; and
    2. At least 50% of the prime wetland shall have Hydric A (very poorly drained) soils and the remaining soils shall be hydric B (poorly drained) soils.

NRCS soils maps were used to identify the outer perimeter borders of continuous hydric soil units (soils that are poorly and very poorly drained). Internal units of non-hydric soil units were broken out in determining wetland acreages, but were included in the inventory and assessment of functionality of the wetland complex as a whole.

Very poorly drained soils are typically very soft, mucky, organic soils, with a depth of greater than 60” to bedrock, moderate to rapid permeability, high water potential, and a water table ranging a maximum of 12” below the surface to 12” above the surface. These characteristics make these soils unsuitable sites for agriculture and development, but there can be limited potential for timber harvesting. Due to the deep, soft, wet soil conditions heavy equipment can only successfully access these sites during

winter months when the ground is frozen. These soil conditions also create high potential for wind throw and seedling damage. Very careful planning and proper permitting must take place ahead of time in order for timber harvesting to be successful on these sites.

Poorly drained soils are firmer soils, but generally still have moderate to rapid permeability, moderate to high water potential, and have seasonal high water table levels that range from the 0" to 18" below the surface. Some of these soils have periods throughout the year when they are drier giving them potential for pasture land and developable sites. If development is to occur on these soils careful, detailed planning must go into particulars such as; drainage and septic systems. These soils typically have the same limitations for forestry practices as very poorly drained soils so access during the winter months or dry periods are recommended. Again careful planning and proper permitting must take place for intense activity to be productive on these soil types.

Prior to conducting field work, permission was sought from landowners, where their land was posted against trespassing. In cases where land was posted and the landowners could not be contacted, ranking of wetlands could not be done in the field. Investigators respect the rights of landowners and their decision to deny open access to their property. In New Hampshire, the public is allowed to access a private property that is not posted. The majority of the wetland complexes were on un-posted land and areas where landowner permission was obtained.

Field Work

Seven wetlands identified from the maps were scheduled for field onsite assessment. They ranged from 49.75 – 1836.64 acres in area. Digital photography, global positioning system (GPS) points, soil auguring, and field notes were used to document spatial and attribute data at all sites observed. A Wetland Function – Value Evaluation Form was filled out onsite as a comparative means for each wetland. The matrix allowed for relative and objective comparison between different wetlands in Town. Appendix A displays a blank Evaluation Form used at each wetland inventoried and assessed in Lancaster. Functional values evaluated included:

1. groundwater recharge/discharge
2. floodflow alteration
3. fish and shellfish habitat
4. sediment/toxicant retention
5. nutrient removal
6. production export
7. sediment/shoreline stabilization
8. wildlife habitat
9. recreation
10. education/scientific value
11. uniqueness/heritage
12. visual quality/aesthetics
13. endangered species habitat
14. other (additional noteworthy qualities)

Mapping Analysis

Field data was processed as point and polygon data with linked attribute tables and photography using ArcView 3.3 software. Polygons and points of new coverages were digitized using aerial photography (DOQs), topographic maps, NRCS soil maps, FWS NWI maps, processed GPS points, and field notes.

Analysis of wetland function and value were conducted by following and modifying the *Method for Comparative Evaluation of Nontidal Wetlands in New Hampshire*, March 1991 by Alan P. Ammann and Amanda Lindley Stone. For each wetland inventoried and rated during field work, a Wetland Function – Value Evaluation Form was filled-out. The matrices and ranking in each evaluation form allowed for side-by-side comparison of the wetlands in Lancaster. Total Wetland Value Units for a wetland were calculated on these data sheets using average Functional Value.

(Average Functional Value) x (Acre of evaluation area) = Wetland Value Units

Wetland Value Units were compared for each wetland: the higher the number, the higher the wetland ranks within the Town.

Public Workshop Presentation

At the completion of the fieldwork and GIS analyses, Watershed to Wildlife, Inc. and North Country Council, Inc. will hold a workshop in Lancaster's Town Hall to discuss results of the study and future planning options for the Town. The goal of this meeting is to increase public awareness of the importance of sustainable conservation or protection of some of the Town's wetlands and associated wildlife habitat. In addition, work from this project will be available for public viewing via 8½ by 11 paper handouts as requested through proper venues.

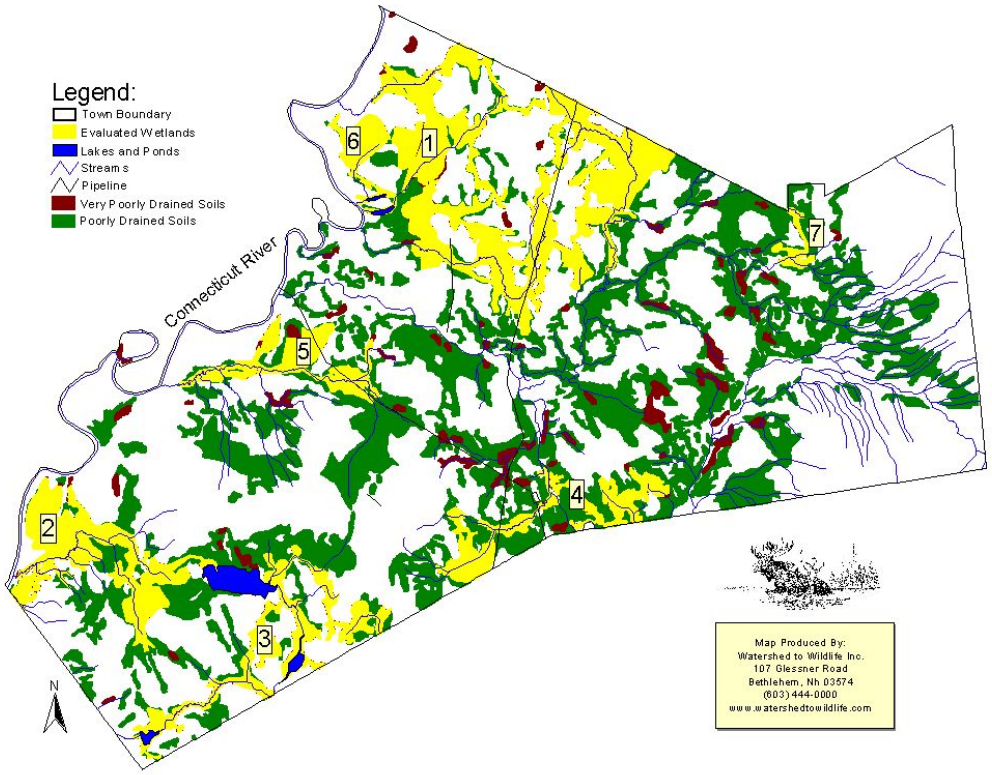
Results

Seven wetland complexes were inventoried and ranked in the field after the initial GIS analysis using available data. There are several more wetlands in Lancaster, but these were not inventoried for the following reasons:

1. Lack of very poorly drained soil (Hydric A) in the wetland
2. Denied access to private property
3. Size of wetland was under 2 acres

All seven wetlands inventoried were large – the smallest being just under 50 acres in size and the largest just over 1813 acres. All contained over 50% very poorly drained soils and had a diversity of wetland types.

Below is a map of the wetland areas in Lancaster where wetlands were assessed and evaluated. Each wetland is numbered and in yellow.



(Please also refer to larger full-page printout of this map - an attachment at the end of this report)

Rowell Road Wetland Complex (# 7)

The Rowell Road Wetland Complex is the smallest of those inventoried and field assessed in this study. This wetland is just under 50 acres and lies between the Pleasant Valley Road, Rowell Road and the Lancaster/Groveton town line. Table 1a. summarizes the National Wetland Inventory (NWI) data and wetland classification by the U.S. Fish and Wildlife Service (Classification of Wetlands and Deepwater Habitats of the United States, 1979, U.S. Department of the Interior, Fish and Wildlife Service, Publication No. FWS/OBS-79/31). The wetland classification types were confirmed during field inventory.

Table 1a.

NWI wetland code	NWI wetland name
PEM1Eb	Palustrine emergent, persistent vegetation, seasonally flooded/saturated, and beaver
PSS1Eb	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, and beaver
PUBFb	Palustrine unconsolidated bottom, semi-permanently flooded, beaver

PUBFh	Palustrine unconsolidated bottom, semi-permanently flooded, and diked/impounded
PFO1E	Palustrine forested, broad-leaved deciduous, seasonally flooded/saturated

This wetland occurs in a basin area and is heavily vegetated giving it good potential for groundwater recharge, floodwater and erosion control, nutrient and chemical removal, and adequate buffers. This complex also contains a variety of potential wildlife habitat types. This wetland is heavily dominated by forested habitat with mature trees and shrubby vegetation. Beaver (*Castor canadensis*) and human activity (b and h in Table 1a.) however have directly influenced portions of this wetland helping to create some areas of open water. These open water areas make up only a very small portion of this wetland and therefore it received a low value for fish and shellfish habitat. Recreation and educational value also received a relatively low value in large part to the fact that accessibility is limited to this wetland complex. Compared to other wetlands assessed in Lancaster this one had a lower overall diversity which affected its score as well.

Much of the Rowell Road Wetland Complex is forested with mature trees or dominated by various shrubs and persistent vegetation as seen in this photograph. This thick vegetation provides great habitat for a variety of wildlife species and can be very beneficial for minimizing erosion problems, and nutrient removal due to complex root systems.

Peacham and wonsqueak muck combined give this wetland 66.13% (Summary Table) very poorly drained soils. The remaining percentage (less than 34%) of this wetland is made up almost entirely of pillsbury sandy loam (Table 2a.). This soil is the most commonly found poorly drained soil in the seven Lancaster wetland complexes evaluated in this report.

Based on these factors and those outlined in the fieldwork section of the introduction of this report, the assessed functional value of this wetland complex is 8.93 out of 14 with the total wetland value being 444.27 (8.93 x 49.75ac.). This functional value is the lowest of the seven wetlands inventoried in Lancaster.

Table 2a.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Peacham muck	549A	26.86
Very poorly drained	Wonsqueak muck	995A	6.04
Poorly drained, Including open water and NWI listed	Pillsbury sandy loam	647B	16.85

Fairgrounds Wetland Complex (# 6)

This photograph illustrates the variety of wetland/habitat types contained within this wetland complex. This portion of the wetland is predominantly scrub/shrub in the foreground and then transitions into a forested wetland scattered with snags (standing dead trees).

The Fairgrounds Wetland complex is the second smallest wetland area inventoried and assessed at 174.91 acres. It is located in the northwestern portion of Lancaster, near the county fairgrounds between the Connecticut River and Route 3. The average functional value of this wetland complex is 11.95 with a total functional value of 2090.17(11.95 x 174.91ac.). This is a large, relatively well buffered wetland that contains a wide variety of wetland/habitat types, which significantly influenced the average functional value it received. Table 1b. summarizes the NWI data and the various wetland types classified by the U.S. Fish and Wildlife Service which were confirmed during field inventory.

Table 1b.

NWI wetland code	NWI wetland name
PEM1C	Palustrine emergent, persistent vegetation, seasonally flooded
PFO1C	Palustrine forested, broad-leaved deciduous, seasonally flooded
PFO2/4E	Palustrine forested, needle-leaved deciduous Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PSS1/EM1E	Palustrine scrub-shrub, broad-leaved deciduous Palustrine emergent, persistent vegetation, seasonally flooded/saturated
PSS1E	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PUBH	Palustrine unconsolidated bottom, permanently flooded
PUBF	Palustrine unconsolidated bottom, semi-permanently flooded
PEM1F	Palustrine emergent, persistent vegetation, semi-permanently flooded
PFO4E	Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PSS1C	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded
PABF	Palustrine aquatic bed, semi-permanently flooded

The numerous types of vegetation cover types (aquatic plants, shrubs, mature trees) along with the varying hydrology (seasonally flooded to permanently flooded) provide potential foraging, resting, and reproduction sites along with travel corridors for various bird, amphibian, reptile, fish, invertebrate, and mammal species. These varying habitat types also provide a potential for rare or endangered wildlife and/or plant species.

Its large flat area and proximity to the Connecticut River also make this wetland a valuable one. It has the potential to make significant contributions to the area with floodwater control and as a filtration source removing nutrients, sediments, and chemicals from the water. A component of this wetland complex that negatively affects its ranking value is the limited access. Most of the land surrounding this complex is part of the county fairgrounds and is private land (which a portion of is Posted). There is a small section of Route 3 that could provide access, but due to high traffic activity has

potential safety hazards. There may also be some accessibility through the Connecticut River. Due to access issues, functions such as recreation, education, and visual quality received slightly lower values.

There are channels of open water that run through this wetland complex adding to its importance as a wildlife habitat, freshwater, and possible recreation source Relative to the size of this wetland these open water channels only make up a small portion of the overall wetland complex.

Of the soils that make up this wetland complex 55.06% of them are very poorly drained and the majority of the remaining 30.68% are made up of poorly drained soils (cohos loam, pemi silt loam, and charles silt loam) (Summary Table). The very poorly drained soils consist of two different types of soil; bucksport muck and medomak mucky silt loam (Table 2b.).

Table 2b.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Bucksport muck	895A	57.01
Very poorly drained	Medomak mucky silt loam	406A	39.29
Poorly drained, Including open water and NWI listed	Cohos loam Pemi silt loam Charles silt loam	505A 633A 209A	78.61

Nadeau Farm Wetland Complex (# 5)

A significant portion of this wetland is bordered by active agricultural lands (as can be seen in the upper left of this photograph). This photograph also shows a clear transition of wetland types from open water → emergent vegetation → scrub/shrub →forested wetland.

The Nadeau Farm Wetland Complex is just over 361 acres lying between the Connecticut River and Route 135 (near John Nadeau's farm). It extends across Route 135 along the pipeline and ends just before the pipeline crosses Route 3. This large wetland contains a variety of wetland types (Table 1c) creating suitable habitat for common, and potentially rare, wildlife and plant species. A significant amount of this wetland lies along open areas made up of active farming and the pipeline. These open areas are beneficial for some wildlife and plant species, but the lack of cover cause a limitation for others. This wetland also contains a wide variety of soils. Five different types of very poorly drained soils make up 63.56% of this wetland, and five different types of poorly drained soils make up a majority of the remaining 36.44% (Table 2c). This variety in soil types helps to explain the amount of diversity found in the complex. Other benefits this wetland complex has are the potential to aid in floodwater control (especially along the Connecticut River) and sediment, chemical, and nutrient removal from the water.

Table 1c.

NWI wetland code	NWI wetland name
PSS1E	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PFO1E	Palustrine forested, broad-leaved deciduous, seasonally flooded/saturated
PFO4Ba	Palustrine forested, needle-leaved evergreen, saturated, and acidic
PEM1E	Palustrine emergent, persistent vegetation, seasonally flooded/saturated
PSS1Eb	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, and beaver
PUBFb	Palustrine unconsolidated bottom, semi-permanently flooded, and beaver
PUBFh	Palustrine unconsolidated bottom, semi-permanently flooded, and diked/impounded
PEM1Eb	Palustrine emergent, persistent vegetation, seasonally flooded/saturated, and beaver
PFO4Eb	Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated, and beaver

This wetland is a very visually accessible complex with adequate physical access giving it potential for recreation and educational value. In areas adjacent or near agricultural lands access is not always encouraged due to crops and livestock, lowering its value for these factors. The active farming also affects its value as a groundwater recharge and discharge source due to the potential for pesticides, herbicides, and an increase in nutrients (through fertilizers) to be added to the system. This wetland is also lacking adequate buffers along some of its edges. These components aided in assigning this wetland an average score of 11.20 out of 14 resulting in a functional value of 3,646.28 (11.20 x 329.98 ac.) (Summary Table).

Table 2c.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Bucksport muck	895A	132.99
Very poorly drained	Medomak mucky silt loam	406 A	62.57
Very poorly drained	Peacham muck	549A	4.95
Very poorly drained	Wonsqueak muck	995A	5.16
Very poorly drained	Pondicherry muck	992A	4.07
Poorly drained,	Cohos loam	505A	

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Including open water and NWI listed	Pillsbury sandy loam Moosilauke loam Rumney fine sandy loam Grange silt loam	647A,B,C 415A,B 105A 433A	55.51

Route 2 / Israel River Wetland Complex (# 4)

The Route 2/Israel River Wetland Complex is the fourth smallest wetland assessed in the town of Lancaster, containing 361.33 acres. It runs along the Lancaster/Jefferson town line with Route 2 bisecting it almost in the center and the Israel River running through sections of it. On the west side of Route 2 a large portion of it lies along the base of Mount Prospect.

After field assessment of this wetland complex, it received an average functional value of 11.60 out of 14 and a total functional value of 4,191.43 (11.60 x 361.33 ac.) (Summary Table). This wetland received high scores for functions such as floodwater control and production export based on its connectivity to the Israel River and the numerous other smaller streams and brooks that flow throughout it. The fact that it is well vegetated with adequate buffers also contributed to higher scores for these functions.

These photographs are looking into a portion of this wetland complex that lies just off of the north side of Route 2 before the Lancaster/Jefferson town line. Many of the shrubs shown at the edges of this scrub/shrub wetland are Highbush-Cranberry (*Viburnum trilobum*) and Common Winterberry Holly (*Ilex verticillata*). Both shrubs produce a red berry in mid-late fall that act as an important food source for many wildlife species. We witnessed a flock of American Robins (*Turdus migratorius*) feeding on one of these winterberry shrubs.

Table 1d.

NWI wetland code	NWI wetland name
PSS1E	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PEM1E	Palustrine emergent, persistent vegetation, seasonally flooded/saturated
PFO4E	Palustrine forested, needle-leaved evergreen, seasonally

NWI wetland code	NWI wetland name
	flooded/saturated
PEM1C	Palustrine emergent, persistent vegetation, seasonally flooded
PUBHh	Palustrine unconsolidated bottom, permanently flooded, diked/impounded
R3UBH	Riverine upper perennial, unconsolidated bottom, permanently flooded
PFO4/EM1E	Palustrine forested, needle-leaved evergreen Palustrine emergent, persistent vegetation, seasonally flooded/saturated
PFO4/SS1E	Palustrine forested, needle-leaved evergreen Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated

There is significant diversity of wetland/habitat types, and hydrology regimes in this complex (Table 1d). Hydrology ranging from areas that are seasonally flooded with periods of drier conditions, to permanently flooded areas increase the amount of wildlife (especially fish and amphibian species) and plant species that can successfully exist in this habitat. Along with a variety of plant species and hydrology regimes there is diversity in the very poorly drained soils in this wetland. This wetland is 71.18 % very poorly drained soils with NRCS soils maps indicating that five different soils types make up this percentage with the majority being bucksport muck and peacham muck (Table 2d). We noted that some northern white cedar (*Thuja occidentalis*) trees were growing in this wetland; a tree species that bucksport and peacham muck both typically support. This tree species is not as common in the area as it once was so finding it growing in this wetland holds some significance. This overall diversity helped this wetland to receive a high score for uniqueness.

Table 2d.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Bucksport muck	895A	87.39
Very poorly drained	Medomak mucky silt loam	406 A	16.79
Very poorly drained	Peacham muck	549A	135.54
Very poorly drained	Wonsqueak muck	995A	13.03
Very poorly drained	Searsport mucky peat	15A	4.44
Poorly drained, Including open water and NWI listed	Pillsbury sandy loam	647A,B,C	104.14

Access is an issue with this wetland complex. Though it can be accessed from the Israel River, Route 2, or the backside (east) of Mount Prospect, none of these access points are ideal. There is only a very thin portion of this wetland that crosses Route 2 and

it is closely surrounded by private homes and businesses. The sections of the Israel River that flow through it are a distance away from any potential road access. The backside of Mount Prospect is probably the most accessible of the choices, but there are significant sections of Posted property. These issues gave recreation, education, and aesthetics slightly lower scores.

Route 2 bisects this wetland complex almost directly through the middle. This brook runs under Route 2 and connects the two wetland complexes that lie on either side of this busy road.

The fact that it is fragmented by Route 2 also lowers its average functional value. The small quiet dirt roads that run through this wetland (and other evaluated wetlands) were not of great concern in considering fragmentation. Wildlife and plant species are typically able to cross them without significant deterrence and hydrology is usually compensated for through structures such as culverts and ground water connectivity. Conversely, Route 2 is a heavily used, wider, paved road. We were able to connect the large wetland complexes on both sides of this road because they are hydrologically connected by a stream that is able to run under it, but there is concern over the connectivity of wildlife and plant species on either side of the road. Therefore this wetland received slightly lower scores due to fragmentation caused by Route 2.

Clark's Pond Area Wetland Complex (# 3)

This wetland complex contains a significant amount of open water that can be navigated by canoe, kayak, or small boat. This photograph also clearly shows the significant amount of aquatic (submergent and emergent) vegetation providing great cover and foraging habitat for wildlife such as waterfowl, muskrats, beaver, moose, and warm water fish.

The third largest wetland complex assessed is the Clark's Pond Area Wetland Complex with just over 456 acres. The majority of the wetland complex lies between the Lancaster/Whitefield town line, the Lancaster/Dalton town line, Martin Meadow Pond Road and Route 3. A small portion of it crosses Route 3 with another small portion crossing the Martin Meadow Pond Road and extending into Martin Meadow Pond. Two additional waterbodies Blood Pond and Clark's Pond, are part of the complex. This wetland complex extends a significant distance across the Lancaster town line into the Town of Whitefield below White Mountains Regional High School on both sides of Route 3.

Though this is only the third largest wetland complex in Lancaster, it is the only complex that received a perfect 14 out of 14 average functional value and probably should be considered equally important and valuable as the two larger wetland complexes that ranked first and second in this study. Due to its size being significantly less acreage than the second and first ranking wetland complexes, it received a total functional value of 6,384.42 (14 x 456.03). This wetland also had the highest percentage of very poorly drained soils with 78.63 % (Summary Table). Bucksport muck makes up the majority of very poorly drained soils, but wonsqueak muck, pondicherry muck, and peacham muck all contribute as well. Pillsbury sandy loam, moosilauke loam, and lyme fine sandy loam make up the majority of the remaining 21.37 % equaling around 97 acres (Table 1e).

Table 1e.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Bucksport muck	895A	187.67
Very poorly drained	Pondicherry muck	992A	66.76
Very poorly drained	Peacham muck	549A	19.91
Very poorly drained	Wonsqueak muck	995A	84.22
Poorly drained, Including open water and NWI listed	Pillsbury sandy loam Moosilauke loam Lyme fine sandy loam	647A,B 415A,B 247C	 97.47

Beavers have the ability to significantly manipulate their surrounding habitat to better suit their needs and directly enhance the habitat around them for a wide variety of other wildlife and plant species. The photograph on the right shows one of many dams found in the Clark's Pond Area Wetland Complex built by beavers. These dams raise water levels potentially expanding the size of the wetland and create more ponded habitats. The snags (standing dead trees) resulting in years of their roots being permanently inundated, provide important perching and potentially cavity nesting sites for birds such as wood ducks (*Aix sponsa*).

This wetland complex has excellent overall diversity. The wetland types classified by the U.S. Fish and Wildlife Service and NWI data show that both palustrine and riverine wetland systems exist in this complex, containing numerous types of vegetation, and numerous hydrology regimes (Table 2e). As mentioned earlier, this great variety in wetland/habitat types over a large area, provides potential for a significant abundance and diversity in invertebrate, amphibian, reptile, fish, bird, mammal, and plant species. A great blue heron (*Ardea herodias*), various duck species, cedar waxwings (*Bombycilla cedrorum*), muskrat (*Ondatra zibethicus*) and moose (*Alces alces*) sign were all observed during assessment of this wetland. It was also observed that this wetland was historically and is currently significantly influenced by beaver activity. Numerous beaver dams of varying ages were found. These dams slow flowing water, expand the width of channeled areas, and have created small to large relatively shallow pond habitats. These characteristics provide suitable habitat for the wildlife species we observed and a great many more such as chain pickerel (*Esox niger*) and other warm water fish species. A man-made dam at Clark's Pond further contributes to the amount and diversity of these types of habitat.

This is one of two beaver lodges found in the wetland complex. Even though this wetland is large enough to potentially support several beaver families (and there is a good chance it does) only two of the two lodges that were found during assessment are currently active.

White pine (*Pinus strobus*) knolls were observed as the dominant upland habitat surrounding much of this wetland complex. There is also a large amount of riverine habitat within the uplands and wetland. These habitat conditions combined with the various wetland types in close proximity to each other provide a significant amount of transition or edge habitat. These various edge habitats create a potential for a greater abundance in wildlife and plant species because they provide a slightly different component to the system. For example turtles that spend the majority of their lives in the open water habitat will travel to the drier edges or wetlands when laying their eggs. For these reasons this wetland complex received perfect scores for fish, shellfish, wildlife, and endangered species habitat.

Table 2e.

NWI wetland code	NWI wetland name
PFO4E	Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PEM1/SS1Eb	Palustrine emergent, persistent vegetation Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, beaver
PUBFb	Palustrine unconsolidated bottom, semi-permanently flooded, beaver
PSS1Eb	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, beaver

NWI wetland code	NWI wetland name
PFO2/4E	Palustrine forested, needle-leaved deciduous Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PEM1Eb	Palustrine emergent, persistent vegetation, seasonally flooded/saturated, beaver
PSS1Fb	Palustrine scrub-shrub, broad-leaved deciduous, semi-permanently flooded, beaver
PSS1E	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PUBHb	Palustrine unconsolidated bottom, permanently flooded, beaver
R3UBH	Riverine upper perennial, unconsolidated bottom, permanently flooded
PFO1Eb	Palustrine forested, broad-leaved deciduous, seasonally flooded/saturated, beaver
PSS1C	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded
PFO2E	Palustrine forested, needle-leaved deciduous, seasonally flooded/saturated
PFO1C	Palustrine forested, broad-leaved deciduous, seasonally flooded
PSS3B	Palustrine scrub-shrub, broad-leaved evergreen, saturated
PUBHh	Palustrine unconsolidated bottom, permanently flooded, diked/impounded
PFO5Fb	Palustrine forested, dead, semi-permanently flooded, beaver
PSS3/1E	Palustrine scrub-shrub, broad-leaved evergreen Palustrine scrub-shrub, broad-leaved deciduous seasonally flooded/saturated

Muskrat scat was found on this partially submerged log. This wetland complex provides excellent habitat for these aquatic rodents because of the amount of open water for travel, and aquatic vegetation for foraging.

Potential for recreation within this wetland is extremely high. There are large amounts of open water that can support kayaks, canoes, small boats, and fishing with abundant wildlife habitat that should provide successful hunting opportunities. Access into this wetland is limited (through private property) somewhat compromising the value of recreation, education, and aesthetic functions. The large area with ample amounts of open water, vegetation, and adequate buffers make groundwater recharge/discharge, floodwater control, nutrient, sediment, and chemical removal, and production export extremely valuable as well. Overall this large and extremely diverse wetland complex is a very valuable system.

The Clark's Pond Area Wetland Complex contains a significant amount of open water and is extremely well vegetated and buffered. These characteristics not only make a visually pleasing scene, but also make it an important source for groundwater recharge and discharge.

Connecticut River Flood Plain Wetland Complex (# 2)

The Connecticut River Flood Plain Wetland Complex is the second largest wetland complex (704.56 ac.) assessed in Lancaster and received the second highest total functional value with a score of 7,679.70 (based on an average functional value of 10.90 out of 14 multiplied by its size of 704.56 ac.) (Summary Table). This complex lies between the Connecticut River (bordered by Route 135), the Lancaster/Dalton town line, and Martin Meadow Pond.

This wetland is an extremely large and relatively unfragmented system. There are no major roads or network of smaller roads that run through this wetland. This is a characteristic that makes it unique when compared to most of the other wetlands assessed in Lancaster. Though the Rowell Road and the Fairgrounds wetland complexes share this characteristic, they are significantly smaller than the Connecticut River Flood Plain Wetland Complex. The Connecticut River borders this wetland for a significant distance, but Route 135 runs tightly between the two for the entire distance, causing significant fragmentation which affects its overall value. Other functions and/or characteristics that this wetland is lacking are significant amounts of open water and access points.

This large well vegetated wetland has the potential to be an important source for floodwater control and groundwater recharge and discharge due to its flat structure and proximity to the Connecticut River.

This wetland contains a wide variety of wetland/habitat types (table 1f), therefore wildlife and endangered species habitat received perfect scores. Floodwater control also received a perfect score because of its flat floodplain structure and proximity to the Connecticut River. This wetland is also beneficial for functions such as groundwater

recharge and discharge, nutrient removal and production export due to its floodplain characteristics and lush vegetation. It also received a high rank for uniqueness because of the large stands of tamarack trees within the complex. There are a limited amount of tamarack bogs in Lancaster and this may be the largest one within the town. (It continues into the Town of Dalton).

Table 1f.

NWI wetland code	NWI wetland name
PFO4E	Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PEM1/SS1Eb	Palustrine emergent, persistent vegetation Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, beaver
PUBFb	Palustrine unconsolidated bottom, semi-permanently flooded, beaver
PFO4Eb	Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated, beaver
PFO2/4E	Palustrine forested, needle-leaved deciduous Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PEM1Eb	Palustrine emergent, persistent vegetation, seasonally flooded/saturated, beaver
PEM1Fb	Palustrine emergent, persistent vegetation, semi-permanently flooded, beaver
PSS1E	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PSS1Eb	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, beaver
PFO1E	Palustrine forested, broad-leaved deciduous, seasonally flooded/saturated

The soils of this wetland are extremely diverse as well. Peacham muck, wonsqueak muck, bucksport muck, and medomak mucky silt loam make up the 59.07% of very poorly drained soils within this wetland complex (Table 2f). Six different types of poorly drained soils make up much of the remaining 40.93% of the wetland complex. This variety of soils is part of the reason why so much diversity exists within the wetland complex.

Table 2f.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Buksport muck	895A	73.51
Very poorly drained	Medomak mucky silt loam	406A	21.59
Very poorly drained	Peacham muck	549A	173.36
Very poorly drained	Wonsqueak muck	995A	147.73
Poorly drained, Including open water and NWI listed	Pillsbury sandy loam Pemi silt loam Lyme fine sandy loam Rumney fine sandy loam Grange silt loam Charles silt loam	647A,B,C 633A 247B 105A 433A 209A	288.37

This wetland has limited amounts of open water for its size as seen in the photograph on the left. It is densely vegetated in all strata (ground cover to canopy cover) and contains floodplain characteristics making it beneficial in functions such as nutrient removal and production export.

Page Hill Road Wetland Complex (# 1)

The Page Hill Road Wetland Complex lies along the Lancaster/Northumberland town line, and between Route 3, the Grange Road, the North Road, and downtown Lancaster. This is by far the largest wetland complex in the town of Lancaster and extends into the town of Northumberland. The portion of this wetland that lies in Lancaster consists of 1813.88 ac.

This wetland received a 9.2 out of 14 for average functional value and a total functional value of 16687.70 (9.2 x 1813.88), giving it the highest functional value of the wetland complexes assessed in Lancaster (Summary Table).

Even though this wetland received the highest total ranking, its only perfect scores were for the sediment/shoreline stabilization category and 'other functions/values' category. This is a large extremely well vegetated and relatively well buffered wetland where no significant amounts of erosion were observed during assessment. It received a perfect score in the 'other' category due to the existence of large amounts of buffered undeveloped land within and around this complex. Some areas of northern white cedar regeneration were also found. As previously mentioned, stands of northern white cedar are not as common in Northern New Hampshire as they once were, making them unique, valuable areas.

This wetland complex covers over 1800 acres making it the largest complex in Lancaster. With so much area, a great deal of varying soil, wetland, and habitat types are included within it giving it a significant amount of diversity.

Because of its dense vegetation and large size this wetland received high scores for functions such as groundwater recharge/discharge and sediment, nutrient, and chemical removal. A wide variety of wetland/habitat types can be found in this wetland complex (Table 1g) creating numerous opportunities for plant and wildlife species. Moose, black bear (*Ursus americanus*), and coyote (*Canis latrans*) sign along with a broad-winged hawk (*Buteo platypterus*), were observed in this complex. For these reasons wildlife and endangered species habitat received high values.

Table 1g.

NWI wetland code	NWI wetland name
PFO4E	Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PEM1/SS1Eb	Palustrine emergent, persistent vegetation Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, beaver
PUBFb	Palustrine unconsolidated bottom, Semipermanently flooded, beaver
PSS1Eb	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated, beaver
PFO2E	Palustrine forested, needle-leaved deciduous, seasonally flooded/saturated

NWI wetland code	NWI wetland name
PEM1Eb	Palustrine emergent, persistent vegetation, seasonally flooded/saturated, beaver
PSS1E	Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PSS4E	Palustrine scrub-shrub, needle-leaved evergreen, seasonally flooded/saturated
PSS1/EM1E	Palustrine scrub-shrub, broad-leaved deciduous Palustrine emergent, persistent vegetation, seasonally flooded/saturated
PUBFh	Palustrine unconsolidated bottom, semi-permanently flooded, diked/impounded
PEM1Eb	Palustrine emergent, persistent vegetation, seasonally flooded/saturated, beaver
PFO1E	Palustrine forested, broad-leaved deciduous, seasonally flooded/saturated
PSS4Ba	Palustrine scrub-shrub, needle-leaved evergreen, saturated, acidic
PFO4/2E	Palustrine forested, needle-leaved evergreen Palustrine forested, needle-leaved deciduous, seasonally flooded/saturated
PFO1Eh	Palustrine forested, broad-leaved deciduous, seasonally flooded/saturated, diked/impounded
PEM1E	Palustrine emergent, persistent vegetation, seasonally flooded/saturated
PUBHh	Palustrine unconsolidated bottom, permanently flooded, diked/impounded
PFO5/EM1Fh	Palustrine forested, dead Palustrine emergent, persistent vegetation, semi-permanently flooded, diked/impounded
PEM1/FO4E	Palustrine emergent, persistent vegetation Palustrine forested, needle-leaved evergreen, seasonally flooded/saturated
PFO4/SS1E	Palustrine forested, needle-leaved evergreen Palustrine scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated
PFO4Ba	Palustrine forested, needle-leaved evergreen, saturated, acidic
PEM1Eh	Palustrine emergent, persistent vegetation, seasonally flooded/saturated,

NWI wetland code	NWI wetland name
	diked/impounded
PEM1/SS1Fb	Palustrine emergent, persistent vegetation Palustrine scrub-shrub, broad-leaved deciduous, semi-permanently flooded, beaver
PFO4/5E	Palustrine forested, needle-leaved evergreen Palustrine forested, dead, seasonally flooded/saturated
PFO4/2Ba	Palustrine forested, needle-leaved evergreen Palustrine forested, needle-leaved deciduous, saturated, acidic

There is a significant amount of undeveloped land within and abutting this wetland complex, but there are also multiple roads (paved and dirt) running throughout it causing potential for fragmentation. Access into much of this complex is limited and there are minimal areas of ponded open water. For these reasons functions such as production export, recreation, education, and aesthetics received lower marks.

This large wetland complex contains multiple habitat types such as the area shown in the photograph on the left. These various habitat types support an assortment of resident wildlife and plant species along with numerous creatures that come to these areas for activities such as foraging and reproduction. Hawks like the one in the photograph on the right will often use the snags commonly found in wetlands as a perching site while hunting.

Very poorly drained soils make up 69.32% of this wetland complex (Summary Table). These soils are bucksport, pondicherry, peacham, and wonsqueak mucks. Six different types of poorly drained soils make up almost 557.27 acres of this complex (Table 2g).

Table 2g.

Drainage Class	Soil Description	NRCS Soil Symbol	Acres
Very poorly drained	Bucksport muck	895A	661.56
Very poorly drained	Pondicherry muck	992A	266.89
Very poorly drained	Peacham muck	549A	222.61
Very poorly drained	Wonsqueak muck	995A	105.55
Poorly drained, Including open water and NWI listed	Pillsbury sandy loam Moosilauke loam Grange silt loam Naumburg fine sandy loam Cohos loam Pemi silt loam	647A,B,C 415A,B 247C 214A,B 505A 633A	557.27

Thick stands of Tamarack (*Larix laricina*), as seen in this photograph, were found throughout this wetland complex. This is a tree species commonly found growing on bucksport, pondicherry, peacham, and wonsqueak muck (which are the very poorly drained soils in this wetland)

Table 1. Summary of soil percentages, size, value, and rank of wetlands inventoried in Lancaster, New Hampshire

Wetland Name	Percent very poorly drained soil	Percent poorly drained soil, open water and NWI listed	Functional Value	Number of Acres	Wetland Value Units	Rank
Rowell Road Wetland Complex	66.13	33.87	8.93	49.75	444.27	**7**
Fairgrounds Wetland Complex	55.06	44.94	11.95	174.91	2,090.17	**6**
Nadeau Farm Wetland Complex	63.56	36.44	11.20	329.98	3,646.28	**5**
Route 2 / Israel River Wetland Complex	71.18	28.82	11.6	361.33	4,191.43	**4**
Clark's Pond Area Wetland Complex	78.63	21.37	14	456.03	6,384.42	**3**
Connecticut River Flood Plain Wetland Complex	59.07	40.93	10.9	704.56	7,679.70	**2**
Page Hill Road Wetland Complex	69.32	30.68	9.2	1,813.88	16,687.70	**1**

Discussion and Future Applications

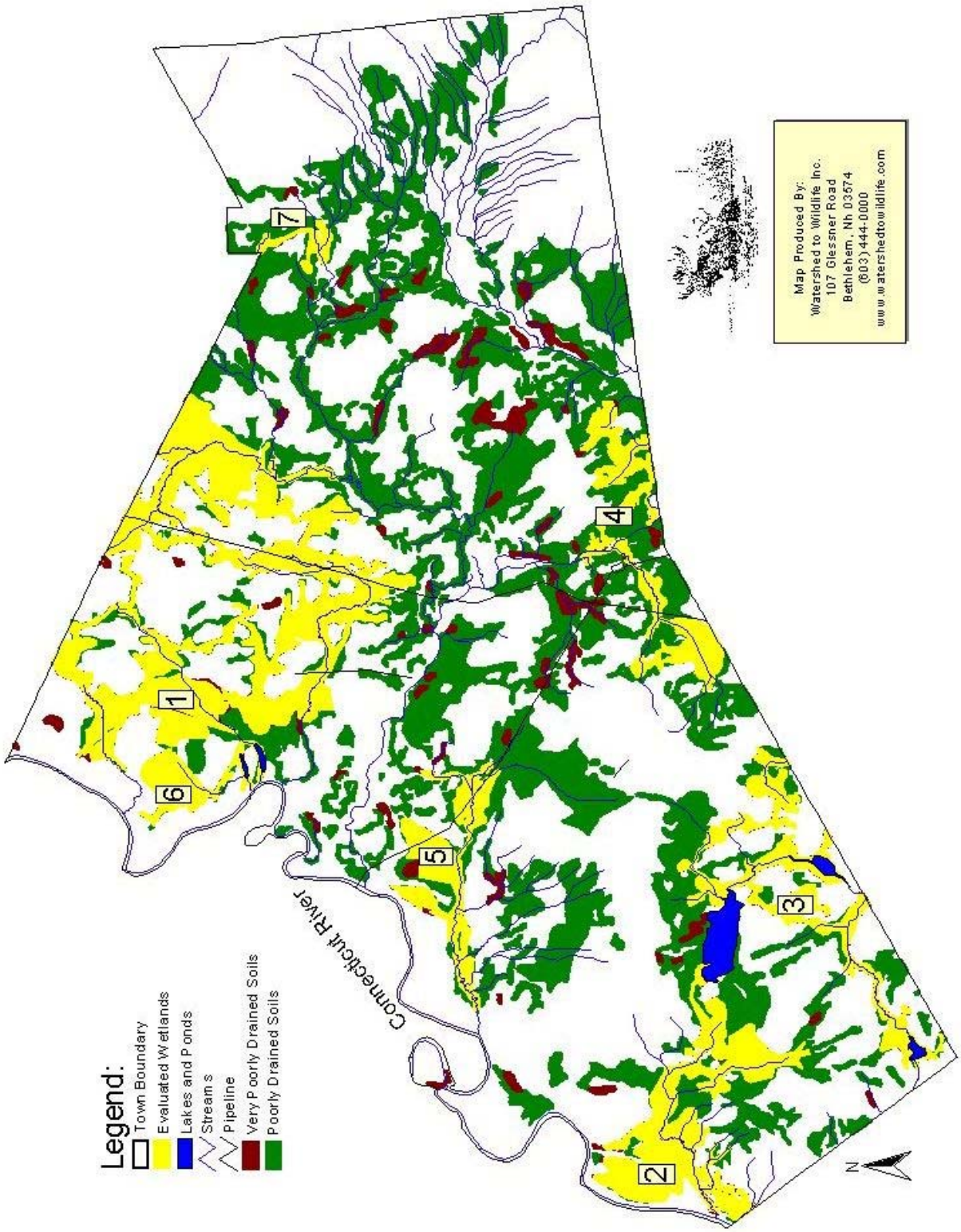
This study was done to equip the Town of Lancaster to implement Prime Wetland Designation if residents choose to do so. The project was funded through the Upper Connecticut River Mitigation and Enhancement Fund, and is part of a three year study to assist nine towns in the region to work towards protection of some of their more "valuable" (higher ranked) wetland resources.

It is recommended that Lancaster residents considering establishing Prime Wetlands in Town as a means to help protect these areas from developmental pressures. A town vote in favor of this special designation of wetlands is necessary first. If the Town of Lancaster decides to proceed with designating Prime Wetlands it must submit a report with appropriate maps to the State of New Hampshire, Department of Environmental Services - Wetlands Bureau. The Wetlands Bureau will review the submission, and grant the designation if the submission is complete. At the time of this report 24 towns in NH have designated prime wetlands: Andover, Barrington, Bow, Brookline, Derry, Enfield, Exeter, Fremont, Gilford, Goffstown, Holderness, Hooksett, Meredith, Newington, Northwood, Nashua, New London, Pelham, Salem, Sanbornton, Sandwich, Tamworth, Weare, and Wolfeboro; none in the North Country.

The seven wetland complexes inventoried are all valuable to the Town of Lancaster. Lancaster has a rare opportunity compared to many other parts of the state – an ability to proactively protect large wetland areas from development. The wetlands inventoried are very unique in Lancaster just due to their extremely large sizes. Six of the seven wetlands are over 100 acres, with the largest nearing 2,000 acres. Where many towns in the southern part of NH would consider 15 acres to be a large tract of land, Lancaster's smallest wetland assessed and ranked is more than three times this size. It should also be noted that all of these wetland complexes are larger than the figures given in this report due to the guidelines that, for the purposes of Prime Wetland Designation, require that at least 50 % of the wetland needs to have very poorly drained hydric soil. Therefore many of the poorly drained soils were omitted to keep the ratio of very poorly to poorly drained soils at least 1.1 to 0.9.

Lancaster has the opportunity to do something very few communities can: proactively protect some large, unique, valuable, and diverse natural resources before fragmentation occurs.

Maps


Legend:
Town Boundary
Evaluated Wetlands
Lakes and Ponds
Streams
Pipeline
Very Poorly Drained Soils
Poorly Drained Soils
Connecticut River
1
2
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4
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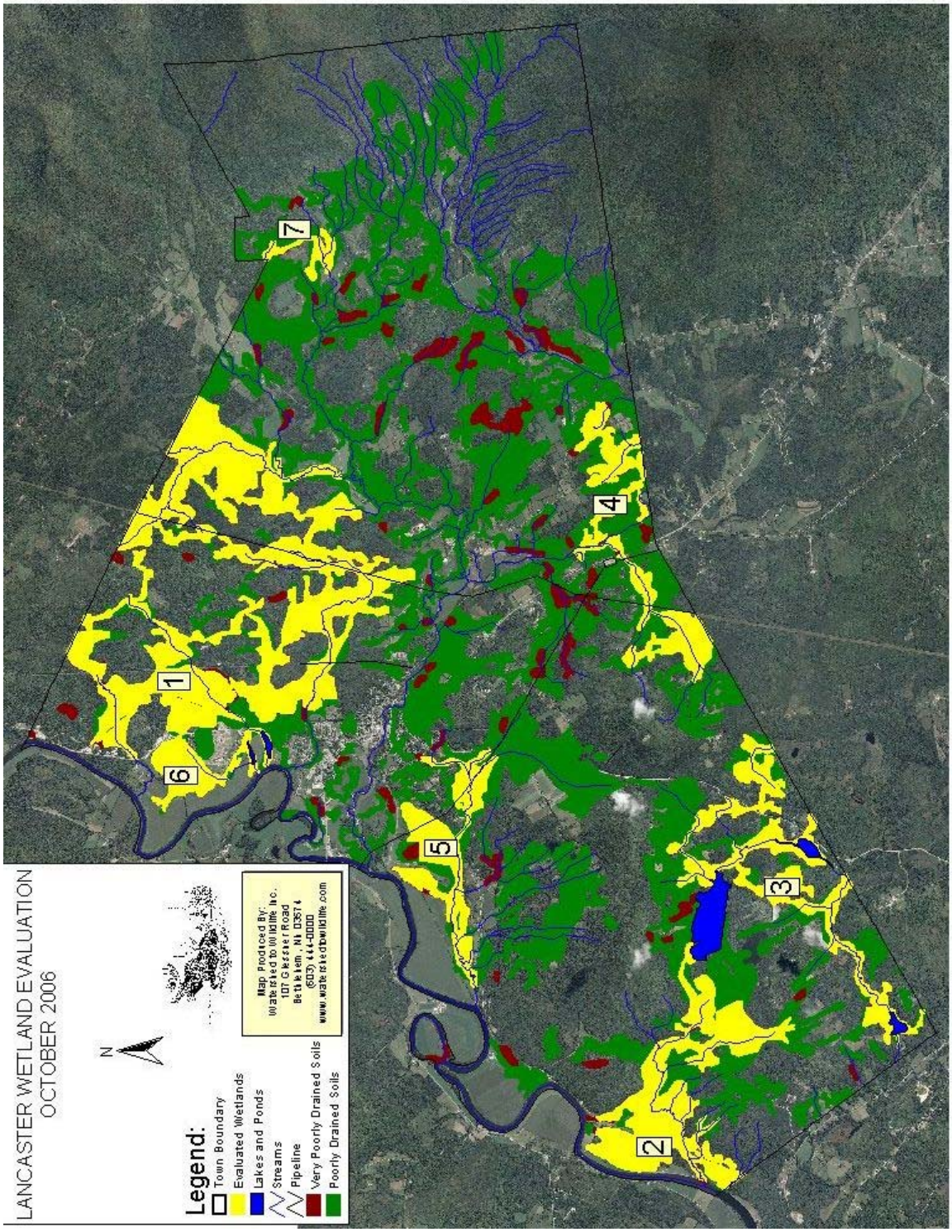
N
Map Produced By:
Watershed to Wildlife Inc.
107 Glessner Road
Bethlehem, Nh 03574
(603) 444-0000
www.watershedtowildlife.com

Maps


LANCASTER WETLAND EVALUATION
OCTOBER 2006
Legend:
Town Boundary
Evaluated Wetlands
Lakes and Ponds
Streams
Pipeline
Very Poorly Drained Soils
Poorly Drained Soils
N
Map Produced By:
Watershed Wildlife Inc.
107 Gessner Road
Bethlehem, NH 03574
(603) 444-0000
www.watershedwildlife.com
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References

Ammann, A.P. and A.L. Stone, 1991. *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire*. New Hampshire Department of Environmental Services, Concord, NH.

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Appendix – Copy of Field Inventory and Assessment Form

WETLAND FUNCTION – VALUE EVALUATION FORM (draft 6/3/2004)

Wetland Description:		File Number:	
		Wetland Identifier:	
		Latitude:	Longitude:
		Preparer(s):	
		Date:	

Function/Value	Capability Y	Capability N	Summary	Principal Yes/No
Groundwater Recharge/Discharge				
Floodflow Alteration				
Fish and Shellfish Habitat				
Sediment/Toxicant Retention				
Nutrient Removal				
Production Export				
Sediment/Shoreline Stabilization				
Wildlife Habitat				
Recreation				
Educational/Scientific Value				
Uniqueness/Heritage				
Visual Quality/Aesthetics				
ES Endangered Species Habitat				
Other				

Notes: *attach list of considerations