Method for Inventorying and Evaluating Freshwater Wetlands In New Hampshire

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NH METHOD

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(NH Method)

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Updates to the NH Method

The *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire* (NH Method), co-authored by Alan Ammann and Amanda Lindley Stone, was originally published in March, 1991. It was adapted from the *Method for the Evaluation of Inland Wetlands in Connecticut,* published in 1986 by the Connecticut Department of Environmental Protection and authored by Alan Ammann and others. Since 1991, the NH Method has been widely used by New Hampshire communities and natural resources professionals. The NH Method's ease of use, its educational value, and the general objectivity of the resulting function evaluations have contributed to its popularity. Since 1991, the NH DES Wetlands Bureau has recommended using the NH Method for evaluating wetlands, especially for the purpose of Prime Wetlands designation.

The first update/revision of the NH Method was completed in 2011, twenty years after its original publication. The 2011 revision and subsequent updates in 2012, 2013 and 2015 have incorporated new and current research, technologies, data and input from users. The NH Wetlands Mapper, an online mapping program tailored for the layperson was developed in 2013 to accompany the NH Method.

Acknowledgements

The 2011 Revisions to the NH Method were conducted by the NH Method Work Group, which included representatives from the state and private organizations listed below. Many thanks are due to this group for the considerable hours they spent reviewing, revising and field testing the updated NH Method. Their contributions of expertise and experience were invaluable.

NH Method Work Group

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*The four primary co-authors for the 2011 revision have been responsible for the ongoing revisions and updates to the NH Method.

I. INTRODUCTION

Wetlands are areas on the landscape with soils that drain so slowly that they usually have water at or near the surface for all or part of the year. These wetland, or "hydric", soils have low oxygen levels and support plants adapted to living in such conditions. Wetlands are usually transitional areas between drier upland soils and open water areas such as streams, rivers, ponds and lakes. Wetlands include forested and shrub swamps, marshes, peatlands, wet meadows, and bordering vegetated shallows of streams, rivers, lakes and ponds.

Wetlands are an important part of the hydrologic system, and play a key role in maintaining drinking water supplies, treating stormwater, storing floodwaters and preventing downstream property damage. Wetlands provide a high degree of biodiversity in the landscape, maintaining healthy and diverse aquatic and wetland-dependent wildlife populations. They provide scenic vistas, as well as hiking, canoeing, fishing and hunting opportunities.

Wetland evaluation is the process of determining the values of a wetland based on an assessment of the functions it performs. The NH Method provides a wetland evaluation method for use by several **audiences**:

- Public officials and community volunteers,
- Professionals who have some familiarity with wetlands, but who are not necessarily wetland specialists, and
- Professional wetland scientists

The NH Method is intended to be used for the following **purposes**:

1. Educating members of conservation commissions, other town boards, non-wetland professionals and others about wetland functions and values.
2. Evaluating one or more wetlands in a study area, such as a town or a watershed.
3. Conducting a comparative evaluation of wetlands in order to designate Prime Wetlands (RSA 482-A:15)
4. Collecting baseline information about the wetlands in a study area for the purposes of conservation.
5. Creating a database of wetland functions and values
6. Supporting local planning and decision-making.

Because development and growth often require towns to prioritize natural resources for protection, it is important that they have available a practical means of inventorying and evaluating their wetlands. The *Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire* (NH Method) was developed for that purpose.

Definitions

The **Definition of Wetlands** in the NH Method is the same as the State of New Hampshire (http://www.gencourt.state.nh.us/rsa/html/L/482-A/482-A-2.htm): *[A wetland is] "an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions."*

Wetland Inventory:
Identifies and maps all wetlands in a study area using available map and aerial photo resources (such as the National Wetland Inventory maps, satellite imagery, and LIDAR. NRCS Soil Maps, color, black & white or infrared aerial photos).

Wetland Functions:
Represent the practical, measurable values of wetlands. Those attributes of wetlands that contribute to their geographical, biological and sociological values.

Wetland Evaluation:
The process of determining the values of a wetland based on an assessment of the functions it performs.

Wetland Delineation:
Not to be confused with wetland evaluation, wetland delineation determines the precise location of the wetland/upland boundary on the ground (and ultimately on a map) based on field indicators, such as vegetation, soils, and hydrology. Delineation requires specialized knowledge about wetlands and should be done by a Certified Wetland Scientist in NH.

Hydric Soils:
These are soils that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. These soils characterize wetland areas:

Very Poorly Drained Soils: Water drains from the soil so slowly that free water remains at or near the surface during the entire year, including most or all of the growing season.

Poorly Drained Soils: Water drains from these soils somewhat more quickly than Very Poorly Drained Soils, hence, they are often dry at the surface during portions of the growing season. These soils are not as wet as Very Poorly Drained Soils.

While the NH Method is designed to be relatively simple to use, its basis is scientifically defensible. It provides a consistent standard for evaluating wetlands across the state.

The NH Method is designed for use by community volunteers and natural resources professionals. While a number of communities have conducted evaluations using volunteers, others have chosen to hire consultants to conduct wetland evaluation projects. Training workshops in the use of the NH Method for all audiences are advertised on the NH Method Website. Even if a community decides to hire a professional to conduct the evaluation, it is helpful for municipal board members to attend a training session so they have an understanding of how the NH Method works and how to use the results.

Appropriate Uses of the NH Method

1. The NH Method is a valuable educational tool for increasing understanding about the functions and values of wetlands.

2. In New Hampshire, most land use decisions are made at the local leve. Evaluating wetlands for different functions allows a town to tailor wetland protection for those values it views as most important. For example, a town may wish to protect wetlands with high scores for flood storage, or large wetland complexes that provide important wildlife habitat. (See sidebar for descriptions of wetland protection methods.)

3. The NH Method can be used to evaluate a single wetland or multiple wetlands:
   - **Multiple Wetlands:** Evaluation of a number of wetlands in a study area (e.g. prime wetlands) comprises a comparative evaluation. This is where the scores for a particular function, such as Ecological Integrity, are reviewed for all wetlands in the study area relative to one another. This helps to identify higher scoring wetlands for that function or for multiple functions.
   - **Single Wetlands:** The user may wish to evaluate a single wetland to get descriptive information about its physical characteristics and functions. This may serve the purpose of generating baseline information prior to wetland restoration, enhancement, or preservation. Note that single wetland evaluation using the NH Method is not a substitute for more detailed evaluation of specific functions. When communicating the results of a single wetland evaluation, be sure to inform local decision makers that the level of information provided is general rather than detailed.

Wetland Protection Mechanisms

- **Zoning and Subdivision Regulations** – Wetlands can be protected through zoning ordinances by implementing a Wetlands Conservation Overlay District. A model ordinance for this is provided in the 2008 NHDES publication *Innovative Land Use Planning Techniques*. Setback requirements can be incorporated into subdivision regulations.

- **Comments to the New Hampshire Wetlands Bureau** – Although wetland permits are issued at the state level, there is opportunity for local input into land use decisions affecting wetlands. Municipal conservation commissions have the legal authority to comment on permit applications on behalf of the town. Individuals may also comment on these applications.

- **Comments to the U.S. Army Corps of Engineers** – Virtually all major wetland alterations require a Federal permit in addition to a state permit. The town and individual citizens can comment during the Federal permitting process.

- **Prime Wetland Designation** – Under the New Hampshire statute (http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-L-482-A.htm) for protecting wetlands from "despoliation and unregulated alteration", municipalities are able to designate some of their high value wetlands as "Prime Wetlands" (http://des.nh.gov/organization/divisions/water/wetlands/prime_wetlands.htm). Prime Wetlands are given special consideration by the Wetlands Bureau in permit application reviews. Appendix A of the NH Method provides web links for more information on Prime Wetlands.

- **Acquisition of wetlands** – Wetlands and their buffers can be acquired either through the purchase of development rights, gifts, or by securing conservation easements on lands encompassing wetlands.

4. Although the NH Method is not designed for impact analysis, the information collected during the evaluation may provide a useful framework for a more detailed and thorough assessment of proposed wetland impacts. Each of the NH Method functions will likely be affected by a wetland impact. For

example, an impact involving the placement of a culvert and roadway fill will likely alter how water flows through the wetland, as well as what types of wildlife can live there. By using the list of functions as a framework for more in-depth studies - i.e. ones that *define* the change in hydrology or wildlife species, a wetland scientist can arrive at a reasonable assessment of the proposed alteration. The user can look at the results from the NH Method on a single wetland and use those together with professional judgment to determine what other information may be needed for the actual impact assessment.

5. Results from wetland evaluations using the NH Method may be used to identify potential wetland restoration sites. Wetlands scoring low for Ecological Integrity because of human disturbance might benefit from restoration to increase the capacity of the wetland to perform this function.

Limitations of the NH Method

1. The NH Method is designed to evaluate functions and values. It is not intended to be used for the delineation of jurisdictional wetland boundaries.
2. The NH Method is not designed for use as a specific method for impact analysis. It needs to be coupled with best professional judgment and other methods of impact analysis, in order to yield detailed, site-specific information.
3. Low scores on one or more wetland functions should not be used to justify eliminating certain wetlands. Low scores may result from impacts that are temporary or will diminish over time. Low scores may also indicate opportunities for restoration. Low scores should be qualified based on the level of comparative information provided at the time of the evaluation.
4. The NH Method is not a substitute for more detailed site-specific studies. Where these studies are required, e.g. a detailed wildlife study or water quality assessment or wetland boundary delineation, other site specific methods should be used.
5. While small wetlands may be less biologically diverse and may have limited value for several functions (meaning that they may score lower), they may stand out for a certain special value (e.g. a rare species). These are typically captured under the Noteworthiness function. Noteworthiness ensures that important wetlands, which might rank low because of size or other factors, get equal consideration.
6. The NH Method is not well suited for evaluating exceptionally large riverine or lacustrine systems such as the Connecticut River or Lake Winnipesaukee. Bordering vegetated (fringe) wetlands on large bodies of water are best evaluated as discrete units that may be influenced by localized watersheds, embayments, coves or shorelines. See **Section 2D** for guidance on how to break up large wetland systems into smaller, more manageable evaluation units. Note that very large wetland systems can be broken in to smaller units for purposes of evaluation, and then recombined to present the final results
7. The NH Method provides a wetland evaluation procedure to rank and compare wetlands on a municipality-wide basis. When legal proceedings require detailed information about individual wetlands, additional detailed field data will be needed to supplement NH Method data. NH Method data alone would not be sufficient in this instance.
8. The NH Method uses a numerical score for each evaluated wetland function. It is important to also interpret the results based on the answers to the questions and not rely solely on numerical scores.
9. In the NH Method the Scores for each function **are not additive**. There is no single wetland score. Each wetland receives a single score for each of 12 functions. Adding the Function Scores to produce a single wetland score is a misuse of the NH Method.

2. HOW THE NH METHOD WORKS

A. Wetland Functions

Wetland functions represent the practical, measurable values of wetlands. While many functions of wetlands are important to people, not all wetlands perform all of these functions at a high level, and not all functions are performed equally in each wetland. How a wetland functions depends on the specific biological and physical features of each wetland site. The NH Method addresses twelve wetland Functions:

FUNCTION	DESCRIPTION
Ecological Integrity	Evaluates the overall health and stability of the wetland ecosystem
Wetland-Dependent Wildlife Habitat	Evaluates the suitability of the wetland as habitat for those animals typically associated with wetlands and wetland edges. No single species is emphasized.
Fish and Aquatic Life Habitat	Evaluates the suitability of surface waters associated with the wetland as habitat for fish and other aquatic life. No single species or group of species is emphasized.
Scenic Quality	Evaluates the visual and aesthetic quality of the wetland.
Educational Potential	Evaluates the suitability of the wetland as a site for education and research.
Wetland-Based Recreation	Evaluates the suitability of the wetland and associated streams and ponds for non-powered boating, fishing, hunting and other similar recreational activities.
Flood Storage	Evaluates the effectiveness of the wetland for storing floodwaters and reducing downstream flooding.
Groundwater Recharge	Evaluates the potential of the wetland to recharge an underlying aquifer.
Sediment Trapping	Evaluates the effectiveness of the wetland for trapping sediments in runoff water from surrounding upland.
Nutrient Trapping/Retention/ Transformation	Evaluates the effectiveness of the wetland for retaining and cycling nutrients, thereby reducing the impacts of excess nutrients in runoff to downstream lakes and streams.
Shoreline Anchoring	Evaluates the effectiveness of the wetland in preventing shoreline erosion.
Noteworthiness	Evaluates the wetland for one or more outstanding features such as critical wildlife habitat, rare species, high value wetlands in urban settings, etc.

The instructions required for evaluating each of the Functions in the NH Method are provided in Section 3. Each Function is prefaced with a brief introduction describing its significance for wetlands. This is followed by a series of questions that examine the different factors that contribute to that Function. Each question includes the rationale behind the question as well as instructions for answering the question. The answers to each of the questions are recorded on the data sheets for each function, provided in Section 4.

B. Completing the Data Sheets

In the NH Method, evaluation of the twelve Functions is carried out by completing a series of data sheets (see Sections 3 and 4). Appendix E provides an example of how to complete the data sheets. Each data sheet has four columns described below:

Column 1 – Evaluation Questions

Lists the questions to be answered for evaluating each function.

Column 2 – Observations and Notes

This blank column should be used for recording observations and explanatory notes that may be useful for reference at a later date. For example, time of year the wetland was evaluated; observations about dumping or litter in the wetland; notes about wetland access and parking, etc. The notes should make clear what the observation was that led to the chosen answer.

Column 3 – Answers

Includes multiple choice answers to each question. In answering any particular question, the evaluator will need to decide which of the corresponding criteria given in Column 3 provide the most appropriate answer to that question.

Column 4 – Score

Each answer in Column 3 is assigned a score. These scores are totaled and averaged to produce an **Average Score** for each Function.

The scores for the answers for each question are on a scale of 1-10 with increments of 10, 5, and 1 (and in some instances, 0). However, if it is felt that the answer to a particular question falls **between** two answer categories, inferences can be made as described below (refer to Appendix E for an example of how this is done):

If the answer to a question is neither a) nor b) but falls between the two, use a value of **7.5** If an answer falls between b) and c), then use a value of **2.5**. Provide justification for the alternate score in the Observations & Notes column. **Note that 7.5 and 2.5 are the only allowable values that can be substituted**. The scale of criteria scores that should be used is:

10 (7.5) 5 (2.5) 1 0

Note that Functions 7 (Flood Storage) and 12 (Noteworthiness) are scored differently. Flood Storage is based on a calculation, not single scores. Noteworthiness uses a single score of 10 for each question that qualifies, and the final score is **totaled**, not averaged.

IMPORTANT: The **final scores for each of the 12 Functions** of a wetland **are not additive**. The NH Method does not calculate a single overall score for a wetland. Instead, each wetland receives 12 separate Function Scores. These scores can be interpreted as follows:

1. If a **single wetland** is being evaluated, review the final Scores for each Function. Higher scores (8-10) indicate a higher performance of that function in the wetland. Lower scores (below 5) indicate that wetland is either compromised for that function, or does not have the characteristics to perform that function well. Lower scoring wetlands should be reviewed for potential restoration.

2. If **multiple wetlands** (e.g. for a town-wide wetland inventory, or for Prime Wetlands Designation) are being evaluated, you can review and compare the scores for each Function for all wetlands evaluated. For example, review the Ecological Integrity scores for all wetlands included in the study. Wetlands with higher Ecological Integrity Function scores can be identified, while lower scoring wetlands could be flagged for potential restoration if the results show significant human-induced degradation. You can also identify wetlands with high scores for multiple functions, e.g. those with average scores above 8.0 on three or more functions.

C. Preparing Wetland Evaluation Maps

An essential part of wetland inventory and evaluation is the preparation of wetland maps. Two sets of maps should be prepared:

- **Wetland Inventory Map:** A large scale map showing all the wetlands in the study area (a town, watershed, or region).
- **Individual Evaluation Maps**: An individual map for each wetland being evaluated.

Much of the information needed to create these maps already exists on GRANIT, the statewide GIS database, as well as other local and regional digital databases. The information recorded on the wetland maps is used to answer a number of the questions on the NH Method evaluation data sheets. Map preparation can be done electronically, using digital GIS data layers available through GRANIT or by using the NH Wetlands Mapper **(see sidebar at right)**.

Typically, the National Wetlands Inventory (NWI) maps and hydric soils data (NRCS Soils Survey) are used for initial determination of the extent of the wetland area. However, the sources of information for NWI maps and NRCS Soil Surveys may be dated and several years old (the NWI maps were compiled using 1984 infrared aerial photography). Therefore they should be used as preliminary guidance rather than final wetland maps. Additional information including more recent aerial photos and orthophotos should be consulted. Most photos have been taken in spring (leaf-off) which helps to show water features and most wetlands areas. This information combined with field checking results in a more accurate estimate of the wetland area for evaluation.

NH Wetlands Base Map: In 2010, the NH Department of Environmental Services Watershed Management Bureau and Wetlands Bureau developed a wetland base map for the state using NWI data. This is intended to provide the first step in wetland mapping. The NH Wetlands Base Map can be accessed via the NH Wetlands Mapper. The map uses the current NH Method Guidelines for Determining Wetland Evaluation Units to indicate where potential wetland breaks may exist.

Prime Wetlands Designation: If you are mapping wetlands for Prime Wetland Designation under RSA 482-A: 15, you will need to refer to the most current legislation for an update. Note that the final maps required for Prime Wetland designation are at a more detailed level than can be created using the NH Wetlands Mapper.

Wetland Mapping Terminology

NH Wetlands Mapper – The NH Wetlands Mapper is a companion to the NH Method. It is a web-based mapping tool designed to assist users conducting functional evaluations of wetlands using the NH Method. It includes a set of flexible map display, navigation, query, and printing tools, as well as the companion forms required to conduct the evaluation.

GRANITView II – The GRANITView II web mapping application provides access to key NH GRANIT data layers, along with a suite of tools to navigate and interact with those data layers. The layers are grouped into a series of functional categories that contain numerous data layers that can be displayed and queried by the user

NH GRANIT (New Hampshire **G**eographically **R**eferenced **AN**alysis and **I**nformation **T**ransfer system) is a cooperative project to create, maintain and make available a statewide geographic data base serving the information needs of state, regional and local decision makers. It is a collaborative effort between the University of New Hampshire and the NH Office of Energy and Planning. The core GRANIT System is housed at UNH, and is available at

GIS – Geographic Information Systems – are computer-based systems that are used to store, manipulate, and display geographic information. The data in a GIS system is stored in "**data layers**" with each layer representing a different landscape feature. Examples of different data layers are: soils, topography, roads and railroads, surface waters, wetlands, aquifers, etc

Polygon – This is a feature in a GIS data layer used to represent area. A polygon is defined by the line that makes up its boundary. Polygons have attributes that describe the geographic feature(s) they represent. Polygons are often irregular in shape. Each polygon contains one or more types of data (e.g., soils, wetland, or aquifer).

NWI – National Wetlands Inventory – This is a program administered by the US Fish and Wildlife Service for mapping and classifying wetland resources in the United States. The NWI was established to develop and provide resource managers with information on the location, extent, and types of wetlands and deepwater habitats.

1. Using the NH Wetlands Mapper (See also Appendix B)

This method is recommended for users not experienced in using GIS software, but GIS users can also use the Mapper. **Specific instructions for using the *NH Wetlands Mapper* to produce wetland maps are provided in Appendix B.**

The NH Wetlands Mapper is a free on-line web tool (http://nhwetlandsmapper.unh.edu**)** available to the public, designed for the lay person and that does not require any specialized knowledge to use. The maps, data and on-line tools in the NH Wetlands Mapper can be used to obtain information needed to answer most non field-based questions asked in the *NH Method,* including:

- Size of the wetland
- Questions you can answer from digital maps generated from the NH Wetlands Mapper, such as land use.
- Questions for which you can get the data using the on-screen tools in the NH Wetlands Mapper, such as number of road crossings, amount of open surface water, etc.

The NH Wetlands Mapper also allows you to save your maps and data on the site and to enter data into an online spreadsheet version of the NH Method evaluation data sheets.

If you are not familiar with the NH Wetlands Mapper, click the **Welcome** and the **Help Tabs** to read the explanation of all the Mapper's functions and how to use them. This will help you learn the basics of how to compile data layers to create a map. Note that the NH Wetlands Mapper uses pop-up windows to report information when the user queries the data, so pop-up blockers should be disabled when using this site.

2. Using GIS Software (See also Appendix C)

The use of computer-based mapping software is recommended for NH Method users who are **experienced in using GIS** or other electronic applications to generate maps using the data layers stored in the GRANIT database. This work can also be contracted out to a GIS professional. Users of this mapping method have typically have greater flexibility when combining various data layers than when using the NH Wetlands Mapper. Specific instructions for using GIS software are not provided in this manual, however, Appendix C provides some more specific instructions for GIS users.

Creating the Wetland Evaluation Maps

A sample set of maps is provided in Appendix E. Tables 1 and 2 below provide instructions for generating paper map copies. Additional map information needed to answer questions in the NH Method can be obtained by using GIS analytical tools or by using on-screen tools on the NH Wetlands Mapper.

Refer to Appendices B and C for more detailed information for compiling the maps. These appendices list all the questions that require maps and other data accessed using the NH Wetlands Mapper or GIS, and provide instructions about how to answer these questions.

Table 1 - WETLAND INVENTORY MAP FOR THE STUDY AREA

- This map provides the initial inventory of all the likely wetlands in the study area (town, watershed, etc.)
- Generate this map at an appropriate scale to display all wetlands in the study area on a single map.
- This map is used to observe the landscape and watershed contexts for the wetlands being evaluated. Having printed paper copies of these maps enables you to use them as a reference throughout the evaluation process.

DATA LAYERS NEEDED	GIS USERS	NH WETLAND MAPPER USERS
• Political boundaries (Political Boundaries Section) • Roads (Transportation Networks Section) • Railroads (Transportation Networks Section) • Surface waters (lakes, ponds, river, streams) (Water & Watersheds Section) • Wetlands (NH DES Wetlands Base Map or National Wetlands Inventory) (Wetlands & Soils Section) • Watersheds (Water & Watersheds Section) • Select one of the following backgrounds for the maps: o **DRG Topographic Map base** (required for some questions) (Imagery Section) o **Aerial Photo Imagery** (use the most current aerial photo imagery available). (Imagery/NAIP & Other Imagery Sections) o Hillshade (Imagery Section) o No background (Imagery Section)	• Generate this map at 1:24,000 or other appropriate scale (poster size) using the data layers listed in this table and available through GRANIT. Other local GIS data, as available may be incorporated. • See instructions in Appendix C for further information.	See instructions in the NH Method Appendix B for using the NH Wetlands Mapper to create and print maps.

Table 2 - INDIVIDUAL WETLAND MAPS.

- Create an individual wetland map for each wetland being evaluated.
- Select an appropriate scale to display the wetland. Smaller wetlands may need a larger scale, and large wetland complexes may need a smaller scale. (Large scale maps zoom in to an area, and small scale maps zoom out and show a larger area).

DATA LAYERS NEEDED	GIS USERS	NH WETLAND MAPPER USERS
• Political boundaries (Political Boundaries Section) • Roads (Transportation Networks Section) • Railroads (Transportation Networks Section) • Surface waters (lakes, ponds, rivers, streams) (Water & Watersheds Section) • Wetlands (NH DES Wetlands Base Map or National Wetlands Inventory) (Wetlands & Soils Section) • Hydric (wetland) soils (National Wetlands Inventory) (Wetlands & Soils Section) • Watersheds (Water & Watersheds Section) • Select one of the following backgrounds for the maps: o **DRG Topographic Map base** (required for some questions) (Imagery Section) o **Aerial Photo Imagery** (use the most current aerial photo imagery available). (Imagery/NAIP & Other Imagery Sections)	• Generate individual wetland maps using the combination of data layers that best meets your needs. • Using GIS tools create a 100 ft and a 500 foot zone around the wetland. This will be used to evaluate soil type and land use within this zone, as required by the NH Method. • See instructions in Appendix C for further information.	• See instructions in the NH Method Appendix B for detailed instructions for using the NH Wetlands Mapper to create and print maps. • Using GIS tools create a 100 ft and a 500 foot zone around the wetland. This will be used to evaluate soil type and land use within this zone, as required by the NH Method. • A map scale of 1:12,000 or 1:10,000 is recommended for most wetlands. 1:10,000 is 1cm = 100 m or 328 feet 1:12,000 is 1" = 1000 ft, or ½" = 500 ft. 1:24,000 is 1" = 2000 ft, or ¼" = 500 ft.

D. GUIDELINES TO DETERMINE WETLAND EVALUATION UNITS

When evaluating wetlands, there are situations when some wetlands may need to be broken into two or more units for evaluation, either where there is a natural break or where there is an artificial break that interferes with wetland hydrology. Artificial flow restrictions (such as roads, culverts, bridges, etc.) can fragment and alter the character of a wetland to a degree that may warrant evaluating the wetland areas on each side of the restriction as separate units. Natural breaks can occur at a stream channel or when there is a natural constriction such as a beaver dam. The guidelines presented below will assist you in deciding under which circumstances to break a wetland complex into separate units for purposes of evaluation. By following the guidance below **consistently** for all the wetlands in the study area, decisions will be more objective and defensible.

Once you have made the initial wetland unit determination, follow the guidelines below to see if any breaks are necessary. **Note that the guidelines will not cover all situations, since there is so much variability in nature.** These are simply guidelines that cover some of the more common situations encountered.

NHDES Wetlands Base Map: The NH Wetlands Base Map developed by the NH DES Watershed Management and Wetlands Bureaus, follows the guidelines below to indicate potential breaks where separate wetland evaluation units may be identified. Note that review of soils, aerial photos, and field checking is still necessary to verify whether these breaks are necessary and appropriate.

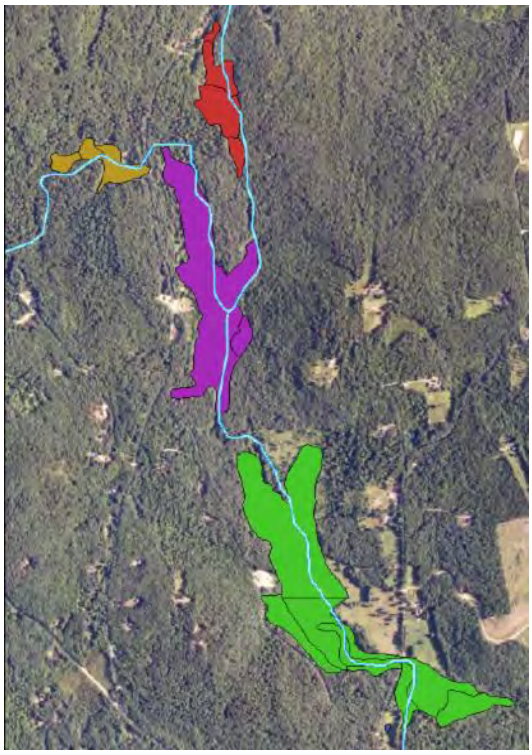
It is recommended that you keep wetland systems whole unless there is a good reason to break the complex into two or more evaluation units. It is not possible to anticipate every situation, and whether or not to break a wetland into separate evaluation units is up to the evaluator's judgment, based on a thorough review of mapped information, aerial photos and field checking.

Step 1: Review wetland maps and field check

Prior to field work, review the wetlands map prepared for the wetland/s being evaluated:

a. First look at the **National Wetlands Inventory (NWI)** wetland areas identified on the **NH DES Wetlands Base Map**, in the NH Wetlands Mapper.
b. Review the Guidelines in Step 2, below, to make an initial determination of potential breaks. Unless one or more of conditions in Step 2 (below) applies, use the entire mapped wetland area as your evaluation unit.
c. If a wetland crosses the boundary of the study area (town, watershed, etc.) the entire wetland should be mapped and evaluated.
d. If the wetland includes one or more upland islands, these should be included in the total wetland acreage except when answering Function 7 (Flood Storage), Question 1, which excludes upland islands.

Step 2: Guidelines to determine if a wetland system needs to be broken into separate evaluation units.



Situation 1: Wetland narrows to a Stream Channel

Description: After the narrowing point, there is no dominance of wetland vegetation or hydric soils outside the channel or beyond the limits of the stream channel and bank.

Decision: The point at which the wetland narrows to the stream channel is the downstream limit of that wetland evaluation unit. The evaluator will need to determine if a break is needed based on field assessment.

The illustration at left shows four hydrologically connected but spatially disconnected wetlands. Each wetland narrows to the stream channel at its outlet.

Situation 2: Wetland is bisected by an active railroad or a one or two lane road

Situation 2a:
Description: Properly sized culverts or a bridge allow the free flow of surface water from one side to the other.

Decision: Evaluate the wetland area on each side of the road as a single wetland evaluation unit.

Situation 2b:
Description: Undersized culvert or properly sized culvert is blocked; culvert is perched above the water surface, or no culvert present. In these instances, there may be different vegetation types and hydrology on each side of the road.

Decision: Evaluate the wetland areas on each side of the road as two separate wetland evaluation units.

The illustration at left shows a wetland bisected by a two lane road

Situation 3: Wetland is bisected by an abandoned railroad or a Class 6 road

Description: The wetland is traversed by an abandoned railroad or a Class 6 road.

Decision: Evaluate the wetland areas on both sides of the road/abandoned railroad as a single wetland evaluation unit **unless there is an obvious hydrologic disconnection between the two sides**, e.g. no culverts or bridges, and distinctly different vegetation classes on each side of the Class 6 road/abandoned railroad. .

The illustration at left shows a wetland bisected by a Class 6 road

Situation 4: Wetland is cut by four-lane or larger highway

Situation 4a:
Description: The highway is elevated and spans the entire wetland complex, and there is no obvious interruption to wetland hydrology

Decision: Consider the wetland on both sides of the highway as a single wetland evaluation unit.

Situation 4b:
Description: The highway crosses through the wetland on fill and there are no culverts or bridges allowing the free flow of water or there are inadequately sized culverts.

Decision: Consider the wetland areas on each side of the highway to be two separate evaluation units.

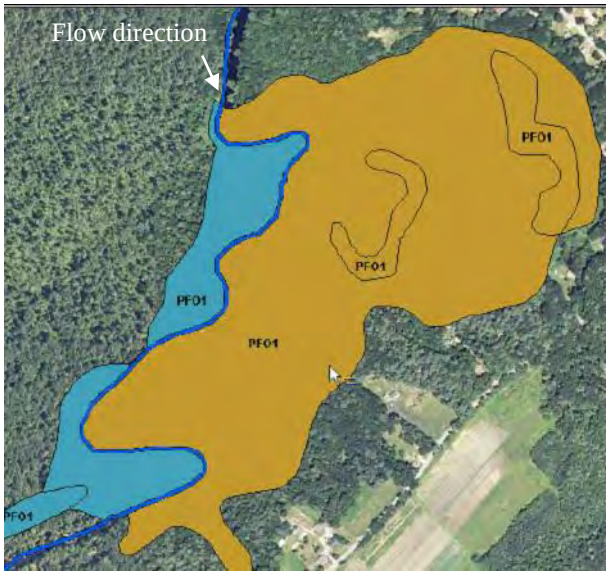
The illustration at left shows a wetland bisected by four-lane highway

Situation 5: Wetland crosses a town boundary

Description: Wetland extends across a town line or watershed boundary

Decision: Evaluate the wetland complex as a single unit regardless of the boundaries.

The illustration at left shows a wetland complex spanning three town boundaries



Situation 6: Wetland is directly adjacent to a river or stream

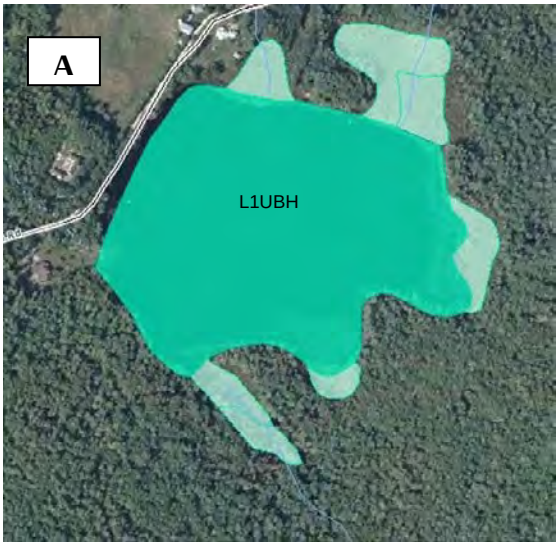
Situation 6a:
Description: Wetland is associated with a 1st, 2nd 3rd or 4th order stream

Decision: The stream and associated wetland(s) are considered to be a single wetland unit for evaluation. Only include the stream reach between the beginning and end points for the wetland

Situation 6b:
Description: Wetland is associated with a 5th order or larger stream.

Decision: Evaluate the wetland areas on each side of the river as separate wetland evaluation units. Include any part of the river that is less than 6.6ft deep (i.e. include any water with aquatic bed vegetation) in the evaluation area. **Use your judgment; based on field checking, to decide if the wetland on both sides of the river should be evaluated as a single unit (some 5th order streams may be quite shallow).**

The illustration at left shows a wetland complex with a 5th order stream



Situation 7: Wetland is associated with a lake that is classified as Lacustrine

Description: Wetland is connected to a lake, classified as Lacustrine (e.g. L1UBH) on NWI maps (depth greater than 6.6ft).

> ***Note:*** *NWI maps were prepared using spring leaf-off photography. Check summer leaf-on photography (NAIP 2003, or more recent photography when available) to look for evidence of aquatic bed vegetation prior to field checking.*

Decision A: If the wetland areas cumulatively occupy less than 1/3 of the surface area of the adjacent deepwater habitat, identify separate "fringe" wetland evaluation units. These units may be formed by bays, coves and other similar shoreline features. Include any adjacent deepwater that is less than 6.6ft deep - i.e. include any water with aquatic bed vegetation directly out from the lakeshore end of the wetland evaluation unit *(see illustration A at left.*

Decision B: Where the wetland areas around a lake occupy more than 1/3 of the surface area of the deepwater habitat, evaluate all wetland areas surrounding the water body as a single evaluation unit and include the area of water as part of the evaluation unit *(see illustration B at left.*

Step 3: Review additional map data

a. Next review the **hydric soils** (see side bar on page 2 of Section 1)together with NWI data and identify areas of hydric soils beyond the NWI boundaries that may need to be field checked to confirm that these areas are wetlands.
b. Review **aerial photos** (provided on the NH Wetlands Mapper or other sources) that can provide additional information prior to field evaluation. It is best to use spring leaf-off photos for this step.
c. If you are evaluating wetlands for Prime Wetlands Designation, very poorly and poorly drained soils should be identified on the wetland evaluation map.
d. Use all of the above data to refine the estimated wetland boundary.

Step 4: Field check wetland site to the extent possible

Note: Be sure to secure landowner permission before accessing properties to field check wetlands

a. Field checking is an important next step for determining wetland evaluation units. Pay particular attention to wetland units whose continuity is not clear from mapped information.
b. After following the guidance above, you may find that after field analysis the wetland evaluation unit may need to be changed in order to more accurately reflect the functions and values of the entire wetland. For example, if the field visit shows that hydrology is not being significantly impaired by a road, railroad, or trail bridge crossing, then you may end up combining two units you previously separated. The reverse may be true if plant community characteristics indicate that the wetland is so impaired that it is effectively acting as two separate units with very different functional values.
c. Keep in mind both historic conditions prior to human disturbance as well as future conditions that may arise from restoration or enhancement efforts. Are the separate units of a wetland complex irreparably distinct? Or could they act as a fully functioning unit after being restored? Are most of the wetland functions completely different among the units? Or is there only one or two that is being affected by the artificial separation?
d. Adjust the wetland size (larger or smaller) based on field checking.
e. When calculating wetland size, include all upland islands that are contained within the overall wetland evaluation unit, *(but remember to deduct these islands from the wetland acreage for the Flood Storage function)*
f. When field checking wetlands for determining evaluation units, you can make more efficient use of your time in the field by conducting wetland evaluation at the same time. Section 3 describes what to look for in the field.

3. USING THE NH METHOD

Once the Individual Wetland Evaluation Maps have been prepared, the next step is to field check the wetlands in the study area. Field checking is an important part of the wetland evaluation. It allows the evaluator to ground truth the information on the Individual Wetland Evaluation Map and to gather additional field-based information needed to complete the wetland evaluation. Be sure to obtain landowner permission to access their property before field evaluating a wetland. If you are not able to obtain permission from a landowner, that landowner's portion of the wetland may need to be left out of the study. There may be other access points from other properties if there is more than one landowner. Reference can also be made to aerial photos and other data sources to help "fill the gap". When field checking wetlands, be prepared for outdoor conditions.

Field Visit Checklist

- Wetland Evaluation Maps
- Copy of completed Appendix B and the list of field questions to answer in the field in Appendix I.
- Copy of the NWI codes table in Appendix F (Figure F-1)
- Sturdy, waterproof hiking boots
- Rubber boots or waders if ground conditions are very wet or have shallow inundation
- Waterproof poncho or rain jacket.
- Bug repellant
- Compass or GPS unit to navigate larger or more remote wetlands (often without trails)
- Topographic map of the area to help find your way around.
- Cell phone, in case of emergency
- Water bottle and snacks if you will be out for a while.
- Clipboard, pencils and eraser + a Ziploc plastic bag to protect your papers during rain
- NH Method data sheets and/or summary data sheet (Data sheets can also be printed onto Rite-in- the-Rain paper for use in wet conditions).
- Camera to document wetland features
- Handheld electronic device to record data (if using)

The following pages provide instructions for answering the evaluation questions using field data and information derived from the Individual Wetland Maps. A blank set of data sheets is provided in Section 3 and is available on the NH Method web site.

EXCEL SPREADSHEET FOR DATA ENTRY

An Excel spreadsheet version of the data form with abbreviated questions and criteria is available on the NH Method web site. Users can enter their completed field data into the spreadsheet, which will total and average final scores and automatically generate a summary data sheet with all the function scores for each wetland evaluated.

Users new to the NH Method or Users who have not used the NH Method very often

We recommend that new users or those with relatively little experience with wetland evaluation take a set of data sheets into the field for each wetland being evaluated. This helps the user understand the wetland characteristics giving rise to each function. You can then enter the data onto the Excel spreadsheet after the field work is done.

Experienced/Professional Users of the NH Method

The abbreviated Excel spreadsheet form provides the user with the option of to use a portable electronic device to enter the data directly into the spreadsheet in the field, or use a paper version, and complete the data sheets back in the office. Be sure that you are **very familiar** with the NH Method questions before you use the abbreviated spreadsheet in the field.

A. Steps in the Use of the NH Method

1	**Establish Your Goals**	• What is the purpose of your wetland evaluation? To learn more about the wetlands in a study area? To determine unique features of a single wetland or a sub-group of wetlands? Evaluation for Prime Wetland Designation? A wetland permit application? Establishing goals helps you plan your evaluation project.
2	**Prepare the Wetland Inventory Map**	• Refer to Section 1C and Appendices B and C for guidance. • Use this map to identify the wetlands to evaluate.
3	**Prepare the Individual Wetland Evaluation Maps**	• Refer to Section 1C and Appendices B and C for guidance. • Use recent aerial photos to confirm wetland locations and modify the limits of the wetland evaluation unit if necessary.
4	**Determine Wetland Evaluation Units**	• Use the Guidelines in Section 2D to determine whether or not the wetland/s being evaluated should be broken into separate evaluation units and/or adjustments should be made to the boundaries. • Include aerial photo review in your determination
5	**Review Instructions to Answer Evaluation Questions**	• Review the questions and background information for each function (Section 4) to familiarize yourself with the information required for the wetland evaluation. • Familiarize yourself with the data sheets for each function
6	**Answer Data Sheet questions using map-based information BEFORE the field visit**	• Use individual wetland maps and NH Wetlands Mapper on-line tools or GIS to answer some of the questions on the data sheets (refer to Appendices B and C). • Appendix I provides a list of questions to answer in the field.
7	**Collect Field Data and complete data sheets**	• ***Be sure to secure landowner permission before checking wetlands in the field.*** • Visit each wetland and record field observations on the data sheets, on the Excel spreadsheet (paper or electronic), or use the abbreviated list of questions in Appendix I. Note that some map-based questions will require field checking to refine answers. • With all data collected, complete the NH Method worksheets. • Modify the wetland boundaries on the wetland maps where necessary.
8	**Complete Excel spreadsheets**	• Using the Excel spreadsheet, record the scores for the questions in each function for each wetland. The spreadsheet automatically computes the Average or Final Score for each function and creates a summary data form for all wetlands.
9	**Complete a Narrative Description for each wetland**	• Write a ½ to one page summary describing the physical features of the wetland, including dominant wetland plants, any wildlife observed, hydrologic characteristics, scenic views, size, watershed characteristics, location relative to other wetlands, etc. Refer to Section 5 for an example of a Narrative Description.
10	**Interpret the data**	• Using the Summary Excel spreadsheet, interpret the data for individual or multiple (comparative) wetlands. Identify data sources and note any limitations in data.

B. Evaluating Wetland Functions

Refer to the Appendices for information to help answer some of the questions in each function. **Appendices B and C** provide instructions for answering questions using mapped information. Hydric Soils Tables in **Appendix D** are used in Function 10: Nutrient Trapping/Retention/Transformation. A worked example of the application of the NH Method is provided in **Appendix E**. **Appendix F** provides a description of the Cowardin System of Wetland Classification and its use in the National Wetlands Inventory (NWI) maps. Instructions for interpreting topographic maps and delineating watersheds are provided in **Appendix G**.

WETLAND FUNCTIONS:

1. **Ecological Integrity**
2. **Wetland-Dependent Wildlife Habitat**
3. **Fish & Aquatic Life Habitat**
4. **Scenic Quality**
5. **Educational Potential**
6. **Wetland-Based Recreation**
7. **Flood Storage**
8. **Groundwater Recharge**
9. **Sediment Trapping**
10. **Nutrient Trapping/Retention/Transformation**
11. **Shoreline Anchoring**
12. **Noteworthiness**

1 – ECOLOGICAL INTEGRITY

Ecological Integrity describes the condition of a wetland where (1) the stability, structure and function of the ecosystem are intact and not impaired by human-caused stressors; (2) there is an abundance and diversity of native plant species, and (3) supporting processes are characteristic of an unstressed system.

Scientific research has found that wetlands are among the most highly productive ecosystems in the world. This high productivity is due in part to their location in the hydrologic cycle. Surface runoff water reaching wetlands from surrounding undeveloped uplands transport dissolved nutrients. These nutrients cycle within the wetlands and produce the dense, diverse vegetation characteristic of these communities. Diversity of wetland vegetation classes provide habitat for a variety of wildlife species, a number of which are uniquely adapted to wetlands and depend on wetlands for survival. All these factors contribute to the ecological integrity of the wetland.

The NH Method evaluates Ecological Integrity in the context of human-induced stressors to the wetland system, human activity in and around the wetland, etc. Each of the questions for this function addresses a stressor that could be impacting the system. Wetlands that are the least impacted by stressors will have a higher score for Ecological Integrity. A wholly intact system that is naturally functioning and has not been impaired by human activities will receive the highest score of 10. Wetlands that are in more developed settings and have been subjected to a number of human disturbances will score lower for this function. Note that impaired wetlands may signal opportunities for restoration. In these instances, document causes and possible solutions.

QUESTION 1 – Are there land uses in the wetland's watershed that could degrade water quality in the wetland?

In general, water quality deteriorates as the land use changes from forestland to agriculture to urban/commercial/industrial land. In addition, canopy shading is reduced causing higher water temperatures, water flow becomes more irregular and extreme, and more sediment is transported into the wetland.

Poor water quality can be harmful to many species of aquatic and terrestrial life. Indeed the whole character of the wetland ecosystem can change when it is exposed to excess sediments, nutrients and other pollutants beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies which can then cause a change in the species composition of both the plant and wildlife communities, often leading to reduced diversity.

> **How to answer the question:** From aerial photography (using GIS or the NH Wetlands Mapper), estimate the percent of the watershed covered by land uses that could produce unnatural sources of sediments, nutrients and other pollutants within the wetland's watershed that could degrade water quality in the wetland. Check these observations in the field wherever possible. These areas may include eroding road banks and ditches, construction sites, impervious surfaces (such as roadways, parking lots, industrial parks, airports and landfills), active cropland, and similar areas with little or no vegetation to protect soils from erosion. Be sure to document any sources on the data sheets. **Note:** Many inland wetlands, particularly peatlands, produce humic acids which stain the water brown but it remains clear. This is not necessarily a sign of poor water quality.

QUESTION 2 – Is there evidence of fill in the wetland?

Fill can disrupt wetland functions by changing the hydrology of the wetland and by altering plant communities.

> **How to answer the question:** Examine the wetland for evidence of fill. Estimate the percentage category (see data sheet) of the area of filled wetland and record the location on the Individual Wetland Evaluation Map. Areas of recent fill may be obvious, but older areas of fill may be more difficult to detect. Look for unnatural or abrupt changes in elevation, shoreline character or soils, especially between developed areas

and surrounding undeveloped areas. For example, alterations made to the wetland in past by railroad construction (old excavation shown by pit and borrow), transportation (borrow for road construction), or other disturbance relative to residential, commercial or industrial development. Indicate the location of the estimated area/s of fill on the Individual Wetland Map.

QUESTION 3 – What percentage of the wetland has been altered by agricultural activities?

Agricultural activities such as plowing, mowing, or pasturing, **within** the wetland, can alter the plant community of that wetland. Where drainage ditches are used, the soil moisture of a wetland can be reduced to a point that the area will no longer support wetland plants.

How to answer the question: Estimate the area of the wetland that includes pastures, mowed areas, and/or agricultural drainage ditches. Indicate the location of these areas on the Individual Wetland Map.

QUESTION 4 – What percentage of the wetland has been adversely impacted by logging activities within the last 10 years?

Logging can impact the plant and wildlife communities of a wetland. Unless the ground is frozen logging activities in the wetland can disturb wetland ecological functions over both the short and long term. Logging equipment can disrupt wetland hydrology by creating ruts and can compact surface soils and decrease soil permeability. Eroding logging roads including those outside/adjacent to the wetland, can add excess sediment to wetlands. Logging conducted in winter when the ground is frozen generally creates less disturbance. The following publications are good references for best management practices for logging activities:

- *Good Forestry in the Granite State – Recommended Voluntary Forest Management Practices for New Hampshire* (2010)
- *Best Management Practices for Forestry: Protecting New Hampshire's Water Quality to protect water quality in New Hampshire* (2005)

[Note: The 2009 revised NH Prime Wetlands Rules allow a property owner to apply for a waiver "…to perform forest management work and related activities in the forested portion of a prime wetland or its 100-foot buffer … A waiver shall be issued only when the department [NH DES] is able to determine there will be no significant net loss of wetland values as identified in …RSA 482-A:1"]

How to answer the question: Estimate the percentage of the wetland that has been adversely impacted by logging in the past ten years (recorded on the Individual Wetland Evaluation Map), e.g. eroding logging roads, altered hydrology, deep ruts, sedimentation, unvegetated landings that are eroding, etc. Note the percentage of the wetland that has been directly affected as well as those areas of the wetland that may have been affecting by logging in the upland area immediately adjacent to the wetland.

QUESTION 5 – How much human activity is taking place in the wetland?

High levels of human activity within the wetland itself are often detrimental to the wetland. The entire wetland ecosystem may be affected because of disturbances to the plant and wildlife communities. Peatlands in particular, are very sensitive environments. They are generally nutrient poor ecosystems that have developed slowly over several thousand years. Disturbed peatlands may take many years to recover and may never recover if the organic substrate is removed.

How to answer the question: Estimate the amount of human activity **in the wetland** other than agriculture and logging. Observable indicators of human activity could include: Motorized and non-motorized use on trails through the wetland, road traffic going through or adjacent to the wetland, structures in the wetland, and dumping of brush and garbage in the wetland.

QUESTION 6 – What percentage of the wetland is occupied by invasive plant species?

Invasive plants are indicators of disturbance and often occur in and around the wetland environment. Two non-native invasive plant species, phragmites (common reed) and purple loosestrife, are particularly adept at invading and ultimately dominating disturbed wetlands. A native species, cattail, often responds to increased sedimentation and can become invasive. To determine if cattails are becoming invasive, observe whether they are dominant near a road or recently cleared land, but are not dominant in the rest of the wetland.

For a list of invasive aquatic plant species, refer to page 4 NH DES's ENv-Wq 1300 rules. Upland (terrestrial) invasive plants that are prohibited or restricted in New Hampshire are listed in the 2011 publication New Hampshire Guide to Upland Invasive Species. Additional information about invasive species in New Hampshire is available on the NH Dept. of Agriculture, Markets & Foods Invasive Species Frequently Asked Questions web page.

> **How to answer the question:** Estimate the percentage of the wetland that is occupied by invasive plants such as phragmites, purple loosestrife or native species that may become invasive, such as cattail. Note that reed canary grass, Japanese barberry, glossy buckthorn, and Japanese knotweed are also problematic invasives that may occur at the edge or in disturbed wetlands.

QUESTION 7 – Are there roads, driveways, or railroads crossing or adjacent to the wetland or within 500 feet of the wetland?

Roads provide access to wetlands which might otherwise remain undisturbed, and represent areas of fill in a wetland. Road crossings are also potential sites for the introduction of invasive plants and water pollutants such as sediment, road salt, oil, and spilled chemicals. In addition, road and railroad crossings can fragment wetland wildlife habitat and disrupt wetland hydrology.

> **How to answer the question:** Identify all roads, driveways or railroads that cross, border or are within 500 ft. of a wetland. Roads, driveways and railroads are defined for the NH Method as any byway or thoroughfare that currently supports vehicular traffic, and whose current footprint alters the natural flow of water into, across, and/or out of the wetland. Three principal categories of impact are recognized
>
> - Road, driveways and/or railroads that are more than 500 ft. away from the edge of the wetland
> - Road, driveways and/or railroads that are within 500 ft. of the wetland but do not border the edge or cross the wetland
> - Road, driveways and /or railroads that either border the wetland or cut through the wetland itself

Keep in mind that continuous wetland evaluation units that have been separated on account of a significant road crossing must be assessed according to the third bullet above (see also Section 2, Part D).

QUESTION 8 – How much human activity is taking place in the upland within 500 feet of the wetland edge?

Human activity (land disturbance, clearing, logging, active trails, development, roads, etc.) in the upland immediately bordering the wetland can have significant effects in the wetland itself. An undisturbed woodland buffer decreases the amount of disturbance within the wetland. This is especially important for nesting birds which may be disturbed by people or household pets. An undisturbed buffer also protects water quality. The ecological integrity of the wetland is maintained by relatively undisturbed conditions in the bordering upland.

> **How to answer the question:** Estimate the amount of human activity **in the adjacent upland,** within 500 ft of the wetland edge, based on criteria provided on the data sheet.

QUESTION 9 – What is the percent of impervious surface within 500 feet of the wetland edge?

Impervious surfaces are an indicator of human activity. Buildings that are within or adjacent to wetlands can be a source of pollutants. Roofs, sidewalks, parking lots, driveways and other paved surfaces that are associated with buildings increase the amount of impervious area next to a wetland, resulting in more runoff, pollutant, sediment and nutrient inputs. Lawns are less pervious than forests and may be sources of pollutants. Impervious surfaces also break up habitat and deter wildlife species that are sensitive to human presence. Nearly all water dependent organisms are negatively affected by pollution and it has been show that watersheds with greater than 10% impervious surface have a significantly higher probability of containing impaired waters.

> **How to answer the question:** Estimate the percentage of impervious surfaces within 500 ft of the wetland edge, and identify on the Individual Wetland Map. Use aerial photos as well as field checking.

QUESTION 10 – Is there a human-made structure that regulates the flow of water through the wetland?

Human-made structures that alter the flow of water through a wetland can have both short and long term effects on ecological integrity. Dams that completely block flow during low water will prevent passage of fish and other aquatic life. Culverts typically constrict flow and provide unnatural substrates for aquatic life. Bridge abutments often accelerate flow through a confined channel and alter the natural meanders of a stream. Artificial barriers to the surface water (hydrology of a wetland) – dams, culverts, bridge abutments, roads, etc. reduce the fundamental ability of a wetland to function as an intact hydrologic system.
[**Note** that beaver dams are regarded as a natural part of the wetland ecosystem. Beaver dams tend to be temporary for the most part, and result in a natural transformation of the wetland ecosystem]

> **How to answer the question:** Consider the source and flow of water through the wetland. Is the flow of water being severely constricted by upstream blockages within wetland such as culverts, artificial dams, or other obstructions? Next examine the flow of water through the wetland and record the presence/absence of a human-made dam, bridge and/or culvert that may be clogged or failing, including at the outlet of the wetland. If the wetland is bisected by a road, check the flow of water through the crossing structure.

2 – WETLAND-DEPENDENT WILDLIFE HABITAT

Habitat can be defined as an environment in which organisms live. The NH Method does not attempt to evaluate the wetland as habitat for particular wildlife species. It assesses the overall suitability of a wetland as habitat for those wildlife species that are dependent on wetlands for all or most of their life cycle. This Function concentrates on those species that are mostly dependent on emergent marsh, flooded shrub wetlands, snag swamps (e.g. flooded dead wooded swamps) or aquatic bed systems.

Wetlands represent a continuum of hydrologic conditions, with uplands at one extreme and deep water habitats at the other. In terms of wetland vegetation classes, emergent wetlands (i.e. marshes) and flooded shrub and dead forested (snag) swamps fall toward the wetter end of the continuum, while most forested and some scrub-shrub wetlands occur successively toward the dryer end. Generally speaking, the more open water in a wetland, the more likely it is to provide habitat for wildlife that are highly dependent on wetlands, such as waterfowl, wading birds, and turtles. Forested wetlands at the less wet end of the spectrum typically provide habitat for primarily upland species rather than wetland-dependent species, e.g. northern waterthrush, Canada warbler, etc.

Peatlands are a common wetland type providing specialized ecological niches for certain peatland-dependent species. For example, one of the state's rarest mammals, the northern bog lemming, is an example of a species dependent on peatland habitat.

Vernal pools are unique wetlands with a seasonal cycle of flooding and drying. The annual drying cycle plays a key role in determining which wildlife species use these pools as habitat. Vernal pools provide critical breeding habitat for a number of amphibian species (frogs and salamanders) as well as insects and crustaceans such as fairy shrimp. Spotted and Blanding's turtles, great blue herons, raccoons and predatory insects travel to vernal pools to feed on amphibian eggs, tadpoles, insects and crustaceans. Vernal pools can exist in a variety of habitats, such as forests, fields, swamps, marshes and in old gravel pits. Section 5 provides further information about vernal pools. Vernal pools are not specifically addressed in this function, but can be flagged in Function 12 – Noteworthiness.

QUESTION 1 – What is the wetland acreage?

Larger wetland complexes are likely to provide greater area and higher plant diversity for wetland-dependent species requiring larger home ranges.

> **How to answer the question:** Record wetland acreage based on the Individual Wetland Map and field checking (include any upland islands located within the wetland in your calculation of wetland acreage)

QUESTION 2 – What is the score for Ecological Integrity?

Those wetlands which are the least degraded by human activity provide the highest quality habitat for wildlife.

> **How to answer the question:** Record the average score from **Ecological Integrity**.

QUESTION 3 – Has water quality in the wetland been degraded by land use in the watershed?

Poor water quality can be harmful to many wetland dependent species. The whole character of the wetland ecosystem can change when it is exposed to excess sediments, nutrients and other pollutants beyond tolerable limits. For example, excess nutrients can cause oxygen deficiencies which in turn can cause a change in the species composition of both the plant and animal communities

> **How to answer the question:** Record the answer from **Ecological Integrity,** Question 1.

QUESTION 4 – What is the area of shallow permanent open water less than 6.6 feet deep, including streams and shallow ponds that are part of the wetland complex?

Open water in or adjacent to a wetland is essential for a number of aquatic wildlife species including fish, mink, otter, waterfowl, wading birds, most amphibians, some reptiles, insects, shellfish, crustaceans, and other invertebrates. Shallow open water is classified as PUB (Palustrine Unconsolidated Bottom), PAB (Palustrine Aquatic Bed) or PEM2 (Palustrine Emergent, Non-persistent) on the NWI Maps (see Appendix F for more details about wetland classification).

> **How to answer the question:** Estimate the area of open water from the Individual Wetland Map, the NH Wetlands Mapper or using GIS tools. Shallow permanent open water (less than 6.6ft deep) is defined as ponded open water having less than 30% of its area covered by trees, shrubs and rooted persistent emergent vegetation. This needs to be determined by field observation in summer or early fall, or from aerial photos taken with the leaves of trees on (see NH Wetlands Mapper or use GIS).

QUESTION 5 – Is there deepwater habitat (lakes or ponds > 6.6 feet deep) and/or 4th order or higher rivers associated with the wetland?

Deepwater habitat is critical for a variety of aquatic life, such as diving waterfowl (e.g. loons and pied billed grebes), ducks, geese, mink, otter, fish, etc. The presence of deep water within or adjacent to a wetland enhances wildlife diversity by providing a greater variety of aquatic habitats, a permanent source of water for the wetland, and more nutrients (food sources) for shallow water and terrestrial organisms within the wetland.

> **How to answer the question:** This question looks at the presence of deepwater habitat deeper than 6.6 feet depth within or adjacent to the wetland (lake, pond or river, classified as Lacustrine or Riverine in the Cowardin Wetland Classification System – see Appendix F for more details). Aquatic vegetation is not typically present in these deeper water habitats, although some may be present in the shallower edges. Determine the type of deepwater habitat within or immediately adjacent to the evaluation area by using the NH Wetlands Mapper, GIS, or visual inspection. Note that NH Fish & Game Department has bathymetry (water depth) data available for some state water bodies. Estimate lake or pond acreage using topographic maps or aerial photographs, both available on the NH Wetlands Mapper or by using GIS. Consult the NH DES list of 4th Order and Higher Streams using the links in the sidebar on stream order. Estimate stream length using the topographic maps or aerial photos available on the NH Wetlands Mapper or by using GIS tools.

Stream Order

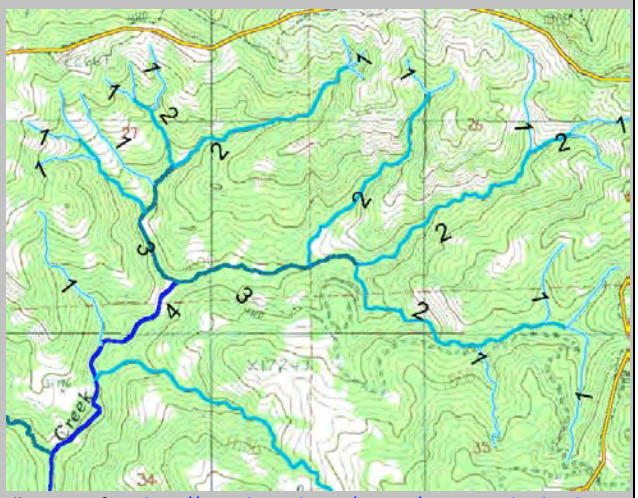


Illustration from http://www.krisweb.com/stream/stream_order_kris.htm

The Strahler system of stream order is a simple method to classify stream segments based on the number of tributaries upstream. A stream with no tributaries (i.e. headwater stream) is considered a first order stream. A stream segment downstream of the confluence (joining) of two first order streams is a second order stream, and so on. A general rule of thumb is that the smaller the number (1st, 2nd order) the smaller the stream, and the larger the number (e.g. 4th, 5th etc.), the larger the streams.

NH DES List of Fourth Order and Higher Streams

NH Statewide Map Atlas "Fourth Order and Higher Streams"

QUESTION 6 – What is the diversity of vegetation classes in the wetland?

Vegetation is an important component of wildlife habitat. Biologists recognize that diversity in the plant community increases the diversity of the wildlife community. Since each wetland class represents a different plant community, the more wetland classes that are present in a wetland, the greater the overall plant diversity of the wetland. In addition, having two wetland classes adjacent to each other may improve the wildlife habitat value over each alone because some wetland wildlife species, such as the alder flycatcher and common yellowthroat, use the edge between two different plant communities. Upland "islands" are areas of upland (usually at a slightly higher elevation than the wetland) that are surrounded by wetland. Because they are relatively inaccessible (being surrounded by wetland) these upland inclusions are often undisturbed by humans and household pets and provide sanctuaries for wildlife. They also provide additional "edge" between plant communities, adding to the overall vegetation diversity.

> **How to answer the question:** Count the number of wetland vegetation classes and upland "islands," each of which should occupy at least 5% of the total wetland area. Count individual wetland classes (e.g. PEM, PFO, and PSS) as well as combined wetland classes (e.g. PEM/PSS, PFO/PEM). Refer to Appendix F for more details about wetland classes and the Cowardin System of Wetland Classification. Note that the wetland vegetation classes and upland islands shown on the NWI map will need field checking to verify. The vegetation in some wetland areas may have significantly changed since the NWI maps were produced in the 1980s. If there are wetland vegetation classes that occupy less than 5% of the wetland area, document these observations in the Observations & Notes column of the NHM Data Form. This will document smaller fringe or patch wetland vegetation areas that may be present.

Wetland Vegetation Classes

Refer to Appendix F for more information about wetland vegetation classes.

Aquatic Bed vegetation is characterized by plants that grow at or below the surface of water. They may be floating, rooted and/or non-rooted and can include species such as duckweed, milfoil, etc.

Emergent vegetation is characterized by rooted herbaceous and grasslike plants that stand erect above or at the water or wetland surface (excluding mosses and Lichens).

Persistent emergents are plant species that normally remain standing until the beginning of the next growing season, e.g. cattails, bulrushes, sedges, reeds.

Non-persistent emergents are plant species that fall below the surface of the water at the end of the growing season, so that at certain times of year there is no obvious sign of emergent vegetation, e.g. pickerel weed, arrowheads, water lilies.

Forested wetlands are characterized by woody vegetation greater than 20 ft tall. They usually include an understory of young trees or shrubs, and an herbaceous layer.

Scrub-Shrub wetlands are dominated by woody vegetation less than 20 ft tall. Species may include true shrubs, young trees, or trees or shrubs that are stunted by saturated conditions.

Bog is a peat accumulating wetland with no inflows or outflows and supports acidic-tolerant plants, such as sphagnum moss and small shrubs, e.g. leatherleaf.

Fen is a peatland that receives some drainage from surrounding mineral soils, and supports persistent emergent plants.

QUESTION 7 – Are other wetlands in close proximity to the study wetland?

Proximity to other wetlands enhances the wildlife value of a wetland. Birds, such as great blue herons, may roost in one wetland and travel to other wetlands to fish. Blanding's turtles typically require a small network of ponds or pools for their seasonal feeding requirements. Wildlife use of wetlands is enhanced when two wetlands in close proximity include wetland vegetation classes that are different. For example, there may be no open water in the evaluation wetland but water may be present in a neighboring wetland. This water enhances the wildlife habitat value of the study wetland because it offers a greater diversity of habitats available to birds, reptiles, and mammals moving between wetlands.

> **How to answer the question:** Determine if there are any other wetlands in close proximity to the study wetland. These wetlands may be hydrologically connected via a watercourse or they may be unconnected.

QUESTION 8 – Are there wildlife travel corridors allowing access to other wetlands?

Access to other wetlands is important to maintaining wildlife populations. Wildlife travel corridors between wetlands should be areas of dense vegetation over 100 feet in width. Very often these will run along the main stream channels through dense woodlands or along shorelines. A wetland that is part of an interconnected system of wetlands can be expected to support more species than a single isolated wetland. Connection via a vegetated watercourse makes travel between different wetlands easier, with the greater diversity of wetland vegetation classes leading to a greater diversity of wildlife species.

> **How to answer the question:** Determine the presence of potential travel corridors for wildlife between the wetland being evaluated and other nearby wetlands as determined above. Optimal travel corridors should be areas of uninterrupted dense vegetation over 100 feet in width. Obstructions to travel lanes might include complete or partial blockage by roads, fences, developed areas, etc.

QUESTION 9 – What percentage of the wetland edge is bordered by undisturbed woodland or idle land (e.g. shrub land or abandoned fields) at least 500 feet in width?

Undisturbed woodland, shrubland or abandoned fields adjacent to the wetland increases the value of the habitat within the wetland itself. This is particularly important for nesting birds that may be disturbed by people and household pets, or for beaver that require well vegetated buffers adjacent to wetlands.

> **How to answer the question:** Review aerial photos along with field observation. Note undisturbed areas within 500 ft of the wetland on the Individual Wetland Map, and estimate the percentage of the wetland edge that is undisturbed by human activity.

QUESTION 10 – What percentage of the wetland is occupied by invasive plant species?

Invasive plants have lower wildlife value than a diverse community of native wetland plants and can form dense stands that crowd out other more valuable plant species, resulting in a loss of native plant diversity. This loss of diversity can significantly reduce the amount and diversity of wildlife using the wetland.

For a list of invasive aquatic plant species, refer to page 4 NH DES's ENv-Wq 1300 rules. Upland (terrestrial) invasive plants that are prohibited or restricted in New Hampshire are listed in the 2011 publication New Hampshire Guide to Upland Invasive Species. Additional information about invasive species in New Hampshire is available on the NH Dept. of Agriculture, Markets and Foods Invasive Species Frequently Asked Questions web page.

> **How to answer the question:** Record your answer from **Ecological Integrity: Question 6**

3 – FISH & AQUATIC LIFE HABITAT

NOTE: This Function evaluates wetlands associated with open water or those that have seasonal or permanent open water within their bounds. It applies to wetlands with standing water, running water, ponded water or lakes, with or without vegetation, whether or not fish are known to be present. If you are assessing a wetland that lacks open water at any time of year, such as raised bog mats, perched forested swamps without pools, or sloping seepage wetlands, omit this function and write "N/A" on the data form and explain why.

In the first edition of the NH Method, fish were treated as a separate group of wildlife with strong affinities to wetlands, particularly those associated with perennial streams or lakes and ponds. Yet, the recognition of fish populations as a subset of wetland wildlife must also include recognition of all of the species that support their well-being, in other words, *aquatic life*.

Since most wetlands have standing water, most wetlands contain habitat for aquatic life. While some wetlands are better at providing viable habitat for water-dependent species than others, most contain varying degrees of the necessary ingredients for their success – namely, food, shelter, and reproductive opportunity. Among the lower tiers of food chain support are the microscopic protists, algae, and bacteria that rely on a 'chemical soup' of nutrients. Higher on the food chain are the snails, clams, crayfish, plus hundreds of invertebrate species that live largely unnoticed in wetlands until they take flight – the caddisflies, mayflies, hellgrammites, midges, and no-see-ums. If present in sufficient numbers, these invertebrates support fish and a host of other vertebrate fauna.

This function addresses the wetland's ability to support all levels of aquatic life that are strictly dependent on water for their survival. The functional capacity of a wetland will score higher if there is abundant water year-round, water quality is high, and there is a diversity of habitat structure supporting a diversity of aquatic wildlife.

QUESTION 1 – What is the dominant land use in the watershed above the wetland?

In general, aquatic life habitat deteriorates as the land use changes from forestland to agriculture to urban/commercial/industrial land because water quality decreases, canopy shading is reduced, water flow becomes more irregular and extreme, and more sediment is transported into the wetland.

> **How to answer the question:** Using topographic maps and aerial photos using the NH Wetlands Mapper, GIS, or images from Google Earth™, identify the dominant land use types in the watershed above the wetland (undisturbed woodland, wetland or abandoned farmland, active farmland, rural residential, and heavily developed urban).

QUESTION 2 – Has water quality in the wetland been degraded by land use in the watershed?

Poor water quality can be harmful to many species of aquatic life. Low oxygen, excess nutrients, and toxic substances can stress species tolerance beyond their limits of survival. Aquatic invertebrates, especially those that are intolerant of pollution, are excellent indicators of water quality. The higher the water quality, the more likely that a higher diversity and abundance of organisms will be present at all levels in the food chain.

> **How to answer the question:** Record the answer from **Ecological Integrity: Question 1.**

QUESTION 3 – What is the area of shallow permanent open water less than 6.6 feet deep, including streams and ponds within the wetland?

While most wetlands contain some open water at least for a portion of the year, those with perennial flowing or open water bodies have more habitat opportunity for aquatic life. In general, the longer the period of inundation throughout the year, the more likely a complex array of water-dependent invertebrate organisms will be present that supports fish and other vertebrate species.

How to answer the question: Record answer from **Wetland-Dependent Wildlife Habitat**: **Question 4**.

QUESTION 4 – What is the acreage of deepwater habitats deeper than 6.6 feet (pond or lake) associated with the wetland?

Those wetlands associated with ponds or lakes tend to have higher populations of aquatic life than those that only contain small impoundments within them. Lakeshore or pondshore fringe wetlands are enhanced by the nearby presence of deepwater habitats (i.e. > 6.6 feet deep). More interactions between trophic groups are possible, and greater stabilizing effects on water quality and condition are also possible.

How to answer the question: This question looks at the presence of deepwater habitat deeper than 6.6 feet within or adjacent to the wetland (lake, pond or river, classified as Lacustrine or Riverine in the Cowardin Wetland Classification System – see Appendix F for more details). Aquatic vegetation is not typically present in these deeper water habitats, although there may be some along the shallower edges. Record the acreage of the pond or lake associated with the wetland being evaluated. This should include the entire acreage of the water body as listed in the NH Wetlands Mapper or on GIS.

QUESTION 5 – What is the width (bank to bank) of the stream <u>within</u> the wetland?

Streams greater than 50 feet wide are typically major rivers that have a wide diversity of habitats and aquatic life associated with them, particularly fish. Streams between 25 feet and 50 feet wide are perennial streams that usually have a high enough gradient to contain a mixture of substrates, channels and pools, yet lack the complex habitat structure of large rivers. Streams less than 25 feet wide are high energy systems with highly variable water levels that typically have natural or artificial barriers to fish passage. Streams less than 2 feet wide are usually intermittent, and tend to be restricted in terms of aquatic life habitat.

How to answer the question: Estimate the average width of the stream (in feet) within the wetland during times of average high water. Note that this can often be determined by observing either high water marks on trees or banks, or the limit of moss growth on the rocks along the water channel.

QUESTION 6 – Does the stream channel appear to have been recently altered?

Note: Consider "recent" to mean within the last five to ten years. Naturally occurring stream channels and banks provide optimally suitable habitat for aquatic life. Altering stream velocity, water depth, or natural flow paths through ditching, excavation, debris removal, channel straightening or leveling can have significant impacts on the natural diversity of aquatic life that absolutely depends on particular types of microhabitat. 100-year flooding events tend to scour channels, move large quantities of sediment and eliminate natural substrate beds (substrate refers to the stream bed materials). Bulldozers and excavators can have a similar effect especially when attempting to "correct" natural flooding events by re-channelizing flows or redirecting riverbank terraces.

How to answer the question: Look at the characteristics of the stream channel associated with the wetland. Does it look like it has been recently altered by extreme flooding? Or has it been significantly altered by artificial (i.e. human) means? Both types of alteration may have had detrimental effects on the health and diversity of the aquatic life community. Does the channel have straight sides and uniformly level banks? Or does it have variably steep or undercut banks that meander? Does the channel itself contain a uniform or diverse mixture of gravels, cobbles, or stones?

Since the gradient of the stream may mask past practices of streambank straightening or excavation, it is important to estimate the type of stream gradient when answering this question:

Low gradient (slow flowing) streams have meandering channels, steep banks, and soft substrates of mud, silt, or organic material. They also often contain oxbows or lateral overflow channels created during periodic high water events.

Medium gradient (moderate flowing) streams have fairly straight channels between wider arcs or bends. The banks are fairly steep and rocky, and the substrate is a mix of coarse and fine sediments, with the silts and fine sands in backwater eddies and pools, and the coarser gravels and cobbles in faster moving riffles.

High gradient (fast moving) streams have nearly straight channels between sharp, angular bends. The banks tend to be angled sharply upwards on the faster current side, but can be shallowly sloped around bars and bends. The substrate is coarse and rocky, with few coarse sands and gravels. Water flow is 'flashy' (subject to rapid change with storms)

When answering this question, consider that the highest value aquatic habitat sites with have natural pools and riffles, varying substrate types, and naturally sloped channels that conform to the topography of the landscape. Medium-value sites will have one or more of these features missing as a result of the types of disturbance events noted above. Although the 5 – 10 year period is generally good for estimating "recent," some streams take much longer to recover (if ever) from human-caused, bank straightening or flow-altering impacts.

QUESTION 7 – Within the wetland, what is the diversity of substrate types in the area(s) occupied by open water (flowing or standing water) during the non-growing season?

Substrate in this question refers to the aquatic bed materials, which could include soils such as peat, muck, sand and gravel. Invertebrate aquatic life is highly dependent on diversity and abundance of substrate types for their survival needs. Shelter, attachment sites, home territories, breeding success, and food types are all associated with substrate. The greater the diversity of substrates, the greater the diversity of invertebrate aquatic life. High invertebrate diversity tends to also support higher vertebrate diversity, especially fish.

How to answer the question: From direct visual field observation, determine the number of substrate types that are subject to regular inundation for at least a portion of the year. Substrate types can be generally lumped into the following categories:

Organic material – Undecomposed to very well-decomposed plant materials, which could include stumps

Mud – Very fine sands, silts and clays that are enriched with decomposed plant matter but still have a gritty feel

Sand – Very fine to coarse gritty soil particles .01 – 2 mm in diameter

Gravel – Coarse soil fragments 2 – 75 mm in diameter

Cobble – Angular or rounded soil fragments 75 - 254 mms in diameter

Stones, boulders or ledge – Consolidated rock fragments > 254 mms in diameter or rock surfaces e.g. ledge

Note: 25.4mm = 1inch

Note that rapidly flowing water is typically underlain by cobbles, gravels and coarse sands; moderately fast flowing water is typically underlain by medium to fine sands; and slow-moving water typically has mud and/or organic material as the substrate type. Under normal water conditions, substrate type *even if not sampled* can be estimated by the flow dynamics of a stream. Pond and lakeshores will have to be directly observed, however, as these are not generally determined by water flow but are more commonly regulated by wave action.

QUESTION 8 – How abundant are coarse woody material and large rocks associated with the open water portion of the wetland?

Cover objects such as rocks, logs, stumps, branches and rocks occur naturally in wetlands, particularly those associated with streams and the edges of ponds or lakes. Cover objects are critical for defense against predators, providing shade, basking sites and regulating water temperature. Coarse woody material is simply woody plant

fragments such as bark, twigs, branches, logs, and stumps that fall or float into water bodies associated with wetlands.

Streamside, pondshore, or lakeshore wetlands with more coarse woody material offer greater natural microhabitat diversity for invertebrates, and better hiding places for fish and other aquatic vertebrates. This material also contributes valuable substrate for bacteria, fungi, algae, etc.

> **How to answer the question:** Visually determine the approximate percentage of cover objects in open water portion of the wetland made up of coarse woody material and large rocks. This may include submerged stumps or logs as well as dead or dying trees that have fallen into a wetland and its associated water body.

QUESTION 9 – What is the abundance of floating & submerged vegetation?

A second set of cover objects includes floating leaved and submerged vegetation in the wetland associated with a river, stream, pond, or lake. Floating vegetation includes water lilies, pondweeds, bur–reed, and other aquatic vegetation that has floating leaves. Submerged vegetation includes bladderworts, milfoils, waterworts, and other herbaceous vegetation that typically grows beneath the surface of the water. Streamside, pondshore, or lakeshore wetlands with a high percentage of floating-leaved and submerged vegetation have better habitat for aquatic life due to an increase in microhabitat structure, shading from the sun, and reduced detection by predators, as well as valuable nutrients from the decomposition of herbaceous vegetation. Areas with less of this vegetation tend to have fewer invertebrates and fish.

> **How to answer the question:** Visually estimate the approximate percentage of cover objects made up of floating leaved and submerged vegetation. This question is best answered in summer when there is vegetative growth. In the non-growing season this will require an estimate of maximum summer growth, or the use of GIS or NH Wetlands Mapper leaf-on aerial photo imagery as a substitute for estimating cover. Note on the data sheets what time of year you were estimating cover, and if the data was derived from NH Wetlands Mapper, GIS or field observation.

QUESTION 10 – Are there artificial barriers/blockages to passage of aquatic life?

Barriers to the passage of aquatic life in a stream can severely limit population health and productivity. Many fish species depend on a barrier-free environment in order to migrate from feeding or shelter areas to breeding grounds. Even stream salamanders and caddisflies will be affected if a barrier such as a dam, elevated culvert, bridge abutment, or roadway has blocked passage up or downstream. Besides blocking animals from a feeding area and a spawning or breeding area, barriers can also limit the invaluable exchange of genetic strains in a population of organisms. For clam and mussels species that rely on fish passage in order to populate different stream reaches, barriers can mean the demise of an entire local population.

Note that some culverts and bridge abutments provide adequate passage for aquatic life except during the low water time of year. If the water level in the outlet drops by more than 8” in a culvert during this time of year **(see photo below)**, then these structures are considered a barrier to fish passage. Also, if the culvert is too small or narrow to contain a natural bed of sand and gravel, it may also prevent passage for aquatic life. While there is no hard and fast rule about when and if animals will use culverts for passage, if in doubt, answer by choosing the lower score. In this question, we are interested in *artificial barriers*, since natural barriers such as beaver dams, downed logs, or rocky ledges are all part of the natural system that aquatic life is adapted to.

> **How to answer the question:** Determine if there are any artificial barriers/blockages to aquatic life passage such as man-made dams (with or without fish ladders), elevated culverts or restricted bridge openings, roadways without a free-flowing culvert, or beaver excluder grates within or at the edge of the wetland. If there is no stream associated with the wetland, then answer the appropriate option.

Left: A perched culvert showing an artificial barrier to aquatic life. A drop of 8" or more during low flow times of year can severely limit the passage of fish and aquatic organisms.

QUESTION 11 – Are fish or aquatic species present that are rare, threatened, endangered or "Species of Special Concern"?

Evidence of high quality wetland habitat is often characterized by the presence of rare, threatened and endangered species and "species of special concern" as defined by NH Fish and Game Dept. These species include those that are *federally* or *state* listed as rare, threatened or endangered, as well as those designated by the NH Fish & Game Department as "Special Concern" because of the likelihood of them becoming threatened or endangered in the future. Lists of these species can be found on the NH Fish and Game website. High quality (i.e. undisturbed) habitat is also essential for most species. Many of our rarest aquatic life species (e.g. blueback herring or ringed boghaunter dragonfly) have declined in the landscape because of habitat loss or severe alteration.

[Note: Not all occurrences of rare, threatened and endangered wildlife have been recorded by the NH Natural Heritage Bureau or the NH Fish & Game Department. Suitable habitat for rare species may exist on the site and these species may be present but currently undocumented].

> **How to answer the question:** Consult the NH Natural Heritage Bureau List of Towns and select the town in question (listed in alphabetical order). See if any species that use wetlands are listed and determine their habitat type(s). For help with this, also see the NH Wildlife Plan Species Profiles. For site specific information on whether or not a rare species is found in or adjacent to the wetland you are evaluating, please submit a formal request to the Non-game and Endangered Species Program, NH Fish & Game Department, 6 Hazen Drive, Concord, NH 03301. Note that other than fish, reptiles, amphibians and dragonflies, most aquatic life species are not tracked by Fish & Game or Natural Heritage.

4 - SCENIC QUALITY

Wetlands can be areas of scenic beauty, and are appreciated for their wild quality and tranquility. Most often wetlands are viewed from public roads, but other important viewing locations might be along a stream, from a canoe, along a nature trail, or from an overlook. In larger wetlands, there may be several viewing locations. In this case, pick the best and most accessible site. Note that some sites that have high scenic quality may not be easily accessible by the public. Use your best judgment in determining scenic quality at such sites (e.g. more remote wetlands). The evaluation area may include the entire wetland, or if the wetland is large, it is possible that only a portion(s) will be evaluated for scenic quality, e.g. an area that is clearly visible from a road or stream. Determine the location/s from which the wetland can be viewed, and note the location/s on the Individual Wetland Map as well as at the top of the data form. Add this information to the spreadsheet and the datasheet. For some wetlands along lakes or rivers, however, the viewing area experienced by the many people might be from a boat.

For this function, the primary viewing site is defined as the point where people are most likely to observe the wetland. Be sure to indicate the location of the viewing site on both the data form and a map.

QUESTION 1 – How many wetland vegetation classes are visible from the primary viewing location(s)?

The question assumes that scenic diversity (several different plant communities visible at one location) increases visual quality.

> **How to answer the question:** Determine the number of wetland vegetation classes that are visible at the viewing site. Use National Wetland Inventory wetland vegetation classes to describe these. Count individual wetland vegetation classes (e.g. PEM, PFO, PSS) as well as combined wetland vegetation classes (e.g. PEM/PSS, PFO5/PEM). Refer to Appendix F for more details about wetland classes and the Cowardin System of Wetland Classification. Note that the wetland classes shown on the NWI map will need field checking to verify. The vegetation in some wetland areas may have significantly changed since the NWI maps were produced in 1989.

QUESTION 2 – Is there public access at the viewing site?

Wetlands on publicly accessible properties may have some form of trail for easier access. Wetlands that are easily viewed from the road and/or have parking nearby provide a good viewing opportunity, as do wetlands that are viewed from trails (include canoe trails as well as walking trails).

> **How to answer the question:** Determine ease of getting to to the viewing location and whether or not there is public access. Keep in mind that Class VI roads and logging skid roads (if passable) can constitute a trail. Access is considered public if the site can be viewed from a roadside or a stream, or written permission is obtained from the landowner to access the viewing point from their property.

QUESTION 3 – What is the visible extent across the wetland?

A clear unobstructed view that shows the wetland's expanse and surrounding landscape provides a high quality visual experience.

> **How to answer the question:** Assess the extent of the wetland visible from the viewing location. Is there a clear view with a large visual expanse, or is the view restricted by taller vegetation, such as trees and shrubs?

QUESTION 4 – What is the approximate extent of open water (including streams) visible from the primary viewing location/s?

Views of open water are generally considered to be aesthetically appealing.

> **How to answer the question:** Estimate the acreage of open water and streams using field observation and/or the NH Wetlands Mapper or GIS tools. For a visual comparison, a soccer field is about 1.1 acres, not including the end zones.

QUESTION 5 – Does the wetland provide visual contrast with the surrounding landscape

Wetlands, which are generally low-lying, often contrast dramatically with the surrounding areas, for example, a marsh adjacent to a ridge or a dense stand of trees. On the other hand, some floodplain or forested wetlands may provide little visual contrast.

> **How to answer the question:** Determine whether the wetland provides visual contrast with the surrounding landscape.

QUESTION 6 – What is the general appearance of the wetland and surrounding land use(s) visible from primary viewing location(s)?

The aesthetic quality of wetlands lies in the natural beauty of their diverse vegetation. Trash and other signs of disturbance detract from this beauty.

> **How to answer the question:** Judge the visual quality of the wetland and surrounding area - is the wetland undisturbed and natural, or are there visual detractors such as litter, abandoned cars, power lines etc. present.

5 – EDUCATIONAL POTENTIAL

- If there is no public or private (i.e. with written permission) access to a potential educational site at the time of evaluation, but there may be potential to develop access in the future, evaluate the wetland for educational potential and flag it as needing future assessment for accessibility.
- If there is no public or private access to the educational site, and/or unacceptable safety hazards (such as steep embankments near water, busy roads, railroad trestles, etc.), and developing public or private access in the future is NOT feasible, then leave this Function out of the evaluation and give it a zero score.

For this function, the primary educational site is defined as the area most likely to be used for education. Be sure to indicate the location of the viewing site on both the data form and a map.

Field studies are considered an important part of the educational process. Wetland field studies are particularly important for teaching ecological principles about wetlands for determining wetland function. This function assesses the educational potential of wetlands in terms of access to the widest variety of wetland types and other natural resources that might be studied. The area evaluated may include the entire wetland, or if the wetland is large it is possible that only a portion of it will be used (based on visibility, accessibility, etc.). Mark the location of the potential educational site on the individual wetland map.

QUESTION 1 – What is the Ecological Integrity of the wetland?

It is assumed that a naturally functioning ecosystem is an excellent educational site for learning about wetland ecological processes in a natural, undisturbed setting.

> **How to answer the question:** Record the Average Score from **Ecological Integrity**.

QUESTION 2 – Does the wetland have high value wildlife habitat?

The educational potential of a site is enhanced by high value wildlife habitat.

> **How to answer the question:** Record the Average Score from **Wetland-Dependent Wildlife Habitat.**

QUESTION 3 - Does the wetland have high value fish and aquatic life habitat?

The educational potential of a site is enhanced by high value aquatic life habitat.

> **How to answer the question:** Record the Average Score from **Fish & Aquatic Life Habitat.**

QUESTION 4 – Is all or part of the wetland on public or private property that has public or private access (i.e. with written permission)?

Wetlands on properties that are publicly owned and managed and have public access usually have some form of trail system. These wetlands may be good locations for educational purposes. Land that is posted cannot be publicly accessed without landowner permission. Permanently conserved lands and public lands are displayed in the NH Wetlands Mapper and are available through GIS. However, note that not all privately owned conserved lands allow public access, and that some require property owner permission for educational use.

> **How to answer the question:** Determine if the wetland is on a property that has public access, e.g. state parks, documented nature preserves, wildlife management areas, or conservation easements with public access. Determine if the landowner is willing to give permission to use the site for educational purposes.

QUESTION 5 – How close is the educational site to off-road parking suitable for 5-10 vehicles or large enough for a school bus?

A suitable parking area close to the potential educational site is important for access and participant safety. Parking areas that are limited in size or are a long walk from a potential educational site reduces the value for group field studies.

> **How to answer the question:** Determine how big the parking area is and how long it takes to get from the parking area to the potential educational site.

QUESTION 6 – How many wetland vegetation classes are accessible or potentially accessible for study at educational site/s?

Several wetland vegetation types in close proximity are considered to provide the best educational opportunity. However, sometimes two or even one wetland vegetation class is adequate for a workshop session.

> **How to answer the question:** Locate all wetland vegetation classes within the wetland, each of which should occupy at least 3% of the total wetland area, that are within a 15 minute walk from the parking area (see Individual Wetland Map), and determine their accessibility. Count individual wetland classes (e.g. PEM, PFO, PSS) as well as combined wetland classes (e.g. PEM/PSS, PFO5/PEM). Refer to Appendix F for more details about wetland classes and the Cowardin System of Wetland Classification. Note that the wetland classes shown on the NWI map will need field checking to verify. The vegetation in some wetland areas may have significantly changed since the NWI maps were produced in 1989. If there are wetland vegetation classes that occupy less than 3% of the wetland area, document these observations in the Observations & Notes column of the NHM Data Form. This will document smaller fringe or patch wetland vegetation areas that may be present.

QUESTION 7 – Is there access to open water (include streams) associated with the wetland at the educational site?

Access to open water (include streams) provides opportunities for students to study the interactions between the wetland and open water ecosystems.

> **How to answer the question:** Determine if there is access to open water associated with the wetland at the educational site.

QUESTION 8 – What is the aesthetic and visual quality of the educational site?

Areas that are undisturbed are assumed to be more visually appealing than areas that are disturbed or part of a built environment. Built areas are less attractive for group studies, and often do not foster a sense of the natural beauty of wetlands.

> **How to answer the question:** Record the Average Score from **Scenic Quality.**

QUESTION 9 – Is the educational site accessible to the disabled?

The educational potential of a wetland is increased if it is accessible to both disabled and able-bodied persons.

> **How to answer the question:** Determine whether the wetland is accessible to the disabled, e.g. nature trails designed for, or useable by, the disabled. Does the site have special disabled access points (parking, etc.). Give details of accessibility (or lack of it) in the Notes section of the data sheet.

6 – WETLAND-BASED RECREATION (CANOEING, KAYAKING, HIKING AND WILDLIFE OBSERVATION)

Note: If the property is posted against access, prohibiting recreational activities such as hiking, hunting and fishing, this function will receive a low score.

A variety of recreational activities take place in and around wetlands. Many people simply enjoy the beauty and sounds of nature and spend their leisure time walking in or near wetlands, observing plant and animal life. Wetlands associated with open water bodies also support recreational activities such as canoeing and kayaking. This evaluation stresses non-power boating which is usually less disruptive to the wetland environment than power boating.

QUESTION 1 – Are there opportunities for wildlife observation?

Observational wildlife-related recreation, which includes birding, photography, etc. is the most popular form of wildlife-related recreation**.**

> **How to answer the question:** Record the Average Score from **Wetland-Dependent Wildlife Habitat**

QUESTION 2 – Is there access to suitable open water for canoes and kayaks?

Many wetlands occur along canoeable streams or lakes. Some more extensive wetlands have sufficient open water for canoeing or kayaking. These attributes provides valuable recreational opportunities. In addition, a canoe or kayak route can provide an important viewpoint for enjoying the scenic beauty of a wetland.

> **How to answer the question:** Determine the suitability of open water or streams (if present) within or adjacent to the wetland for canoeing and kayaking. In some cases, water levels may only be adequate during spring high water.

QUESTION 3 – Are there trail-based recreation opportunities?

Trails provide easy access to the wetland for hiking, fishing, hunting and other low impact recreational activities.

> **How to answer the question:** Determine if there are trails, including water trails, in and immediately adjacent to the wetland that provide access for activities such as hiking, hunting, and fishing.

QUESTION 4 – Are there off-trail recreation opportunities?

Wetlands with good access that have ample open water or upland buffer characteristics offer better opportunities for off-trail hiking, nature study, fishing or hunting, etc. Those that are small, lack open water, or a disturbed upland buffer offer less.

> **How to answer the question:** Determine the acreage of open water using the Individual Wetland Map and aerial photos. Then, using aerial photos and field observation, determine how much of the wetland edge has an undisturbed buffer of 500 ft.

QUESTION 5 – Is there off-road public parking at the potential recreation site for at least two cars?

Parking near the water is convenient for recreational uses.

> **How to answer the question:** Determine if there is adequate parking for at least two cars and access to the water from it. Adequate parking requires an open area with a firm soil or gravel base. For safety, the parking area should be located on the same side of the road as the wetland and should have an unobstructed view of oncoming traffic at the point of entrance and exit.

QUESTION 6 – What is the scenic quality of the potential recreation site?

Aesthetically pleasing surroundings enhance an outdoor recreational experience. This is particularly true for such activities as canoeing and wildlife observation.

> **How to answer the question:** Record the Average Score from **Scenic Quality**

7 - FLOOD STORAGE

Freshwater wetlands act as natural flood regulators by temporarily storing floodwaters and then slowly releasing the stored waters downstream. During heavy rains and rapid periods of melting in late winter, the water entering the wetland from rainfall, surface runoff and stream-flow is temporarily stored in wetland depressions and slowed down by shrubs, trees, emergent vegetation and surface topography. This reduces the quantity of water in the downstream river system at the peak of the flood, and ensures that floodwaters from tributaries do not reach the main river at the same time. In this way, wetlands help protect adjacent and downstream areas from flood damage. The loss of upstream floodplain wetlands can significantly increase downstream flooding and damage.

The intention of this function is to evaluate the ability of the wetland to attenuate (slow down and store) floodwaters. This requires determining the wetland acreage, watershed acreage, location of the wetland within watershed, and estimating the flood storage volume of the wetland. The flood storage index method provided below is an approximate, simplified method for evaluating the ability of the wetland to store water.

In the following situations, the Flood Value Index does not need to be calculated for the wetland being studied. Instead a certain flood index range can be assumed:

1. Wetlands with slopes steeper than 10% (10' vertical : 100' horizontal) as measured along the flow path, where it is obvious that little flood attenuation could occur, **should be assigned a Low Flood Index Value.** For wetlands or portions of wetlands with slopes steeper than 10%, a flood index value of 0.5 may be assigned without further analysis (Use Terrain Navigator or other similar software to mark the point upstream and downstream to calculate slope, or calculate slope based on other available topographic information, or estimate in field with an inclinometer or other method for determining slope).
2. For large ponds, lakes or wetlands with greater than 200 acres of ponded water surface area under normal conditions and streams that are Fourth Order or higher (i.e. 4th, 5th, 6th etc.) **assign a High Flood Index Value**.

QUESTION 1: What is the Wetland Area (acreage) likely to pond or flood (W)?

The larger the area of the wetland that is likely to flood or is ponded, the greater the capacity of the wetland to store floodwater.

How to answer this question: Using the NH Wetlands Mapper, GIS tools, or wetland maps, calculate the area of the wetland (in acres) that is likely to pond or store water during and for a period at least 6 hours after rainfall events. Field observation may also be needed. You can also use PEM, PUB, and PAB wetland classes as evidence of ponding and estimate the acreage using the NH Wetlands Mapper. Only include the relatively flat portions of the wetland, not including steep slopes or transitions at the perimeter of the ponded area that would not allow for water ponding (see Figures 1 and 2). If there are any upland islands/inclusions in the wetland area, you will need to subtract the acreage of the upland from the total wetland acreage and use this adjusted acreage in this calculation. If better information is not available, then the area of wetland likely to flood or be ponded may be estimated as percent of the wetland that is likely to flood or be ponded based on field observations and available mapping (i.e. if 80% of an entire 100 acre wetland is estimated to flood or be ponded, then the Wetland Area would equal 80 acres).

QUESTION 2: What is the Watershed Area in acres (S)?

The size of the watershed is can be an important factor determining the effectives of a wetland for storing floodwaters.

How to answer this question: Draw the wetland's watershed using the evaluated wetland's outlet as the downstream limit of the watershed. Refer to Appendix G for instructions for drawing the watershed boundary.

If the wetland has no surface outlet (e.g. a kettlehole or bog), demarcate the watershed area using the high points in the landscape around the wetland (hills & ridges as shown on USGS topographic map) from which water would flow to the wetland.

QUESTION 3: What is the Water Storage Depth in wetland (D)*?*

The depth at which a wetland can store water is a factor in its flood control capacity. The Water Storage Depth is the depth of water that can be stored within a wetland above normal stage (i.e. above normal ponded elevation of the wetland).The greater the water storage depth, the greater the flood storage capacity of the wetland is.

How to answer this question: The Water Storage Depth is the additional depth at which water can pond above normal stage water elevation. Normal stage water depth is the typical depth of water within wetland most of the year between and prior to rainfall events - this can either be the ponded water elevation or ground surface of the wetland depending on site conditions. Refer to Figures 1 and 2 below for an illustration of water storage depth.

Debris lines (wrack line) around wetland and/or water stains at outlet culvert or headwall may be used as indicators of water storage depth. For wetlands with beaver dams at outlet determine normal stage pond elevation and maximum ponded depth based on wrack lines, the difference would be the Water Storage Depth. Conduct field observation to collect information on wrack lines, water stains, etc.

Estimate the Water Storage Depth in the wetland using one of the following ways:

1. If detailed flood storage information is available from hydrologic studies, or the actual available water storage depth is known, this information may be used as the water storage depth. Indicate the water storage depth in tenths of feet.

2. If better data is not available assume the default **Water Storage Depth (D)** for the wetland area to be 1.0 foot.

Note for Professionals: *If FEMA Flood Elevations are available, check the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the town in which the wetland is located to determine if wetland is within Zone AE where base flood elevations have been determined. If wetland is within FIRM Zone AE, then use the base flood (100-year) elevation and USGS mapping to determine the average depth of flooding that would occur across the wetland being evaluated. Use this average flood depth as the Water Storage Depth instead of the default value of 1.0 foot. If elevations of wetland areas are shown with contours on the available topographic maps (2 ft minimum contour interval with same elevations datum as the FIRM map), use the average difference between contour elevations and base flood elevation for flood depth. For ponds and lakes with a defined water surface elevation as shown on USGS map, use the average difference between this elevation and base flood elevation for flood depth. The flood depth (i.e. Water Storage Depth) is the difference between the normal water surface elevation of pond, lake or stream and the FIRM base flood elevation.*

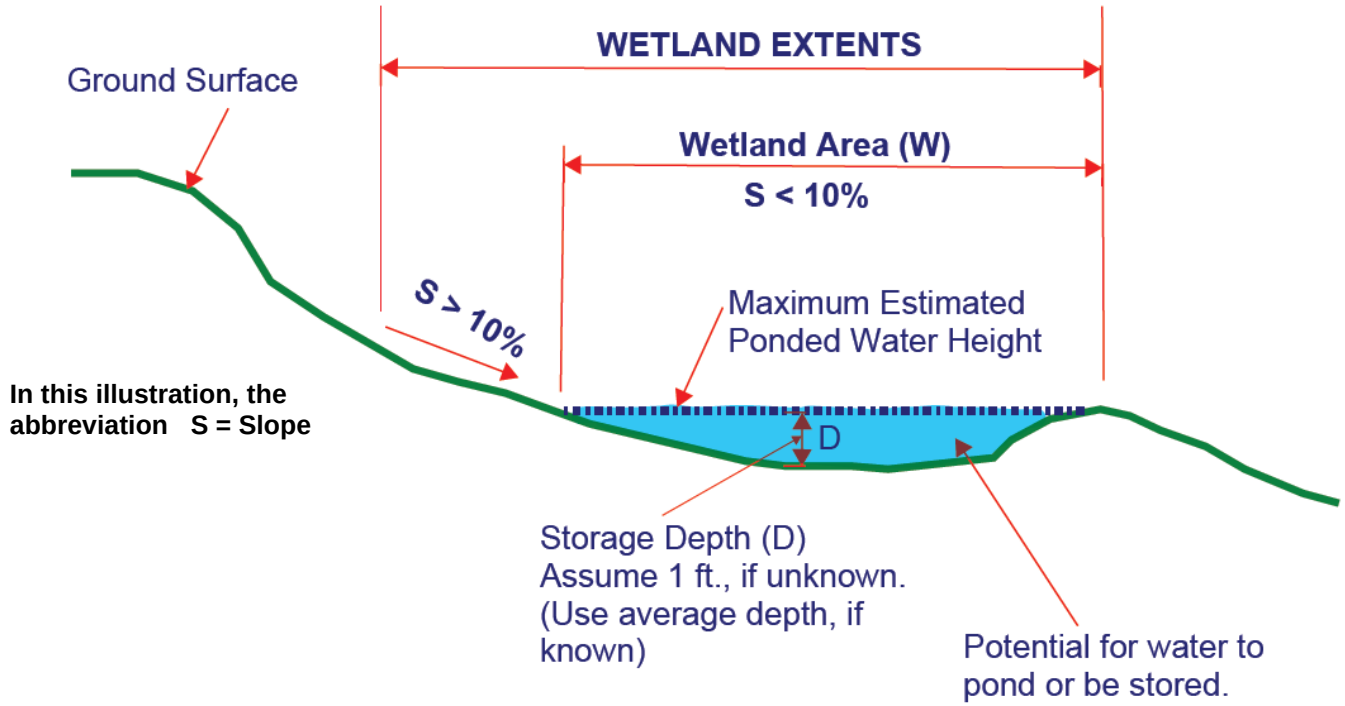


Figure 1: Water Storage Depth in a wetland with no ponding under normal conditions

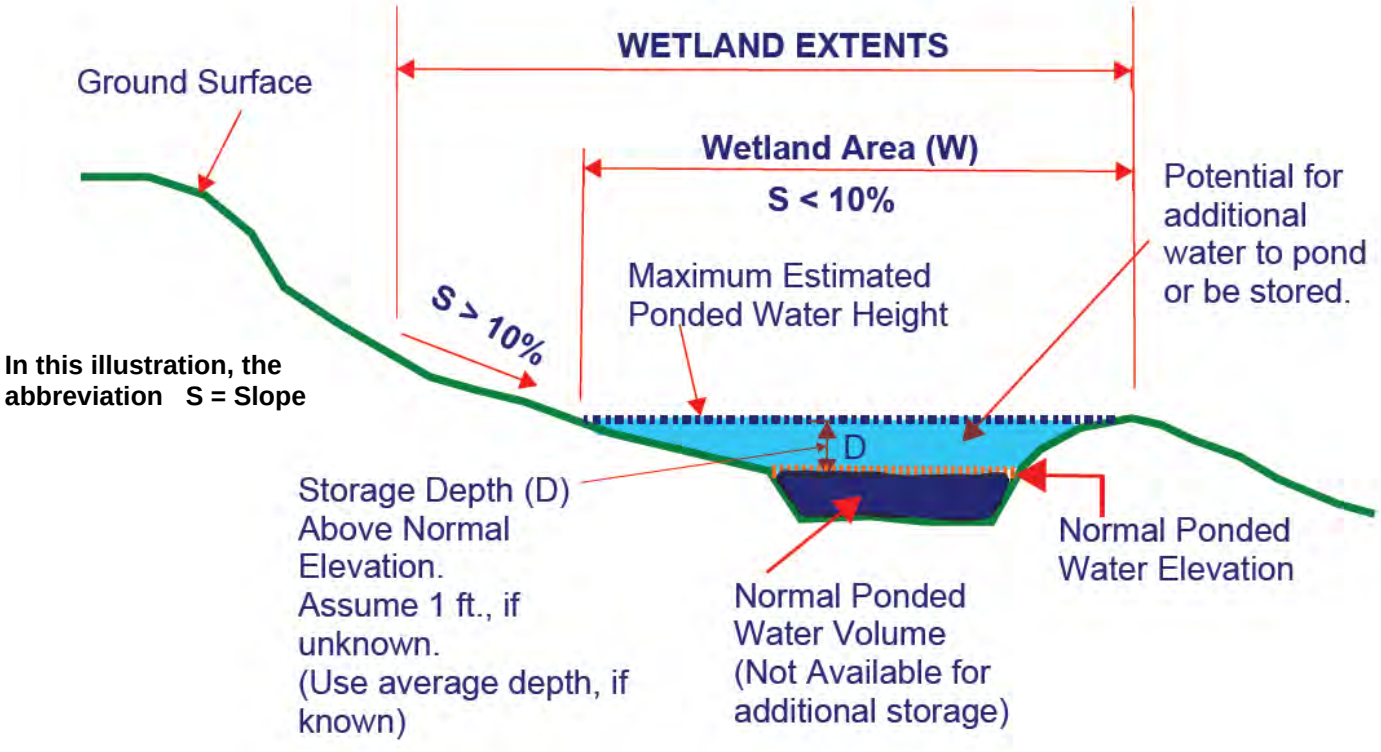


Figure 2: Water Storage Depth in a wetland with ponding under normal conditions

QUESTION 4: What is the Wetland Storage Volume (V)?

The greater the wetland acreage and associated water storage depth, the greater the amount (volume) of floodwaters the wetland can attenuate.

How to answer this question: Calculate the **Wetland Storage Volume (V)** using your answers for Wetland Area (**W**) in acres (Question 1) and the water storage depth (**D**) in feet (Question 3).

Wetland Acres (**W**) x Water Storage Depth (**D**) = Wetland Storage Volume (**V**) in acre-feet

The Excel spreadsheet, available on the NH Method web site, can be used for this calculation.

Note: Use Wetland Area in Acres times Water Storage Depth in Feet to obtain Wetland Storage Volume in Acre-Feet.

QUESTION 5: Wetland Storage Volume Factor (F)

The Wetland Storage Volume Factor (F) increases as the wetland storage volume increases, that is, the greater the storage volume, the greater the capacity of the wetland to store floodwater.

How to answer this question: Use Table 1 (you will likely need to interpret your value to the closest value in Table 1 to determine the **Wetland Storage Volume Factor (F).** Using the **Wetland Storage Volume (V)** determined in Question 4, locate the number in the first column of Table 1 that most closely approximates (V).
Read off the corresponding Wetland Storage Volume Factor (F) from column 2 of Table 1.

NOTE: If the Wetland Storage Volume is greater than 200 acre-feet, use a Wetland Storage Volume Factor (F) equal to 1.00.

QUESTION 6: Watershed Area Factor (A)

Generally, the larger the wetland is in relation to the watershed, the greater the opportunity to store floodwaters. A watershed with >10% wetland area is likely to have a significant effect on floodwater runoff (i.e. A=1.0). Where the percentage of wetland in the watershed is less than 10%, the ability of the wetland to affect downstream flooding is reduced. If the wetland/watershed percentage falls below 1% then a minimum value of 0.5 is assigned. Table 2 is based on a linear relationship between wetland size and watershed size.

How to answer this question: Use Table 2 to determine the **Watershed Area Factor (A)**. This factor is based on the wetland area as a percentage of the watershed..

$$\frac{W = \text{Wetland Area (acres)}}{S = \text{Watershed Area (acres)}} \times 100 = \text{Wetland Area to Watershed Area Percentage } \mathbf{(P)}$$

Locate the percentage in column 1 of Table 2 that most closely approximates your answer (you will likely need to interpret your value to the closest value in Table 2). Read off the corresponding Watershed Area Factor (**A**) from column 2 of Table 2 (interpolate to the closest value).

If the wetland acreage is greater than 10% of the watershed area, use a **Watershed Acreage Factor (A)** equal to 1.00.

TABLE 1*	
Wetland Storage Volume Factor (F)	
Wetland Storage Volume (V) (acre-feet)	**Value of F**
≥ 200	1.000
150	0.950
100	0.900
75	0.850
50	0.800
37.5	0.750
25	0.700
18.75	0.650
12.5	0.600
9.375	0.550
6.25	0.500
4.69	0.450
3.125	0.400
2.36	0.350
1.6	0.300
1.2	0.250
0.8	0.200
0.6	0.150
0.4	0.100
0.3	0.075
0.2	0.050
0.15	0.037
0.1	0.025
0.05	0.012
0	0.000

TABLE 2*	
Watershed Area Factor (A)	
(P) Wetl. Area/Wshed Area x 100	**Value for A**
≥10%	1.00
9%	0.95
8%	0.90
7%	0.85
6%	0.80
5%	0.75
4%	0.70
3%	0.65
2%	0.60
1%	0.55
< 1%	0.50

**(you will need to interpret your value to the closest value in Tables 1 and 2)*

SEE BELOW LEFT FOR EXAMPLES OF WETLAND FLOOD INDEX CALCULATION:

Example 1: *(See Wetland I.D. 1 in Table 3– sample spreadsheet)*

Wetland Area (W) = 0.25 acres
Watershed Area (S) = 25 acres
Water Storage Depth (D) = 0.5 ft (known depth)
Water Storage Volume (V) = 0.5 ft x 0.25 acres = 0.125 acre-feet
Wetland Storage Volume Factor (F) = 0.03 (from Table 1)
Watershed Area Factor (A) = 0.55 (from Table 2, where 0.25 acres/25 acres x 100 = 1%)
Location in Watershed (L) = 0.8
Wetland Flood Index = 0.03 x 0.55 x 0.80 = 0.0132
Flood Value Type = Low Flood Value

Example 2: *(see Wetland I.D. W3 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 33 acres
Watershed Area (S) = 17,937 acres
Water Storage Depth (D)= 1.0 ft (default value)
Water Storage Volume (V) = 1.0 ft x 33 acres = 33 acre-feet
Wetland Storage Volume Factor (F) = 0.73 (from Table 1)
Watershed Area Factor (A) = 0.5 (from Table 2, where 33 acres/17,937 acres x 100 = 0.18%)
Location in Watershed (L)= 1.0
Wetland Flood Index Value Type = 0.73 x 0.5 x 1.0 = 3.65
Flood Value = Moderate Flood Value

Table 3: Example of Flood Index Worksheet for Multiple Wetlands

Use the Excel spreadsheet on the NH Method Website for automated calculation of the Flood Water Storage Index

"Red" headings indicate data input columns
"Black" headings indicate columns where figures are automatically calculated

Flood Index = (F x A x L) x 10, where:
Maximum Wetland Storage Volume = 200 acre-ft
Maximum Wetland Flood Function Value = 10

Wetland I.D.	Wetland Acreage (W)	Watershed Acreage (S)	Wetland Area as % of Watershed (P) from Table 2	Watershed Area Factor (A) Table 2	Location in Watershed (L) (1.0/0.8/0.6)	Water Storage Depth feet (D) 1.0 = default	Wetland Storage Volume acre feet (D) acre feet	Wetland Storage Volume Factor (F) Table 1	Flood Index
1	0.25	25	1.00	0.55	0.8	0.5	0.125	0.03	**0.132**
2	0.75	15	5.00	0.75	1	1	0.75	0.19	**1.425**
3	2	50	4.00	0.7	0.8	2.5	5	0.46	**2.576**
4	10	100	10.00	1	1	3	30	0.72	**7.200**
5	10	1000	1.00	1	1	4	40	0.77	**7.700**
6	3	47	6.38	0.81	0.8	2	6	0.48	**3.110**
7	0.1	3	3.33	0.42	0.6	0.5	0.05	0.016	**0.040**
8	0.75	20	3.75	0.68	0.6	0.15	0.1125	0.027	**0.110**
9	1	50	2.00	0.6	1	2.5	2.5	0.35	**2.100**
10	50	400	12.50	1	0.8	3	150	0.95	**7.600**
W1	283	19548	1.45	0.57	1	1	283	1	**5.700**
W3	33	17937	0.18	0.5	1	1	33	0.73	**3.650**
W4	54	17291	0.31	0.5	1	1	54	0.73	**3.650**
W5	202	16619	1.22	0.56	1	1	202	1	**5.600**
W6	175	2664	6.57	0.82	1	1	175	0.95	**7.790**
W7	40	446	8.97	0.94	1	1	40	0.78	**7.332**
W8	24	380	6.32	0.51	1	1	24	0.69	**3.519**
W9	43	679	6.33	0.51	1	1	43	0.77	**3.927**
W10	116	2161	5.37	0.77	1	1	116	0.92	**7.084**
W11	63	880	7.16	0.86	1	1	63	0.83	**7.138**
W12	24	3302	0.73	0.86	1	1	24	0.69	**5.934**
ND1	93.7	5169	1.81	0.57	1	1	93.7	0.88	**5.016**
ND2	50	3741	1.34	0.57	1	1	50	0.8	**4.560**
ND3	37	258	14.34	1	1	1	37	0.75	**7.500**
ND4	101	2700	3.74	0.68	1	1	101	0.9	**6.120**
ND5	110.5	562	19.66	1	1	1	110.5	0.92	**9.200**
ND6	99	1753	5.65	0.77	1	1	99	0.9	**6.930**

QUESTION 7: Location of wetland within the watershed (L)

Wetlands located in the lower portions of the watershed have the greatest potential to reduce flooding. Wetlands in the upper portions of the watershed have a somewhat lower potential to reduce flood waters, although these wetlands are still of significance for flood storage.

How to answer this question: Refer to Figure 3 for an illustration showing how to determine location of the wetland in the watershed

Step 1 – determine if any portion of the wetland is located within 1,000 feet of a 4th Order or higher stream, or a pond or lake that outlets to a 4th Order or higher stream that it is a tributary to. If any portion of the wetland is hydrologically connected and within 1,000 ft of a 4th Order or higher stream that it is a tributary to, then assign a location factor (L) of 1.0 on the data forms (answer (a)). If this situation does not exist, not proceed to Step 2.

Step 2 – determine if any portion of the wetland is located within 500 feet along the flow path of a perennial stream (solid blue line as shown on USGS Map) that it is a tributary to. If so, assign a location factor (L) of 0.8 on the data forms (answer (b). If not proceed to Step 3.

Step 3 – If no portion of the wetland is hydrologically connected and within 1,000 ft. of a 4th Order or higher stream that it is a tributary to, or within 500 feet of a perennial stream that it is a tributary to, assign a location factor of 0.6 on the data forms (answer (c)).

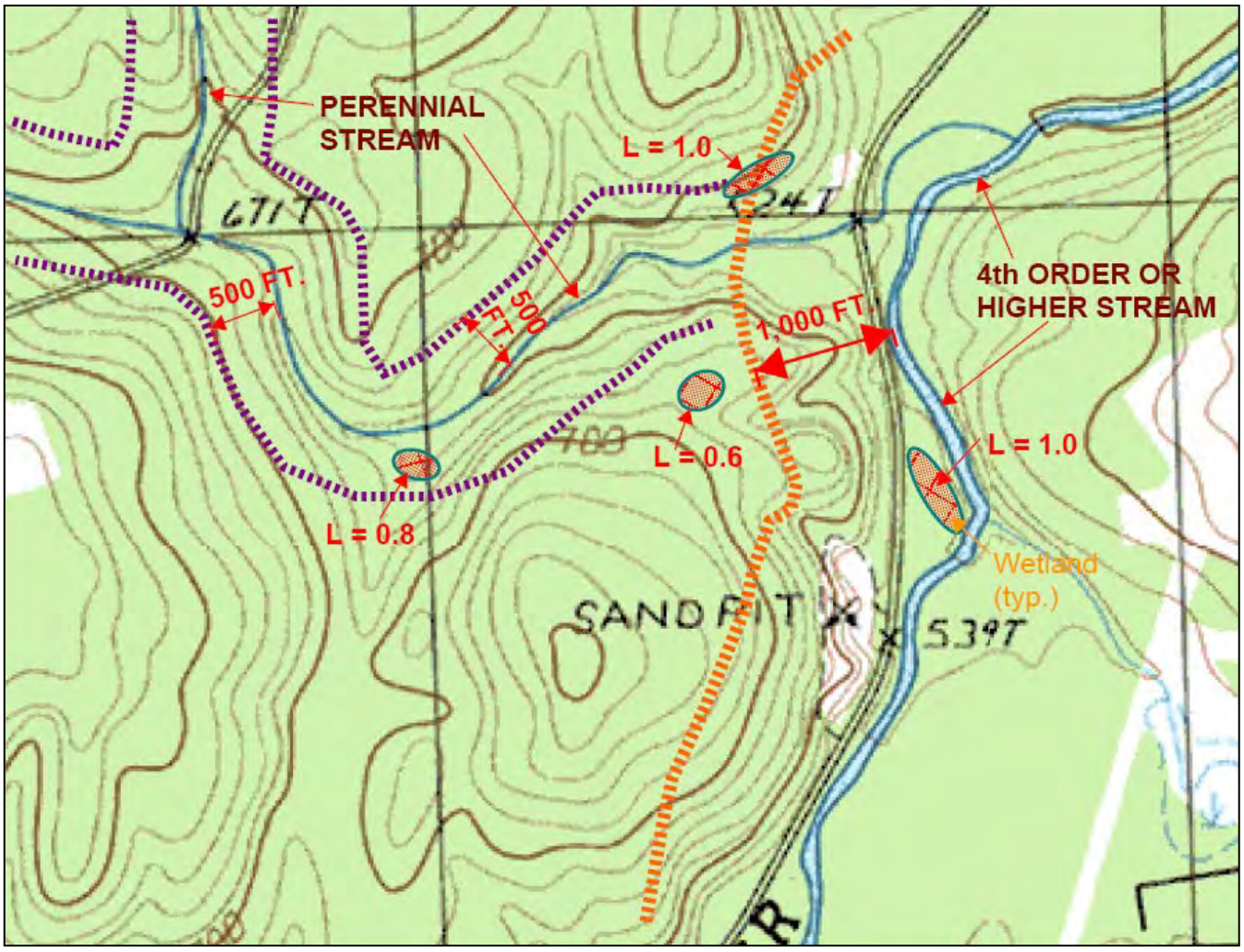


Figure 3: Determining the location of the wetland within the watershed

8 – GROUNDWATER RECHARGE

Note that this function does not require field observation.

Groundwater is a critical element in the functioning of wetland systems. Wetlands are typically groundwater discharge areas. Water that moves beneath the ground surface often discharges into wetlands throughout the year, even when rain or surface water flows are absent. Springs and seeps, often be seen at the edge of wetlands or along stream bank, are examples of groundwater discharge sites, and are essential in maintaining water tables and stream base flows throughout the year.

Wetlands may also serve as groundwater *recharge* areas. In certain instances, wetlands may play an important role in recharging ground water supplies by delivering water back into the ground through permeable coarse-textured soils that allow for rapid infiltration of rainwater, snowmelt and run-off. These soils include sands, gravels and cobbles associated with glacial outwash deposits. If these deposits are deep and widespread and include layers of variously sorted materials, they have mostly likely been identified as **stratified drift aquifers** by NH DES. Stratified drift aquifers have a high correlation with the potential to yield water for human consumptive uses.

The questions in this function are all related to groundwater recharge since drinking water supplies derived from groundwater are so critical for all living organisms. They ask the user to identify areas of stratified drift aquifers, areas where there are potential drinking water supplies known as *Favorable Gravel Well Areas*, and areas where coarse sands and gravels exist adjacent to or underlying the wetland that have not been identified as an aquifer.

QUESTION 1 – Does the wetland overlie stratified drift aquifer?

Under normal circumstances (i.e. at most times of the year, and in the absence of land use changes) most wetlands function as groundwater discharge areas. At certain times of year, however, some wetlands function as recharge areas. This is not uncommon in summer in wetlands that overlie deep sands and gravels.

> **How to answer the question:** Using the "Aquifers" data layer in the NH Wetlands Mapper or using GIS tools, determine if the wetland overlies or lies along a stratified drift aquifer boundary. "Adjacent" is defined as within ¼ mile (1,320 feet).

QUESTION 2 – Is the wetland in a potential public water supply area?

Wetlands in direct contact with Favorable Gravel Well areas have the potential to affect ground water quality.

> **How to answer the question:** You will need to access the stratified drift aquifer maps showing Favorable Gravel Well Analysis (FGWA) to determine if the study wetland overlies or is in direct contact with areas identified as potential public water supplies. This information is not available on the NH Wetlands Mapper - users can go to the Society for the Protection of NH Forests web site to access FGWA information**.** Scroll to the bottom of the page to download the statewide map showing Favorable Gravel Well analysis. Use the PDF Zoom tool to zoom into your town. A 600% zoom gives you a close up view of your town's data. To get a paper map showing the data for your town, or for GIS users wanting to obtain the data set, contact Pierce Rigrod, NH DES Drinking Water and Groundwater Bureau, at pierce.rigrod@des.nh.gov or 603-271-0688.

QUESTION 3 – Is the wetland within a public wellhead protection area?

Wetlands that are associated with public wellhead protection areas may be a significant factor in groundwater discharge and recharge interactions.

> **How to answer the question:** Using the NHDES Drinking Water Map, determine if the wetland is within a public wellhead protection area. To obtain a copy of this map, contact Pierce Rigrod (see Q. 2 above)

QUESTION 4 – What is the percent coverage of highly permeable soils within 100 ft of the wetland?

Well drained soil and gravel deposits beneath and adjacent to the wetland provide permeable layers that facilitate infiltration. If these soils are dominant, there is likely to be an interaction between the water in the wetland and water stored in the underlying stratified drift. You are looking at coarse sediments adjacent to the wetland boundary as well in within the wetland.

> **How to answer the question:** Identify the soils types within 100 ft. of the wetland using the NH Wetlands Mapper or by using GIS tools. Using Table 3, check off the soils in the list that correspond to the soils within 100 ft. of the wetland. Estimate the percent coverage of all of the soils you checked off in Table 3.

Table 3: SAND & GRAVEL SOIL TYPES

***Note**: This list of soils was prepared for the purpose of providing an additional data layer for consideration under the groundwater function – i.e. to include areas that are not mapped as aquifer recharge areas yet contain surface soils with coarse particle sizes which enhance infiltration.*

Number & Slope Classes[1]	Map Unit name & Particle Size Groups[2]	Drainage Class[3]	Record % of 100-ft. wetland buffer
12 B,C,D	Hinckley gravelly LS	ED	
21 B,C,D	Colton, gravelly LS	ED	
22 B,C,D	Colton LS	ED	
24 B,C	Agawam FSL & LS	WD	
25 B,C,D	Ninigret-Windsor complex LS	MWD/WD	
26 B,C,D	Windsor LS	ED	
35 B,C,D	Champlain LS	SED	
36 B,C,D	Adams LFS	SED	
22 A,B,E	Colton S&G	ED	
212 B,C	Hinckley, very gravelly LS	ED	
222 B,C,D	Colton, very stony LS	ED	
236 B,C,D	Adams, very stony FLS	SED	
300	Udipsamments	SED	
313	Deerfield, LS	MWD	
350	Udipsamments	SED	
400	Udorthents, S	ED	
526 B,C	Caesar LS	ED	

1. SLOPE CLASSES

A, B = 0 – 8% (includes 'A' on older maps) C = 8 – 15% D = 15 – 25% E = > 25%

2. PARTICLE SIZE GROUPS

F = fine L = loam S = sand LS = loamy sand SL = sandy loam G = gravel

3. DRAINAGE CLASSES

WD = well drained SED = somewhat excessively drained ED = excessively drained MWD = moderately well drained

QUESTION 5: What is the percent coverage of the highly permeable soil types listed in Table 4 within the wetland?

Water table wetlands are associated with soils formed in sand and gravel deposits (stratified drift) that lack horizontal restrictive layers. Water table levels fluctuate with the seasons, rainfall events, etc. At certain times of the year these wetlands potentially function as recharge areas.

> **How to answer the question:** Identify the soil types within the wetland using the NH Wetlands Mapper, GIS tools, etc. Using Table 4, check off the soil types in the list and estimate the percent coverage of all of these soil types.

Table 4: HIGHLY PERMEABLE WETLAND SOIL TYPES THAT POTENTIALLY CONTRIBUTE TO RECHARGE DURING DRY SEASONS.

Map Symbol	Soil Name	Drainage Class			
		Somewhat Poorly Drained	Poorly Drained	Very Poorly Drained	Record % of wetland area
15	Searsport			X	
34	Wareham		X		
115	Scarboro			X	
125	Scarboro, very stony			X	
214	Naumberg		X		
314	Pipestone		X		
315	Mashpee		X		
325	Scarboro variant			X	
326	Scarboro variant, very stony			X	
393	Timakwa			X	
394	Chocorua variant			X	
395	Chocorua			X	
433	Grange		X		
546	Walpole		X		
547	Walpole, stony		X		
614	Kinsman		X		
615	Augres		X		
900	Endoaquents, sandy		X	X	
913	Sudbury variant	X			
914	Duane variant	X			
915	Deerfield variant	X			
916	Croghan variant	X			
918	Madawaska variant	X			
992	Pondicherry			X	
				Total percent	_____%

9 - SEDIMENT TRAPPING

Sediment trapping is the process by which inorganic particles (mineral particles derived from rock) of any size are removed from surface waters and retained within a wetland. This water quality function occurs in wetlands when fewer inorganic sediments leave a wetland than enter it, either as runoff from the land surrounding the wetland or as surface flow in the streams that enter the wetland. During periods of heavy rainfall, surface runoff within the wetland's watershed may cause erosion and increase the amount of suspended sediment in surface water. Suspended sediment entering Riverine and Lacustrine systems in storm water runoff can be harmful to aquatic ecosystems. The sediment accumulates in stream bottoms, smothering gravel spawning areas and killing aquatic insect larvae. Sediment can also reduce the storage capacity of downstream water supply reservoirs.

Although too much sediment deposition and accumulation in a wetland may alter its biological functions, floodwater storage capacity and groundwater exchange, the quality of ecosystems located downstream is maintained or protected if suspended sediment is retained in wetlands. Because toxins (such as pesticides and petroleum products) often adhere to suspended sediment, they also may be retained with the sediment. Retaining sediment in wetlands will lengthen the lifespan of downstream reservoirs and channels, and reduce the need for costly removal of accumulated sediment from lakes, ponds and man-made structures.

Sediment deposition in many wetland systems is also an important annual source of nutrients that support wetland aquatic life. As water flows through wetlands, it is slowed by plants and the size of the wetland and much of the sediment load settles to the bottom before the water moves further on downstream. As much as 80-90% of the sediments in the water may be removed as they move through wetlands, resulting in cleaner water entering lakes, rivers and streams.

Of the factors that affect the ability of a wetland to trap and retain sediments, those included in this evaluation method are: the size and capacity of the wetland to store surface waters; the shape and gradient of the wetland basin; the shape and gradient of any streams that enter or flow through the wetland; and the density and distribution of vegetation within the wetland. Of these, flow velocity is the single most important factor affecting the ability of a wetland to trap sediments.

QUESTION 1 – What is the wetland's Flood Storage value?

The Flood Storage function as evaluated in this method assesses the ability of a wetland to store surface water flows during weather events that result in higher than normal surface water flows. Storing or holding surface waters in a wetland also results in a reduction in water velocities. As water velocities decrease, suspended sediments begin to drop out of the water column. Thus, an increased ability to store flood waters generally has a positive correlation with a wetland's ability to trap sediments.

How to answer this question: Record the average score from **7–Flood Storage.**

QUESTION 2 –Does the wetland lack an outlet or have a constricted outlet?

If the wetland lacks an outlet or has a constricted outlet, most incoming suspended sediments will end up being retained within the wetland. Constricted outlets may include undersized culverts. (Refer to attached figure to determine if the wetland has a constricted outlet). Sheet flow (or overland flow) is the movement of water that occurs over land in places where there are no defined channels. The water spreads out over a large area at a uniform depth. This also referred to as overland flow.

How to answer this question: Determine whether there is an outlet to the wetland by looking at USGS Topographic Maps and by field inspection. Determine whether the outlet is constricted. An outlet is constricted if you can answer YES to any of the following statements:

- Channel flow is present, and the width of the wetland outlet at annual high water is less than one-third the average width of the wetland perpendicular to the flow path.
- Channel flow is present, and the cross-sectional area of the wetland outlet is less than the cross-sectional area of the inlet(s).
- Channel flow is not present – the wetland has no gradient and the total width of the wetland outlet is less than one-tenth the average width of the wetland.

QUESTION 3 – What is the character of water flow through the wetland?

Irregular (or sinuous) stream channels increase frictional resistance along the shoreline, reducing velocities and increasing the effectiveness of the wetland system at trapping sediments. Sinuosity (shape of stream channel) is calculated as the ratio of stream channel length to the straight line distance of the stream. Stormwater runoff may also be slowed by contact with vegetation where sediments are deposited on the plants and/or the wetland substrate. This means that less sediment will leave the wetland and make its way to a downstream water body. A sinuous (winding or "snaking") shaped stream channel usually indicates slower water velocities and a greater travel distance through the wetland, increasing the ability of the wetland to trap sediments. For this question, wetland systems that do not have a discernible stream channel through all or part of the wetland are considered effective at removing sediments. **Note that a discernable stream channel in only a very small portion of the wetland does qualify the wetland to be included in answering the questions in this function.**

How to answer this question: Determine the shape of the stream channel(s) within the wetland by looking at aerial photos on the NH Wetlands Mapper in the Topography and Imagery section, or by using GIS tools to review aerial photos, and field observation. Measure the length of the stream channel along the centerline of the channel. Then measure a straight line from the upstream end of the stream channel to the downstream end of the channel (note: only measure those areas where a discernible channel is present). The sinuosity ratio is the length of the actual channel divided by the straight line distance of the stream. **NOTE:** If there is more than one stream channel in the wetland, do the calculation based on the total length of all streams.

$$\frac{\textit{Channel Length}}{\textit{Straight line distance of stream}} = \textit{Sinuosity Ratio}$$

If the ratio is 1.5 or greater, then assign a score of 10 for this question. If there is no channel or the outlet is impounded and standing water is present, a score of 10 should also be assigned to this question.

QUESTION 4 – What is the ratio of the wetland's size to the size of its watershed?

Wetlands that are large in relation to their watershed are more likely to be able to slow surface waters and store any suspended sediments.

How to answer this question: Using the acreage of the watershed above the outlet of the wetland, and the acreage of the wetland, calculate the ratio as a percentage (include any upland islands located within the wetland in your calculation of wetland acreage)

$$\frac{\textit{Acres of Wetland}}{\textit{Area of watershed above wetland outlet}} \times 100$$

QUESTION 5 – What is the gradient within the wetland?

The gentler the slope or gradient of the wetland, the lower the velocity of the water flowing through it and the greater the likelihood that any suspended sediments in the surface water flows, sheet flow or channel flow, will be removed from suspension and retained in the wetland. Use default data from NH Wetlands Mapper or use an instrument that is more precise (gradient should not be estimated in the field)

How to answer this question: Measure the change in elevation between the highest elevation of the wetland and the lowest (usually the outlet) – note that the elevation change is likely to be small, but this is still significant for sediment trapping. Divide this by the length of the wetland along it longest axis. Multiply this by 100 to get the percent gradient.

$$\frac{\textit{Highest Elevation of Wetland} - \textit{Lowest Elevation of Wetland}}{\textit{Total Length of Wetland}} \times 100$$

Elevations can be determined in several ways:

- Use the Digital Elevation Model (DEM) data in the NH Wetlands Mapper to estimate gradient.
- Using the **DRG Topographic Map** background, determine the highest and lowest elevation of the wetland along its longest axis. Subtract the two elevations to get the elevation difference.
- Alternatively, you can use **Google Earth** (free download from the internet). As you hold the cursor over a point on a map, the elevation will be displayed in the lower left part of the screen. Determine the elevation at the highest and lowest ends of the wetland, as best as you can identify it on the Google Earth map.
- Terrain Navigator (commercial product) is another tool that can be used to calculate elevations.
- Professionals can calculate slope using GIS tools or they can use site specific elevations that were generated via traditional ground survey.

QUESTION 6 – What is the extent (percent cover) of all vegetation types that will most likely trap sediments? (e.g. forested swamps, scrub shrub swamps, and persistent emergent marshes).

Forested wetlands, fens, shrub swamps and wetlands dominated by persistent emergent plants will have a higher capacity to trap sediments and to stabilize sediments with their stems, leaves and root systems than wetlands dominated by non-persistent emergent vegetation and/or aquatic bed vegetation which have a high percentage of open water with no vegetation.

How to answer this question: Use aerial photos available through GRANIT, the NH Wetlands Mapper, or other sources together with field observation to determine which wetland vegetation class dominates the wetland during the growing season. Refer to Appendix F for more detailed explanation of wetland vegetation classes.

QUESTION 7 – What is the average water depth in the wetland during the growing season?

Shallow densely vegetated wetlands are more likely to retain sediments than are wetlands with greater water depths. Shallow wetlands offer greater frictional resistance, particularly when they are densely vegetated along the flow path. Water depths of greater than 6.6 feet deep inhibit the growth of woody and persistent emergent plants which are important to the ability of the wetland to slow the velocity of surface water and allow for sediments to settle out of the water column.

How to answer this question: Estimate the average depth of water within the portion of the wetland that is either permanently or regularly inundated with water. Where there is open water with no emergent vegetation and or aquatic bed vegetation is sparse, assume the water depth is greater than 6.6 feet deep. If the open water area is dominated by persistent and non-persistent emergent plants, assume the water depth is less than 6.6 ft. deep.

10 – NUTRIENT RETENTION, REMOVAL & TRANSFORMATION

Nitrogen and phosphorous are components of fertilizers used in agriculture and on lawns and gardens. These are the nutrients most often associated with water pollution. Excessive amounts of these nutrients in lakes and ponds can cause algal blooms and oxygen deficiencies which may result in the death of fish and aquatic organisms. This process is known as eutrophication. Undeveloped watersheds generally export very low levels of nutrients to downstream watersheds, whereas highly developed watersheds export high levels of nutrients downstream. Within reason, a wetland can reduce nutrient levels flowing into downstream ponds, lakes, streams, rivers or estuaries so that the effects of eutrophication are prevented or reduced.

Some wetlands are effective at retention, removal and transformation of nutrients, which is important for maintaining water quality in lakes, streams and ponds. **Nutrient retention** is the storing of nutrients (most importantly nitrogen and phosphorus) within the substrate or vegetation of wetlands. **Nutrient removal** includes the elimination of dissolved chemicals through sedimentation or the conversion of nutrients, such as nitrogen, into gas. **Nutrient uptake** includes biological processes that transfer nutrients into the bodies of plants and animals.

It is important to note that in some instances, the nutrient loads in a watershed may be so high that the wetland itself is overwhelmed to the point that excess nutrients are simply passed on downstream without significant reduction. In addition, certain wetland systems, such as bogs, are highly sensitive, to excessive amounts of nutrients and this can eventually degrade several wetland functions. The application of sound conservation and best management practices, such as those for stormwater management, in the watershed can significantly reduce excess nutrient loading to wetlands and downstream water bodies.

QUESTION 1 – What is the wetland's Flood Storage value?

Increased ability to store flood waters may also result in a greater capacity for the wetland to transform nutrients.

How to answer this question: Record the average score from **7 – Flood Storage.**

QUESTION 2 – What is the wetland's ability to trap sediments?

Nutrients can adhere to sediment particles, and are often transported with sediments. The ability of a wetland to slow velocities and trap sediments is a necessary component of nutrient retention/removal.

How to answer this question: Record the average score from **9 – Sediment Trapping**.

QUESTION 3 – What is the extent (percent cover) of persistent emergent vegetation, trees and/or shrubs within the wetland?

Vegetated wetlands have a greater ability to transform nutrients than wetlands that include open water and low vegetation density. Forested wetlands, shrub swamps, and wetlands dominated by persistent emergent plants (marshes) have a higher capacity than other wetland types (such as open water, fens, or aquatic bed) to remove nutrients from the water by absorption through their root systems and transformation.

How to answer this question: Record the answer from **Sediment Trapping,** Question 6.

QUESTION 4 –What hydroperiod occurs over more than 50% of the wetland?

The wetland hydroperiod is the length of time during which surface water remains in the wetland**.** Flooded or ponded water in a wetland creates conditions that help retain nutrients in the bottom sediments as well as release nitrogen as a harmless gas. Wetlands that are seasonally flooded develop low oxygen (anoxic) conditions which allows transformation of nitrogen compounds to gaseous nitrogen and release into the atmosphere. Wetlands with constantly (or nearly constantly) saturated substrates tend to retain nutrients, partly because the rate of oxygen diffusion into the constantly saturated soils is slow. These conditions usually favor oxygen retention. Some oxidation of the substrate/sediments is essential for optimal nitrogen removal.

How to answer this question: Determine the dominant hydroperiod within the wetland using aerial photos (NAIP aerial photos on the NH Wetlands Mapper and GIS) and field observation. What is the most dominant/most persistent hydroperiod year-round? National Wetland Inventory wetland codes (the water regime modifiers) may provide helpful supplemental information, but keep in mind that this source of information may be somewhat dated and only approximates actual hydroperiods in the field. Refer to the side bar at right for more information about the water regime modifiers. Vegetation growing in and around a wetland can provide a simple and relatively accurate indicator of wetland hydroperiod. Wetlands with hydroperiods of less than six months usually have a predominance of trees. Wetlands with hydroperiods of less than 9 months have more shrub species growing in the wetland. The presence of floating aquatic plants and/or persistent herbaceous vegetation usually indicate wetlands with more permanent hydroperiods.

QUESTION 5 – What hydric soils cover the greatest percentage of the wetland?

Wetlands dominated by finely textured soils tend to be most effective at transforming nutrients within the water column.

How to answer this question: Use NRCS Soils data from the NH Wetlands Mapper or GRANIT GIS and refer to Tables A, B and C in Appendix D to find out which soil type is most dominant in the wetland.

Note to Professionals: *Some wetlands may be have been field delineated in an area that has been mapped as upland soil by NRCS, so none of the Tables referenced would have the applicable soil unit on it. If this is the case, the user should determine the closest NRCS soil map unit to that found in the wetland being evaluated. Look at hydric soil types for nearby wetlands to make an educated guess, or dig a hole and key it out.*

Description of Water Regime Modifiers, as used in the Cowardin System of Wetland Classification
(refer to Appendix F)

Temporarily flooded (A): Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants growing both in uplands & wetlands are characteristic of the temporarily flooded regime.

Saturated (B): The substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.

Seasonally flooded (C) Surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.

Seasonally Flooded/Well Drained (D): Surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. Soils are coarse (e.g. sandy or gravelly) and therefore water tables lower fairly quickly during the growing season.

Seasonally Flooded/Saturated (E): Surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent the substrate remains saturated to the surface for extended periods during the growing season.

Semi permanently flooded (F): Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.

Intermittently Exposed (G): Surface water is present throughout the year except in years of extreme drought.

Permanently flooded(H): Water covers the land surface throughout the year in all years. Vegetation is composed of obligate wetland plants

11 - SHORELINE ANCHORING

If there is no stream, river, lake or pond within or adjacent to the wetland, leave this Function out of the evaluation.

Shoreline anchoring is an important function of wetlands. Wetlands typically occur at the interface between water bodies and uplands. They provide a physical barrier that dissipates wave action and slows down currents. Vegetated wetlands bordering waterbodies, in particular, can play a critical role in stabilizing banks, trapping sediments, and taking up nutrients. These are important aspects of protecting water quality.

QUESTION 1 – What is the gradation of wetland vegetation types along the shoreline?

Those wetlands that provide a gradual transition from open water to upland across a wide range of wetland vegetation classes, such as emergent to scrub-shrub to forested, provide greater protection against shoreline erosion.

> **How to Answer the Question:** Determine the number of wetland vegetation classes (including mixed vegetation classes) in the wetland area bordering the area of open water (stream or pond). Refer to Appendix F for more detailed explanation of wetland vegetation classes.

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QUESTION 2 – What is the vegetation density in the wetland bordering the watercourse, lake or pond?

The greater the vegetation density, the greater the ability of wetlands to anchor soil. Sparsely vegetated or bare areas are very susceptible to erosion. Forested wetlands, fens, shrub swamps and wetlands dominated by persistent emergent plants will have a higher capacity to anchor shorelines than wetlands dominated by non-persistent emergent vegetation and/or aquatic bed vegetation which are not very effective at anchoring shorelines.

> **How to Answer the Question:** Make a visual estimate of vegetation density in the wetland bordering the watercourse or lake/pond. This is best done during the summer because some wetland plant species die back during the winter.

QUESTION 3 – How wide is the wetland bordering a watercourse, lake or pond?

Wider wetlands are more resistant to erosive forces than narrower wetlands.

> **How to Answer the Question:** Using the NH Wetlands Mapper measuring tool or GIS tools, determine the average width of wetland bordering watercourse, lake or pond.

QUESTION 4 – How "rough" is the substrate of the wetland at the shoreline of the waterbody?

Wetlands with a higher density of coarse substrate particles (e.g. gravels, cobbles or stones) have a greater ability to anchor shorelines than those with evenly fine particles (e.g. clays and silts).

> **How to Answer the Question:** Review the aerial photographs using NH Wetlands Mapper (zoom in to a large scale to get close-up detail) to get an initial idea of substrate types. Confirm this in the field using a visual inspection to the degree possible.

12 - NOTEWORTHINESS

Noteworthiness refers to certain features a wetland may possess that gives it a high value regardless of any other attribute. Unlike the preceding functions, the score for this function is calculated by totaling the scores for each question answered affirmatively. **There is no score averaging for this function.**

Question 1 – Is the wetland located in or within 500 ft of an area of Highest Ranked Habitat (state or regional level), as identified in the NH Wildlife Action Plan Highest Ranked Habitat Condition map?

The NH Wildlife Action Plan has identified areas of **Highest Ranked Habitats** for species of concern. Wetlands that are part of these designated habitat complexes play an important role in providing habitat diversity. These habitat complexes provide key buffer areas and travel corridors along streams and between wetlands. They also include large unfragmented blocks of land

> **How to Answer the Question:** Information on Highest Ranked Habitat Condition can be obtained from the Wildlife Action Plan critical habitats layer in the NH Wetlands Mapper, GRANIT GIS, or at NH Fish & Game's website

Question 2 – Does the wetland have local significance because it has consistently high scores for a number of functions and/or is among the top 10 largest wetlands in, or partially in, town?

Wetlands can be significant within a local geographical or political area even though they may rate as an average when compared to other wetlands in a larger geographic area. The NH Method assumes that a wetland has local significance if one or more of its functions are among the highest scores of all wetlands in the study area.

> **How to Answer the Question:** After all the wetlands within the evaluation area have been evaluated, determine which wetlands have the highest scores for each of the functions. The top scoring wetlands for each of the functions should be given a score of 10 for this question. The cutoff score for inclusion in this group should be documented. A recommended level is the top 10% of wetlands in each Function. Determine if this wetland is among the top 10% largest wetlands in town. If you are doing a single wetland evaluation that does not involve an inventory, estimate the percentage using the NH Wetlands Mapper.

Question 3 – Does the wetland have local, regional or statewide significance because it is it located in a priority area, is documented in a local or regional conservation plan, or it has been recognized as having regional importance in the state?

Wetlands that are in priority areas identified by conservation plans have local and sometimes regional significance, and could be part of a larger land conservation effort. Large wetland complexes have the capacity to perform a variety of functions at a relatively high level, depending on the level of disturbance in and around the wetland. A wetland may be the largest wetland of its vegetation class in the study area or it may have regional important for storing floodwaters.

> **How to Answer the Question:** Review local, regional or statewide conservation plans (check with land trusts covering your area), Master Plans and Natural Resources Inventories and determine if the wetland is in a priority area. Review the NWI maps and aerial photographs and determine if the wetland is among the largest in the area or region.

Question 4 – Does the wetland have known biological, geological, or other elements that are rare or unique as documented by the NH Natural Heritage Bureau or as determined by a professional?

Some wetlands may have locally rare or unique attributes that may not otherwise be recognized by the NH Method.

> **How to Answer the Question:** Using field observation, local/professional knowledge and review of the NH Natural Heritage Bureau records, determine if there are any known exemplary natural communities (e.g. Atlantic White Cedar Swamp, Black Gum Swamp, vernal pools) or rare or endangered plants within the wetland complex. See Appendix A in the NH Method for links to the publication *Natural Communities of NH*, which includes a form to report possible rare or exemplary natural communities and a key to the communities. In addition, look for any significant geological features associated with the wetland that might be unique or rare in the area. Document your rationale in the observations and notes section of the data form.

Question 5 – Is the wetland known to contain a documented historical or archaeological site?

Certain wetlands may contain or be adjacent to important historic or archaeological sites such as old mill ponds or Indian encampments. Native Americans frequently lived near wetlands, and used resources provided by the wetland itself. Early settlers had a need for water which they found in ample supply in and around wetlands. Water power was harnessed to provide power for milling flour, sawing timber, and eventually for manufacturing.

> **How to Answer the Question:** Consult town historic resources or inquire through the state archaeological office to determine known or documented evidence of historic or archaeological sites in the wetland. **Note:** It is recommended that the specific location of archaeological sites should be kept confidential to reduce the possibility of vandalism.

Question 6 – Is the wetland hydrologically connected to a state or federally designated river within ¼ mile of the wetland's outlet?

Wetlands that are hydrologically connected to State Designated Rivers or federally designated Wild and Scenic Rivers form an important component of the ecology of that river system. River resources may be protected under these state and federal programs.

> **How to Answer the Question:** Determine whether the wetland is hydrologically connected (by a stream, river, lake or pond) to a river designated under the New Hampshire Rivers Management and Protection Program or the National Wild and Scenic Rivers Program within ¼ mile of the wetland's outlet.

Question 7 – Is the wetland one of just a few left in an urban setting?

Wetlands that are among just a few left in an urban area, especially if they are relatively large and have an adequate buffer, may be among the last refuges for wildlife, and can provide important habitat for migratory birds. These wetlands also provide natural viewscapes and educational opportunities for people living in urban areas.

> **How to Answer the Question:** Establish if the wetland has local significance because of its setting in an urban area.

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

1 – ECOLOGICAL INTEGRITY

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there land uses in the wetland's watershed that could degrade water quality in the wetland?		a. Less than 5% of the watershed has land uses that could degrade water quality. b. 5-10% of the watershed has land uses that could degrade water quality. c. > 10% of the watershed has land uses that could degrade water quality.	10 5 1
2. Is there evidence of fill in the wetland?		a. Less than 1 % b. From 1-3 % c. More than 3 %	10 5 1
3. What percentage of the wetland has been altered by agricultural activities?		a. Less than 5 % b. From 5 to 25 % c. More than 25 %	10 5 1
4. What percentage of the wetland has been adversely impacted by logging activity within the last 10 years?		a. Less than 1% b. From 1 to 10 % c. More than 10 %	10 5 1
5. How much human activity is taking place in the wetland (e.g. ATV use, trails, cars, dumping of brush and garbage, etc.)?		a. Low: Few trails in use, little or no traffic, and little or no litter. b. Moderate: Some used trails, roads, litter c. High: Many trails, roads, and/or litter	10 5 1
6. What percentage of the wetland is occupied by invasive plant species?		a. None b. 1-5% of the wetland has invasive species c. > 5% of the wetland has invasive species	10 5 1
7. Are there roads, driveways and/or railroads crossing or adjacent to the wetland or come within 500 ft. of the wetland?		a. No roads, driveways or railroads. within 500 ft. of, or in the wetland b. Roads, driveways, railroads are within 500 ft of the wetland c. Roads, driveways, railroads cross, or are adjacent to, the wetland	10 5 1
8. How much human activity is taking place in the upland within 500 feet of the wetland edge?		a. Less than 5% or no activity b. Human activity evident in up to 25% of the 500 ft zone c. Human activity evident in more than 25% of the 500 ft zone	10 5 1
9. What is the percent of impervious surface within 500 feet of the wetland edge?		a. Less than 3% impervious area within 500 ft of the wetland edge b. 3-10% impervious area within 500 ft of the wetland edge c. Greater than 10% impervious area within 500 ft of the wetland edge	10 5 1
10. Is there a human-made structure that regulates the flow of water through the wetland?		a. No human made structures present **upstream of, or in** the wetland. b. One or more human made structures present **upstream of, or** in the wetland but hydrologic modification is slight c. One or more human made structures present **upstream of, or** in the wetland that severely block or alter surface water hydrology	10 5 1

AVERAGE SCORE FOR ECOLOGICAL INTEGRITY
(Add scores for each question and divide by 10) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

2 – WETLAND-DEPENDENT WILDLIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the wetland acreage (including upland islands)?		a. More than 100 acres b. From 20 - 100 acres c. Less than 20 acres	10 5 1
2. What is the score for Ecological Integrity?		Average score for **Ecological Integrity**	_____
3. Has water quality in the wetland been degraded by land use in the watershed?		Record Answer from **Ecological Integrity**, Question 1	_____
4. What is the area of shallow permanent open water less than 6.6 feet deep, including streams and shallow ponds that are part of the wetland complex?		a. More than 3 acres b. From 0.5 to 3 acres c. Less than 0.5 acre	10 5 1
5. Is there deepwater habitat (lakes or ponds > 6.6ft deep) and/or 4th order or higher rivers associated with the wetland?		a. Deepwater stream ≥1 mile long and/or lake or pond ≥10 acres present b. Deepwater stream < 1 mile long and/or lake or pond < 10 acres present c. No deepwater stream, lake or pond present	10 5 1
6. What is the diversity of vegetation classes in the wetland? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more wetland classes (including upland islands) present b. Two wetland classes (including upland islands) present c. One wetland class present	10 5 1
7. Are other wetlands in close proximity to the study wetland?		a. Other connected or unconnected wetlands within a 0.25 mile distance b. Wetland connected to other wetlands within a 0.5 to 1 mile distance by perennial stream or lake, **OR** other unconnected wetlands are present within a 0.25 to 0.5 mile distance c. Wetland not hydrologically connected to other wetlands within 1 mile and more than 0.5 miles from other unconnected wetlands.	10 5 1

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

2 – WETLAND-DEPENDENT WILDLIFE HABITAT (continued)

Evaluation Questions	Observations & Notes	Answers	Score
8. Are there wildlife travel corridors allowing access to other wetlands?		a. Free access along well vegetated stream corridor, woodland, or lakeshore b. Access partially blocked by roads, urban areas, or other obstructions c. Access blocked by roads, urban areas, or other obstructions	10 5 1
9. What percentage of the wetland edge is bordered by undisturbed woodland or idle land (e.g. shrub land or abandoned fields) at least 500 feet in width?		a. More than 95% of the wetland b. More than 75-95% of the wetland c. Less than 75% of the wetland	10 5 1
10. What percentage of the wetland is occupied by invasive plant species?		Record Answer from **Ecological Integrity**, Question 6	_____

AVERAGE SCORE FOR WILDLIFE HABITAT
(Add scores for each question and divide by 10) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

3 – FISH AND AQUATIC LIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the dominant land use in the watershed above wetland?		a. Woodland, wetland, or abandoned farmland b. Active farmland or rural residential c. Urban and heavily developed suburban areas, commercial and industrial areas.	10 5 1
2. Has water quality in the wetland been degraded by land use in the watershed?		Record Answer from **Ecological Integrity**, Question 1	_____
3. What is the area of <u>shallow</u> permanent open water less than 6.6 ft deep, including streams and ponds within the wetland?		Record Answer from **Wetland-Dependent Wildlife Habitat**, Question 4	_____
4. What is the acreage of <u>deepwater</u> habitats deeper than 6.6 feet (pond or lake) associated with the wetland?		a. More than 100 acres b. From 10 to 100 acres c. Less than 10 acres d. deepwater pond or lake not present	10 5 1 0
5. What is the width (bank to bank) of the stream within the wetland?		a. More than 50 feet b. From 25 to 50 feet c. Less than 25 feet d. No stream present	10 5 1 0
6. Does the stream channel appear to have been recently altered?		a. Stream is in a natural channel, either a meandering low gradient stream, **OR** a steeper gradient stream with pools and riffles b. Portions of stream appear recently modified, **OR** stream formerly channelized but has regained some natural channel features c. Stream appears to have been recently been channelized, **OR** stream is confined in a non-vegetated chute or pipe d. No stream present	10 5 1 0
7. Within the wetland, what is the diversity of substrate types in the area(s) <u>occupied by open water</u> (flowing or standing) for the non-growing season?		a. 4 or more substrate types b. 2 or 3 substrate types c. 1 substrate type	10 5 1
8. How abundant are coarse woody material and large rocks associated with the open water portion of the wetland?		a. Moderately Abundant to Abundant: More than 10% of the open water portion of the wetland area contains cover objects such as logs, stumps, branches and rocks b. Scarce: Less than 10% of the ~~water~~ open water portion of the wetland wetland area contains cover objects c. No visible woody materials or rocks	10 5 1

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Evaluation Questions	Observations & Notes	Answers	Score
9. What is the abundance of floating & submerged vegetation?	Date of Observation:	a. Abundant: More than 70% of water area contains cover objects such as pond lilies, pondweed, and bladderwort b. Moderately abundant: From 30 to 70% of water area contains floating and submerged vegetation c. Scarce: Less than 30% of the water area contains floating and submerged vegetation	10 5 1
10. Are there artificial barriers to the passage of aquatic life? **(e.g. dams, elevated culverts, bridge with a width less than the natural stream channel, road crossings, etc. along the stream reach associated with the wetland).**		a. No artificial barrier(s) present. b. An artificial barrier is present and equipped with a fish ladder or other provisions for fish passage, or artificial barrier is only present during extreme low water c. Dam, elevated culverts or other artificial barrier(s) is present without provisions for fish passage d. Stream not present	10 5 1 0
11. Are fish or aquatic species present that are rare, threatened, endangered or "Species of Greatest Conservation Need"?		a. Documented occurrence of a rare or endangered fish or aquatic life species within or immediately adjacent to the subject wetland b. Documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland and suitable habitat exists for this species within the wetland c. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, but suitable habitat exists and wetland is within range of one or more rare species d. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, and suitable habitat is not known to exist	10 5 1 0

AVERAGE SCORE FOR FISH & AQUATIC LIFE HABITAT
(Add scores for each question and divide by 11) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

4 – SCENIC QUALITY

Primary viewing Site: _____

Evaluation Questions	Observations & Notes	Answers	Score
1. How many wetland vegetation classes are visible from the primary viewing location(s)? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more classes b. Two classes c. One class	10 5 1
2. Is there public access at the viewing site?		a. Viewing site is on a property with public access, and trails to the site, or site is along a road. b. Wetland is on property with public access but no trails to the site. c. Wetland is on a property that does not have public access.	10 5 1
3. What is the visible extent across the wetland?		a. Large expanse visible and low growing plants, or mixed vegetation classes you can see through b. View is somewhat restricted by trees and shrubs c. Forested or scrub-shrub wetland with little or no expanse visible.	10 5 1
4. What is the approximate extent of open water (including streams) visible from the primary viewing location/s?		a. More than 3 acres b. From 1 to 3 acres c. Less than 1 acre	10 5 1
5. Does the wetland provide visual contrast with the surrounding landscape?		a. High level of visual contrast with surrounding natural landscape. b. Some visual contrast with surrounding natural landscape c. Little visual contrast with surrounding landscape, or surrounding landscape is developed	10 5 1
6. What is the general appearance of the wetland and surrounding land use(s) visible from primary viewing location(s)?		a. Wetland is undisturbed and natural. No visual detractors, such as buildings, litter, abandoned cars, or powerlines b. Limited disturbance in and/or around wetland. Minor visual detractors c. Severe visual detractors present	10 5 1

AVERAGE SCORE FOR SCENIC QUALITY
(Add scores for each question and divide by 6) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

5 – EDUCATIONAL POTENTIAL

Primary Educational Site(s): _____

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the Ecological Integrity of the wetland?		Average Score from **1- Ecological Integrity**	_____
2. Does the wetland have high value wildlife habitat?		Average Score from **2 – Wetland-Dependent Wildlife Habitat**	_____
3. Does the wetland have high value fish and aquatic life habitat?		Average Score from **3 – Fish & Aquatic Life Habitat**	_____
4. Is all or part of the wetland on public or private property that has public or private access (i.e. with written permission)?		a. Wetland is on a property with public or private access and trails to the site. b. Wetland is on a property with public or private access but no trails to the site. c. Wetland is on a property that does not currently have public or private access.	10 5 1
5. How close is the educational site to off-road parking suitable for 5-10 vehicles or large enough for a school bus?		a. Adequate parking is available less than a 5 minute walk from the educational site. b. Adequate parking is a 5-15 minute walk from educational site, or parking is limited to less than 5 cars. c. Adequate parking is more than 15 mins walk from the educational site, or no adequate parking is available.	10 5 1
6. How many wetland vegetation classes are accessible or potentially accessible for study at the educational site? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more wetland vegetation classes b. Two wetland vegetation classes c. One wetland vegetation class	10 5 1
7. Is there access to open water (include streams) associated with the wetland at educational site?		a. Direct access to water available b. Water access is a short distance (5 mins or less) from the educational site c. No access or access not feasible d. No open water	10 5 1 0
8. What is the aesthetic and visual quality of the educational site?		Average Score from **4 – Scenic Quality**	_____
9. Is the educational site accessible to the disabled?		a. Yes b. No	10 0

AVERAGE SCORE FOR EDUCATIONAL POTENTIAL
(Add scores for each question and divide by 9) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

6 – WETLAND-BASED RECREATION (CANOEING, KAYAKING, AND WILDLIFE OBSERVATION)

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there opportunities for wildlife observation?		Average score for **2 – Wetland-Dependent Wildlife Habitat**	_____
2. Is there access to suitable open water for canoes and kayaks?		a. Open water is present, with easy access b. Open water is present, but site is not easily accessed for canoes/kayaks. c. Open water is present but no access is allowed or possible d. No open water suitable for canoe/kayak	10 5 1 0
3. Are there trail-based recreation opportunities?		a. Maintained trails are present in and immediately adjacent to the wetland b. Trails are present but not maintained c. No trails are present	10 5 1
4. Are there off-trail recreation opportunities?		a. Wetland has open water greater than 0.5 acres in size **AND** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. b. Wetland has open water greater than 0.5 acres in size **OR** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. c. Wetland has neither open water nor an undisturbed buffer greater than 75% d. No access to potential recreation site or access not feasible	10 5 1 0
5. Is there off-road public parking at the potential recreation site for at least two cars?		a. Adequate parking is available less than 5 minutes from the recreation site. b. Adequate parking is a 5-10 minute walk from the recreation site, or parking is limited. c. Adequate parking is more than 10 minutes walk from the recreation site, or no adequate parking is available. d. No access to potential recreational site or access is not feasible	10 5 1 0
6. What is the scenic quality of the potential recreational site?		Average score from **4 – Scenic Quality**	_____

AVERAGE SCORE FOR WATER-BASED RECREATION
(Add scores for each question and divide by 6) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

7 – FLOOD STORAGE

Instead of manually calculating the Wetland Flood Index on this data sheet, you can use the Flood Index Worksheet, an Excel spreadsheet provided on the NH Method website which is set up to do all the calculations for you. An example of the spreadsheet is provided in Table 3.

Note that this function is scored somewhat differently from the other NH Method function. A series of factors are developed that are then use to derive the Flood Storage Index. The numerical scores for the factors do not correspond to the 10, 5, 1, 0 scoring scale used in the other functions.

In the following situations, the Flood Value Index does not need to be calculated for the wetland being studied. Instead a certain flood index range can be assumed:

1. Wetlands with slopes greater than 10% (10' vertical :100' horizontal) as measured along the flow path, where it is obvious that little flood attenuation could occur, **should be assigned a Low Flood Index Value range (0.0 to 0.9).**
2. For large ponds or lakes or wetlands with ponded water surface area greater than 200 acres and streams that are Fourth Order or higher (i.e. 4th, 5th, 6th etc.) **assign a High Flood Index Value range (7.6 to 10.0)**

Evaluation Questions	Observations and Notes	Answers	Factor
1. What is the Wetland Acreage (W)? *Be sure to EXCLUDE the acreage of any upland islands from the total wetland acreage*		_____acres	
2. What is the Watershed Acreage (S)?		_____acres	
3. What is the Water Storage Depth in the wetland (D)?		a. Use the actual water storage depth if known b. Assign a default value of 1.0 if the wetland is located in a 100 year floodplain c. Assign a default value of 1.0 ft if the actual water storage depth is not known	**D**= ___ ft **D**=1.0 ft **D**=1.0 ft
4. What is the Wetland Storage Volume (V)?		Multiply Water Storage Depth by Wetland acreage: D x W = V	**V**=_____ acre feet
5. Wetland Storage Volume Factor (F)		Insert value from Table 1	**F**= _____
6. Watershed Area Factor (A)		Insert value from Table 2	**A**=_____
7. Location of wetland within the watershed (L) *(Choose the highest factor that applies)*		a. Wetland located within 1,000 ft of a 4th order or higher stream OR within 1000 ft of a pond/lake that outlets to a 4th order or higher stream b. Wetland located within 500 ft of a perennial stream (less than 4th order) c. Neither of the above situations apply to the study wetland	1.0 0.8 0.6

SCORE FOR WETLAND FLOOD INDEX = F x A x L x 10 _____

Use the score to locate the Value Range below and assign Flood Index Value

Wetland Flood Index Values	Flood Value Type
0.0 – 0.9	Low Flood Value
1.0 – 2.5	Low to Moderate Flood Value
2.6 – 5.0	Moderate Flood Value
5.1 – 7.5	Moderate to High Flood Value
7.6 – 10.0	High Flood Value

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

TABLE 1*	
Wetland Storage Volume Factor (F)	
Wetland Storage Volume (V) (acre-feet)	**Value of F**
≥ 200	1.000
150	0.950
100	0.900
75	0.850
50	0.800
37.5	0.750
25	0.700
18.75	0.650
12.5	0.600
9.375	0.550
6.25	0.500
4.69	0.450
3.125	0.400
2.36	0.350
1.6	0.300
1.2	0.250
0.8	0.200
0.6	0.150
0.4	0.100
0.3	0.075
0.2	0.050
0.15	0.037
0.1	0.025
0.05	0.012
0	0.000

TABLE 2*	
Watershed Area Factor (A)	
(P) Wetl. Area/Wshed Area x 100	**Value for A**
≥10%	1.00
9%	0.95
8%	0.90
7%	0.85
6%	0.80
5%	0.75
4%	0.70
3%	0.65
2%	0.60
1%	0.55
< 1%	0.50

(you will need to interpret your value to the closest value in Tables 1 and 2)

SEE BELOW LEFT FOR EXAMPLES OF WETLAND FLOOD INDEX CALCULATION:

Example 1: *(See Wetland I.D. 1 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 0.25 acres
Watershed Area (S) = 25 acres
Water Storage Depth (D) = 0.5 ft (known depth)
Water Storage Volume (V) = 0.5 ft x 0.25 acres = 0.125 acre-feet
Wetland Storage Volume Factor (F) = 0.03 (from Table 1)
Watershed Area Factor (A) = 0.55 (from Table 2, where 0.25 acres/25 acres x 100 = 1%)
Location in Watershed (L) = 0.8
Wetland Flood Index = 0.03 x 0.55 x 0.80 = 0.0132
Flood Value Type = Low Flood Value

Example 2: *(see Wetland I.D. W3 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 33 acres
Watershed Area (S) = 17,937 acres
Water Storage Depth (D) = 1.0 ft (default value)
Water Storage Volume (V) = 1.0 ft x 33 acres = 33 acre-feet
Wetland Storage Volume Factor (F) = 0.73 (from Table 1)
Watershed Area Factor (A) = 0.5 (from Table 2, where 33 acres/17,937 acres x 100 = 0.18%)
Location in Watershed (L)= 1.0
Wetland Flood Index Value Type = 0.73 x 0.5 x 1.0 = 3.65
Flood Value = Moderate Flood Value

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Table 3: Example of Flood Index Worksheet for Multiple Wetlands

Use the Excel spreadsheet on the NH Method Website
for automated calculation of the Flood Water Storage Index

Flood Index = (F x A x L) x 10
Where:
Maximum Wetland Storage Volume = 200 acre-ft
Maximum Wetland Flood Function Value = 10

"Red" headings indicate data input columns
"Black" headings indicate columns where the figures are automatically calculated

Wetland I.D.	Wetland Acreage (W)	Watershed Acreage (S)	Wetland Area as % of Watershed (P) from Table 2	Watershed Area Factor (A) Table 2	Location in Watershed (L) (1.0/0.8/0.6)	Water Storage Depth feet (D) 1.0 = default	Wetland Storage Volume acre feet (D) acre feet	Wetland Storage Volume Factor (F) Table 1	Flood Index
1	0.25	25	1.00	0.55	0.8	0.5	0.125	0.03	**0.132**
2	0.75	15	5.00	0.75	1	1	0.75	0.19	**1.425**
3	2	50	4.00	0.7	0.8	2.5	5	0.46	**2.576**
4	10	100	10.00	1	1	3	30	0.72	**7.200**
5	10	1000	1.00	1	1	4	40	0.77	**7.700**
6	3	47	6.38	0.81	0.8	2	6	0.48	**3.110**
7	0.1	3	3.33	0.42	0.6	0.5	0.05	0.016	**0.040**
8	0.75	20	3.75	0.68	0.6	0.15	0.1125	0.027	**0.110**
9	1	50	2.00	0.6	1	2.5	2.5	0.35	**2.100**
10	50	400	12.50	1	0.8	3	150	0.95	**7.600**
W1	283	19548	1.45	0.57	1	1	283	1	**5.700**
W3	33	17937	0.18	0.5	1	1	33	0.73	**3.650**
W4	54	17291	0.31	0.5	1	1	54	0.73	**3.650**
W5	202	16619	1.22	0.56	1	1	202	1	**5.600**
W6	175	2664	6.57	0.82	1	1	175	0.95	**7.790**
W7	40	446	8.97	0.94	1	1	40	0.78	**7.332**
W8	24	380	6.32	0.51	1	1	24	0.69	**3.519**
W9	43	679	6.33	0.51	1	1	43	0.77	**3.927**
W10	116	2161	5.37	0.77	1	1	116	0.92	**7.084**
W11	63	880	7.16	0.86	1	1	63	0.83	**7.138**
W12	24	3302	0.73	0.86	1	1	24	0.69	**5.934**
ND1	93.7	5169	1.81	0.57	1	1	93.7	0.88	**5.016**
ND2	50	3741	1.34	0.57	1	1	50	0.8	**4.560**
ND3	37	258	14.34	1	1	1	37	0.75	**7.500**
ND4	101	2700	3.74	0.68	1	1	101	0.9	**6.120**
ND5	110.5	562	19.66	1	1	1	110.5	0.92	**9.200**
ND6	99	1753	5.65	0.77	1	1	99	0.9	**6.930**

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

8 – GROUNDWATER

Note that this function does not require any field work

Evaluation Questions	Observations & Notes	Answers	Score
1. Does the wetland overlie a stratified drift aquifer?		a. Wetland overlies **a** stratified drift aquifer b. Wetland is within ¼ mile of a stratified drift aquifer c. Wetland is more than ¼ mile from **a** stratified drift aquifer	10 5 1
2. Is the wetland in a potential public water supply area?		a. Wetland is in an area identified by Favorable Gravel Well Analysis b. Wetland is within ¼ mile of an area identified by Favorable Gravel Well Analysis c. Wetland is more than ¼ mile from an area identified by Favorable Gravel Well Analysis	10 5 1
3. Is the wetland within a public wellhead protection area?		a. More than 75% of the wellhead protection area includes the wetland b. 25%-75% of the wellhead protection area includes the wetland c. Less than 25% of the wellhead protection area includes the wetland	10 5 1
4. What is the percent coverage of highly permeable soils within 100 ft of the wetland? *Refer to Table 3 to answer this question*		a. More than 50% of the soil types within 100 ft of the wetland are on the list in Table 3. b. 25-50% of the soil types within 100 ft of the wetland listed in Table 3 c. Less than 25% of soil types within 100 ft of the wetland are listed in Table 3	10 5 1
5. What is the percent coverage of the highly permeable soil types listed in Table 4 within the wetland? *Refer to Table 4 to answer this question*		a. More than 50% of the soil types within the wetland are on the list in Table 4 b. 25-50% of the soil types within the wetland listed in Table 4 c. Less than 25% of the soil types within the wetland are listed in Table 4	10 5 1

AVERAGE SCORE FOR GROUND WATER
(Add scores for each question and divide by 5) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Table 3: SAND & GRAVEL SOIL TYPES

***Note**: This list of soils was prepared for the purpose of providing an additional data layer for consideration under the groundwater function – i.e. to include areas that are not mapped as aquifer recharge areas yet contain surface soils with coarse particle sizes which enhance infiltration.*

Number & Slope Classes[1]	Map Unit name & Particle Size Groups[2]	Drainage Class[3]	Record % of 100-ft. wetland buffer
12 B,C,D	Hinckley gravelly LS	ED	
21 B,C,D	Colton, gravelly LS	ED	
22 B,C,D	Colton LS	ED	
24 B,C	Agawam FSL & LS	WD	
25 B,C,D	Ninigret-Windsor complex LS	MWD/WD	
26 B,C,D	Windsor LS	ED	
35 B,C,D	Champlain LS	SED	
36 B,C,D	Adams LFS	SED	
22 A,B,E	Colton S&G	ED	
212 B,C	Hinckley, very gravelly LS	ED	
222 B,C,D	Colton, very stony LS	ED	
236 B,C,D	Adams, very stony FLS	SED	
300	Udipsamments	SED	
313	Deerfield, LS	MWD	
350	Udipsamments	SED	
400	Udorthents, S	ED	
526 B,C	Caesar LS	ED	

1. SLOPE CLASSES

A, B = 0 – 8% (includes 'A' on older maps) C = 8 – 15% D = 15 – 25% E = > 25%

2. PARTICLE SIZE GROUPS

F = fine L = loam S = sand LS = loamy sand SL = sandy loam G = gravel

3. DRAINAGE CLASSES

WD = well drained SED = somewhat excessively drained ED = excessively drained MWD = moderately well drained

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Table 4: HIGHLY PERMEABLE WETLAND SOIL TYPES THAT POTENTIALLY CONTRIBUTE TO RECHARGE DURING DRY SEASONS.

Map Symbol	Soil Name	Drainage Class			
		Somewhat Poorly Drained	Poorly Drained	Very Poorly Drained	Record % of wetland area
15	Searsport			X	
34	Wareham		X		
115	Scarboro			X	
125	Scarboro, very stony			X	
214	Naumberg		X		
314	Pipestone		X		
315	Mashpee		X		
325	Scarboro variant			X	
326	Scarboro variant, very stony			X	
393	Timakwa			X	
394	Chocorua variant			X	
395	Chocorua			X	
433	Grange		X		
546	Walpole		X		
547	Walpole, stony		X		
614	Kinsman		X		
615	Augres		X		
900	Endoaquents, sandy		X	X	
913	Sudbury variant	X			
914	Duane variant	X			
915	Deerfield variant	X			
916	Croghan variant	X			
918	Madawaska variant	X			
992	Pondicherry			X	
				Total percent	_____%

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

9 – SEDIMENT TRAPPING

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Average score from 7 – Flood Water Storage.	____
2. Does the wetland lack outlet or have a constricted outlet?		a. Wetland has no outlet or has a constricted outlet or is ponded above the outlet b. Wetland has an outlet but flow path through wetland is primarily sheet flow c. Wetland outlet not constricted or flow primarily within stream channel.	10 5 1
3. What is the character of water flow through the wetland? $\frac{\textit{Channel Length}}{\textit{Straight line distance of stream}}$ = *Sinuosity Ratio*		a. At least one of the following situations apply: • No stream channel OR • Inlet present but no outlet OR • Outlet is im pounded and standing water present in downstream end of wetland OR • Inlet and outlet present and channel sinuosity is $\geq$ 1.5 b. Inlet and outlet present, and sinuosity of channel is >1.0 and <1.5 c. Channel is straight (sinuosity=1.0) and no impoundments within wetland or at wetland outlet	10 5 1
4. What is the ratio of the wetland's size to the size of its watershed? $\frac{\textit{Acres of Wetland}}{\textit{Area of watershed above wetland outlet}} \times 100$		a. Wetland is more than 10% of its watershed b. Wetland is between 1-10% of its watershed. c. Wetland is less than 1% of its watershed.	10 5 1
5. What is the gradient within the wetland?		a. Wetland has gradient < 0.5% or no outlet b. Wetland gradient is 0.5% to 3% c. Wetland has gradient greater than 3%.	10 5 1
6. What is the areal extent (% coverage) all vegetation types that will most likely trap sediments? (e.g. forested swamps, scrub shrub swamps, and persistent emergent marshes) *Refer to Appendix F for more information about wetland vegetation classes.*		a. Persistent emergent plants (stems above surface of water /wetland throughout the year), trees and/or shrubs cover at least 90% of the surface area of the wetland. b. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover 50-90% of the wetland's surface area. c. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover <50% of the wetland's surface area.	10 5 1
7. What is the average water depth in the wetland during growing season?		a. Average water depth is < 1 ft or there is no open water b. Average water depth > 1 ft and < 6.6 ft. c. Average water depth is greater than 6.6 ft	10 5 1

AVERAGE SCORE FOR SEDIMENT TRAPPING:
(Add scores for each question and divide by 7) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

10 – NUTRIENT REMOVAL/RETENTION/TRANSFORMATION

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Average score from **7 – Flood Storage.**	_____
2. What is the wetland's ability to trap sediments?		Average score from **9 – Sediment Trapping.**	_____
3. **What is the extent (percent cover) of persistent emergent vegetation, trees and/or shrubs within the wetland?**		Record answer from **9 – Sediment Trapping**, Question 6	_____
4. What hydroperiod occurs over more than 50% of the wetland?		a. Semi-permanently flooded, seasonally flooded/saturated, or saturated b. Seasonally flooded, seasonally flooded/well-drained or temporarily flooded c. Permanently flooded or intermittently exposed	10 5 1
5. What hydric soils cover the greatest percentage of the wetland?		a. Wetland is dominated by fine textured soils (refer to Table A, Appendix D) b. Wetland is dominated by organic and/or peat soils (refer to Table B, Appendix 3) c. Wetland is dominated by sands and gravels (refer to Table C, Appendix D)	10 5 1

AVERAGE SCORE FOR NUTRIENT TRANSFORMATION
(Add scores for each question and divide by 5) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

11 – SHORELINE ANCHORING

If there is no stream, river, lake or pond within or adjacent to the wetland, leave this Function out of the evaluation.

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the gradation of wetland vegetation types along the shoreline?		a. Three or more wetland vegetation types present (PAB, PEM, PSS or PFO) b. Two wetland vegetation types present c. One wetland vegetation type present	10 5 1
2. What is the vegetation density in the wetland bordering watercourse, lake or pond?		a. High: More than 90% woody or persistent vegetation cover b. Moderate: From 70-90% woody or persistent vegetation cover c. Low: Less than 70% woody or persistent vegetation cover	10 5 1
3. How wide is the wetland bordering the watercourse, lake or pond?		a. More than 20 feet b. From 10-20 feet c. Less than 10 feet	10 5 1
4. How "rough" is the substrate of the wetland at the shoreline of the waterbody?		a. Wetland substrate characterized by many boulders, stones or cobbles and woody material b. Wetland substrate has few boulders, stones or cobbles, or substrate is mostly gravel or coarse sands and little woody material c. Wetland substrate is uniformly smooth and is comprises of clays, silts or very fine sands or organic materials and no woody material	10 5 1

AVERAGE SCORE FOR SHORELINE ANCHORING
(Add scores for each question and divide by 4) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

12 – NOTEWORTHINESS

Describe noteworthy features in the wetland narrative

Note that the scores for this function are totaled and NOT averaged

Evaluation Questions	Observations & Notes	Answers	Score
1. Is the wetland located in or within 500 ft of an area of Highest Ranked Habitat (state or regional level), as identified on the NH Wildlife Action Plan Highest Ranked Habitat Condition map?		a. Yes	10
2. Does the wetland have local significance because has consistently high scores for all functions and/or is among the top ten largest wetlands in town?		a. Yes	10
3. Does the wetland have local, regional or statewide significance because it is it located in a priority area, is documented in a local or regional conservation plan, or it has been recognized as having regional importance in the state?		a. Yes	10
4. Does the wetland have known biological, geological, or other elements that are rare or unique as documented by the NH Natural Heritage Bureau or as determined by a professional?		a. Yes	10
5. Is the wetland known to contain a documented historical or archaeological site?	*Reference the documentation here:*	a. Yes	10
6. Is the wetland hydrologically connected to a state or federally designated river within ¼ mile of the wetland's outlet?		a. Yes	10
7. Is the wetland one of just a few left in an urban setting?		a. Yes	10

TOTAL SCORE FOR NOTEWORTHINESS _____

Add up the scores for all questions which received a YES answer.
The total score is the score for this function (**note that this score is not averaged).**
For example, if you answered YES to four questions, the score would be 40.
If you answered YES to only one question, the score is 10

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

1 – ECOLOGICAL INTEGRITY

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there land uses in the wetland's watershed that could degrade water quality in the wetland?		a. Less than 5% of the watershed has land uses that could degrade water quality. b. 5-10% of the watershed has land uses that could degrade water quality. c. > 10% of the watershed has land uses that could degrade water quality.	10 5 1
2. Is there evidence of fill in the wetland?		a. Less than 1 % b. From 1-3 % c. More than 3 %	10 5 1
3. What percentage of the wetland has been altered by agricultural activities?		a. Less than 5 % b. From 5 to 25 % c. More than 25 %	10 5 1
4. What percentage of the wetland has been adversely impacted by logging activity within the last 10 years?		a. Less than 1% b. From 1 to 10 % c. More than 10 %	10 5 1
5. How much human activity is taking place in the wetland (e.g. ATV use, trails, cars, dumping of brush and garbage, etc.)?		a. Low: Few trails in use, little or no traffic, and little or no litter. b. Moderate: Some used trails, roads, litter c. High: Many trails, roads, and/or litter	10 5 1
6. What percentage of the wetland is occupied by invasive plant species?		a. None b. 1-5% of the wetland has invasive species c. > 5% of the wetland has invasive species	10 5 1
7. Are there roads, driveways and/or railroads crossing or adjacent to the wetland or come within 500 ft. of the wetland?		a. No roads, driveways or railroads. within 500 ft. of, or in the wetland b. Roads, driveways, railroads are within 500 ft of the wetland c. Roads, driveways, railroads cross, or are adjacent to, the wetland	10 5 1
8. How much human activity is taking place in the upland within 500 feet of the wetland edge?		a. Less than 5% or no activity b. Human activity evident in up to 25% of the 500 ft zone c. Human activity evident in more than 25% of the 500 ft zone	10 5 1
9. What is the percent of impervious surface within 500 feet of the wetland edge?		a. Less than 3% impervious area within 500 ft of the wetland edge b. 3-10% impervious area within 500 ft of the wetland edge c. Greater than 10% impervious area within 500 ft of the wetland edge	10 5 1
10. Is there a human-made structure that regulates the flow of water through the wetland?		a. No human made structures present **upstream of, or in** the wetland. b. One or more human made structures present **upstream of, or** in the wetland but hydrologic modification is slight c. One or more human made structures present **upstream of, or** in the wetland that severely block or alter surface water hydrology	10 5 1

AVERAGE SCORE FOR ECOLOGICAL INTEGRITY
(Add scores for each question and divide by 10) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

2 – WETLAND-DEPENDENT WILDLIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the wetland acreage (including upland islands)?		a. More than 100 acres b. From 20 - 100 acres c. Less than 20 acres	10 5 1
2. What is the score for Ecological Integrity?		Average score for **Ecological Integrity**	_____
3. Has water quality in the wetland been degraded by land use in the watershed?		Record Answer from **Ecological Integrity**, Question 1	_____
4. What is the area of shallow permanent open water less than 6.6 feet deep, including streams and shallow ponds that are part of the wetland complex?		a. More than 3 acres b. From 0.5 to 3 acres c. Less than 0.5 acre	10 5 1
5. Is there deepwater habitat (lakes or ponds > 6.6ft deep) and/or 4th order or higher rivers associated with the wetland?		a. Deepwater stream ≥1 mile long and/or lake or pond ≥10 acres present b. Deepwater stream < 1 mile long and/or lake or pond < 10 acres present c. No deepwater stream, lake or pond present	10 5 1
6. What is the diversity of vegetation classes in the wetland? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more wetland classes (including upland islands) present b. Two wetland classes (including upland islands) present c. One wetland class present	10 5 1
7. Are other wetlands in close proximity to the study wetland?		a. Other connected or unconnected wetlands within a 0.25 mile distance b. Wetland connected to other wetlands within a 0.5 to 1 mile distance by perennial stream or lake, **OR** other unconnected wetlands are present within a 0.25 to 0.5 mile distance c. Wetland not hydrologically connected to other wetlands within 1 mile and more than 0.5 miles from other unconnected wetlands.	10 5 1

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

2 – WETLAND-DEPENDENT WILDLIFE HABITAT (continued)

Evaluation Questions	Observations & Notes	Answers	Score
8. Are there wildlife travel corridors allowing access to other wetlands?		a. Free access along well vegetated stream corridor, woodland, or lakeshore b. Access partially blocked by roads, urban areas, or other obstructions c. Access blocked by roads, urban areas, or other obstructions	10 5 1
9. What percentage of the wetland edge is bordered by undisturbed woodland or idle land (e.g. shrub land or abandoned fields) at least 500 feet in width?		a. More than 95% of the wetland b. More than 75-95% of the wetland c. Less than 75% of the wetland	10 5 1
10. What percentage of the wetland is occupied by invasive plant species?		Record Answer from **Ecological Integrity**, Question 6	_____

AVERAGE SCORE FOR WILDLIFE HABITAT
(Add scores for each question and divide by 10) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

3 – FISH AND AQUATIC LIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the dominant land use in the watershed above wetland?		a. Woodland, wetland, or abandoned farmland b. Active farmland or rural residential c. Urban and heavily developed suburban areas, commercial and industrial areas.	10 5 1
2. Has water quality in the wetland been degraded by land use in the watershed?		Record Answer from **Ecological Integrity**, Question 1	_____
3. What is the area of <u>shallow</u> permanent open water less than 6.6 ft deep, including streams and ponds within the wetland?		Record Answer from **Wetland-Dependent Wildlife Habitat**, Question 4	_____
4. What is the acreage of <u>deepwater</u> habitats deeper than 6.6 feet (pond or lake) associated with the wetland?		a. More than 100 acres b. From 10 to 100 acres c. Less than 10 acres d. deepwater pond or lake not present	10 5 1 0
5. What is the width (bank to bank) of the stream within the wetland?		a. More than 50 feet b. From 25 to 50 feet c. Less than 25 feet d. No stream present	10 5 1 0
6. Does the stream channel appear to have been recently altered?		a. Stream is in a natural channel, either a meandering low gradient stream, **OR** a steeper gradient stream with pools and riffles b. Portions of stream appear recently modified, **OR** stream formerly channelized but has regained some natural channel features c. Stream appears to have been recently been channelized, **OR** stream is confined in a non-vegetated chute or pipe d. No stream present	10 5 1 0
7. Within the wetland, what is the diversity of substrate types in the area(s) <u>occupied by open water</u> (flowing or standing) for the non-growing season?		a. 4 or more substrate types b. 2 or 3 substrate types c. 1 substrate type	10 5 1
8. How abundant are coarse woody material and large rocks associated with the open water portion of the wetland?		a. Moderately Abundant to Abundant: More than 10% of the open water portion of the wetland area contains cover objects such as logs, stumps, branches and rocks b. Scarce: Less than 10% of the ~~water~~ open water portion of the wetland wetland area contains cover objects c. No visible woody materials or rocks	10 5 1

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Evaluation Questions	Observations & Notes	Answers	Score
9. What is the abundance of floating & submerged vegetation?	Date of Observation:	a. Abundant: More than 70% of water area contains cover objects such as pond lilies, pondweed, and bladderwort b. Moderately abundant: From 30 to 70% of water area contains floating and submerged vegetation c. Scarce: Less than 30% of the water area contains floating and submerged vegetation	10 5 1
10. Are there artificial barriers to the passage of aquatic life? **(e.g. dams, elevated culverts, bridge with a width less than the natural stream channel, road crossings, etc. along the stream reach associated with the wetland).**		a. No artificial barrier(s) present. b. An artificial barrier is present and equipped with a fish ladder or other provisions for fish passage, or artificial barrier is only present during extreme low water c. Dam, elevated culverts or other artificial barrier(s) is present without provisions for fish passage d. Stream not present	10 5 1 0
11. Are fish or aquatic species present that are rare, threatened, endangered or "Species of Greatest Conservation Need"?		a. Documented occurrence of a rare or endangered fish or aquatic life species within or immediately adjacent to the subject wetland b. Documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland and suitable habitat exists for this species within the wetland c. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, but suitable habitat exists and wetland is within range of one or more rare species d. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, and suitable habitat is not known to exist	10 5 1 0

AVERAGE SCORE FOR FISH & AQUATIC LIFE HABITAT
(Add scores for each question and divide by 11) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

4 – SCENIC QUALITY

Primary viewing Site: _____

Evaluation Questions	Observations & Notes	Answers	Score
1. How many wetland vegetation classes are visible from the primary viewing location(s)? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more classes b. Two classes c. One class	10 5 1
2. Is there public access at the viewing site?		a. Viewing site is on a property with public access, and trails to the site, or site is along a road. b. Wetland is on property with public access but no trails to the site. c. Wetland is on a property that does not have public access.	10 5 1
3. What is the visible extent across the wetland?		a. Large expanse visible and low growing plants, or mixed vegetation classes you can see through b. View is somewhat restricted by trees and shrubs c. Forested or scrub-shrub wetland with little or no expanse visible.	10 5 1
4. What is the approximate extent of open water (including streams) visible from the primary viewing location/s?		a. More than 3 acres b. From 1 to 3 acres c. Less than 1 acre	10 5 1
5. Does the wetland provide visual contrast with the surrounding landscape?		a. High level of visual contrast with surrounding natural landscape. b. Some visual contrast with surrounding natural landscape c. Little visual contrast with surrounding landscape, or surrounding landscape is developed	10 5 1
6. What is the general appearance of the wetland and surrounding land use(s) visible from primary viewing location(s)?		a. Wetland is undisturbed and natural. No visual detractors, such as buildings, litter, abandoned cars, or powerlines b. Limited disturbance in and/or around wetland. Minor visual detractors c. Severe visual detractors present	10 5 1

AVERAGE SCORE FOR SCENIC QUALITY
(Add scores for each question and divide by 6) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

5 – EDUCATIONAL POTENTIAL

Primary Educational Site(s): _____

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the Ecological Integrity of the wetland?		Average Score from **1- Ecological Integrity**	_____
2. Does the wetland have high value wildlife habitat?		Average Score from **2 – Wetland-Dependent Wildlife Habitat**	_____
3. Does the wetland have high value fish and aquatic life habitat?		Average Score from **3 – Fish & Aquatic Life Habitat**	_____
4. Is all or part of the wetland on public or private property that has public or private access (i.e. with written permission)?		a. Wetland is on a property with public or private access and trails to the site. b. Wetland is on a property with public or private access but no trails to the site. c. Wetland is on a property that does not currently have public or private access.	10 5 1
5. How close is the educational site to off-road parking suitable for 5-10 vehicles or large enough for a school bus?		a. Adequate parking is available less than a 5 minute walk from the educational site. b. Adequate parking is a 5-15 minute walk from educational site, or parking is limited to less than 5 cars. c. Adequate parking is more than 15 mins walk from the educational site, or no adequate parking is available.	10 5 1
6. How many wetland vegetation classes are accessible or potentially accessible for study at the educational site? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more wetland vegetation classes b. Two wetland vegetation classes c. One wetland vegetation class	10 5 1
7. Is there access to open water (include streams) associated with the wetland at educational site?		a. Direct access to water available b. Water access is a short distance (5 mins or less) from the educational site c. No access or access not feasible d. No open water	10 5 1 0
8. What is the aesthetic and visual quality of the educational site?		Average Score from **4 – Scenic Quality**	_____
9. Is the educational site accessible to the disabled?		a. Yes b. No	10 0

AVERAGE SCORE FOR EDUCATIONAL POTENTIAL
(Add scores for each question and divide by 9) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

6 – WETLAND-BASED RECREATION (CANOEING, KAYAKING, AND WILDLIFE OBSERVATION)

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there opportunities for wildlife observation?		Average score for **2 – Wetland-Dependent Wildlife Habitat**	_____
2. Is there access to suitable open water for canoes and kayaks?		a. Open water is present, with easy access b. Open water is present, but site is not easily accessed for canoes/kayaks. c. Open water is present but no access is allowed or possible d. No open water suitable for canoe/kayak	10 5 1 0
3. Are there trail-based recreation opportunities?		a. Maintained trails are present in and immediately adjacent to the wetland b. Trails are present but not maintained c. No trails are present	10 5 1
4. Are there off-trail recreation opportunities?		a. Wetland has open water greater than 0.5 acres in size **AND** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. b. Wetland has open water greater than 0.5 acres in size **OR** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. c. Wetland has neither open water nor an undisturbed buffer greater than 75% d. No access to potential recreation site or access not feasible	10 5 1 0
5. Is there off-road public parking at the potential recreation site for at least two cars?		a. Adequate parking is available less than 5 minutes from the recreation site. b. Adequate parking is a 5-10 minute walk from the recreation site, or parking is limited. c. Adequate parking is more than 10 minutes walk from the recreation site, or no adequate parking is available. d. No access to potential recreational site or access is not feasible	10 5 1 0
6. What is the scenic quality of the potential recreational site?		Average score from **4 – Scenic Quality**	_____

AVERAGE SCORE FOR WATER-BASED RECREATION
(Add scores for each question and divide by 6) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

7 – FLOOD STORAGE

Instead of manually calculating the Wetland Flood Index on this data sheet, you can use the Flood Index Worksheet, an Excel spreadsheet provided on the NH Method website which is set up to do all the calculations for you. An example of the spreadsheet is provided in Table 3.

Note that this function is scored somewhat differently from the other NH Method function. A series of factors are developed that are then use to derive the Flood Storage Index. The numerical scores for the factors do not correspond to the 10, 5, 1, 0 scoring scale used in the other functions.

In the following situations, the Flood Value Index does not need to be calculated for the wetland being studied. Instead a certain flood index range can be assumed:

1. Wetlands with slopes greater than 10% (10' vertical :100' horizontal) as measured along the flow path, where it is obvious that little flood attenuation could occur, **should be assigned a Low Flood Index Value range (0.0 to 0.9).**
2. For large ponds or lakes or wetlands with ponded water surface area greater than 200 acres and streams that are Fourth Order or higher (i.e. 4th, 5th, 6th etc.) **assign a High Flood Index Value range (7.6 to 10.0)**

Evaluation Questions	Observations and Notes	Answers	Factor
1. What is the Wetland Acreage (W)? *Be sure to EXCLUDE the acreage of any upland islands from the total wetland acreage*		_____acres	
2. What is the Watershed Acreage (S)?		_____acres	
3. What is the Water Storage Depth in the wetland (D)?		a. Use the actual water storage depth if known b. Assign a default value of 1.0 if the wetland is located in a 100 year floodplain c. Assign a default value of 1.0 ft if the actual water storage depth is not known	**D**= ___ ft **D**=1.0 ft **D**=1.0 ft
4. What is the Wetland Storage Volume (V)?		Multiply Water Storage Depth by Wetland acreage: D x W = V	**V**=_____ acre feet
5. Wetland Storage Volume Factor (F)		Insert value from Table 1	**F**= _____
6. Watershed Area Factor (A)		Insert value from Table 2	**A**=_____
7. Location of wetland within the watershed (L) *(Choose the highest factor that applies)*		a. Wetland located within 1,000 ft of a 4th order or higher stream OR within 1000 ft of a pond/lake that outlets to a 4th order or higher stream b. Wetland located within 500 ft of a perennial stream (less than 4th order) c. Neither of the above situations apply to the study wetland	1.0 0.8 0.6

SCORE FOR WETLAND FLOOD INDEX = F x A x L x 10 _____

Use the score to locate the Value Range below and assign Flood Index Value

Wetland Flood Index Values	Flood Value Type
0.0 – 0.9	Low Flood Value
1.0 – 2.5	Low to Moderate Flood Value
2.6 – 5.0	Moderate Flood Value
5.1 – 7.5	Moderate to High Flood Value
7.6 – 10.0	High Flood Value

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

TABLE 1*	
Wetland Storage Volume Factor (F)	
Wetland Storage Volume (V) (acre-feet)	**Value of F**
≥ 200	1.000
150	0.950
100	0.900
75	0.850
50	0.800
37.5	0.750
25	0.700
18.75	0.650
12.5	0.600
9.375	0.550
6.25	0.500
4.69	0.450
3.125	0.400
2.36	0.350
1.6	0.300
1.2	0.250
0.8	0.200
0.6	0.150
0.4	0.100
0.3	0.075
0.2	0.050
0.15	0.037
0.1	0.025
0.05	0.012
0	0.000

TABLE 2*	
Watershed Area Factor (A)	
(P) Wetl. Area/Wshed Area x 100	**Value for A**
≥10%	1.00
9%	0.95
8%	0.90
7%	0.85
6%	0.80
5%	0.75
4%	0.70
3%	0.65
2%	0.60
1%	0.55
< 1%	0.50

(you will need to interpret your value to the closest value in Tables 1 and 2)

SEE BELOW LEFT FOR EXAMPLES OF WETLAND FLOOD INDEX CALCULATION:

Example 1: *(See Wetland I.D. 1 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 0.25 acres
Watershed Area (S) = 25 acres
Water Storage Depth (D) = 0.5 ft (known depth)
Water Storage Volume (V) = 0.5 ft x 0.25 acres = 0.125 acre-feet
Wetland Storage Volume Factor (F) = 0.03 (from Table 1)
Watershed Area Factor (A) = 0.55 (from Table 2, where 0.25 acres/25 acres x 100 = 1%)
Location in Watershed (L) = 0.8
Wetland Flood Index = 0.03 x 0.55 x 0.80 = 0.0132
Flood Value Type = Low Flood Value

Example 2: *(see Wetland I.D. W3 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 33 acres
Watershed Area (S) = 17,937 acres
Water Storage Depth (D) = 1.0 ft (default value)
Water Storage Volume (V) = 1.0 ft x 33 acres = 33 acre-feet
Wetland Storage Volume Factor (F) = 0.73 (from Table 1)
Watershed Area Factor (A) = 0.5 (from Table 2, where 33 acres/17,937 acres x 100 = 0.18%)
Location in Watershed (L)= 1.0
Wetland Flood Index Value Type = 0.73 x 0.5 x 1.0 = 3.65
Flood Value = Moderate Flood Value

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Table 3: Example of Flood Index Worksheet for Multiple Wetlands

Use the Excel spreadsheet on the NH Method Website
for automated calculation of the Flood Water Storage Index

Flood Index = (F x A x L) x 10
Where:
Maximum Wetland Storage Volume = 200 acre-ft
Maximum Wetland Flood Function Value = 10

"Red" headings indicate data input columns
"Black" headings indicate columns where the figures are automatically calculated

Wetland I.D.	Wetland Acreage (W)	Watershed Acreage (S)	Wetland Area as % of Watershed (P) from Table 2	Watershed Area Factor (A) Table 2	Location in Watershed (L) (1.0/0.8/0.6)	Water Storage Depth feet (D) 1.0 = default	Wetland Storage Volume acre feet (D) acre feet	Wetland Storage Volume Factor (F) Table 1	Flood Index
1	0.25	25	1.00	0.55	0.8	0.5	0.125	0.03	**0.132**
2	0.75	15	5.00	0.75	1	1	0.75	0.19	**1.425**
3	2	50	4.00	0.7	0.8	2.5	5	0.46	**2.576**
4	10	100	10.00	1	1	3	30	0.72	**7.200**
5	10	1000	1.00	1	1	4	40	0.77	**7.700**
6	3	47	6.38	0.81	0.8	2	6	0.48	**3.110**
7	0.1	3	3.33	0.42	0.6	0.5	0.05	0.016	**0.040**
8	0.75	20	3.75	0.68	0.6	0.15	0.1125	0.027	**0.110**
9	1	50	2.00	0.6	1	2.5	2.5	0.35	**2.100**
10	50	400	12.50	1	0.8	3	150	0.95	**7.600**
W1	283	19548	1.45	0.57	1	1	283	1	**5.700**
W3	33	17937	0.18	0.5	1	1	33	0.73	**3.650**
W4	54	17291	0.31	0.5	1	1	54	0.73	**3.650**
W5	202	16619	1.22	0.56	1	1	202	1	**5.600**
W6	175	2664	6.57	0.82	1	1	175	0.95	**7.790**
W7	40	446	8.97	0.94	1	1	40	0.78	**7.332**
W8	24	380	6.32	0.51	1	1	24	0.69	**3.519**
W9	43	679	6.33	0.51	1	1	43	0.77	**3.927**
W10	116	2161	5.37	0.77	1	1	116	0.92	**7.084**
W11	63	880	7.16	0.86	1	1	63	0.83	**7.138**
W12	24	3302	0.73	0.86	1	1	24	0.69	**5.934**
ND1	93.7	5169	1.81	0.57	1	1	93.7	0.88	**5.016**
ND2	50	3741	1.34	0.57	1	1	50	0.8	**4.560**
ND3	37	258	14.34	1	1	1	37	0.75	**7.500**
ND4	101	2700	3.74	0.68	1	1	101	0.9	**6.120**
ND5	110.5	562	19.66	1	1	1	110.5	0.92	**9.200**
ND6	99	1753	5.65	0.77	1	1	99	0.9	**6.930**

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

8 – GROUNDWATER

Note that this function does not require any field work

Evaluation Questions	Observations & Notes	Answers	Score
1. Does the wetland overlie a stratified drift aquifer?		a. Wetland overlies **a** stratified drift aquifer b. Wetland is within ¼ mile of a stratified drift aquifer c. Wetland is more than ¼ mile from **a** stratified drift aquifer	10 5 1
2. Is the wetland in a potential public water supply area?		a. Wetland is in an area identified by Favorable Gravel Well Analysis b. Wetland is within ¼ mile of an area identified by Favorable Gravel Well Analysis c. Wetland is more than ¼ mile from an area identified by Favorable Gravel Well Analysis	10 5 1
3. Is the wetland within a public wellhead protection area?		a. More than 75% of the wellhead protection area includes the wetland b. 25%-75% of the wellhead protection area includes the wetland c. Less than 25% of the wellhead protection area includes the wetland	10 5 1
4. What is the percent coverage of highly permeable soils within 100 ft of the wetland? *Refer to Table 3 to answer this question*		a. More than 50% of the soil types within 100 ft of the wetland are on the list in Table 3. b. 25-50% of the soil types within 100 ft of the wetland listed in Table 3 c. Less than 25% of soil types within 100 ft of the wetland are listed in Table 3	10 5 1
5. What is the percent coverage of the highly permeable soil types listed in Table 4 within the wetland? *Refer to Table 4 to answer this question*		a. More than 50% of the soil types within the wetland are on the list in Table 4 b. 25-50% of the soil types within the wetland listed in Table 4 c. Less than 25% of the soil types within the wetland are listed in Table 4	10 5 1

AVERAGE SCORE FOR GROUND WATER
(Add scores for each question and divide by 5) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Table 3: SAND & GRAVEL SOIL TYPES

***Note**: This list of soils was prepared for the purpose of providing an additional data layer for consideration under the groundwater function – i.e. to include areas that are not mapped as aquifer recharge areas yet contain surface soils with coarse particle sizes which enhance infiltration.*

Number & Slope Classes[1]	Map Unit name & Particle Size Groups[2]	Drainage Class[3]	Record % of 100-ft. wetland buffer
12 B,C,D	Hinckley gravelly LS	ED	
21 B,C,D	Colton, gravelly LS	ED	
22 B,C,D	Colton LS	ED	
24 B,C	Agawam FSL & LS	WD	
25 B,C,D	Ninigret-Windsor complex LS	MWD/WD	
26 B,C,D	Windsor LS	ED	
35 B,C,D	Champlain LS	SED	
36 B,C,D	Adams LFS	SED	
22 A,B,E	Colton S&G	ED	
212 B,C	Hinckley, very gravelly LS	ED	
222 B,C,D	Colton, very stony LS	ED	
236 B,C,D	Adams, very stony FLS	SED	
300	Udipsamments	SED	
313	Deerfield, LS	MWD	
350	Udipsamments	SED	
400	Udorthents, S	ED	
526 B,C	Caesar LS	ED	

1. SLOPE CLASSES

A, B = 0 – 8% (includes 'A' on older maps) C = 8 – 15% D = 15 – 25% E = > 25%

2. PARTICLE SIZE GROUPS

F = fine L = loam S = sand LS = loamy sand SL = sandy loam G = gravel

3. DRAINAGE CLASSES

WD = well drained SED = somewhat excessively drained ED = excessively drained MWD = moderately well drained

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

Table 4: HIGHLY PERMEABLE WETLAND SOIL TYPES THAT POTENTIALLY CONTRIBUTE TO RECHARGE DURING DRY SEASONS.

Map Symbol	Soil Name	Drainage Class			
		Somewhat Poorly Drained	Poorly Drained	Very Poorly Drained	Record % of wetland area
15	Searsport			X	
34	Wareham		X		
115	Scarboro			X	
125	Scarboro, very stony			X	
214	Naumberg		X		
314	Pipestone		X		
315	Mashpee		X		
325	Scarboro variant			X	
326	Scarboro variant, very stony			X	
393	Timakwa			X	
394	Chocorua variant			X	
395	Chocorua			X	
433	Grange		X		
546	Walpole		X		
547	Walpole, stony		X		
614	Kinsman		X		
615	Augres		X		
900	Endoaquents, sandy		X	X	
913	Sudbury variant	X			
914	Duane variant	X			
915	Deerfield variant	X			
916	Croghan variant	X			
918	Madawaska variant	X			
992	Pondicherry			X	
				Total percent	_____%

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

9 – SEDIMENT TRAPPING

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Average score from 7 – Flood Water Storage.	____
2. Does the wetland lack outlet or have a constricted outlet?		a. Wetland has no outlet or has a constricted outlet or is ponded above the outlet b. Wetland has an outlet but flow path through wetland is primarily sheet flow c. Wetland outlet not constricted or flow primarily within stream channel.	10 5 1
3. What is the character of water flow through the wetland? $\frac{\textit{Channel Length}}{\textit{Straight line distance of stream}}$ = *Sinuosity Ratio*		a. At least one of the following situations apply: • No stream channel OR • Inlet present but no outlet OR • Outlet is im pounded and standing water present in downstream end of wetland OR • Inlet and outlet present and channel sinuosity is $\geq$ 1.5 b. Inlet and outlet present, and sinuosity of channel is >1.0 and <1.5 c. Channel is straight (sinuosity=1.0) and no impoundments within wetland or at wetland outlet	10 5 1
4. What is the ratio of the wetland's size to the size of its watershed? $\frac{\textit{Acres of Wetland}}{\textit{Area of watershed above wetland outlet}} \times 100$		a. Wetland is more than 10% of its watershed b. Wetland is between 1-10% of its watershed. c. Wetland is less than 1% of its watershed.	10 5 1
5. What is the gradient within the wetland?		a. Wetland has gradient < 0.5% or no outlet b. Wetland gradient is 0.5% to 3% c. Wetland has gradient greater than 3%.	10 5 1
6. What is the areal extent (% coverage) all vegetation types that will most likely trap sediments? (e.g. forested swamps, scrub shrub swamps, and persistent emergent marshes) *Refer to Appendix F for more information about wetland vegetation classes.*		a. Persistent emergent plants (stems above surface of water /wetland throughout the year), trees and/or shrubs cover at least 90% of the surface area of the wetland. b. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover 50-90% of the wetland's surface area. c. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover <50% of the wetland's surface area.	10 5 1
7. What is the average water depth in the wetland during growing season?		a. Average water depth is < 1 ft or there is no open water b. Average water depth > 1 ft and < 6.6 ft. c. Average water depth is greater than 6.6 ft	10 5 1

AVERAGE SCORE FOR SEDIMENT TRAPPING:
(Add scores for each question and divide by 7) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

10 – NUTRIENT REMOVAL/RETENTION/TRANSFORMATION

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Average score from **7 – Flood Storage.**	_____
2. What is the wetland's ability to trap sediments?		Average score from **9 – Sediment Trapping.**	_____
3. **What is the extent (percent cover) of persistent emergent vegetation, trees and/or shrubs within the wetland?**		Record answer from **9 – Sediment Trapping**, Question 6	_____
4. What hydroperiod occurs over more than 50% of the wetland?		a. Semi-permanently flooded, seasonally flooded/saturated, or saturated b. Seasonally flooded, seasonally flooded/well-drained or temporarily flooded c. Permanently flooded or intermittently exposed	10 5 1
5. What hydric soils cover the greatest percentage of the wetland?		a. Wetland is dominated by fine textured soils (refer to Table A, Appendix D) b. Wetland is dominated by organic and/or peat soils (refer to Table B, Appendix 3) c. Wetland is dominated by sands and gravels (refer to Table C, Appendix D)	10 5 1

AVERAGE SCORE FOR NUTRIENT TRANSFORMATION
(Add scores for each question and divide by 5) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

11 – SHORELINE ANCHORING

If there is no stream, river, lake or pond within or adjacent to the wetland, leave this Function out of the evaluation.

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the gradation of wetland vegetation types along the shoreline?		a. Three or more wetland vegetation types present (PAB, PEM, PSS or PFO) b. Two wetland vegetation types present c. One wetland vegetation type present	10 5 1
2. What is the vegetation density in the wetland bordering watercourse, lake or pond?		a. High: More than 90% woody or persistent vegetation cover b. Moderate: From 70-90% woody or persistent vegetation cover c. Low: Less than 70% woody or persistent vegetation cover	10 5 1
3. How wide is the wetland bordering the watercourse, lake or pond?		a. More than 20 feet b. From 10-20 feet c. Less than 10 feet	10 5 1
4. How "rough" is the substrate of the wetland at the shoreline of the waterbody?		a. Wetland substrate characterized by many boulders, stones or cobbles and woody material b. Wetland substrate has few boulders, stones or cobbles, or substrate is mostly gravel or coarse sands and little woody material c. Wetland substrate is uniformly smooth and is comprises of clays, silts or very fine sands or organic materials and no woody material	10 5 1

AVERAGE SCORE FOR SHORELINE ANCHORING
(Add scores for each question and divide by 4) _____

Wetland Name/Code:_____ Evaluation Date:_____ Evaluator:_____

12 – NOTEWORTHINESS

Describe noteworthy features in the wetland narrative

Note that the scores for this function are totaled and NOT averaged

Evaluation Questions	Observations & Notes	Answers	Score
1. Is the wetland located in or within 500 ft of an area of Highest Ranked Habitat (state or regional level), as identified on the NH Wildlife Action Plan Highest Ranked Habitat Condition map?		a. Yes	10
2. Does the wetland have local significance because has consistently high scores for all functions and/or is among the top ten largest wetlands in town?		a. Yes	10
3. Does the wetland have local, regional or statewide significance because it is it located in a priority area, is documented in a local or regional conservation plan, or it has been recognized as having regional importance in the state?		a. Yes	10
4. Does the wetland have known biological, geological, or other elements that are rare or unique as documented by the NH Natural Heritage Bureau or as determined by a professional?		a. Yes	10
5. Is the wetland known to contain a documented historical or archaeological site?	*Reference the documentation here:*	a. Yes	10
6. Is the wetland hydrologically connected to a state or federally designated river within ¼ mile of the wetland's outlet?		a. Yes	10
7. Is the wetland one of just a few left in an urban setting?		a. Yes	10

TOTAL SCORE FOR NOTEWORTHINESS _____

Add up the scores for all questions which received a YES answer.
The total score is the score for this function (**note that this score is not averaged).**
For example, if you answered YES to four questions, the score would be 40.
If you answered YES to only one question, the score is 10

5. INTERPRETING & ANALYZING THE RESULTS

The NH Method provides an important tool for the reliable and consistent evaluation of wetland functions. An important step in the assessment of wetland functions is the analysis and interpretation of the results. There are many different ways to display and interpret the results of a wetland evaluation. This section offers some general guidance for reviewing the completed data forms and using the Excel Spreadsheet described in Section 3, page 1). Several examples provide more detailed guidance on some different ways that results can be interpreted, including:

- Ways of presenting the data
- Identifying high priority wetlands
- Reporting the results of the wetland evaluation
- Using the information for establishing wetlands policy
- Identifying wetland restoration opportunities
- Documentation to obtain funding for wetland conservation projects
- General outreach and education.

A. Wetland Evaluation Report

There are three important components for compiling a wetland evaluation report: Maps, Data, and Narrative Description.

1. Reference to the Wetland Maps and Study Area Maps (see Section 2. C)

The map/s generated for each wetland and any modifications made as a result of field evaluation should be included in the report for each wetland. Each map should have the title of the study, the wetland name and or number, a north arrow indicating orientation of the map and a map scale. A publication date is also helpful. Sample maps are provided in Appendix E.

2. Evaluation Data

- **Evaluating multiple wetlands in a study area:** The Excel Spreadsheet includes a Score Summary Sheet for comparing functional scores for multiple wetlands in a study area. The data entered in each column is automatically taken from the Excel spreadsheet for each wetland evaluated. It uses the Average Score that each wetland received for each of the twelve functions evaluated by the NH Method. Using this summary sheet, the user can easily determine:
    - Highest scoring functions in each wetland
    - Lower scoring functions in each wetland (potential candidates for restoration)
    - Which wetlands have the largest number of high scoring functions?
    - Which wetlands are flagged for noteworthy features?
    - For each function, which wetlands score highest or lowest for that function?

  Section B that follows provides additional guidance on a more detailed interpretation of results.

  In general, those wetlands that score high for a number of functions are likely to be wetlands of high importance within the study area. Those wetlands that score high for only one

function may also be deemed important if that one function is the most highly valued in the study area.

- **Evaluating single wetlands in a study area:** Use the Single Wetland Score Summary Sheet provided at the end of this section (available as a Word Document on the NH Method Website), or use the Excel Score Summary for that wetland. Using this summary sheet, you can determine:
    - Which functions are scoring highest or lowest for that wetland. Potential candidates for restoration may be identified by reviewing the lower functional scores.
    - Remaining analysis depends on the purpose of the single wetland evaluation.

3. Narrative descriptions of the study area wetlands

A written description or narrative of each wetland is important because it allows the user to identify important features of the wetland that might otherwise get lost in the data and helps the user focus on the attributes of each wetland that give rise to its functions and values.

In order to help the user with the analysis of the results, it is important to refer back to the individual wetland maps and the study area map that were created to help answer the evaluation questions. To gain a sense of the importance of a wetland, it is useful to look at the juxtaposition of the wetland relative to other wetlands, streams, lakes, ponds, rivers and watershed boundaries.

A detailed description of each wetland can help formalize the analysis. The description should reference:

- the Summary Scores for the wetland/s in the study area,
- specific comments or notes made about each wetland on the evaluation sheets,
- the wetland maps and any other maps prepared as part of the evaluation, and
- photos taken of the wetland (with photo point location and direction indicated on the base map.

All of these items become part of the final report for the study with documentation for each wetland evaluated.

Below is a list of factors to include in the wetland description. A sample wetland description is given in Appendix E.

A good wetland description should include as much of the following information as is available:

- Wetland Identification (could be a number, such as Wetland 1, but sometimes a name, such as Hart's Wetland.
- Wetland photos and the location/orientation of the photo. Photos can be numbered according to a corresponding photo log that includes a description of what is seen in the photo, or the description can be included as a caption to that photo.
- Wetland Size (round up to whole acres, and if the wetland is less than one acre, in square feet as well).
- The name of the HUC 12 Watershed in which the wetland is located.
- The size of the wetland watershed that was used in the evaluation.
- The number of inlets to the wetland and whether they are perennial or intermittent. If you know of ephemeral inlets, you can mention these as well.
- The number of outlets from the wetland and whether they are perennial or intermittent.

- Note if there is a well-defined channel within the wetland, and if there is, describe the channel. Is it straight with deep cut banks that do not allow the water to interact with the adjacent soils, or is the channel sinuous or diffuse with much interaction between the surface water flows in the channel and the adjacent vegetation in the wetland?
- State the dominant NWI classification code: For example, PEM1E, and write out what that stands for: PEM1E – Palustrine, persistent emergent vegetation, seasonally flooded/saturated. If there are other NWI class codes of importance to the evaluation, then also mention them.
- Are there upland islands? Is there open water? If so, describe these features. State how many upland islands there are. Provide the acreage of open water and estimate its depth. Describe any open water/vegetative interspersion.
- Describe the dominant plants that were found within the NWI classification codes mentioned above. Are there invasive plants in the wetland or in the adjacent upland?
- Describe any wildlife or wildlife sign observed. Is the wetland located in an area identified as critical wildlife habitat in the NH Wildlife Action Plan?
- Describe how the wetland is connected to other wetlands via stream channels, either above and/or below it. If these other wetlands were evaluated as part of the study, then mention these wetlands by their Wetland Names and or Identification Codes.
- Describe the wetland functions that the wetland received a high score for and the reasons why it ranked highly for those functions. This is where the comments entered onto the data sheets for each function are put to use. Is the wetland located in a source-water protection area? Is it located in a large unfragmented landscape that has been identified as a high ranking habitat area by the NH Wildlife Action Plan? These and many other parameters can be discussed here. Describe low scoring functions and explain why they scored low.

B. Ways of Presenting the Data

Several examples are given to provide the user with ideas for their own use. Since each wetland evaluation project is different, the interpretation of the assessment data will be unique to each project. With the advent of new GIS technologies, remote data, and presentation media, there is no limit to the ways in which the assessment data can be communicated to interested parties.

Certain types of presentations can enhance the Wetlands Report components (Maps, Data and Narrative Description), and that is where creativity can play a large role in effectively communicating the findings of wetland evaluation. Table 5.1 summarizes a few presentation options for the user.

Table 5.1. Sample ways of presenting the results using different media

Media Type	Maps	Data	Narrative	Comments
Written Report	X	X	X	The standard written report contains all three components. With variously sized maps (see below), charts and tables that summarize the data, as well as written descriptions of each wetland that was assessed and how they compare to others.
Slide Show	X	X	X	A slide show (e.g. PowerPoint) can be a very effective tool for communicating the value of a wetland to a wide audience. When comparing the results of a town-wide assessment, it should contain summary tables, maps, and highlighted bullets on functional values.
Web Site	X	X	X	Making the NH Method assessment available on the web promotes broad readership and direct use of the data. Keep in mind that certain types of information may be inappropriate, such as rare species locations and parcel boundary data.
Digital Catalog	X	X		Some libraries have digital 'file catalogs' that can allow password-protected users to access the data and maps from a local assessment project. This is sometimes a more appropriate way to allow users to review individual wetland data sheets and supporting maps instead of in one bound, gigantic report.
CD/DVD	X	X	X	A good follow-up project for the map & narrative report is the transcription of the data and maps into an audiovisual file that includes a narrated, visual review of the wetlands in a given area. This can often be done with inexpensive video recorders and media processing programs.
Interactive Reporting	X	X		Another potential follow-up project to a wetland evaluation is s the creation of data forms (hard copy or digital) for reporting wildlife species observed, water quality data collected, water table levels, and other monitoring data that may have been collected from selected wetlands.

Presenting Wetland Evaluation Maps

Appendix E illustrates ways in which maps can be presented for viewing using the GRANIT Data Mapper. It includes a subject wetlands location map, a watershed map with a topographic map background, an individual wetland map showing NWI, hydric soils, and aquifer data, and a soils map for the area around the evaluation wetland. Section 2.C. of the NH Method describes the data layers that go into these maps as well as some options for creating these base maps. If the user has GIS capabilities or has assistance from a professional to create individual wetland base maps, two possible formats can be used. The first example focuses on the National Wetlands Inventory (NWI) cover classes (including any open water areas) and is presented using a USGS topographic map as the base. (Figure 5.1) Note that this map includes a title block, wetland evaluation unit identifier, a legend, a location map inset, and an accuracy disclaimer.

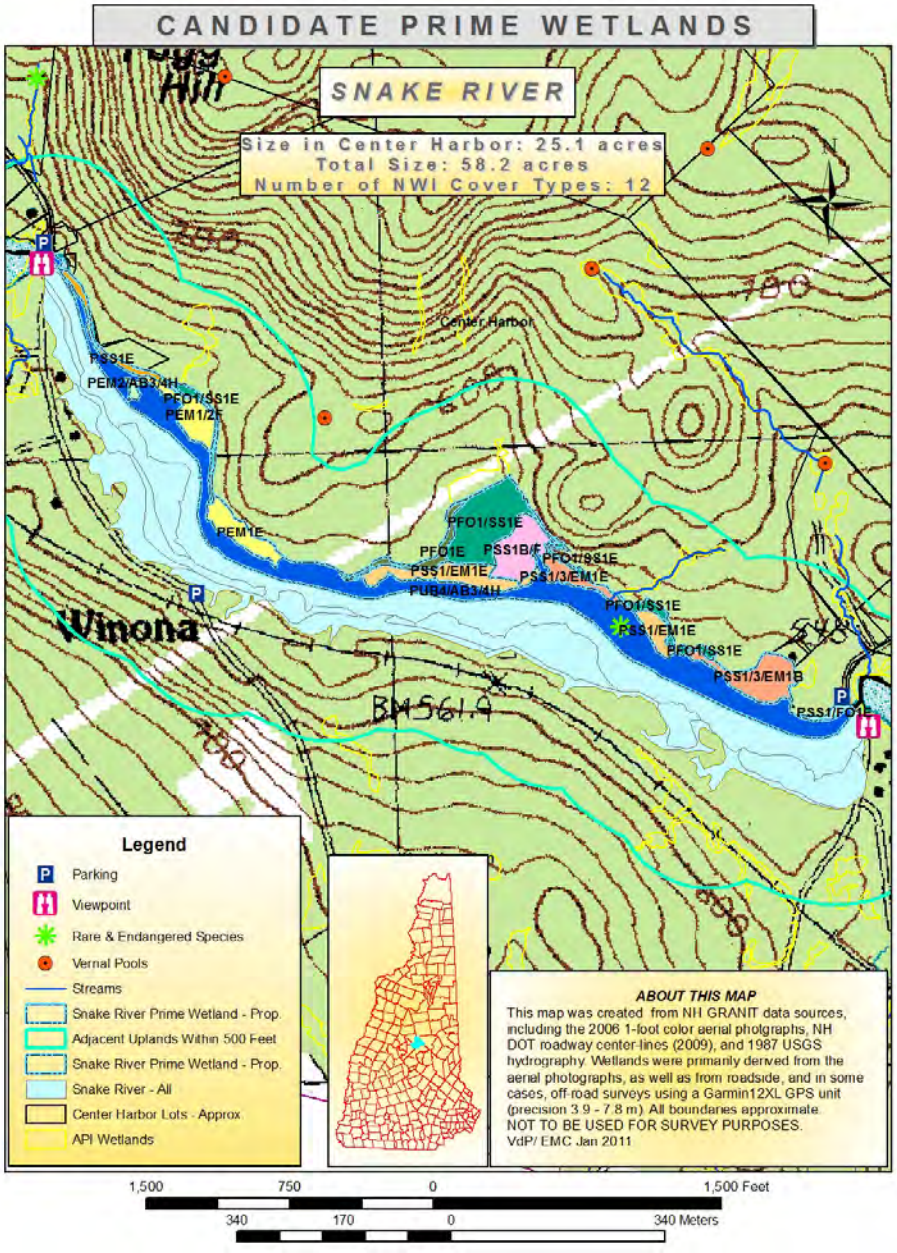

Figure 5.1 NWI Wetland Classes shown on a topographic map base

A second type of base map format that can be used is one that includes hydric soil information as well as a 500-foot upland area around the wetland, shown by a line that demarcates the areas area where Ecological Integrity (Function 1) and Wetland-Dependent Wildlife Habitat (Function 2) questions can be answered. This example is shown on an aerial photo base map (Figure 5.2):

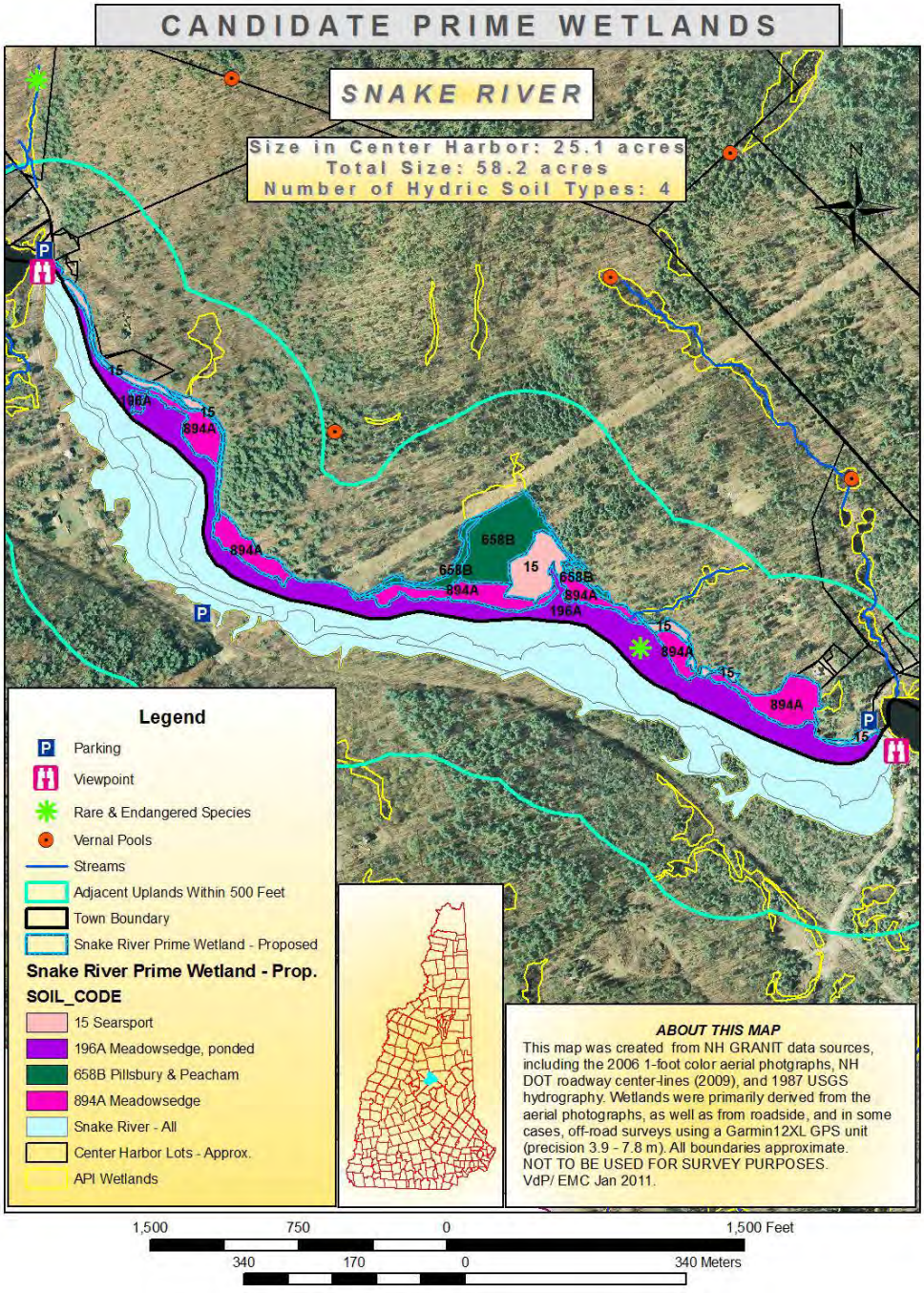

Figure 5.2 NWI Wetland Classes shown on an aerial photo background

These two examples provide the basic information necessary to answer most of the map-based (rather than field-based) questions in the NH Method and are also a first step in analyzing the results of the assessment. For example, the above maps show that there is very little disturbance and few structures in the adjacent 500-foot upland area for the study wetland and so **Ecological Integrity** will score relatively high. There is ample open water habitat and an undisturbed buffer on the north side and so **Wetland-**

Dependent Wildlife Habitat will likely score fairly high. Good parking exists adjacent to the wetland and viewpoints overlook low-growing marshes and open water, which will likely lead to relatively high scores for **Scenic Quality** and **Educational Potential**. **Wetland-based Recreation** will likely also score high, although **Sediment Trapping** and **Nutrient Transformation** will likely only get moderate scores because of the predominance of non-persistent vegetation, a fairly straight stream channel and moderate flood storage capacity. The dense bordering vegetation shows a potentially high score for **Shoreline Anchoring**, and the presence of rare species in a marsh-dominated habitat that serves a public drinking water supply area will flag several features in the **Noteworthiness** function.

The maps also show that more than half of the wetland lies within an adjoining town, so some degree of cooperation will be required if any type of long-lasting protection measure is proposed. The topographic base map indicates that the wetland is directly connected to other open water bodies, and a quick view of the GRANIT Data Mapper or GIS base layers indicates that this wetland provides a critical link between two very highly used recreational lakes. The overall value of this wetland is therefore easily conveyed in the map product, but how does it compare to other wetlands in this town?

Having access to GIS mapping on a personal desktop can add tremendous value to the results of a NH Method wetland assessment. Where a study involves multiple wetlands, the user can display comparison values among wetlands on a single map. The following example (Figure 5.3) shows how **Ecological Integrity** can be displayed as a gradient color among six different prime wetlands based on the average scores for that function.

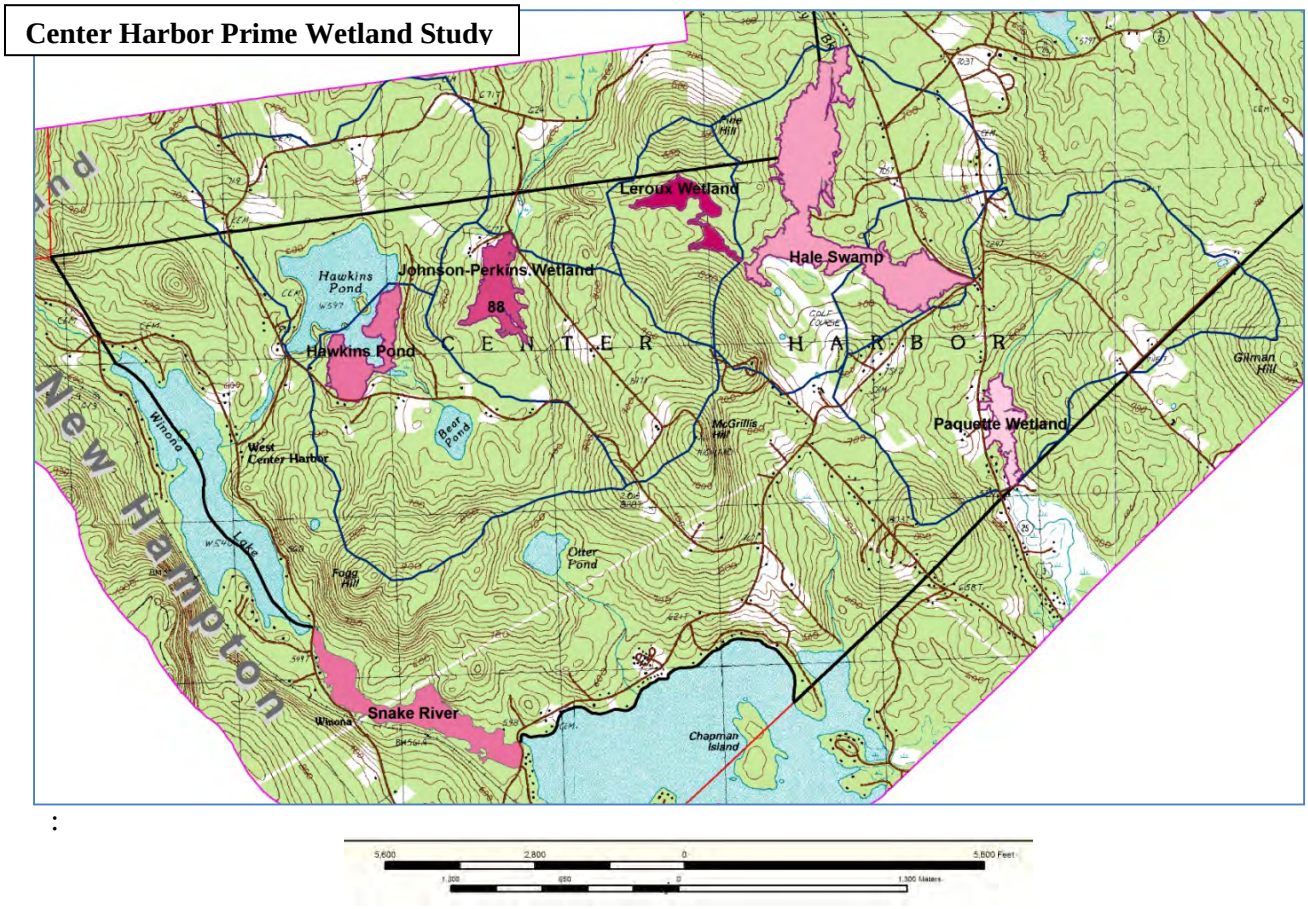

Figure 5.3. Gradient mapping of Ecological Integrity for six wetlands in Center Harbor. [Note: Average Function Scores are between 0 and 1.0 based on the scoring system used in the 1991 NH Method. The higher the score the darker the shade of pink.]

Any one of the Average Function Scores can be mapped on a gradient scale that reflects the range of values calculated for each function.[1] Several function scores can be shown at once by including a visual bar chart displaying the 12 Average Function Scores for each wetland evaluated, as shown Figure 5.4.

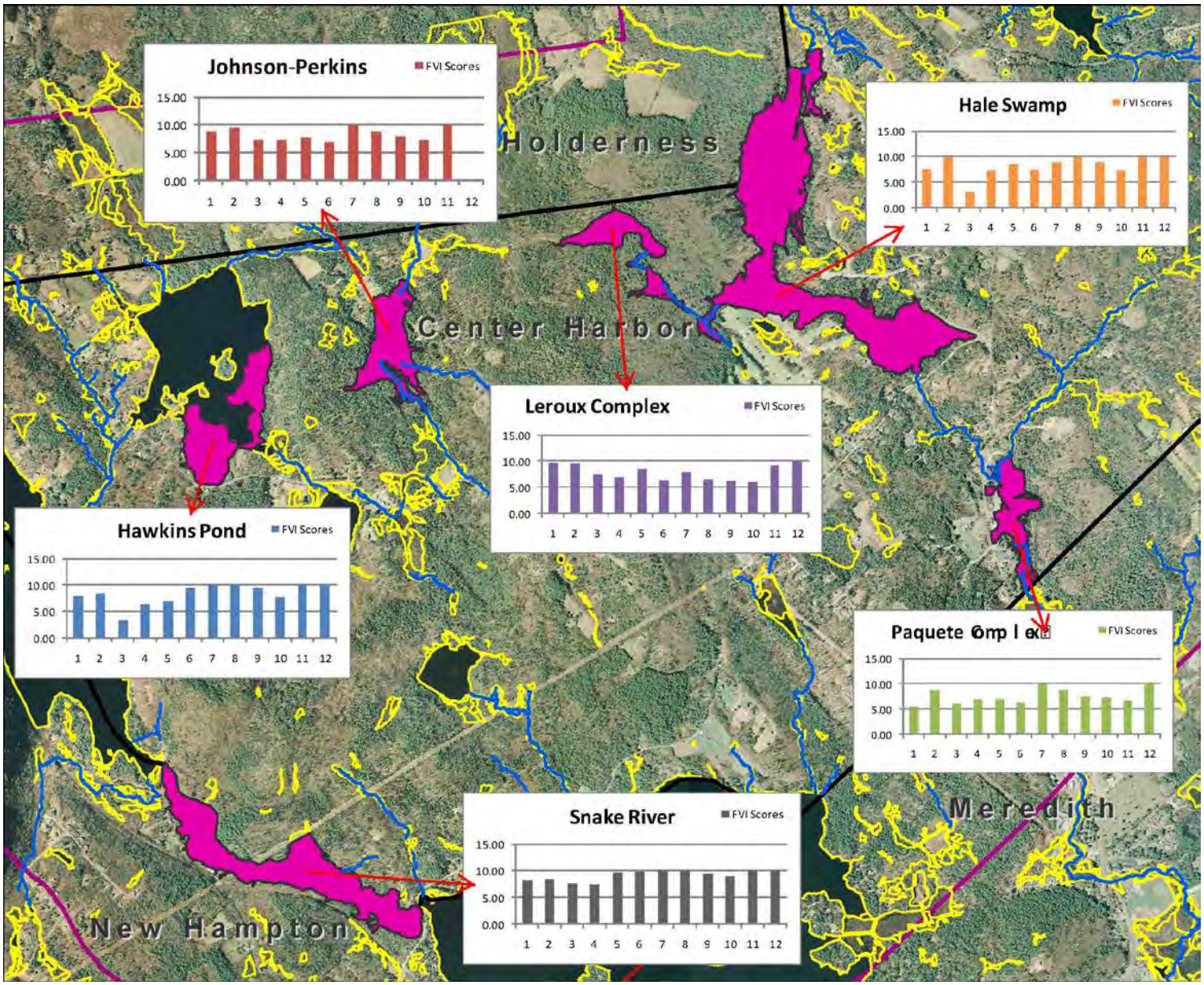

Figure 5.4. Sample wetland assessment showing Functional Value Average Scores

[1] Using a GIS mapping program such as ArcMap,™ these gradient values can be classified according to *natural breaks* (as was performed above), equal intervals, standard deviation or any other logical interval system that is appropriate.

Maps can also show conservation priorities in an area where wetlands are a stated conservation target in a given municipality. For example, this can be done on a wildlife habitat basis if the wetland-dependent wildlife function is a priority (Figure 5.5).

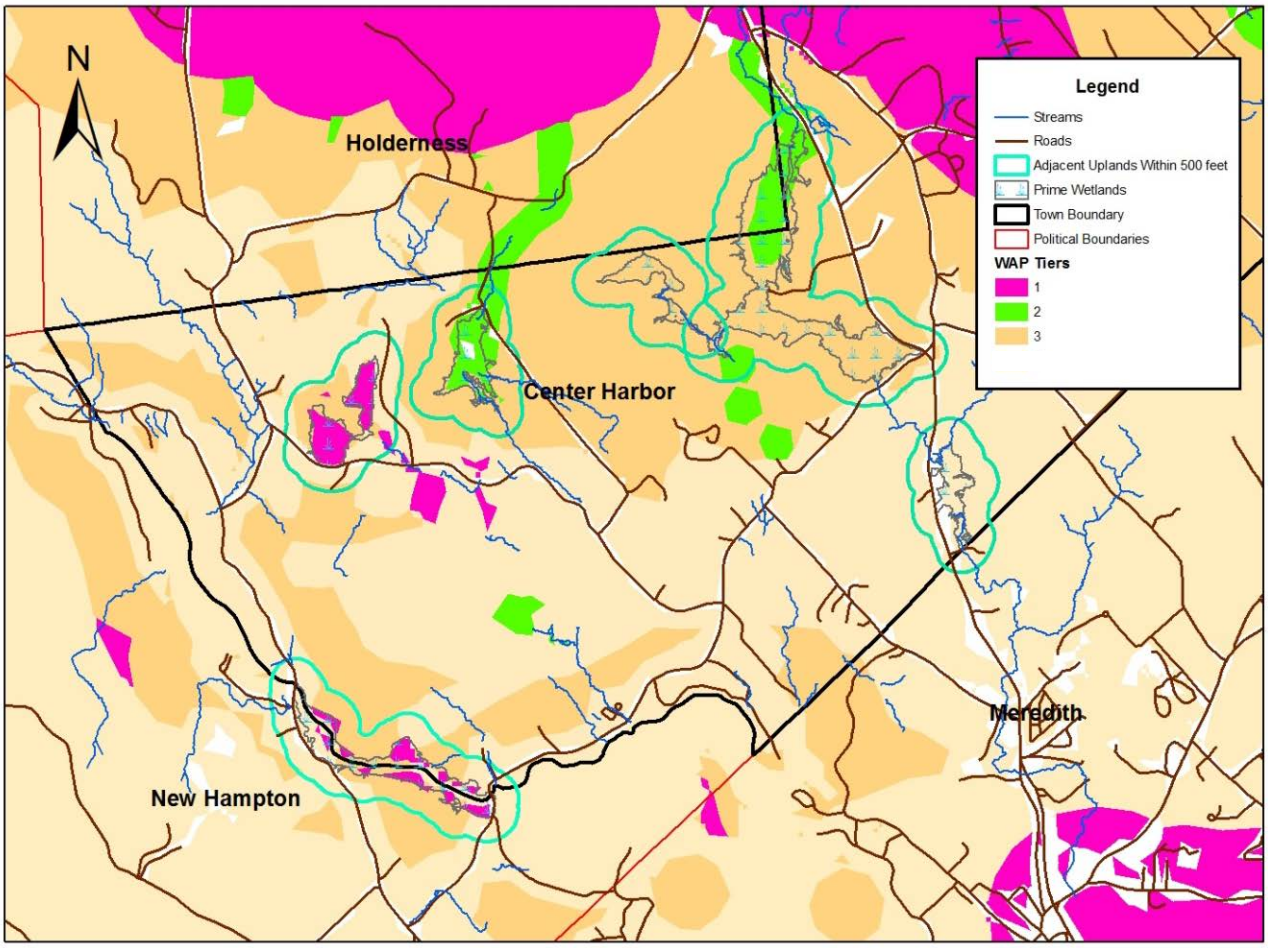

Figure 5.5. Wetlands and the adjacent 500-foot upland areas shown on the 2010 Wildlife Action Plan Highest Ranked Habitats map. Tier 1 habitat (in pink) is the Highest Ranked Habitat in the State, followed by Tier 2 (in green), which is Highest Ranked Habitat in the Biological Region, followed by Tier 3 (in orange) which shows Supporting Landscapes. From a wildlife habitat standpoint, this map shows which wetlands include the highest quality wetland habitat.

Presenting Mapped Data in Tables and Charts

The data contained in maps can also be presented in tables and charts in the wetland evaluation report. While some maps may include the actual data from the evaluation (as shown in the examples above), many reports use stand-alone tables and charts that summarize the evaluation data. An example of such a table includes the size and location information about the wetlands that were evaluated. Table 5.2 provides an example that was derived from the above maps.

Table 5.2. Sample Wetland Evaluation Summary Table for Wetland Size and Location

CENTER HARBOR PRIME WETLAND INVENTORY - SIZE & LOCATION						
CODE	**WETLAND NAME**	**SIZE (acres)**	**SIZE (Acres in Center Harbor)**	**TAX MAP #'s**	**NEAREST ROAD(S)**	**ZONING**
1	Paquette Wetland Complex	18	18	Sheet 4	Route 3	RR, C
2	Hale Swamp	123	97	Sheet 3	Route 3, Waukewan Road	RR
3	Leroux Wetland Complex	18	18	Sheet 1, 3	McCrillis Hill Road	RR
4	Hawkins Pond	31	31	Sheet 1	Hawkins Pond Road, Piper Hill Road	RR
5	Johnson-Perkins Wetland Complex	26	26	Sheet 1	Piper Hill Road	RR
6	Snake River	58	25	Sheet 1	Winona Road	RR
	Total Acres of Wetland in Study Area	**275**	**215**	**ZONING KEY:**	**RR = Rural Residential; C = Commercial**	

The wetland code can be any number or letter combination that makes sense for the evaluation. These codes can be used as markers on a map, or in a table where the full wetland name does not easily fit. Codes can also be of use in portable data loggers, GPS units, PDA's, etc. The wetland name can use local geography, such as the vernacular name for the swamp, marsh or water body associated with the wetland. It does not have to carry the name(s) of the landowners but if it does permission needs to be granted in advance. Tax map and lot information, as well as road location is very useful for helping citizens recognize where the wetlands are, and is required information should any of the wetland be nominated as prime wetlands either locally or with the state. The land use zoning codes provides information about the current and potential use of the land, and aids the user in answering some of the evaluation questions in the NH Method.

A second table that can be used in wetland evaluation reports and can form part of the analysis is derived directly from answers in the NH Method. This "working table" can be a handy reference sheet to review when considering options for conservation, regulatory setbacks, and other protection alternatives. Table 5.3 uses data from the Center Harbor example to illustrate this.

Table 5.3. Sample summary chart of important wetland attributes derived from evaluation data sheets and map work

NAME	SIZE (acres)	# NWI classes	# upland islands	% Fill	% Very poorly drained soils	Stream Length (ft)	Open Water (acres)	Shore-land (feet)	Education area	Scenic view area	Recrea-tion area
Hawkins Pond #1	31	10	0	0	95	0	85	2679	2	26	31
Johnson-Perkins #2	26	10	0	0.01	82	217	4	1829	2	16	4
Paquette Complex #3	19	11	9	27	77	1996	4	3093	19	7	19
Leroux Complex #4	18	10	3	0	90	2200	3	2614	7	2	3
Hale Swamp #5	123	18	12	0.01	93	108	17	9235	14	31	2
Snake River #6	58	9	0	0.01	89	5640	20	6861	3	50	58

Beginning with the left columns of Table 5.3:

- The **Wetland name** and **size** is derived from the wetland evaluation mapping process and provides the context for the remainder of the table's information.
- **# NWI types** refers to the number of different wetland classes according to the National Wetlands Inventory information (see Section 2.C. on preparing wetlands inventory maps). The number of NWI classes helps indicate the vegetative diversity of the wetland and directly relates to the wildlife habitat value.
- **# Upland Islands**, likewise, also helps characterize the habitat value of each wetland.
- **% Fill** provides information about the *Ecological Integrity* of the wetland as well as the opportunity for restoration (percent of fill in the wetland).
- **% Very poorly drained soils -** The amount of very poorly drained soil indicates how wet the wetland evaluation unit is and provides the necessary data for prime wetlands. Check the prime wetlands website for updated information regarding soils requirements for prime wetlands http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wt100-800.pdf .
- The amount of **Open water** and **Shoreland** associated with streams and/or ponds in the wetland also provides context for prime wetland designation and highlights the water quality (sediments and nutrients) & recreation functions.
- The size of the **educational area**, the **scenic/viewing area**, and the area suitable for **wetland-based recreation** relate to the cultural values of wetlands. These data are derived directly from the data forms and are usually determined in the field.

The final table that all wetland evaluation reports should include is the Average Score Summary Table for all 12 functions. This summarizes the Average Function Scores for all wetlands included in a study. Table 5.4 provides an example using the Center Harbor wetlands:

Table 5.4. Sample Summary Table showing average scores for all 12 Functions

WETLAND CODE	SIZE (acres)	AVERAGE SCORES FOR EACH FUNCTION											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	18	5.5	8.8	6.0	6.8	6.9	6.1	10.0	8.8	7.5	7.2	6.7	**10.0**
2	**123**	7.5	**9.8**	3.0	7.3	8.5	7.4	9.0	**10.0**	9.0	7.3	**10.0**	**40.0**
3	18	**9.6**	9.5	7.5	6.9	8.5	6.4	8.0	6.5	6.2	6.0	9.2	**30.0**
4	31	7.9	8.4	3.4	6.3	6.8	9.4	**10.0**	**10.0**	**9.5**	7.7	**10.0**	**20.0**
5	26	8.8	9.4	7.2	7.2	7.8	6.8	**10.0**	8.8	8.0	7.3	**10.0**	10.0
6	58	8.3	8.4	**7.6**	**7.4**	**9.6**	**9.8**	**10.0**	**10.0**	**9.5**	**9.0**	**10.0**	**50.0**

	ROSE	Highest values among all assessed wetlands
	GREEN	Second highest values among all assessed wetlands
	BLUE	Third Highest Values among all assessed wetlands

1 = Ecological Integrity
2 = Wetland-Dependent Wildlife Habitat
3 = Fish & Aquatic Habitat
4 = Scenic Quality
5 = Educational Potential
6 = Wetland-based Recreation
7 = Floodwater Storage
8 = Groundwater
9 = Sediment Trapping
10 = Nutrient Transformation
11 = Shoreline Anchoring
12 = Noteworthiness

Charts can provide the same information as most tables, but in variable and creative ways. The standard bar chart is very effective since it offers a visual (vertical or horizontal) depiction of the average scores derived from the NH Method evaluation. Bar charts can address single functional value sets for one or more wetlands, as shown in the Johnson-Perkins Wetland Functional Value summary (Figure 5.6) and the Ecological Integrity summary (Figure 5.7).

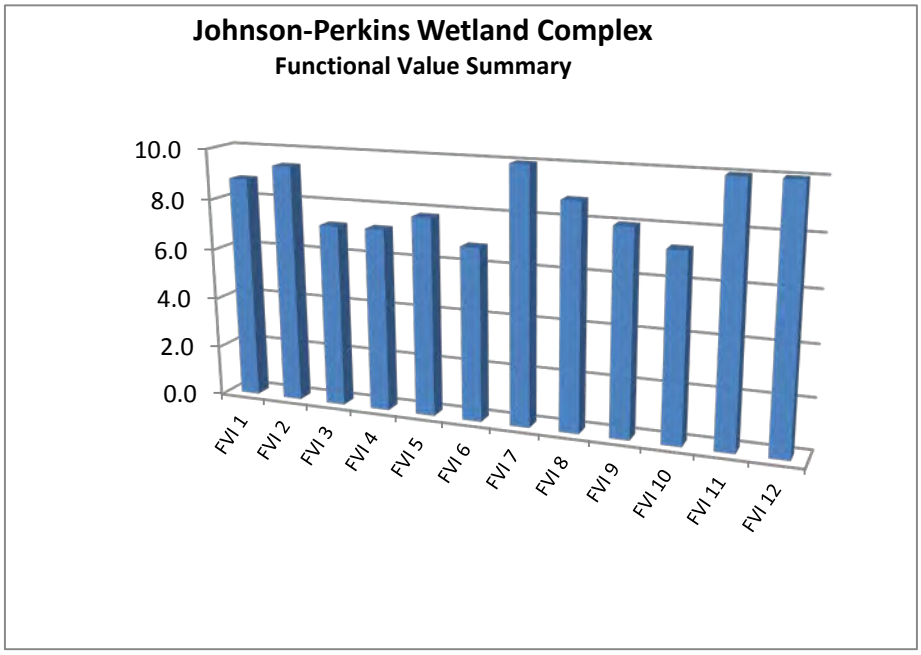

Figure 5.6. Sample Functional Value Summary for single wetland

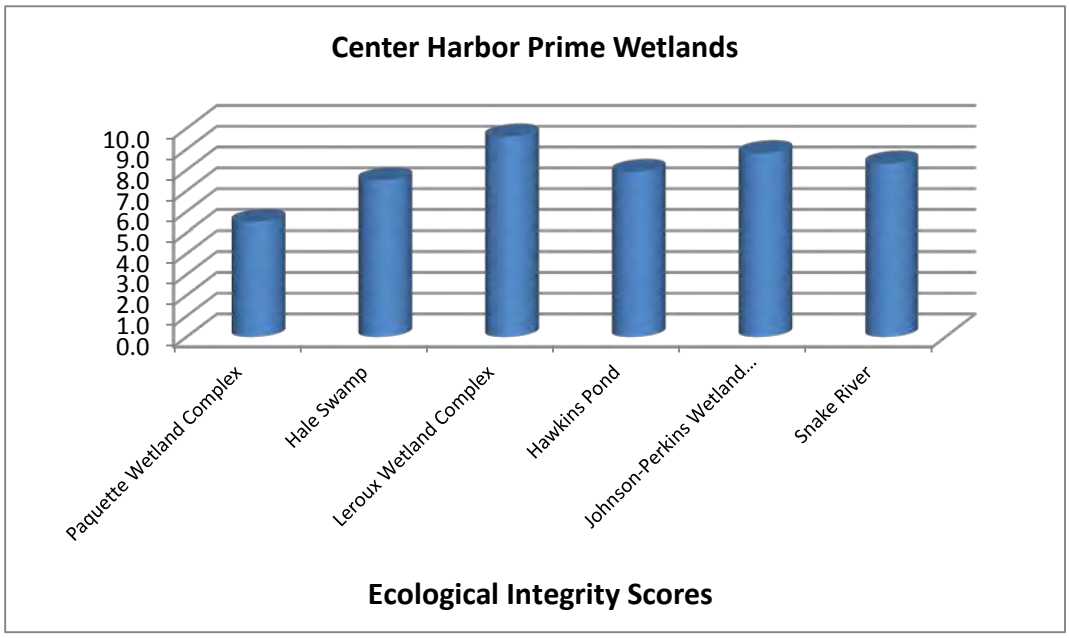

Figure 5.7. Sample chart showing the Average Function Scores for Ecological Integrity in the six Center Harbor Wetlands.

Bar charts can also address multiple functional values for a single or multiple wetlands. Figure 5.8 shows the average scores for all 12 functions in the six Center Harbor wetlands.

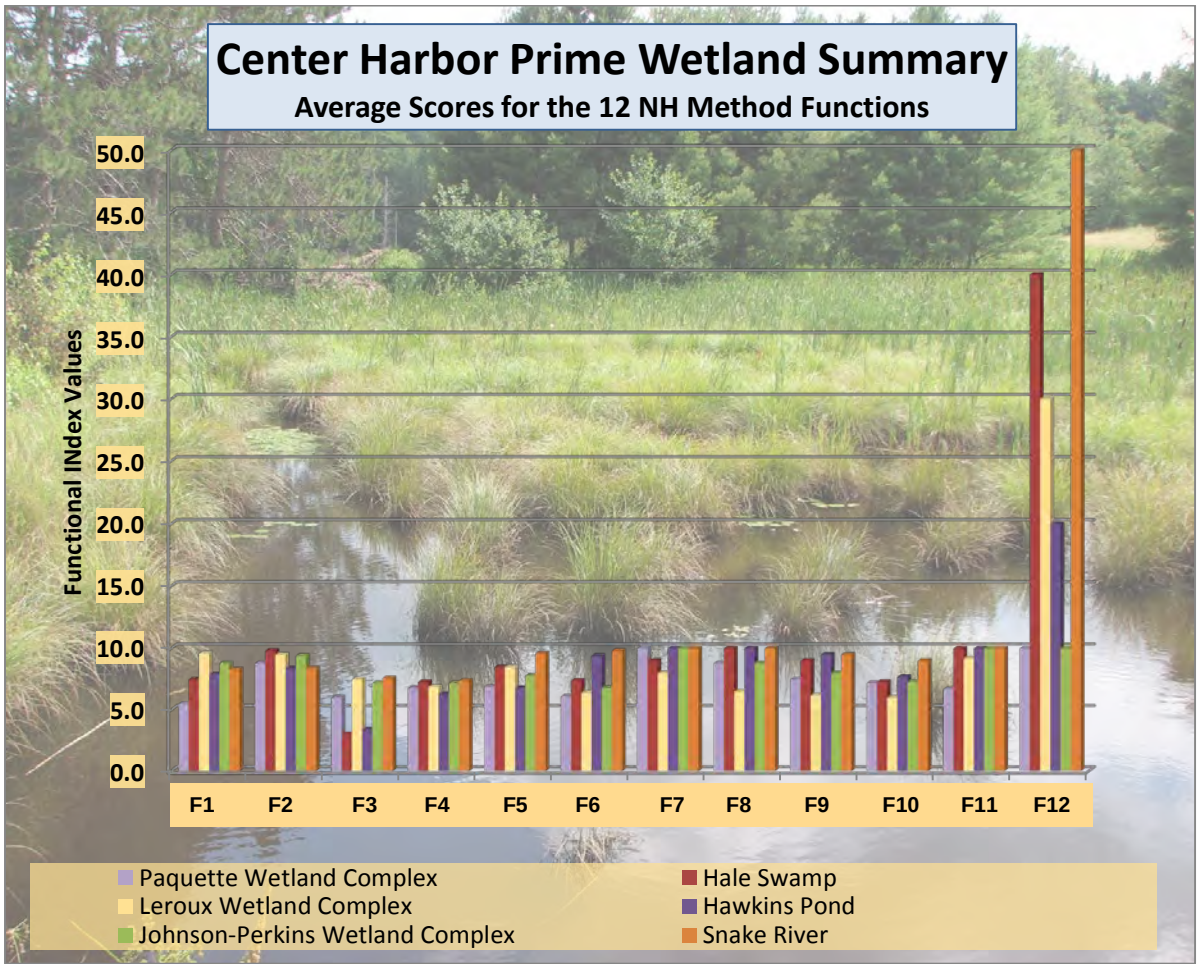

Figure 5.8. Sample bar chart showing a comparison of all Average Function Scores for all wetlands

Combination charts can also provide excellent visual displays of data. As an example, Figure 5.9 shows the scores for Wetland-Dependent Wildlife Habitat with the size of each wetland (the red line graph) compared with the Average Function scores (shown as blue bars):

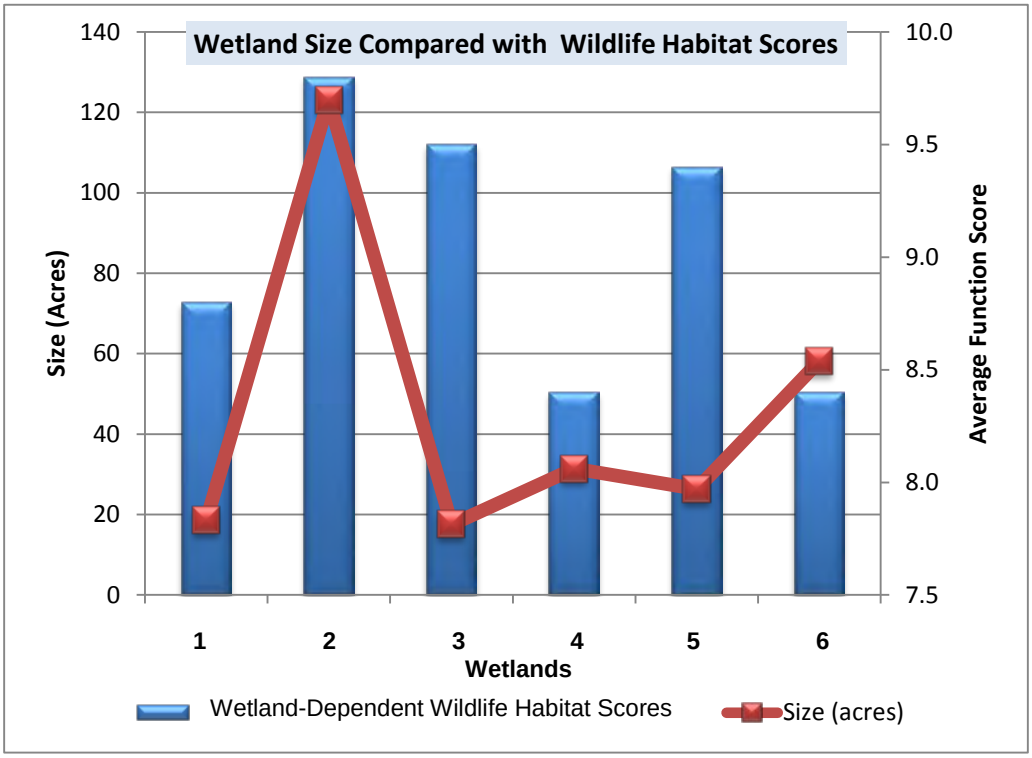

Figure 5.9. Sample summary chart comparing size with Wetland-Dependent Wildlife Habitat scores

A number of other chart combinations and styles are possible, including ones that highlight a particular master plan or land use goal such as protecting wetlands to prevent flood damage or maintain water quality. In the case of flood damage prevention the Flood Storage Function (Function 7) can be shown for each wetland in each major watershed identified in a study in order to better understand how each contributes to preventing floods (Figure 5.10)

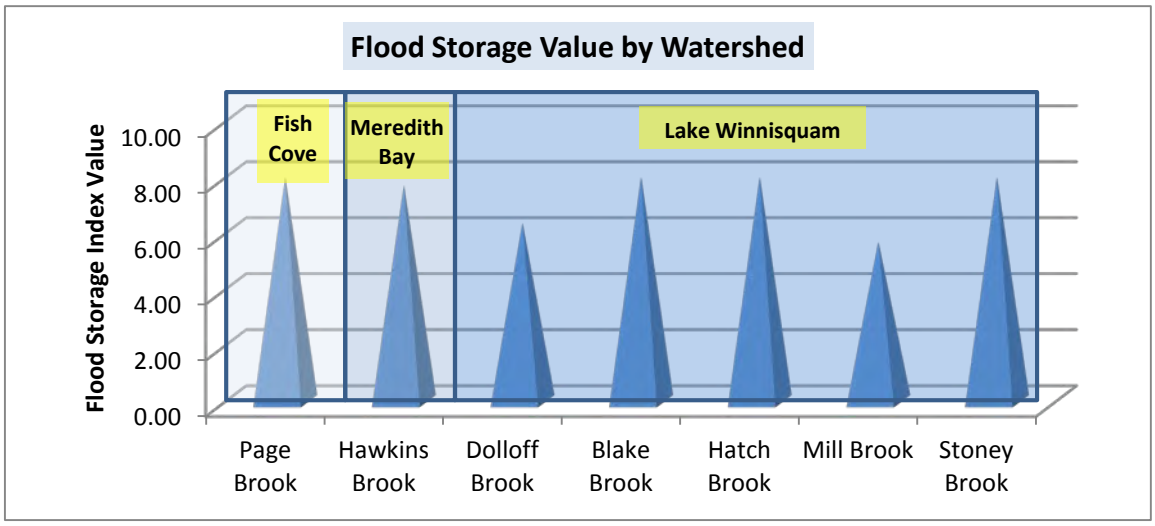

Figure 5.10. Sample chart showing Flood Storage Index Value by watershed for each wetland

When looking at the maintenance of water quality, two or more wetland functions can be compared sequentially in a given watershed in order to better understand how each wetland contributes to that goal (Figure 5.11).

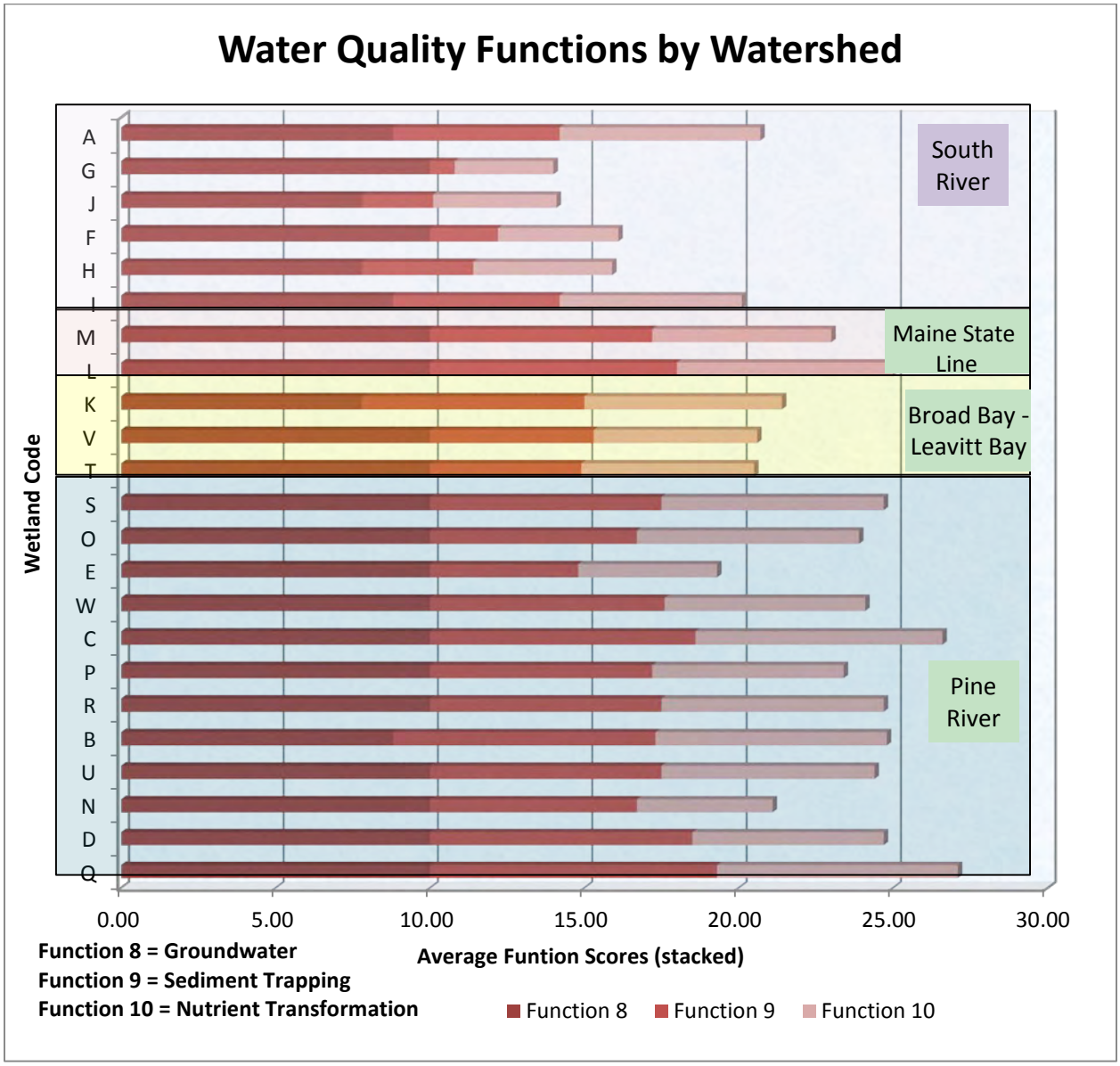

Figure 5.11. Sample chart illustrating a comparison of all three water quality functions grouped by watershed

C. How To Apply The Results To Wetland Protection Actions

The analysis of wetland scores is just the first step in targeting wetland protection applications that follow. In general, these applications can be organized into four areas:

- Education & Outreach
- Conservation Planning
- Policy & Regulatory Decision-Making
- Identifying Restoration Opportunities

While these applications are often inter-related, there are different types of information that can be derived from the results of the NH Method assessment. The discussion below highlights some commonly used wetland evaluation results for each activity.

Education and Outreach

As noted in Section 2 (How the NH Method Works) of the NH Method, there are a number of decisions that need to be made at the outset in terms of which audiences will receive and review the results generated by the NH Method. The very process of identifying, mapping, and evaluating wetlands in a given area will often engage a number of individuals and organizations that will learn about, publish and use information about the evaluations being completed. Perhaps the best outreach tool for a municipal application of the NH Method is the incorporation of volunteers involved in the inventory evaluation. Equally important is the support offered by the municipal officials who will need to understand and sign off on a project that entails a number of costs. State agencies will also need to understand the results of the wetland assessment, whether in conjunction with prime wetland designation, comments on a pending wetland permit application, or the impacts of development on water quality. Each audience will need to be briefed on both the methodology and the results of the wetland evaluation.

The use of a Powerpoint™ slide show or similar type of visual presentation to a particular audience can provide the necessary information to both initiate a project and report on the results. Public forums are a required part of any decision-making process and a well-tailored presentation can make a big difference in the outcome of any wetland protection initiative.

Brochures, posters, maps, newspaper articles and web sites are just a few of the other forms of media that can be used to convey the importance of wetland functions and the need to protect wetlands in a given area. Public recreation trail maps often highlight wetland areas for hiking, hunting, fishing, or other forms of outdoor recreation. Interactive web sites can present valuable information about local wetlands and can also be used to solicit input on identifying wildlife

species that frequent these areas. In one town that engaged in a wetlands inventory, an easel with a flipchart was put in the general store for citizens to write down wildlife sightings around the town's wetlands. Pictures were encouraged, and many of these ended up on the town's web site. This is a good way to involve ordinary citizens.

Conservation Planning

A map of the priority wetlands that were identified during a wetland evaluation project is a first step in determining whether or not a particular wetland can be protected. "Protected" in this sense refers to either outright acquisition of the fee title, or obtaining permanent easement restrictions (voluntary on the part of the landowner) on the parcels that comprise the target wetland. Critical to the understanding of land ownership patterns is a municipal tax map that can be obtained at the town hall. In many municipalities of the state these tax maps are now available digitally and can be downloaded either as image documents (e.g. as .pdf or .tif files) or as computer generated map files (e.g. shapefiles). The latter are more robust in that they can be viewed with the state conservation lands layer as an overlay, which quickly offers the user a view of where protected parcels currently exist. Figure 5.12 provides an example for some of the prime wetlands in Meredith:

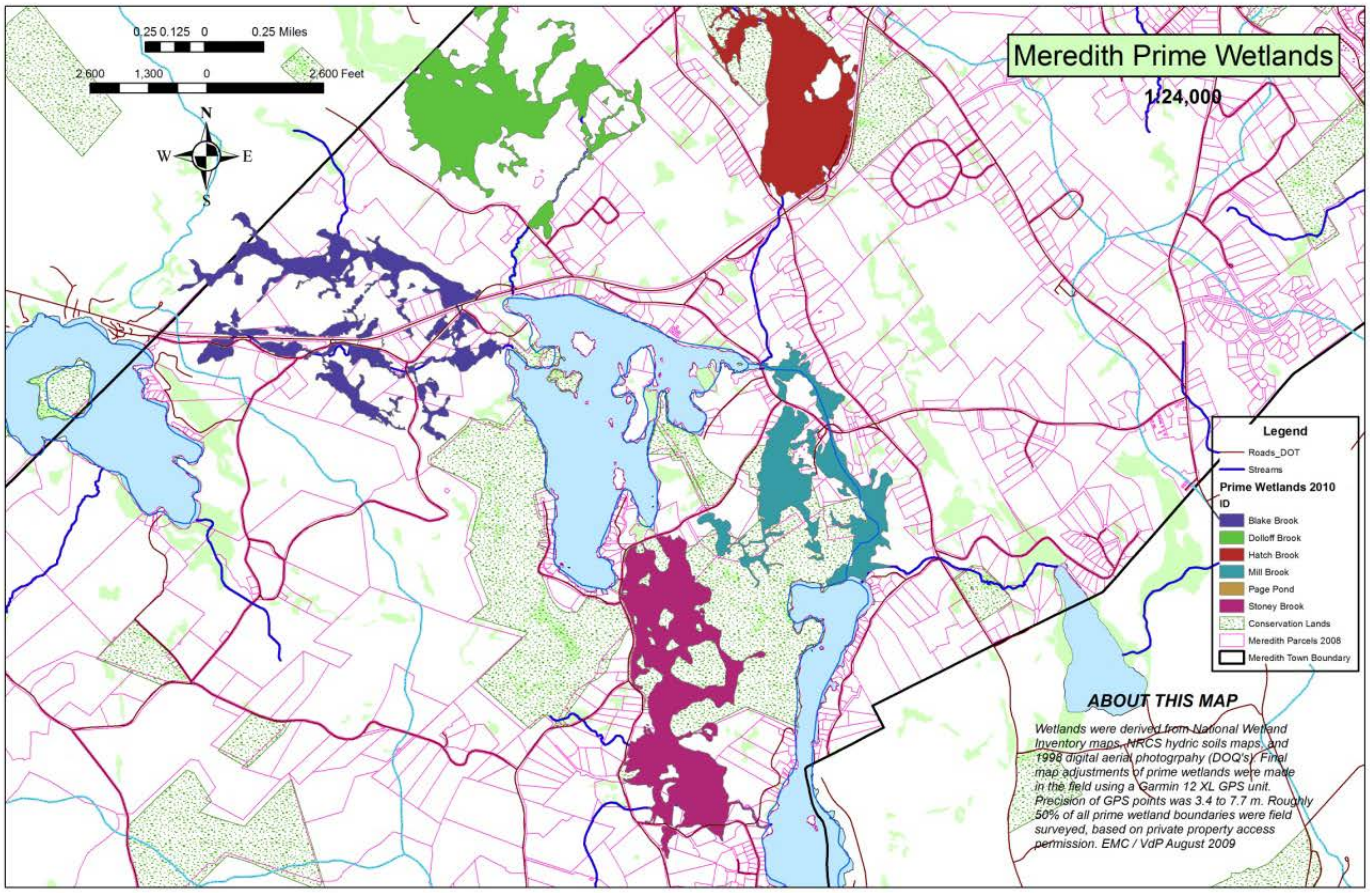

Figure 5.12. Sample tax map showing wetlands in relation to existing conservation parcels. Each wetland is color coded to easily distinguish one from another. Conserved areas are show in stippled green.

A table that summarizes the amount of conservation land associated with each target wetland is also very useful as an outreach tool and one that can help substantiate funding requests. Table 5.5 provides an example for six high scoring wetland complexes in Meredith.

Table 5.5. Sample table showing the amount of protected land associated with each wetland

MEREDITH PRIME WETLANDS					
Wetland Name	**ACRES**	**# of Parcels**	**# Cons. Parcels**	**Ac. in Cons.**	**% protected**
Dolloff Brook	192.2	12	0	0	0
Blake Brook	137.3	77	2	8.4	6.1
Mill Brook	132.9	51	5	28.3	21.3
Stoney Brook	207.2	29	2	118.4	57.2
Hatch Brook	213.0	19	2	76.4	35.9
Page Brook	281.4	29	8	203.2	72.2

Further analysis of the potential for future wetland conservation requires inquiries about landowner interest and willingness. If the land owner is willing, then next steps involve survey status, appraisal information, clear title and assessment of the costs involved. While outright donations of land or development rights are optimal, most protection efforts require the fund-raising and due diligence associated with any land conservation transaction. Wetlands that have been highly ranked through use of the NH Method can provide significant incentives for municipalities, land conservation organizations, and individuals to protect them and the land around them. The multiple resource values associated with prime wetlands, for example, can be conserved in perpetuity to the benefit of both landowners and residents of the municipality in which they are found.

Policy & Regulatory Decision-Making

Perhaps the most commonly cited reason for conducting a NH Method evaluation of wetlands in a given area is to support eventual passage of some type of regulatory mechanism that helps protect wetlands and water resources. Whether the goal is to ensure long-term flood storage capacity, drinking water supplies, or wildlife habitat, a comprehensive set of laws and rules that regulate land use in and adjacent to wetlands can have long-lasting impacts on how wetland resources are treated by the general public. A frequent use of a wetland inventory that initially identifies where wetlands are is to support a Wetlands Conservation Overlay District as a part of a town's zoning ordinance. Similarly, a frequent use of a wetlands evaluation is to support variable protection mechanisms relating to setbacks and buffers around wetlands. The following briefly describes the generalized steps in this process:

Generalized Steps for the Establishment of Local Wetland Regulations

1. Locate, identify, and map all wetlands in a given municipality, watershed, etc.
2. Classify each wetland vegetation class.
3. Establish size and/or average function score thresholds for those wetlands being evaluated.
4. Complete NH Method evaluation for each wetland that meets minimum criteria.
5. Complete the analysis and interpretation of the wetland assessment results.

A Wetlands Conservation Overlay District can be established through the Warrant Article process once Steps 1 and 2 are completed. This generally results in a "one-size-fits-all" approach to wetland protection where standardized setbacks are created for all wetlands in a town. After steps 3 – 6 are finished variable buffer setbacks can be created either through the state's prime wetland designation process or through another set of protective regulations that operate at the local level. Under RSA 482-A:15 *prime wetlands* are defined as being of such an unspoiled, fragile, or sensitive nature that they are significant wetland resources deserving of special protection. As of 2011, the state's rules require that a public hearing be held if any activity is proposed to occur in the prime wetland or within 100 feet of its edge. Check http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wt100-800.pdf for updates to prime wetland rules. The designation process is clearly spelled out in Env-Wt Chapter 700 rules and requires considerable effort on the part of the town to complete the approval process.

Wetland Restoration Opportunities

A simple comparison of the average scores for Ecological Integrity will often indicate the opportunity for restoration for a given wetland complex. Low scores that result from previous fill, roadway or railroad crossings, blocked culverts or bridges, dams, or intensive land use in and adjacent to the wetland provide strong indications of restoration opportunity. For example, while wetlands in an urban setting may score very low on the wetland functions because of their proximity to development, one needs to take account of their "natural" habitat that provides respite from the built environment. It is understood that these "urban wetlands" not only may have enhanced educational and scenic value in the context of their location, they may also provide excellent opportunities for restoring or enhancing compromised function (note that these wetlands can also be flagged under the Noteworthiness Function).

The Aquatic Resource Mitigation (ARM) Fund in New Hampshire is the state's version of the *In Lieu Fee Program*, one that awards up to several millions of dollars per watershed for wetland restoration activities. A comprehensive wetland assessment using a methodology such as the NH Method is required in order to apply to the fund for money to pay for restoration activities. The NH method provides an 'existing conditions' report that can be compared with Function Scores that could be increased through various restoration, enhancement, or preservation options. For more information, refer to http://des.nh.gov/organization/divisions/water/wetlands/wmp/faq_arm_funds_committee.htm

While Ecological Integrity offers a 'one-stop shopping' approach to identifying restoration opportunities, any combination of functions can be analyzed for opportunities to improve the functioning of a given wetland. A wildlife enhancement approach may, for example, require the removal, enlargement, or replacement of a blocked, perched, or otherwise inoperable culvert that is blocking wildlife passage. Not only will this improve aquatic wildlife passage, it may also improve water quality and alter downstream hydrology in beneficial ways for groundwater recharge, flood dissipation, or nutrient transformation. Removal of invasive species is another activity that can enhance wildlife habitat. If town-wide goals are known and prioritized, wetlands that have compromised functions in these areas can be targeted for enhancement. Many of the compromised functions can be improved with good planning, adequate funding, and hard-working volunteers.

APPENDIX A
WETLAND RESOURCES AND REFERENCES

ORGANIZATIONS THAT CAN HELP:

NH Association of Natural Resource Scientists

NH County Conservation District Offices

NH Natural Resources Conservation Service

Regional Planning Commissions in NH

UNH Cooperative Extension

NH Association of Conservation Commissions

FUNDS TO PROTECT WETLANDS

Aquatic Resource Mitigation Fund – NH DES Wetlands Bureau
The Aquatic Resource Mitigation (ARM) Fund has been created as an additional compensatory mitigation option available to applicants for impacts to wetlands and other aquatic resources. This mitigation option is available for use after avoidance and minimization of impacts to these aquatic resources has been achieved. DES is authorized to collect mitigation funds in lieu of other forms of wetland mitigation as part of a wetlands application. DES holds and manages funds to be offered as grants for potential projects that will accomplish long-term environmental results.

Wetlands Reserve Program – Natural Resources Conservation Service
The Wetlands Reserve Program (WRP) is currently a part of the USDA's Agricultural Conservation Easement Program (ACEP) that was most recently reorganized and reauthorized in 2014. It offers private landowners a source of funds to restore and conserve wetlands and their buffers. Project ranking is competitive, and reimbursement rates are set by geographic area. Once awarded and approved, projects are funded according to availability on an annual basis.

NEW HAMPSHIRE WETLANDS RULES AND LAWS

NH DES Wetlands Bureau

NH DES Wetlands Rules - Env-Wt 100-900

Env-Wt 100 ORGANIZATIONAL RULES
Env-Wt 200 RULES OF PRACTICE AND PROCEDURE
Env-Wt 300 CRITERIA AND CONDITIONS FOR PERMITS
Env-Wt 400 SHORELINE STRUCTURES
Env-Wt 500 PERMIT PROCEDURE
Env-Wt 600 TIDAL WETLANDS
Env-Wt 700 PRIME WETLANDS
Env-Wt 800 COMPENSATORY MITIGATION
Env-Wt 900 STREAM CROSSINGS

Law: *RSA 482-A: Fill and Dredge in Wetlands*

Prime Wetlands

RSA 482-A:15 has a provision that allows a municipality to designate certain wetlands within its borders as being worthy of extra protection because of their size, uniqueness, fragility, unspoiled character or other relevant factors that make them of substantial significance. Env-Wt 700 of the Wetlands Rules provides detailed criteria for the adoption of designated prime wetlands (see web link below).

The first step in designating prime wetlands is to conduct an inventory of wetlands in town consistent with current statutory requirements. Following the inventory, threshold conditions may be set for one or more measurable functions or characteristics (e.g. all wetlands important for flood control and wildlife habitat, or wetlands greater than a certain size). These threshold conditions reflect the priorities of the community and limit the set of wetlands that can reasonably be studied, without eliminating significant candidates from consideration. The candidate wetlands are then evaluated using a wetland evaluation method such as the NH Method.

Note that wetlands proposed for prime designation must be greater than 2 acres in size, contain at least 50% very poorly drained soils, and have all three of the technical criteria for wetlands, namely, hydric soils, hydrophytic vegetation **and** wetland hydrology.

Prime Wetlands (RSA 482-A:15)

Prime Wetlands RSA 483-A:11-IV - Forestry in and around Prime Wetlands

These rules allow a property owner to apply for a waiver "…to perform forest management work and related activities in the forested portion of a prime wetland or its 100-foot buffer". "A waiver shall be issued only when the department [NH DES] is able to determine there will be no significant net loss of wetland values as identified in …RSA 482-A:1"

NH DES Wetlands Rules - Chapter Env-Wt 700 Prime Wetlands

WATER RESOURCES

NH Department of Environmental Services

Drinking Water and Groundwater Protection Bureau

Water Division

NH Geological Survey

Biomonitoring Program

NH DES List of 4th Order Streams

UNH Cooperative Extension - Lakes Lay Monitoring Program

WETLAND CLASSIFICATION AND NATIONAL WETLANDS INVENTORY

US Fish & Wildlife Service – National Wetlands Inventory

Classification of Wetlands and Deepwater Habitats of the United States.
Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. U.S. Fish and Wildlife Service. FWS/OBS – 79/31.

FOREST MANAGEMENT INFORMATION

UNH Cooperative Extension

Good Forestry in the Granite State

Best Management Practices for forestry to protect water quality in New Hampshire (PDF document)

Society for the Protection of NH Forests

Education programs include forest and wildlife ecology, forestry and forest management, logging, land conservation, N.H. forest history, winter tree identification and more

WILDLIFE INFORMATION

NH Fish & Game Dept.

Non Game & Endangered Wildlife Program

NH Wildlife Action Plan

Fisheries Management

UNH Cooperative Extension Wildlife Resources

Taking Action for Wildlife (UNH Cooperative Extension and NH Fish and Game Dept)

NH Audubon

RARE PLANTS AND EXEMPLARY NATURAL COMMUNITIES

NH Division of Forests and Lands - Natural Heritage Bureau

Natural Communities of NH, including Key to Natural Communities (PDF Document)

Includes a key to natural communities and a reporting form for suspected rare or exemplary natural communities

The Nature Conservancy – NH

VERNAL POOLS

Vernal pools are wetlands with a seasonal cycle of flooding and drying. Some vernal pools flood in the spring with water from melting snow, rain or high groundwater and then typically dry by summer's end. Other pools follow a similar pattern, but fill with rain in autumn, hold water all winter and spring, and then dry out by late summer. The annual drying cycle of vernal pools makes them different from other wetlands and plays a key role in determining which wildlife species uses which pools as habitat.

NH Fish & Game Department

Vernal Pool Habitat Profile in the NH Wildlife Action Plan (starts p. 155)

Identification and Documentation of Vernal Pools in New Hampshire (PDF document)

UNH Cooperative Extension

Vernal Pool Habitats and Resources

NH Wetlands Bureau – Vernal Pools Resources

MAPPING INFORMATION

Favorable Gravel Well Analysis

Google Earth

GRANIT

NH GRANIT – New Hampshire's Statewide GIS Clearinghouse

GRANITView Mapper

NH Wetlands Mapper

NH Fish & Game

Using the Wildlife Action Plan Maps

Wildlife Action Plan Maps by Town

Terrain Navigator (commercial product)

US Fish & Wildlife Service – National Wetlands Inventory

ADDITIONAL WETLAND REFERENCE MATERIALS

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Wetland Evaluation Technique (WET): Volume II: Methodology, Operational Draft Technical Report Y-87-?, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

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Ecological Integrity Assessment and Performance Measures for Wetland Mitigation. NatureServe, Arlington, VA.

Magee, D.W., 1981.
Freshwater Wetlands – A guide to Common Indicator Plants of the Northeast. The University of Massachusetts Press.

Mitsch, W.J. and J.G. Gosselink. 2007.
Wetlands, 4th ed., John Wiley & Sons, Inc., New York

NatureServe. 2006.
Ecological Performance Standards for Wetland Mitigation: An Approach Based on Ecological Integrity Assessments. NatureServe, Arlington, VA.

Niering, W.A., 1988.
Wetlands: The Audubon Society Nature Guides. Alfred A. Knopf, Inc.

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High Intensity Soil Maps for New Hampshire, Standards.

Stone, A. 2001 (editor).
Natural Resources Inventories: A Guide for New Hampshire Communities and Conservation Groups.
UNH Cooperative Extension.

Tiner, R. 1999.
Wetland Indicators. A Guide to Wetland Identification, Delineation, Classification, and Mapping, Lewis Publishers.

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Winter Guide to Woody Plants of Wetlands and Their Borders: NE US. Institute for Wetland and Environmental Education and Research.

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Field Guide to Nontidal Wetland Identification.

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Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center

U.S. Dept. of Agriculture, Natural Resources Conservation Service, 2010. Version 7.0. New Hampshire State-Wide Numerical Soils Legend.

U.S. Fish & Wildlife Service, US Army Corps of Engineers, US Environmental Protection Agency, and USDA Soil Conservation Service, 1989. Interagency Manual for Identifying and Delineating Jurisdictional Wetlands

Wetland Plant Indicator Status

NRCS Wetland Indicator Status web page

Regional Wetland Plant Lists Northeast (Region 1)

Appendix B

QUESTIONS TO ANSWER BEFORE THE FIELD VISIT: USING THE NH WETLANDS MAPPER AND OTHER SOURCES

(Remaining questions are answered during field checking)

Each of the questions in the table on the following page requires using the **NH Wetlands Mapper,** unless otherwise noted. **Record answers on the *NH Method* Data Sheets** (can be done online using the **NH Wetlands Mapper.**

BEFORE USING THE NH WETLANDS MAPPER:

- Go to the NH Wetlands Mapper web site home page. Click on the **Welcome tab** (upper left) for instructions on using the Wetlands Mapper.
- Review the tools available in the NH Wetlands Mapper by clicking on the **Help tab** (upper left) and learning how the mapping tools work and the content of the tabs (layers, legend, wetland tools, zoom, download, print). Try each function on a sample wetland and become familiar with the Mapper's capacity and limitations before using it in conjunction with the NH Method evaluation forms.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
1 - Ecological Integrity		
Question 1	Sources of water quality degradation in the watershed	**From NH Wetlands Mapper:** • Display **Aerial Photo** Imagery to answer the question. • Display **Water and Watersheds > Watersheds (HUC 12).** • Read **Appendix G in the NH Method** to learn how to delineate a watershed boundary using a topographic map. • Go **to "Wetlands & Watersheds" > User Defined Wetlands"** and use the drawing tool to draw the watershed boundary on the topographic background. In many cases, the "HUC 12" Watersheds will include a portion of your wetland's watershed boundary, so you can use the HUC 12 Watersheds' boundaries as part of your wetland watershed boundaries, tracing over them with the Drawing Tool. • With the drawn watershed displayed in the Watersheds Tab, click on the watershed boundary line and the acreage will be displayed on the right, in the bar at the bottom of the screen. (This measurement will stay displayed until you click a different feature.) • Review the watershed together with the aerial photo to determine potential sources of contamination. Print the map, choosing "print pdf map" from the print menu and save a copy of the pdf of the map.
Question 7	Road, railroad or driveway crossings within 500 ft. of the wetland	**From NH Wetlands Mapper:** • Review the target wetland with the most recent **Aerial Photo** background available for your region of the state (it varies). Use the **Transportation/Railroads** or **Topographic map** layers to identify road crossings. • Confirm road crossings with ***field checking***.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 8	Level of human activity **in the upland** within 500 feet of the wetland edge (land disturbance, clearing, logging, trails, roads, etc.)	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** background turned on, go to Wetlands & Watersheds > User Defined Wetlands and select a wetland you've defined (step 6, above), then choose "Edit". You can then enter a "buffer interval" in feet. After doing so & clicking "OK", the map will be redrawn showing a semi-transparent zone around the wetland that's the width you specified (500 ft. for this question). Record any signs of human activity observable in the photo. (Keep this map open for the next question) • Confirm human activity with ***field checking***.
Question 9	Percent of impervious surface area within 500 ft. of the wetland edge	**From NH Wetlands Mapper** • Use the same map with a 500 ft. "buffer" zone around the wetland in question 8, above, and measure the area of buildings and other impervious areas within 500 ft of the wetland. • Confirm the extent of impervious surfaces with ***field checking***.
2 - Wetland-Dependent Wildlife Habitat		
Question 1	Wetland size (acres)	**From NH Wetlands Mapper** • Turn on either the **NHDES Wetlands Base Map** or the **NWI** (National Wetlands Inventory) **layer** & **the Hydric Soils** layer, in the **Water and Watersheds** layers. Turn the legend on. Areas shown as **Palustrine** are freshwater wetlands. • Left click your mouse on the **Identify Tool** ("**i**" icon) to activate it**.** Click on each wetland vegetation type polygon to access the data, including acreage. • Alternatively, draw the wetland boundary as described in the NH Wetlands Mapper Help Tab and Wetlands Tab (Create New Wetland button) • ***Field checking*** *is necessary to calculate the final wetland size.*
Question 4	Area of shallow, permanent open water and streams (less than 6.6 ft deep)	**From NH Wetlands Mapper** • Click on the **Identify Tool** to activate it. Use it to get the acreage of all PAB and PUB wetland vegetation classes by clicking on them. I window will appear with the acreage.. • Click on the **Measure Line tool** to activate it. Use the tool to measure stream length. Click on the start of the stream at the wetland edge, then along its length as needed to approximate its curves. Double click on the last point. You will see a line between your click points and the total distance will appear in the bar near the bottom of the screen. Distance will show in feet if under a mile in and miles if more. Multiply the resulting stream length by the stream channel width (observe in the field and on aerial photo) to get the stream area in square feet, and then convert to acres. • Add the stream acreage to the acreage of shallow permanent open water (PUB and PAB codes).
Question 5	Deepwater habitat associated with the wetland (lake, pond or river) deeper than 6.6ft.	**From NH Wetlands Mapper** • Turn on the **NHDES Wetlands Base Map** or the **NWI** layers in the **Water and Watersheds** layers. Turn the legend on. Areas shown as **Lacustrine** are lakes and ponds • Use the **Identify Tool** to get the acreage of lakes and ponds. • Check the **NH DES List of Fourth Order and Higher Streams**

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
		• to identify any 4th order or higher streams. You can also determine the stream order of a stream on the map by activating the identify button and clicking on the stream channel. • Use the **Measure Line tool** to measure the length of the 4th order or higher stream associated with the wetland.
Question 6	Wetland vegetation class diversity, including upland "islands" (NWI codes)	**From NH Wetlands Mapper** • Turn on the **NHDES Wetlands Base Map** or the **NWI layer** in the **Water and Watersheds** layers and choose "Labels on" to label the NWI classes. • Use the **Identify Tool** to get the acreage of NWI wetland vegetation classes. • Confirm this information with ***field checking.***
Question 7	Other wetlands in close proximity to the study wetland	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** background and **the NHDES Wetlands Base Map** or the **NWI layer** & **the Hydric Soils** layer and **Hydric soils** layer(s) turned on, use the **Measure Line tool** to determine distance to nearby wetlands. • Confirm this information with ***field checking.***
Question 8	Wildlife access to other wetlands.	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** and **the NHDES Wetlands Base Map** or the **NWI** layer turned on, identify areas of apparently natural vegetation between wetlands that could function as wildlife travel routes. • Confirm this information with ***field checking.***
Question 9	Percent of wetland edge bordered by upland wildlife habitat	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** and **the NHDES Wetlands Base Map** or the **NWI** layer turned on, use the **buffer** tool to identify areas of apparently natural vegetation within 500 ft of the wetland edge. (See Section 1, Question 8 for instructions on the buffer tool.) • Estimate the percentage of 500 ft. buffer area that is undisturbed upland habitat. • Confirm this information with ***field checking.***
3 – Fish & Aquatic Life Habitat		
Question 1	Dominant land use in watershed	**From NH Wetlands Mapper** • Go **to "Wetlands & Watersheds" > User Defined Wetlands"** and use the drawing tool to draw the watershed boundary on the topographic background. In many cases, the "HUC 12" Watersheds will include a portion of your wetland's watershed boundary, so you can use the HUC 12 Watersheds' boundaries as part of your wetland watershed boundaries, tracing over them with the Drawing Tool. • With the most recent **Aerial Photo** background turned on, and the watershed of your wetland of interest showing (Go to "Wetlands & Watersheds" > User Defined Wetlands"), observe the land uses in the watershed and determine the dominant category in the question. • Confirm this information with ***field checking.***
Question 4	Acres of deepwater habitats (deeper than 6.6ft)	**From NH Wetlands Mapper** Similar to Section 2, Question 5: • Turn on the **NHDES Wetlands Base Map** or the **NWI** layer in the

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
		Water and Watersheds layers. Turn the legend on. Areas shown as **Lacustrine** are lakes and ponds • Use the **Identify Tool** to get the acreage of lakes and ponds.
Question 6	Does the stream channel appear to have been recently altered?	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** turned on, identify any stream sections that appear straightened and note them for field observation. Confirm this information with ***field checking.***
Question 11	Rare or endangered wildlife present?	Review the **NH Natural Heritage Bureau Town List** • Select the town in question (listed in alphabetical order). See if any species that use wetlands are listed and determinetheir habitat type(s). Use this a guide for possible observations of rare species in those habitats.
4 – Scenic Quality		
Question 2	Public access	**From NH Wetlands Mapper** • Using the **Conservation &Public Lands layer** with the wetland displayed, Using the **Identify Tool,** determine if the wetland is on a property that has public access (public land). Public access is not specifically indicated in the **NH Wetlands Mapper**, so this may require further research to determine access for some conservation properties. This might include checking deeds and asking the town Conservation Commission). Confirm this information with ***field checking.***
Question 4	Open water visible .	**From NH Wetlands Mapper:** • Use the **Identify Tool** to get the acreage of all PAB and PUB wetland vegetation classes and any pond or lake (Lacustrine) acreage. Estimate size of large open river areas (**Measure Line tool** may be useful). The question is broad: Is the open water area less than one acre, more than three acres, or somewhere in between? • Confirm this information with ***field checking.***
5 – Educational Potential		
Question 4	Public or private property with public access	**From NH Wetlands Mapper (Same as Section 4, Question 2)** • Using the **Conservation &Public Lands layer** with the wetland displayed, use the **Identify Tool to** determine if the wetland is on a property that has public access (public land). Public access is not specifically indicated in the **NH Wetlands Mapper**, so this may require further research to determine access for some conservation properties. This might include checking deeds and asking the town Conservation Commission. • Confirm this information with ***field checking.***
Question 6	Number and accessibility of wetland classes accessible or potentially accessible for study at educational site	**From NH Wetlands Mapper** Similar to Section 2, Wetland Dependent Wildlife Habitat, Question 6, but only for areas from which the wetland is likely to be viewed: • Turn on the **NHDES Wetlands Base Map** or the **NWI** layer in the **Water and Watersheds** layers and choose "Labels on" to label the NWI classes • Identify those that would be visible from the wetland's primary viewing location(s). • Use the most recent **Aerial Photo** imagery to refine your observation of the NWI map. • Confirm this information with ***field checking.***

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
6 – Wetland-based recreation - NO DATA NEEDED FROM NH WETLANDS MAPPER		
7 – Floodwater Storage		
Question 1	Wetland acres, not including upland "islands".	**From NH Wetlands Mapper:** • Using the same instructions from Section 2, Wetland Dependent Wildlife Habitat, Question 1, calculate Wetland acreage, excluding the area of any upland islands. Subtract the acreage of any upland islands from the total wetland acreage and use this adjusted acreage in this calculation.
Question 2	Watershed acres	**From NH Wetlands Mapper:** **The watershed will have been drawn already for Question 1.1.** To get the watershed size: • With the drawn watershed displayed in the Watersheds Tab, click on the watershed boundary line and the acreage will be displayed on the right, in the bar at the bottom of the screen. (This measurement will stay displayed until you click a different feature.) • Print the map, choosing "print pdf map" from the print menu and save a copy of the pdf of the map.
Question 7	Location within the watershed	**From NH Wetlands Mapper:** • Use the buffer function in the Wetlands Tab to determine the wetland's location in relation to a perennial/4th order stream (refer to Section 3, Figure 3) • To determine stream order, see: **NH DES List of Fourth Order and Higher Streams** **NH Statewide Map Atlas "Fourth Order and Higher Streams"**
8 – Groundwater Recharge		
Question 1	Does the wetland overlie stratified drift aquifer?	**From NH Wetlands Mapper:** • Display the **Aquifer** layer and determine if the wetland overlies stratified drift aquifer.
Question 2	Is the wetland in a potential public water supply area?	**Use Forest Society Website for Favorable Gravel Well Analysis:** • Using the Favorable Gravel Well map provided on this website, zoom to the town, and locate the area with the wetland. Once you have located the town, you will need to zoom in to at least 600%. • Determine if the wetland overlies or is immediately adjacent to a Favorable Gravel Well area.
Question 3	Public wellhead protection area?	• See instructions in the NH Method, Section 3, p. 28. (To get a paper map showing the data for your town, or for GIS users wanting to obtain the data set, contact Pierce Rigrod, NH DES Drinking Water and Groundwater Bureau, at pierce.rigrod@des.nh.gov or 603-271-0688.)
Question 4	Percent coverage of highly permeable soils **within 100 ft.** of the wetland**.**	**From NH Wetlands Mapper:** • Display the **Soils (All Soils)** layer with soil polygons labeled. • Create a 100 ft. "buffer" area around the wetland, following the instructions for Section 1, Ecological Integrity, Question 8. • Visually determine the dominant soil type within 100 ft of the wetland. • Determine whether the dominant sol type is on the list of sand and gravel soil types in **Table 3 in the NH Method**.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 5	Percent coverage of the highly permeable soil types **within the wetland**	• Display the **Soils (All Soils)** layer with soil polygons labeled. • Visually determine the dominant soil type within the wetland. Determine whether the dominant sol type is on the list of "recharge" soil types in **Table 4 in Section 3, NH Method**.
9 - Sediment Trapping		
Question 2	Character of outlet .	**From NH Wetlands Mapper:** • Display Imagery > **USGS 7.5 min. Topos** (topographic map) and use it to locate any outlet/s or lack of. May not be evident on map • Confirm this information with ***field checking***, and check the degree of constriction of the outlet in the field.
Question 3	Character of water flow through the wetland	**From NH Wetlands Mapper:** • Use the most recent **Aerial Photo** imagery and the **Water Resources** layers to determine the shape of the stream channel in the wetland, if any.
Question 5	Gradient of Wetland	**From the printed map or NH Wetlands Mapper:** • Using the **Elevation > DEM** (digital elevation model) layer, determine the highest and lowest elevation of the wetland along its longest axis by clicking on the inlet and outlet ends of the wetland. Zoom in closely to do this, or the Mapper may display more than one elevation value. Click on the wetland inlet with the **Identify Tool.** A window will appear containing the elevations of the point clicked. Repeat for the outlet. Subtract the two elevations to get the elevation difference. • Alternatively, you can use **Google Earth**. As you hold the cursor over a point on a map, the elevation will be displayed in the lower left part of the screen. Determine the elevation at the highest and lowest ends of the wetland on the Google Earth map.
Question 6	Percentage cover of persistent, sediment trapping vegetation in the wetland	**From the printed map or NH Wetlands Mapper:** • With a wetland layer on, use the identify tool to find acreages of vegetation classes PFO, PSS & PEM. Add the acreage of these types. • Confirm this information with ***field checking***
10 - Nutrient Trapping/Retention/Transformation – NO DATA NEEDED FROM NH WETLANDS MAPPER		
Question 3	Percent cover of wetland vegetation classes	• Same procedures as for Section 9, Sediment Trapping, Question 6. • Transfer your answer • Confirm this information with ***field checking.***
Question 4	Hydroperiod of wetland	**From NH Wetlands Mapper** • Turn on the **NHDES Wetlands Base Map** or the **NWI layer** in the **Water and Watersheds** layers and choose "Labels on" to label the NWI classes. • Identify the hydroperiod code for the NWI polygons and record this information. • Determine which hydrologic regime dominates the wetland (> 50% of NWI polygon's acreage). • Confirm this information with ***field checking***.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 5	Wetland soils	**From NH Wetlands Mapper:** • Display the **Hydric Soils** layer with soil polygons **labeled**. • Determine the acreage of each hydric soil polygon using the **Identify Tool** and record this information. • Using **Appendix D in the NH Method**, determine whether the wetland is dominated (>50%) by fine textured soils, organic soils, or sands & gravels.
11 - Shoreline Anchoring		
Question 1	Gradation of vegetation types	• Same instructions as for Section 2, Wetland-Dependent Wildlife Habitat, Question 9. Determine the number of wetland classes *along the shoreline*.
Question 3	How wide is the wetland bordering the watercourse, lake or pond?	**From NH Wetlands Mapper or Printed Maps:** • Use the **Measure Line Tool, a wetland layer** and aerial photography in the NH Wetlands Mapper to estimate the average wetland width. • Confirm this information with ***field checking***.
12. Noteworthiness		
Question 1	Is wetland within 500 ft. of Highest Ranked Habitat?	**From NH Wetlands Mapper or Printed Maps:** • Using the **Wildlife Action Plan Highest Ranked Habitat** data, identify any highest ranked habitat (statewide significance – pink; or regional significance – green) in or near the wetland.
Question 6	Connection to a state or federally designated river?	Refer to the list of rivers in **New Hampshire Rivers Management and Protection Program and National Wild and Scenic Rivers Program** **From NH Wetlands Mapper** • Use the **Measure Line tool** to determine distance to the nearest state designated river, if applicable.
Question 7	Is the wetland one of just a few left in an urban setting?	**From NH Wetlands Mapper:** • In an urban area, use recent aerial photography and one or more of the wetland layers to determine the local significance of the subject wetland and if other wetlands are present.

APPENDIX C

QUESTIONS TO ANSWER BEFORE THE FIELD VISIT: USING GIS OR OTHER ANALYTICAL TOOLS

(Remaining questions are answered during field checking)

Wetland scientists and other natural resources professionals use a variety of different analytical tools available to them. Among some of the more commonly used tools are:

- GRANIT Data Layers using ArcGIS, Autocad or similar software
- Terrain Navigator
- Google Earth
- GRANIT Data Mapper
- Stereoscopic Aerial Photos

Record answers on the *NH Method* Data Sheets

Question #	Feature	Get answers using GIS or other Analytical tools
1 - Ecological Integrity		
Question 1	Sources of water quality degradation in the watershed	• **Use aerial photography and watersheds** • **Draw the watershed for the wetland being studied** • Review the watershed together with the aerial photo to determine potential sources of contamination.
Question 7	Road, railroad or driveway crossings	**From Printed Individual Wetland Map or Using GIS Or Other Analytical Tools** • Identify road, railroad and driveway crossings that cross or come within 500 ft of the wetland. • Confirm road crossings with ***field checking***.
Question 8	Level of human activity **in the upland** within 500 feet of the wetland edge (land disturbance, clearing, logging, trails, roads, etc.)	Use recent aerial photography as a background. • Demarcate a zone 500 ft from the wetland edge. • Determine any signs of human activity within 500 ft of the wetland, observable in the photo • Confirm with ***field checking.***
Question 9	Percent of impervious surface within 500 feet of the wetland edge	• Using recent **Aerial Imagery** identify impervious surfaces within 500 ft. of the wetland. • Confirm impervious surfaces with ***field checking***.
2 - Wetland-Dependent Wildlife Habitat		
Question 1	Wetland size (acres)	• Determine the size of the wetland using GIS resources (NWI, Hydric Soils, Aerial Photos) and **field checking**.
Question 4	Area of shallow, permanent open water and streams (less than 6.6 ft deep)	• Calculate the acreage of all PAB and PUB wetland vegetation classes. • Calculate stream acreage and add to acreage of PUB and PAB • Confirm with ***field checking.***
Question 5	Deepwater habitat associated with the wetland (lake, pond or river) deeper than 6.6ft.	• Calculate the acreage of deepwater lakes and ponds. • Offline - Check the **NH DES List of Fourth Order and Higher Streams** to identify any 4th order or higher streams. Estimate the length of the 4th order or higher stream associated with the wetland.
Question 6	Wetland vegetation class diversity, including upland "islands" (NWI codes)	• Identify wetland vegetation classes using NWI Maps and/or aerial photography. • Confirm with ***field checking.***

Question #	Feature	Get answers using GIS or other Analytical tools
Question 7	Other wetlands in close proximity to the study wetland	• Using **aerial photography and NWI wetlands/hydric soils**, determine distance to nearby wetlands from the study wetland. • Confirm with ***field checking.***
Question 8	Wildlife access to other wetlands	• Use recent **Aerial Photo Imagery and NWI wetlands/hydric soils** to identify areas of apparently natural vegetation or undisturbed stream corridors between wetlands that could function as wildlife travel routes. • Confirm with ***field checking.***
Question 9	Percent of wetland edge bordered by upland wildlife habitat	• Use recent **Aerial Imagery** to identify areas of apparently natural vegetation within 500 ft of the wetland edge. • Calculate the percentage of the wetland edge bordered by undisturbed upland habitat. • Confirm with ***field checking.***
3 – Fish & Aquatic Life Habitat		
Question 1	Dominant land use in watershed	• Use recent **Aerial Imagery** together with recent **Land Cover** data to assess land use in the watershed of the wetland being studied. • Confirm with ***field checking.***
Question 4	Acres of deepwater habitats (deeper than 6.6ft)	• Use aerial imagery and NWI data to calculate area of deepwater habitat (lakes and ponds classified as Lacustrine in NWI codes)
Question 6	Does the stream channel appear to have been recently altered?	• Using recent **Aerial Imagery,** identify any stream sections that appear straightened • Confirm with field checking.
Question 11	Rare or endangered wildlife present?	• Review the **NH Natural Heritage Bureau Town List** and select the town in question (listed in alphabetical order). See if any species that use wetlands are listed and determine their habitat type(s). Use this a guide for possible observations of rare species in those habitats.
4 – Scenic Quality		
Question 2	Public Access	• Use the **Conservation & Public Lands** data layer to determine if the wetland is on a property that has public access (public land). Public access is not specifically indicated in the Conservation &Public Lands data, so this may require further research to determine access for some conservation properties. This might include checking deeds and asking the town Conservation Commission). • Confirm this information with ***field checking.***
Question 4	Open water visible	• Calculate acreage of all PAB and PUB wetland vegetation classes and any pond or lake acreage. Calculate the size of large open river areas. The question is broad: Is the open water area less than one acre, more than three acres, or somewhere in between? • Confirm with ***field checking.***
5 – Educational Potential		
Question 4	Public or private property with public access	• Use the **Conservation & Public Lands** data layer together with the **Wetlands** data layer to determine if the wetland is on a property that has public access. Public access is not specifically indicated in the **GRANIT Data Mapper** so this may require checking with the town (Conservation Commission). Confirm with **field checking.**
Question 6	Number and accessibility of wetland classes accessible or potentially accessible at educational site	• Same instructions as **2 – Wetland-Dependent Wildlife Habitat**, Question 6. Determine if the number of vegetation classes are accessible at the education site. • Confirm this information with ***field checking.***

Question #	Feature	Get answers using GIS or other Analytical tools
6 – Wetland-based recreation - NO GIS or Other DATA NEEDED		
7 – Flood Storage		
Question 1	Wetland acres, not including upland "islands".	• Calculate Wetland acreage, excluding the area of any upland island. If there are any upland islands/inclusions in the wetland area, you will need to subtract the acreage of the upland from the total wetland acreage and use this adjusted acreage in this calculation.
Question 2	Watershed acres	• Using the **topographic map** and GIS or Other tools, draw the watershed boundary and calculate acreage.
Question 7	Location within the watershed	• Determine the location of the wetland in relation to a perennial/4th order stream (refer to Section 3, Figure 3). • To determine stream order, see: **NH DES List of Fourth Order and Higher Streams** **NH Statewide Map Atlas "Fourth Order and Higher Streams**
8 – Groundwater Recharge		
Question 1	Does the wetland overlie stratified drift aquifer?	• View the **Aquifer Data Layer** and determine if the wetland overlies stratified drift aquifer
Question 2	Is the wetland in a potential public water supply area?	**Use GIS or Other Analytical Tools or use the Forest Society Website for Favorable Gravel Well Analysis:** • Using the Favorable Gravel Well maps available on GRANIT or via the Forest Society web page, locate the wetland area. • Determine if the wetland overlies or is immediately adjacent to a Favorable Gravel Well area.
Question 3	Is the wetland within a public wellhead protection area?	• Determine if the wetland is within a public wellhead protection area. To get the GIS data for wellhead protection areas, contact Pierce Rigrod, NH DES Drinking Water and Groundwater Bureau, at pierce.rigrod@des.nh.gov or 603-271-0688.)
Question 4	Percent coverage of highly permeable soils **within 100** ft of the wetland	• Using the **Soils Data Layer** with soil polygons visually determine the percent cover of highly permeable soils within 100 ft of the wetland.
Question 5	Percent coverage of the highly permeable soil types **within the wetland**	• Using the **Soils Data Layer** with all soil polygons visually determine the percent cover of highly permeable soils within the wetland itself. • Determine if the dominate soils types are on the list in Table 4 in Section 3 in the NH Method,
9 - Sediment Trapping		
Question 2	Character of outlet	• Use the **DRG Topographic** data layer to locate any outlet/s (or lack thereof). • Confirm type of outlet and restriction, if any, with ***field checking.***
Question 3	Character of water flow through the wetland	• Using recent **Aerial Photography and stream lines**, determine shape of the stream channel in the wetland • Confirm with field observation.
Question 5	Gradient of Wetland	• Using GIS, determine the highest and lowest elevation of the wetland along its longest axis. Subtract the two elevations to get the elevation difference.
Question 6	Percentage cover of persistent, sediment trapping vegetation in the wetland	• Identify NWI wetland classes and determine the wetland vegetation classes (PFO, PSS, PEM) with the most acreage. Add the acreage of these types. Confirm with ***field checking.***
10 - Nutrient Trapping/Retention/Transformation – NO DATA NEEDED FROM G RANIT DATA MAPPER		
Question 3	Percent cover of wetland vegetation classes	• Same directions as **9 - Sediment Trapping**, Question 6 above. Transfer your answer. • Confirm this information with ***field checking.***

Question #	Feature	Get answers using GIS or other Analytical tools
Question 4	Hydroperiod of wetland	• Using the NWI data layers, determine the hydroperiod codes for the NWI polygons. • Determine which hydrologic regime dominates the wetland (> 50% of NWI polygon's acreage). • Confirm this information with ***field checking***.
Question 5	Wetland soils	• Use the **Hydric Soils** layer to determine the acreage of each hydric soil polygon. • Using **Appendix D in the NH Method**, determine whether the wetland is dominated (>50%) by fine textured soils, organic soils, or sands & gravels.
11 - Shoreline Anchoring		
Question 1	Gradation of vegetation types	• Same instructions as for Section 2, Wetland-Dependent Wildlife Habitat, Question 9. Determine the number of wetland classes *along the shoreline*.
Question 3	How wide is the wetland bordering the watercourse, lake or pond?	• Using aerial photography and the wetland boundary, calculate the average wetland width • Confirm this information with ***field checking***.
12. Noteworthiness		
Question 1	Is wetland within 500 ft. of Highest Ranked Habitat?	• Using the **Wildlife Action Plan Highest Ranked Habitat** data, identify any highest ranked habitat (statewide significance – pink; or regional significance – green) that appears in or near the wetland.
Question 6	Connection to a state designated river?	Refer to the list of rivers in **New Hampshire Rivers Management and Protection Program and National Wild and Scenic Rivers Program** **Using GIS or Other Analytical Tools:** • Determine distance to the nearest state designated river, if applicable.
Question 7	Is the wetland one of just a few left in an urban setting	• Use the land use an aerial photo data layers to determine the significance of the wetland in an urban setting. Is it one of just a few left?

APPENDIX D

Wetland Soils Data compiled from USDA-NRCS Statewide Numerical Soils Legend (April 2010)

Table A	**Fine-Textured Soils**
Table B	**Organic and/or Peat**
Table C	**Sands and gravels**

TABLE A - FINE TEXTURED SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Carroll	LDB	Lyme-Pillsbury association, extremely stony	Loose or firm loamy till, 3-8% slopes	poorly
Carroll	LfA	Leicester-Moosilauke complex, very stony	Loose or firm loamy till	poorly
Carroll	LfB	Leicester-Moosilauke complex, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Carroll	Lm	Limerick	Silty Alluvial	poorly
Carroll	Ra	Raynham	Marine or Glaciolacustrine	poorly
Carroll	RgB	Ridgebury	Firm, compact, platy till, 3-8% slopes	poorly
Carroll	RIA	Ridgebury, very stony	Firm, compact, platy till	poorly
Carroll	RIB	Ridgebury, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Carroll	Wc	Whitman, very stony	Firm, compact, platy till	very poorly
Cheshire	5	Rippowam, frequently flooded	Alluvial	poorly
Cheshire	6	Saco, frequently flooded	Silty Alluvial	very poorly
Cheshire	107	Rippowam-Saco complex, frequently flooded	Alluvial	very poorly
Cheshire	109	Limerick, frequently flooded	Silty Alluvial	poorly
Cheshire	218	Raynham-Wareham complex, occasionally flooded	Marine or Glaciolacustrine	poorly
Cheshire	340B	Stissing	Firm, compact, silty, till, 3-8% slopes	poorly
Cheshire	341B	Stissing, very stony	Firm, compact, silty, till, 3-8% slopes	poorly
Cheshire	347B	Lyme and Moosilauke, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Cheshire	533	Raynham, poorly drained	Marine or Glaciolacustrine	poorly
Cheshire	646B	Pillsbury, poorly drained	Firm, compact, platy till, 3-8% slopes	poorly
Cheshire	647B	Pillsbury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Coos	105A	Rumney, frequently flooded	Alluvial	poorly
Coos	209A	Charles, frequently flooded	Silty Alluvial	poorly
Coos	600	Endoaquents, loamy	Loamy Alluvial	
Coos	224C	Bemis, very stony	Firm, compact, platy till, 8-15% slopes	poorly
Coos	246B	Lyme	Loose or firm loamy till, 3-8% slopes	poorly
Coos	247A	Lyme, very stony	Loose or firm loamy till	poorly
Coos	247B	Lyme, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Coos	247C	Lyme, very stony	Loose or firm loamy till, 8-15% slopes	poorly

TABLE A - FINE TEXTURED SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Coos	406A	Medomak, frequently flooded	Silty Alluvial	very poorly
Coos	433A	Grange, poorly drained	Glaciofluvial	poorly
Coos	505A	Cohas, occasionally flooded	Alluvial	poorly
Coos	549A	Peacham, very stony	Firm, compact, silty, till	very poorly
Coos	589A	Cabot	Firm, compact, platy till	poorly
Coos	589B	Cabot	Firm, compact, platy till, 3-8% slopes	poorly
Coos	589C	Cabot	Firm, compact, platy till, 8-15% slopes	poorly
Coos	590A	Cabot, very stony	Firm, compact, platy till	poorly
Coos	590B	Cabot, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Coos	590C	Cabot, very stony	Firm, compact, platy till, 8-15% slopes	poorly
Coos	633A	Pemi	Marine or Glaciolacustrine	poorly
Coos	646A	Pillsbury, poorly drained	Firm, compact, platy till	poorly
Coos	646B	Pillsbury, poorly drained	Firm, compact, platy till, 3-8% slopes	poorly
Coos	646C	Pillsbury, poorly drained	Firm, compact, platy till, 8-15% slopes	poorly
Coos	647A	Pillsbury, poorly drained, very stony	Firm, compact, platy till	poorly
Coos	647B	Pillsbury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Coos	647C	Pillsbury, poorly drained, very stony	Firm, compact, platy till, 8-15% slopes	poorly
Coos	768A	Peacham-Wonsqueak-Cabot association, extremely stony	Firm, compact, silty, till	very poorly
Coos	769B	Monarda-Burnham association, very stony	Firm, compact, silty, till 3-8% slopes	poorly
Coos	770B	Monarda-Telos association, very stony	Firm, compact, silty, till 3-8% slopes	poorly
Coos	825B	Pillsbury-Peacham-Peru association, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Coos	832A	Peacham-Wonsqueak-Pillsbury association, extremely stony	Firm, compact, silty, till	very poorly
Coos	865B	Bemis-Surplus association, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Coos	895A	Bucksport	Muck Organic Freshwater	very poorly
Coos	964B	Howland-Cabot association, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Coos	965B	Cabot-Howland association, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Grafton	5	Rippowam, frequently flooded	Alluvial	poorly
Grafton	105	Rumney, frequently flooded	Alluvial	poorly
Grafton	109	Limerick, frequently flooded	Silty Alluvial	poorly
Grafton	341A	Stissing, very stony	Firm, compact, silty, till	poorly

TABLE A - FINE TEXTURED SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Grafton	341B	Stissing, very stony	Firm, compact, silty, till, 3-8% slopes	poorly
Grafton	347A	Lyme and Moosilauke, very stony	Loose or firm loamy till	poorly
Grafton	347B	Lyme and Moosilauke, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Grafton	406	Medomak, frequently flooded	Silty Alluvial	very poorly
Grafton	534	Binghamville	Marine or Glaciolacustrine	poorly
Grafton	633	Pemi	Marine or Glaciolacustrine	poorly
Grafton	647A	Pillsbury, poorly drained, very stony	Firm, compact, platy till	poorly
Grafton	647B	Pillsbury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Grafton	717	Lyme-Peacham association, very stony	Loose or firm loamy till	very poorly
Grafton	731	Peacham and Ossipee, very stony	Firm, compact, silty, till	very poorly
Grafton	723B	Peru-Pillsbury association, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Hills East	Bg	Binghamville	Marine or Glaciolacustrine	poorly
Hills East	LeA	Leicester Variant, (Typic)	Loose or firm loamy till	poorly
Hills East	LsA	Leicester Variant, (Typic), very stony	Loose or firm loamy till	poorly
Hills East	LtA	Leicester-Walpole complex	Loose or firm loamy till	poorly
Hills East	LtB	Leicester-Walpole complex	Loose or firm loamy till, 3-8% slopes	poorly
Hills East	LvA	Leicester-Walpole complex, very stony	Loose or firm loamy till	poorly
Hills East	LvB	Leicester-Walpole complex, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Hills East	RbA	Ridgebury	Firm, compact, platy till	poorly
Hills East	ReA	Ridgebury, very stony	Firm, compact, platy till	poorly
Hills East	ReB	Ridgebury, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Hills East	Rp	Rippowam, frequently flooded	Alluvial	poorly
Hills East	Sm	Saco Variant, frequently flooded	Silty Alluvial	very poorly
Hills West	105	Rumney, frequently flooded	Alluvial	poorly
Hills West	246B	Lyme	Loose or firm loamy till, 3-8% slopes	poorly
Hills West	247B	Lyme, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Hills West	549	Peacham, very stony	Firm, compact, silty, till	very poorly
Hills West	646B	Pillsbury, poorly drained	Firm, compact, platy till, 3-8% slopes	poorly
Hills West	647B	Pillsbury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly

TABLE A - FINE TEXTURED SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Merr/Belknap	005A	Rippowam, frequently flooded	Alluvial	poorly
Merr/Belknap	006A	Saco, frequently flooded	Silty Alluvial	very poorly
Merr/Belknap	049A	Whitman, very stony	Firm, compact, platy till	very poorly
Merr/Belknap	105A	Rumney, frequently flooded	Alluvial	poorly
Merr/Belknap	406A	Medomak, frequently flooded	Silty Alluvial	very poorly
Merr/Belknap	533A	Raynham, poorly drained	Marine or Glaciolacustrine	poorly
Merr/Belknap	647A	Pillsbury, poorly drained, very stony	Firm, compact, platy till	poorly
Merr/Belknap	647B	Pillsbury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Merr/Belknap	649A	Peacham Variant (acid), extremely stony	Firm, compact, silty, till	very poorly
Merr/Belknap	657A	Ridgebury, poorly drained, very stony	Firm, compact, platy till	poorly
Merr/Belknap	657B	Ridgebury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Rockingham	033A	Scitico	Marine or Glaciolacustrine	poorly
Rockingham	134	Maybid	Marine or Glaciolacustrine	very poorly
Rockingham	305	Lim-Pootatuck complex, frequently flooded	Alluvial	poorly
Rockingham	533	Raynham, poorly drained	Marine or Glaciolacustrine	poorly
Rockingham	538A	Squamscott	Marine or Glaciolacustrine	poorly
Rockingham	656A	Ridgebury, poorly drained	Firm, compact, platy till	poorly
Rockingham	657A	Ridgebury, poorly drained, very stony	Firm, compact, platy till	poorly
Rockingham	657B	Ridgebury, poorly drained, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Strafford	Be	Biddeford	Marine or Glaciolacustrine	very poorly
Strafford	LcB	Leicester	Loose or firm loamy till, 3-8% slopes	poorly
Strafford	LeA	Leicester, very stony	Loose or firm loamy till	poorly
Strafford	LeB	Leicester, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Strafford	LrA	Leicester-Ridgebury complex, very stony	Loose or firm loamy till	poorly
Strafford	LrB	Leicester-Ridgebury complex, very stony	Loose or firm loamy till, 3-8% slopes	poorly
Strafford	RgA	Ridgebury	Firm, compact, platy till	poorly
Strafford	RgB	Ridgebury	Firm, compact, platy till, 3-8% slopes	poorly
Strafford	RIA	Ridgebury, very stony	Firm, compact, platy till	poorly

TABLE A - - FINE TEXTURED SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Strafford	RIB	Ridgebury, very stony	Firm, compact, platy till, 3-8% slopes	poorly
Strafford	Ru	Rippowam, frequently flooded	Alluvial	poorly
Strafford	ScA	Scitico	Marine or Glaciolacustrine	poorly
Strafford	ScB	Scitico	Marine or Glaciolacustrine	poorly
Strafford	SwA	Shaker	Marine or Glaciolacustrine	poorly
Strafford	SwB	Shaker	Marine or Glaciolacustrine	poorly
Strafford	Ta	Tidal Marsh	Marine or Glaciolacustrine	very poorly
Strafford	Wa	Whitman, very stony	Firm, compact, platy till	very poorly
Sullivan	ShB	Stissing, very stony	Firm, compact, silty, till	poorly
Sullivan	LyB	Lyme-Moosilauke complex, very stony	Loose or firm loamy till	poorly
Sullivan	Lk	Limerick	Silty Alluvial	poorly
Sullivan	LuA	Lyme-Moosilauke complex	Loose or firm loamy till	poorly
Sullivan	LyA	Lyme-Moosilauke complex, very stony	Loose or firm loamy till	poorly
Sullivan	PgA	Pillsbury	Firm, compact, platy till	poorly
Sullivan	PlA	Pillsbury	Firm, compact, platy till	poorly
Sullivan	Ra	Raynham	Marine or Glaciolacustrine	poorly
Sullivan	Ru	Rumney, frequently flooded	Alluvial	poorly
Sullivan	Sa	Saco, frequently flooded	Silty Alluvial	very poorly
Sullivan	Sga	Stissing	Firm, compact, silty, till	poorly
Sullivan	ShA	Stissing, very stony	Firm, compact, silty, till	poorly

TABLE B - ORGANIC and/or PEAT SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Carroll	CM	Chocorua	Organic over Sand, Freshwater	very poorly
Carroll	GW	Greenwood	Muck Organic Freshwater	very poorly
Carroll	OT	Ossipee	Organic over loamy, freshwater	very poorly
Cheshire	197	Borohemists, ponded	Muck Organic Freshwater	very poorly
Cheshire	295	Greenwood	Muck Organic Freshwater	very poorly
Cheshire	395	Chocorua	Organic over Sand, Freshwater	very poorly
Cheshire	495	Ossipee	Organic over loamy, freshwater	very poorly
Coos	895A	Bucksport	Muck Organic Freshwater	very poorly
Coos	950A	Vassalboro-Wonsqueak association	Peat Organic Freshwater	very poorly
Coos	992A	Pondicherry	Organic over Sand, Freshwater	very poorly
Coos	995A	Wonsqueak	Organic over loamy, freshwater	very poorly
Grafton	295	Greenwood	Muck Organic Freshwater	very poorly
Grafton	395	Chocorua	Organic over Sand, Freshwater	very poorly
Hills East	BoA	Borohemists, nearly level	Muck Organic Freshwater	very poorly
Hills East	BpA	Borohemists, ponded	Muck Organic Freshwater	very poorly
Hills East	Cu	Chocorua	Organic over Sand, Freshwater	very poorly
Hills East	Gw	Greenwood	Muck Organic Freshwater	very poorly
Hills West	197	Borohemists, ponded	Muck Organic Freshwater	very poorly
Hills West	295	Greenwood	Muck Organic Freshwater	very poorly
Hills West	395	Chocorua	Organic over Sand, Freshwater	very poorly
Hills West	495	Ossipee	Organic over loamy, freshwater	very poorly
Merr/Belknap	194A	Catden Variant (sapric Haplohemists), ponded	Muck Organic Freshwater	very poorly
Merr/Belknap	196A	Meadowsedge, ponded	Mucky Peat Organic Freshwater	very poorly
Merr/Belknap	296A	Catden Variant (sapric Haplohemists)	Muck Organic Freshwater	very poorly
Merr/Belknap	393A	Timakwa	Organic over Sand, Freshwater	very poorly

TABLE B - ORGANIC and/or PEAT SOILS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Class
Merr/Belknap	394A	Chocorua Variant (euic)	Organic over Sand, Freshwater	very poorly
Merr/Belknap	894A	Meadowsedge	Mucky Peat Organic Freshwater	very poorly
Rockingham	97	Greenwood and Ossipee, ponded	Organic over loamy, freshwater	very poorly
Rockingham	295	Greenwood	Muck Organic Freshwater	very poorly
Rockingham	395	Chocorua	Organic over Sand, Freshwater	very poorly
Rockingham	397	Ipswich, frequently flooded	Tidal Organic	very poorly
Rockingham	495	Ossipee	Organic over loamy, freshwater	very poorly
Rockingham	497	Pawcatuck, frequently flooded	Organic over Sand, Tidal	very poorly
Rockingham	597	Westbrook, frequently flooded	Organic over silty, tidal	very poorly
Rockingham	997	Ipswich, low salt, frequently flooded	Tidal Organic	very poorly
Strafford	Fa	Fresh Water Marsh	NA	very poorly
Strafford	Mp	Muck and peat	Organic	very poorly
Sullivan	Bp	Borohemists, ponded	Muck Organic Freshwater	very poorly
Sullivan	Ch	Chocorua	Organic over Sand, Freshwater	very poorly
Sullivan	Gw	Greenwood	Muck Organic Freshwater	very poorly
Sullivan	Ot	Ossipee	Organic over loamy, freshwater	very poorly

TABLE C - SANDS AND GRAVELS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Classs
Carroll	NaB	Naumberg	Stratified Sand & Gravel	poorly
Cheshire	15	Searsport	Stratified Sand & Gravel	very poorly
Cheshire	214	Naumberg, poorly drained	Stratified Sand & Gravel	poorly
Cheshire	414	Moosilauke, poorly drained	Loose Till of Sandy Texture	poorly
Coos	015A	Searsport	Stratified Sand & Gravel	very poorly
Coos	214A	Naumberg, poorly drained	Stratified Sand & Gravel	poorly
Coos	214B	Naumberg, poorly drained	Stratified Sand & Gravel	poorly
Coos	414A	Moosilauke, poorly drained	Loose Till of Sandy Texture	poorly
Coos	414B	Moosilauke, poorly drained	Loose Till of Sandy Texture	poorly
Coos	415A	Moosilauke, poorly drained, very stony	Loose Till of Sandy Texture	poorly
Coos	415B	Moosilauke, poorly drained, very stony	Loose Till of Sandy Texture	poorly
Coos	415C	Moosilauke, poorly drained, very stony	Loose Till of Sandy Texture	poorly
Coos	817A	Moosilauke-Waumbek association, very stony	Loose Till of Sandy Texture	poorly
Coos	900	Endoaquents, sandy	Sandy Alluvial	
Grafton	15	Searsport	Stratified Sand & Gravel	very poorly
Grafton	114	Walpole-Binghamville complex	Stratified Sand & Gravel	poorly
Grafton	614	Kinsman	Stratified Sand & Gravel	poorly
Grafton	729B	Waumbek-Lyme association, very stony	Loose Till of Sandy Texture	poorly
Hills East	PiA	Pipestone	Sandy Glaciofluvial Deposits	poorly
Hills East	PiB	Pipestone	Sandy Glaciofluvial Deposits	poorly
Hills East	Sn	Saugatuck	Sandy Glaciofluvial Deposits	poorly
Hills East	So	Scarboro	Stratified Sand & Gravel	very poorly
Hills East	Sr	Scarboro, very stony	Stratified Sand & Gravel	very poorly
Hills West	15	Searsport	Stratified Sand & Gravel	very poorly
Hills West	214A	Naumberg, poorly drained	Stratified Sand & Gravel	poorly
Hills West	214B	Naumberg, poorly drained	Stratified Sand & Gravel	poorly

TABLE C - SANDS AND GRAVELS

(Compiled from USDA-NRCS NH Statewide Numerical Soils Legend, April 2010)

County Name	Map Unit Symbol	Map Unit Name	Parent Material	Drainage Classs
Merr/Belknap	214A	Naumberg, poorly drained	Stratified Sand & Gravel	poorly
Merr/Belknap	315A	Mashpee	Stratified Sand & Gravel	poorly
Merr/Belknap	325A	Scarboro Variant (Typic), very stony	Stratified Sand & Gravel	very poorly
Merr/Belknap	326A	Scarboro Variant (Typic)	Stratified Sand & Gravel	very poorly
Merr/Belknap	415A	Moosilauke, poorly drained, very stony	Loose Till of Sandy Texture	poorly
Merr/Belknap	415B	Moosilauke, poorly drained, very stony	Loose Till of Sandy Texture	poorly
Rockingham	115	Scarboro	Stratified Sand & Gravel	very poorly
Rockingham	125	Scarboro, very stony	Stratified Sand & Gravel	very poorly
Rockingham	314A	Pipestone	Sandy Glaciofluvial Deposits	poorly
Rockingham	546A	Walpole	Stratified Sand & Gravel	poorly
Rockingham	547A	Walpole, very stony	Stratified Sand & Gravel	poorly
Rockingham	547B	Walpole, very stony	Stratified Sand & Gravel	poorly
Strafford	Sb	Saugatuck	Sandy Glaciofluvial Deposits	poorly
Strafford	MI	Mixed Alluvial Land	NA	poorly
Sullivan	Na	Naumberg	Stratified Sand & Gravel	poorly

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Evaluator: *Frank Mitchell*

Summary of Scores

FUNCTION	SCORE
1. Ecological Integrity	8.5
2. Wetland-Dependent Wildlife Habitat	7.5
3. Fish & Aquatic Habitat	6.1
4. Scenic Quality	9.2
5. Educational Potential	6.
6. Wetland-Based Recreation	6.5
7. Floodwater Storage	5.2
8. Groundwater	1.0
9. Sediment Trapping	7.9
10. Nutrient Removal / Retention / Transformation	6.1
11. Shoreline Anchoring	7.5
12. Noteworthiness	40.0

Narrative Description

Foss Meadow is a marsh & shrub wetland of approximately 61 acres. It is located in the upper part of the Little Suncook River Watershed, at the eastern base of Nottingham Mountain in Deerfield. The wetland's watershed is 873 acres and is largely forested and undeveloped.

The wetland is influenced by beaver activity and was in the path of the July, 2008 tornado, which had an impact in the 500 ft. zone around approximately half the wetland. Wetland vegetation classes observed in the wetland include: Palustrine Emergent (PEM1Eb and PEM1Fb), Palustrine Emergent/Scrub-shrub (PEM/PSS1E and PEM/SS1Eb), Palustrine Unconsolidated Open Bottom – Open Water (PUBFb), and Palustrine Forested (PFO1 & PFO5b). Dominant plant species observed in the wetland included a variety of herbaceous emergent plants. The soils in the wetland were mapped by NRCS as 97 - Greenwood and Ossipee, ponded water. One stream (Griffin Brook) flows through the wetland (approximately 9 acres of open water)

ECOLOGICAL INTEGRITY
The ecological integrity of Foss Meadows is moderately high. Water quality in the wetland appears high, and there is no evidence of fill or other human disturbance. However, logging in the upland adjacent to the wetland and in parts of the wetland) following the 2008 tornado has created some potential short term erosion. Within 500 ft of the

wetland, the upland is largely undisturbed (one town road and no buildings). The wetland's outlet is an abandoned beaver dam, resulting in lower water levels than in recent years.

WETLAND-DEPENDENT WILDLIFE HABITAT

The fifth largest wetland in town, Foss Meadow has significant wildlife habitat value. Approximately 10% of the wetland is open water, supporting species such as waterfowl. A stream flows through the wetland and there are four dominant wetland vegetation classes (PEM, PSS, PUB, PFO). Other wetlands nearby increase the value of wetland habitats in the area.

FISH AND AQUATIC HABITAT

Habitat for fish and aquatic life is favored by the extensive marsh & shrub habitats but is limited by the amount of open water and perennial stream habitat. Contributing to habitat value are a largely forested watershed, high water quality a diversity of substrate types in the wetland and associated stream, abundant cover (wood and large rocks) and the absence of artificial barriers. Blanding's turtle, an endangered species in NH, has been reported in the vicinity of Foss Meadow (personal communication with a local resident and Phil Auger, UNHCE).

SCENIC QUALITY

Foss Meadow is a particularly scenic wetland with an opportunity for an open view across it to Nottingham Mountain. The view from Griffin Road was temporarily enhanced by the tornado and the logging that followed it. (By 2015, vegetation was high and dense enough to restrict views for the road and vice versa). The scenic view will remain available from other parts of the wetland edge as the logged area continues to regenerate. Nottingham Mountain creates a high degree of landscape contrast. Diversity of vegetation in and around the wetland and its generally natural appearance enhance its scenic value.

EDUCATIONAL POTENTIAL

Foss Meadow has moderate educational potential. Favoring educational use are the wetland's unspoiled character, wildlife habitat and scenic values, several wetland vegetation types, open water and a stream. Public access is available through the Deerfield Hart Town Forest and physical access is not difficult. The wetland is close to a public road with modest parking. There is no disabled access.

WETLAND-BASED RECREATION

Foss Meadow has opportunities for wildlife observation, access to a stream and the wetland's scenic quality. Limited parking and lack of disabled access are limiting factors.

FLOODSTORAGE

Foss Meadow's capacity to store water during times of flooding is moderate to high. The wetland is relatively large in relation to its watershed (about 6.36%) enabling it to hold a large amount of water produced by the watershed during times of high flow.

GROUNDWATER

This function scored low for Foss Meadow. There is no stratified drift aquifer near the wetland, no potential public water supply area nearby and limited groundwater recharge potential (dominant soil types within 500 ft of the wetland are Chatfield-Hollis-Canton Complex (140 C&D) and they are not highly permeable).

SEDIMENT TRAPPING

The sediment trapping function of Foss Meadow is moderately high, due to a moderate to high Wetland Flood Storage capability, an outlet that is constricted by two large beaver dams, and some ponded open water which

allows sediments to filter out of the surface watery. Contributing to the sediment trapping function are the moderate gradient of the wetland's watershed, dense emergent wetland vegetation and relatively shallow water depth.

NUTRIENT REMOVAL/ RETENTION/TRANSFORMATION

The wetland has a moderate ability to attenuate nutrients. Contributing to this function are the Wetland Flood Storage, dense emergent wetland vegetation and sediment trapping capacity. Other factors are a seasonally saturated/flooded and semi-permanently flooded hydrology and very poorly drained wetland soils that support year-round nutrient attenuation. .

SHORELINE ANCHORING

Foss Meadow has a moderate shoreline anchoring capacity, a function of two wetland vegetation types along the shoreline (emergent & shrub), high vegetation density and a wide wetland area bordering the stream.

NOTEWORTHINESS

Foss Meadows has several noteworthy features, including 1) Highest Ranked Habitat in about half the wetland (state and regional significance), as described in the NH Wildlife Action Plan, 2) local significance because it is the 5th largest wetland in town, and 3) regional significance because it is located in a priority area in Bear-Paw Regional Greenways Conservation Plan and is one of the larger wetlands in the region

Foss Meadow, Deerfield, looking southwest, June, 2011 photo

In the foreground is upland vegetation that is regenerating following the July, 2008 tornado which struck the area and subsequent cutting and removal of trees from the site. Edging the open water area (PUBFb) on both sides is an emergent marsh (PEM1Eb and PEM1FEb), mixing with scrub/shrub vegetation (PEM/PSS1E) on the far side of the wetland. Note the small "island" of pines in the top center of the photo is not shown

on NWI maps, apparently too small for the scale of the data. In the background is upland forest, with Nottingham Mountain, the upper part of Foss Meadow's watershed, as the highest feature.

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Evaluator: *Frank Mitchell*

Foss Meadow
A closer view of the small "island" area in Foss Meadows shows sprouting tree stumps in the foreground (from tree cutting)and the emergent marsh vegetation (PEM1Eb) around the pines (note their poor condition). The far side of the wetland is classified by the NWI as PEM/SS1E. In the actual wetland, there's a mix of emergent herbaceous vegetation, small shrubs and some open water/unconsolidated bottom (PUB) not shown on NWI. Note also the remains of a few dead trees (there had been more standing trees before the tornado)*. They show that the wetland's hydrology has changed over time, formerly being drier and capable of supporting trees. The NWI modifier "b" indicates there has been beaver activity.

* See aerial imagery post-2008 to view the dead downed trees in the wetland following the tornado

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

1 – ECOLOGICAL INTEGRITY

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there land uses in the wetland's watershed that could degrade water quality in the wetland?	*Logging and associated stream/wet area crossings following the 2008 tornado have created sources of sediment on one side of the wetland.*	a. Less than 5% of the watershed has land uses that could degrade water quality. b. 5-10% of the watershed has land uses that could degrade water quality. c. > 10% of the watershed has land uses that could degrade water quality.	10 (7.5) 5 1
2. Is there evidence of fill in the wetland?	*One stream crossing at south end of wetland.*	a. Less than 1 % b. From 1-3 % c. More than 3 %	(10) 5 1
3. What percentage of the wetland has been altered by agricultural activities?	*None*	a. Less than 5 % b. From 5 to 25 % c. More than 25 %	(10) 5 1
4. What percentage of the wetland has been adversely impacted by logging activity within the last 10 years?	*See note for question 1*	a. Less than 1% b. From 1 to 10 % c. More than 10 %	10 (5) 1
5. How much human activity is taking place in the wetland (e.g. ATV use, trails, cars, dumping of brush and garbage, etc.)?	*None evident*	a. Low: Few trails in use, little or no traffic, and little or no litter. b. Moderate: Some used trails, roads, litter c. High: Many trails, roads, and/or litter	(10) 5 1
6. What percentage of the wetland is occupied by invasive plant species?	*None observed but clearing noted in question 1 could lead to introduction of invasives. Should be monitored annually.*	a. None b. 1-5% of the wetland has invasive species c. > 5% of the wetland has invasive species	(10) 5 1
7. Are there roads, driveways and/or railroads crossing or adjacent to the wetland or come within 500 ft. of the wetland?	*A logging road crosses the stream entering the wetland just upstream of the wetland and Logging trails/roads are extensive on the east side of the wetland.*	a. No roads, driveways or railroads. within 500 ft. of, or in the wetland b. Roads, driveways, railroads are within 500 ft of the wetland c. Roads, driveways, railroads. cross or are adjacent to the wetland	(10) 5 1
8. How much human activity is taking place in the upland within 500 feet of the wetland edge?	*Little human activity is in the 500 ft. zone. The dominant land use is forested, but Griffin Road runs just outside the 500 ft. zone around the wetland.*	a. Less than 5% or no activity b. Human activity evident in up to 25% of the 500 ft zone c. Human activity evident in more than 25% of the 500 ft zone	10 (5) 1
9. What is the percent of impervious surface within 500 feet of the wetland edge?	*None, though there are several buildings within 700 ft.*	a. Less than 3% impervious area within 500 ft of the wetland edge b. 3-10% impervious area within 500 ft of the wetland edge c. Greater than 10% impervious area within 500 ft of the wetland edge	(10) 5 1

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9. Is there a human-made structure that regulates the flow of water through the wetland?	*No, but the beaver dam that controlled the water level for decades has been unmaintained recently and water level is somewhat lower.*	a. No human made structures present in the wetland b. One or more human made structures present in the wetland but hydrologic modification is slight c. One or more human made structures present in the wetland that severely block or alter surface water hydrology	(10) 5 1

AVERAGE SCORE FOR ECOLOGICAL INTEGRITY

(Add scores for each question and divide by 10) *8.6*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

2 – WETLAND-DEPENDENT WILDLIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the wetland acreage?	*61 acres (drawn wetland polygon from NH Wetlands Mapper).*	a. More than 100 acres b. From 20 - 100 acres c. Less than 20 acres	10 (5) 1
2. What is the score for Ecological Integrity?	*Logging and associated stream/wet area crossings following the 2008 tornado have created sources of sediment on one side of the wetland.*	Average score for **Ecological Integrity**	*8.6* -------
3. Has water quality in the wetland been degraded by land use in the watershed?		Record Answer from **Ecological Integrity**, Question 1	*5* _____
4. What is the area of shallow permanent open water less than 6.6 feet deep, including streams and shallow ponds that are part of the wetland complex?	*7.9 acres of PUB (NH Wetlands Mapper) Round to 8 acres to include stream channel.*	a. More than 3 acres b. From 0.5 to 3 acres c. Less than 0.5 acre	(10) 5 1
5. Is there deepwater habitat (lakes or ponds > 6.6ft deep) and/or 4th order or higher rivers associated with the wetland?	*No (small stream only)*	a. Deepwater stream ≥1 mile long and/or lake or pond ≥10 acres present b. Deepwater stream < 1 mile long and/or lake or pond < 10 acres present c. No deepwater stream, lake or pond present	10 5 (1)
6. What is the diversity of vegetation classes in the wetland? *Refer to Appendix F for more information about wetland vegetation classes.*	*4 classes: PUB, PEM, PSS, PFO (NH Wetlands Mapper)*	a. Three or more wetland classes (including upland islands) present b. Two wetland classes (including upland islands) present c. One wetland class present	(10) 5 1
7. Are other wetlands in close proximity to the study wetland?	*Yes, one larger (16.6 acres) & one smaller (0.2) acres) one are within 0.25 miles.*	a. Other connected or unconnected wetlands within a 0.25 mile distance b. Wetland connected to other wetlands within a 0.5 to 1 mile distance by perennial stream or lake, **OR** other unconnected wetlands are present within a 0.25 to 0.5 mile distance c. Wetland not hydrologically connected to other wetlands within 1 mile and more than 0.5 miles from other unconnected wetlands.	(10) 5 1

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

2 – WETLAND-DEPENDENT WILDLIFE HABITAT (continued)

Evaluation Questions	Observations & Notes	Answers	Score
8. Are there wildlife travel corridors allowing access to other wetlands?	*Griffin Rd. James Rd & houses along them constitute barriers to animal movement.*	a. Free access along well vegetated stream corridor, woodland, or lakeshore b. Access partially blocked by roads, urban areas, or other obstructions c. Access blocked by roads, urban areas, or other obstructions	(10) 5 1
9. What percentage of the wetland edge is bordered by undisturbed woodland or idle land (e.g. shrub land or abandoned fields) at least 500 feet in width?	*Estimated > 90% is bordered by natural land cover, within 500 ft., though about half the wetland edge was cleared following the 2008 tornado. Griffin Rd. is within 500 ft. of the wetland at one point, hence the >90% estimate.*	a. More than 95% of the wetland b. between 75-95% of the wetland c. Less than 75% of the wetland	10 (5) 1
10. What percentage of the wetland is occupied by invasive plant species?	*None observed.*	Record Answer from **Ecological Integrity**, Question 6	*10*

AVERAGE SCORE FOR WILDLIFE HABITAT

(Add scores for each question and divide by 10) *7.5*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

3 – FISH AND AQUATIC LIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the dominant land use in the watershed above wetland?	*Mostly wooded*	a. Woodland, wetland, or abandoned farmland b. Active farmland or rural residential c. Urban and heavily developed suburban areas, commercial and industrial areas.	(10) 5 1
2. Has water quality in the wetland been degraded by land use in the watershed?	*Logging and associated stream/wet area crossings following the 2008 tornado have created sources of sediment on one side of the wetland.*	Record Answer from **Ecological Integrity**, Question 1	*5* ------
3. What is the area of shallow permanent open water less than 6.6 ft deep, including streams and ponds within the wetland?	*7.9 acres of PUB (NH Wetlands Mapper)*	Record Answer from **Wetland-Dependent Wildlife Habitat**, Question 4	*10* -----
4. What is the acreage of deepwater habitats deeper than 6.6 feet (pond or lake) associated with the wetland?	*None*	a. More than 100 acres b. From 10 to 100 acres c. Less than 10 acres d. deepwater pond or lake not present	10 5 1 (0)
5. What is the width (bank to bank) of the stream within the wetland?	*Est. 20 ft. average.*	a. More than 50 feet b. From 25 to 50 feet c. Less than 25 feet d. No stream present	10 5 (1) 0
6. Does the stream channel appear to have been recently altered?	*Channel appears natural*	a. Stream is in a natural channel, either a meandering low gradient stream, **OR** a steeper gradient stream with pools and riffles b. Portions of stream appear recently modified, **OR** stream formerly channelized but has regained some natural channel features c. Stream appears to have been recently been channelized, **OR** stream is confined in a non-vegetated chute or pipe d. No stream present	(10) 5 1 0
7. Within the wetland, what is the diversity of substrate types in in the area(s) <u>occupied by open water</u> (flowing or standing) for the non-growing season?	*Difficult to observe directly. Observations done from location on and near the near beaver dam. .*	a. 4 or more substrate types b. 2 or 3 substrate types c. 1 substrate type	10 (5) 1

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

8. How abundant are coarse woody material and large rocks associated with the open water portion of the wetland?	*Tornado caused many dead tree trunks to fall, so downed logs are abundant in parts of the wetland.*	a. Moderately Abundant to Abundant: More than 10% of water portion of the wetland area contains cover objects such as logs, stumps, branches and rocks b. Scarce: Less than 10% of the water portion of the wetland area contains cover objects c. No visible woody materials or rocks	(10) 5 1
9. What is the abundance of floating & submerged vegetation?	Date of Observation: *May 15. Need to recheck during growing season and/or check aerial photos in summer season.*	a. Abundant: More than 70% of water area contains cover objects such as pond lilies, pondweed, and bladderwort b. Moderately abundant: From 30 to 70% of water area contains floating and submerged vegetation c. Scarce: Less than 30% of the water area contains floating and submerged vegetation	10 5 (1)
10. Are there artificial barriers to the passage of aquatic life? **(e.g. dams, elevated culverts, bridge with a width less than the natural stream channel, road crossings, etc. along the stream reach associated with the wetland).**	*None present*	a. No artificial barrier(s) present. b. An artificial barrier is present and equipped with a fish ladder or other provisions for fish passage, or artificial barrier is only present during extreme low water c. Dam, elevated culverts or other artificial barrier(s) is present without provisions for fish passage	(10) 5 1
11. Are fish or aquatic life present that are rare, threatened, endangered or "Species of Special Concern"??	*Blanding's turtle reported from vicinity (personal communication with nearby landowner and Phil Auger, UNHCE.*	a. Documented occurrence of a rare or endangered fish or aquatic life species within or immediately adjacent to the subject wetland b. Documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland **and** suitable habitat exists for this species within the wetland c. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, but suitable habitat exists and wetland is within range of one or more rare species d. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, and suitable habitat is not known to exist	10 (5) 1 0

AVERAGE SCORE FOR FISH & AQUATIC LIFE HABITAT –

(Add scores for each question and divide by 11) *6.1*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

4 – SCENIC QUALITY

Primary Viewing Site(s): __From Griffin Rd and near outlet accessed through Hart Town Forest

Evaluation Questions	Observations & Notes	Answers	Score
1. How many wetland vegetation classes are visible from the primary viewing location(s)? *Refer to Appendix F for more information about wetland vegetation classes.*	*4 classes: PUB, PEM, PSS, PFO (NH Wetlands Mapper)*	a. Three or more classes b. Two classes c. One class	(10) 5 1
2. Is there public access at the viewing site?	*Not posted against access but public access not guaranteed. Road view is a result of clearing following 2008 tornado and view will disappear over time as trees re-grow.*	a. Viewing site is on a property with public access, and trails to the site, or site is along a road. b. Wetland is on property with public access but no trails to the site. c. Wetland is on a property that does not have public access.	(10) 5 1
3. What is the visible extent across the wetland?	*See note for previous question.*	a. Large expanse visible and low growing plants, or mixed vegetation classes you can see through b. View is somewhat restricted by trees and shrubs c. Forested or scrub-shrub wetland with little or no expanse visible.	(10) 5 1
4. What is the approximate extent of open water (including streams) visible from the primary viewing location/s?	*Estimated10 acres including stream*	a. More than 3 acres b. From 1 to 3 acres c. Less than 1 acre	(10) 5 1
5. Does the wetland provide visual contrast with thesurrounding landscape?	*Yes - Nottingham Mountain is the backdrop to the west.*	a. High level of visual contrast with surrounding natural landscape. b. Some visual contrast with surrounding natural landscape c. Little visual contrast with surrounding landscape, or surrounding landscape is developed	(10) 5 1
6. What is the general appearance of the wetland and surrounding land use(s) visible from primary viewing location(s)?	*Logging effects remain - ruts, stumps. etc.*	a. Wetland is undisturbed and natural. No visual detractors, such as buildings, litter, abandoned cars, or powerlines b. Limited disturbance in and/or around wetland. Minor visual detractors c. Severe visual detractors present	10 (5) 1

AVERAGE SCORE FOR SCENIC QUALITY

(Add scores for each question and divide by 7) *9.2*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

5 – EDUCATIONAL POTENTIAL

Primary Educational Site(s): __Near outlet accessed through Hart Town Forest_____

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the Ecological Integrity of the wetland?		Average Score from **1- Ecological Integrity**	*8.5* -----
2. Does the wetland have high value wildlife habitat?		Average Score from **2 – Wetland-Dependent Wildlife Habitat**	*7.5* -----
3. Does the wetland have high value fish and aquatic life habitat?	*Limited open/deepwater habitats, small stream size.*	Average Score from **2 – Fish & Aquatic Life Habitat**	*6.1* -----
4. Is all or part of the wetland on public or private property that has public access?	*Not posted against access but public access not guaranteed around most of wetland.. Is a lightly maintained trail near the wetland on Deerfield Hert Town Forest. Road view is result of clearing following 2008 tornado and view will disappear over time as trees re-grow.*	a. Wetland is on a property with public or private access and trails to the site. b. Wetland is on a property with public or private access but no trails to the site. c. Wetland is on a property that does not have public access.	10 5 (1)
5. How close is the educational site to off-road parking suitable for 5-10 vehicles or large enough for a school bus?	*But not formally open to the public.*	a. Adequate parking is available less than a 5 minute walk from the educational site. b. Adequate parking is a 5-15 minute walk from educational site, or parking is limited to less than 5 cars. c. Adequate parking is more than 15 mins walk from the educational site, or no adequate parking is available.	10 (5) 1
6. How many wetland vegetation classes are accessible or potentially accessible for study at the educational site? *Refer to Appendix F for more information about wetland vegetation classes.*	*4 classes: PUB, PEM, PSS, PFO (NH Wetlands Mapper)*	a. Three or more wetland vegetation classes b. Two wetland vegetation classes c. One wetland vegetation class	(10) 5 1
7. Is there access to open water (include streams) associated with the wetland at educational site?	*Stream present, though difficult to access due to wetland around it.*	a. Direct access to water available b. Water access is a short distance (5 mins or less) from the educational site c. No access or access not feasible d. No open water	(10) 5 1 0
8. What is the aesthetic and visual quality of the educational site?		Average Score from **4 – Scenic Quality**	*9.2* -----
9. Is the educational site accessible to the disabled?	*No*	a. Yes b. No	10 (0)

AVERAGE SCORE FOR EDUCATIONAL POTENTIAL

(Add scores for each question and divide by 9) *6.4*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

6 – WETLAND-BASED RECREATION (CANOEING, KAYAKING, AND WILDLIFE OBSERVATION)

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there opportunities for wildlife observation?	*Yes.*	Average score for **2 – Wetland-Dependent Wildlife Habitat**	*7.5* ---
2. Is there access to suitable open water for canoes and kayaks?	*Limited open water & difficult access*	a. Open water is present, with easy access b. Open water is present, but site is not easily accessed for canoes/kayaks. c. No open water and no access	10 (5) 0
3. Are there trail-based recreation opportunities?	*There is a lightly maintained trail near the wetland on the Deerfield Hert Town Forest.*	a. Maintained trails are present in and immediately adjacent to the wetland b. Trails are present but not maintained c. No trails are present	10 (7.5) 5 1
4. Are there off-trail recreation opportunities (e.g. open water or undisturbed buffer)?	*Half the wetland edge was salvage cut following the 2008 tornado. It's "natural" but not forested or "undisturbed".* *Wetland has 7.9 acres of open waster (PUB) habitat..*	a. Wetland has open water greater than 0.5 acres in size **AND** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. b. Wetland has open water greater than 0.5 acres in size **OR** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. c. Wetland has neither open water nor an undisturbed buffer greater than 75%	10 (5) 1
5. Is there off-road public parking at the potential recreation site for at least two cars?	*Yes, but not formally open to the public.*	a. Adequate parking is available less than 5 minutes from the recreation site. b. Adequate parking is a 5-10 minute walk from the recreation site, or parking is limited. c. Adequate parking is more than 10 minutes walk from the recreation site, or no adequate parking is available.	10 (5) 1
6. What is the scenic quality of the potential recreational site?		Average score from **4 – Scenic Quality**	*9.2* ---

AVERAGE SCORE FOR WATER-BASED RECREATION

(Add scores for each question and divide by 6) *6.5*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

7 – FLOOD STORAGE

Instead of manually calculating the Wetland Flood Index on this data sheet, you can use the Flood Index Worksheet, an Excel spreadsheet provided on the NH Method website (http://nhmethod.org/manual.htm) which is set up to do all the calculations for you. An example of the spreadsheet is provided in Table 3.

Note that this function is scored somewhat differently from the other NH Method function. A series of factors are developed that are then use to derive the Flood Storage Index. The numerical scores for the factors do not correspond to the 10, 5, 1, 0 scoring scale used in the other functions.

In the following situations, the Flood Value Index does not need to be calculated for the wetland being studied. Instead a certain flood index range can be assumed:

1. Wetlands with slopes greater than 10% (10' vertical :100' horizontal) as measured along the flow path, where it is obvious that little flood attenuation could occur, **should be assigned a Low Flood Index Value range (0.0 to 0.9).**
2. For large ponds or lakes or wetlands with ponded water surface area greater than 200 acres and streams that are Fourth Order or higher (i.e. 4th, 5th, 6th etc.) **assign a High Flood Index Value range (7.6 to 10.0)**

Evaluation Questions	Observations and Notes	Answers	Factor
1. What is the Wetland Acreage (W)? *Be sure to EXCLUDE the acreage of any upland islands from the total wetland acreage*	*Wetland size is from drawn watershed in NH Wetlands Mapper*	*53.32* acres	
2. What is the Watershed Acreage (S)?	*From drawn watershed boundary in NH Wetlands Mapper.*	*839.01* acres	
3. 3. What is the Water Storage Depth in the wetland (D)?	*Default*	a. Use the actual water storage depth if known b. Assign a default value of 1.0 if the wetland is located in a 100 year floodplain c. Assign a default value of 1.0 ft if the actual water storage depth is not known	**D**= ___ ft **D**=1.0 ft (**D**=1.0 ft)
4. 4. What is the Wetland Storage Volume (V)?		Multiply Water Storage Depth by Wetland acreage: D x A = V	**V** = *53.22* acre feet
5. 5. Wetland Storage Volume Factor (F)	*Interpolated value*	Insert value from Table 1	**F**= *0.81*
6. Watershed Area Factor (A)	*Interpolated value : 53.32/839.01 x 100 = 6.4.0% = 0.82*	Insert value from Table 2	**A**=*0.82*
7. 7. Location of wetland within the watershed (L)	*Wetland has first order perennial stream entering and discharging from it. It becomes second order within 1000 ft. of leaving the wetland.*	a. Wetland located within 1,000 ft of a 4th order or higher stream OR within 1000 ft of a pond/lake that outlets to a 4th order or higher stream b. Wetland located within 500 ft of a perennial stream (less than 4th order) c. Neither of the above situations apply to the study wetland	1.0 (0.8) 0.6

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

SCORE FOR WETLAND FLOOD INDEX = **F x A x L x** *0.81 x 0. 82 x 0.8 x 10 =* **5.2** *(Mod - High Flood Value)*

Use the score to locate the Value Range below and assign Flood Index Value

Wetland Flood Index Values	Flood Value Type
0.0 – 0.9	Low Flood Value
1.0 – 2.5	Low to Moderate Flood Value
2.6 – 5.0	Moderate Flood Value
5.1 – 7.5	Moderate to High Flood Value
7.6 – 10.0	High Flood Value

TABLE 1

Wetland Storage Volume Factor (F)

Wetland Storage Volume (V) (acre-feet)	Value of F
≥ 200	1.000
150	0.950
100	0.900
75	0.850
50	0.800
37.5	0.750
25	0.700
18.75	0.650
12.5	0.600
9.375	0.550
6.25	0.500
4.69	0.450
3.125	0.400
2.36	0.350
1.6	0.300
1.2	0.250
0.8	0.200
0.6	0.150
0.4	0.100
0.3	0.075
0.2	0.050
0.15	0.037
0.1	0.025
0.05	0.012
0	0.000

TABLE 2

Watershed Area Factor (A)

(P) Wetl. Area/Wshed Area x 100	Value for A
≥10%	1.00
9%	0.95
8%	0.90
7%	0.85
6%	0.80
5%	0.75
4%	0.70
3%	0.65
2%	0.60
1%	0.55
< 1%	0.50

(you will need to interpolate your value using Tables 1 and 2), or choose the closest value.

EXAMPLES OF WETLAND FLOOD INDEX CALCULATION:

Example 1: *(See Wetland I.D. 1 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 0.25 acres
Watershed Area (S) = 25 acres
Water Storage Depth (D) = 0.5 ft (known depth)
Water Storage Volume (V) = 0.5 ft x 0.25 acres = 0.125 acre-feet
Wetland Storage Volume Factor (F) = 0.03 (from Table 1)
Watershed Area Factor (A) = 0.55 (from Table 2, where 0.25 acres/25 acres x 100 = 1%)
Location in Watershed (L) = 0.8
Wetland Flood Index = 0.03 x 0.55 x 0.80 = 0.0132 **Flood Value Type = Low Flood Value**

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

Example 2: *(see Wetland I.D. W3 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 33 acres
Watershed Area (S) = 17,937 acres
Water Storage Depth (D)= 1.0 ft (default value)
Water Storage Volume (V) = 1.0 ft x 33 acres = 33 acre-feet
Wetland Storage Volume Factor (F) = 0.73 (from Table 1)
Watershed Area Factor (A) = 0.5 (from Table 2, where 33 acres/17,937 acres x 100 = 0.18%)
Location in Watershed (L)= 1.0
Wetland Flood Index ValueType = 0.73 x 0.5 x 1.0 = 3.65 Flood Value = Moderate Flood Value

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

Table 3: Example of Flood Index Worksheet for Multiple Wetlands

Use the Excel spreadsheet on the NH Method Webiste (http://nhmethod.org/manual.htm) for automated calculation of the Flood Water Storage Index

Flood Index = (F x A x L) x 10
Where:
Maximum Wetland Storage Volume = 200 acre-ft
Maxiumum Wetland Flood Function Value = 10

"Red" headings indicate data input columns
"Black" headings indicate columns where the figures are automatically calculated

Wetland I.D.	Wetland Acreage (W)	Watershed Acreage (S)	Wetland Area as % of Watershed (P) from Table 2	Watershed Area Factor (A) Table 2	Location in Watershed (L) (1.0/0.8/0.6)	Water Storage Depth feet (D) 1.0 = default	Wetland Storage Volume acre feet (D) acre feet	Wetland Storage Volume Factor (F) Table 1	Flood Index
1	0.25	25	1.00	0.55	0.8	0.5	0.125	0.03	**0.132**
2	0.75	15	5.00	0.75	1	1	0.75	0.19	**1.425**
3	2	50	4.00	0.7	0.8	2.5	5	0.46	**2.576**
4	10	100	10.00	1	1	3	30	0.72	**7.200**
5	10	1000	1.00	1	1	4	40	0.77	**7.700**
6	3	47	6.38	0.81	0.8	2	6	0.48	**3.110**
7	0.1	3	3.33	0.42	0.6	0.5	0.05	0.016	**0.040**
8	0.75	20	3.75	0.68	0.6	0.15	0.1125	0.027	**0.110**
9	1	50	2.00	0.6	1	2.5	2.5	0.35	**2.100**
10	50	400	12.50	1	0.8	3	150	0.95	**7.600**
W1	283	19548	1.45	0.57	1	1	283	1	**5.700**
W3	33	17937	0.18	0.5	1	1	33	0.73	**3.650**
W4	54	17291	0.31	0.5	1	1	54	0.73	**3.650**
W5	202	16619	1.22	0.56	1	1	202	1	**5.600**
W6	175	2664	6.57	0.82	1	1	175	0.95	**7.790**
W7	40	446	8.97	0.94	1	1	40	0.78	**7.332**
W8	24	380	6.32	0.51	1	1	24	0.69	**3.519**
W9	43	679	6.33	0.51	1	1	43	0.77	**3.927**
W10	116	2161	5.37	0.77	1	1	116	0.92	**7.084**
W11	63	880	7.16	0.86	1	1	63	0.83	**7.138**
W12	24	3302	0.73	0.86	1	1	24	0.69	**5.934**
ND1	93.7	5169	1.81	0.57	1	1	93.7	0.88	**5.016**
ND2	50	3741	1.34	0.57	1	1	50	0.8	**4.560**
ND3	37	258	14.34	1	1	1	37	0.75	**7.500**
ND4	101	2700	3.74	0.68	1	1	101	0.9	**6.120**
ND5	110.5	562	19.66	1	1	1	110.5	0.92	**9.200**
ND6	99	1753	5.65	0.77	1	1	99	0.9	**6.930**

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

8 – GROUNDWATER

Note that this function does not require any field work

Evaluation Questions	Observations & Notes	Answers	Score
1. Does the wetland overlie stratified drift aquifer?		a. Wetland overlies stratified drift aquifer b. Wetland is adjacent to stratified drift aquifer c. Wetland is not located over or adjacent to stratified drift aquifer	10 5 (1)
2. Is the wetland in a potential public water supply area?		a. Wetland is in an area identified by Favorable Gravel Well Analysis b. Wetland is directly adjacent to an area identified by Favorable Gravel Well Analysis c. Wetland is not located in or adjacent to an area identified by Favorable Gravel Well Analysis	10 5 (1)
3. Is the wetland within a public wellhead protection area?	*No*	a. More than 75% of the wellhead protection area includes the wetland b. 25%-75% of the wellhead protection area includes the wetland c. Less than 25% of the wellhead protection area includes the wetland	10 5 (1)
4. **What is the percent coverage of highly permeable soils within 100 ft of the wetland?** *Refer to Table 3 to answer this question*	*140C, 140 D, 447B & 547B are the principal soil types within 100 ft. of the wetland (NH Wetlands Mapper) 547 B is a potential recharge soil. It occupies approx. 18% of the 100 ft. zone.*	a. More than 50% of the soil types within 100 ft of the wetland are on the list in Table 3. b. 25-50% of the soil types within 100 ft of the wetland listed in Table 3 c. < 25% of the soil types within 100 ft of the wetland are listed in Table 3	10 5 (1)
5. **What is the percent coverage of the highly permeable soil types (listed in Table 4) within the wetland?** *Refer to Table 4 to answer this question*	*97 (Greenwood & Ossipee, Ponded) - organic soils - not recharge soils*	a. More than 50% of the soil types **within** the wetland are listed in Table 4. b. 25 – 50% of the soil types **within** the wetland are listed in Table 4. c. Less than 25% of the soil types **within** the wetland are listed in Table 4.	10 5 (1)

AVERAGE SCORE FOR GROUND WATER

(Add scores for each question and divide by 5) *1.0*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

9 – SEDIMENT TRAPPING

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Wetland Flood Index score from 7 – Flood Storage.	5.2
2. Does the wetland lack outlet or have a constricted outlet?	*There is an outlet, subject to beaver dams*	a. Wetland has no outlet or has a constricted outlet. b. Wetland has an outlet but flow path through wetland is primarily sheet flow or ponded in a shallow basin. c. Wetland outlet not constricted or flow primarily within stream channel.	(10) 5 1
3. What is the character of water flow through the wetland? *Channel Length* / *Straight line distance of stream* = *Sinuosity Ratio*	*Stream channel is relatively straight, though appearing natural.* *3,600 ft. stream channel length ÷ 3,300 straight line distance = 1.1 sinuosity ratio.*	a. At least one of the following situations apply: • No stream channel OR • Inlet present but no outlet OR • Outlet is im pounded and standing water present in downstream end of wetland OR • Inlet and outlet present and channel sinuosity is ≥ 1.5 b. Inlet and outlet present, and sinuosity of channel is >1.0 and <1.5 c. Channel is straight (sinuosity=1.0) and no impoundments within wetland or at wetland outlet	(10) 5 1
4. What is the ratio of the wetland's size to the size of its watershed? *Acres of Wetland* / *Area of watershed above wetland outlet* x 100	*53.32/839.01 = 6.36%*	a. Wetland is more than 10% of its watershed. b. Wetland is between 1-10% of its watershed. c. Wetland is less than 1% of its watershed.	10 (5) 1
5. What is the gradient within the wetland?	*731.3 - 721.2 = 10.1 ft.* *10.1 ft. ÷ 4,100 ft. wetland length (axis) = .25 % slope*	a. Wetland has gradient less than 0.5% or has no outlet b. Wetland gradient is 0.5% to 3% c. Wetland has gradient greater than 3%.	(10) 5 1
6. What is the areal extent (% coverage) all vegetation types that will most likely trap sediments? (e.g. forested swamps, scrub shrub swamps, and persistent emergent marshes). *Refer to Appendix F for more information about wetland vegetation classes.*	*Persistent Emergent (PEM) classes occupy about 75% of the wetland.*	a. Persistent emergent plants (stems above surface of water /wetland throughout the year), trees and/or shrubs cover at least 90% of the surface area of the wetland. b. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover 50-90% of the wetland's surface area. c. Open Water or Aquatic Bed vegetation covers < 50% of the surface area of the wetland	10 (5) 1
6. What is the average water depth in the wetland during growing season?	*This is an estimate based on observation and vegetation.*	a. Average water depth is less than 1 foot or there is no open water b. Average water depth greater than 1 foot and less than 6.6 feet. c. Average water depth is greater than 6.6 ft	(10) 5 1

AVERAGE SCORE FOR SEDIMENT TRAPPING:
(Add scores for each question and divide by 7) 7.9

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

10 – NUTRIENT REMOVAL/RETENTION/TRANSFORMATION

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Flood Index Score from **7 – Flood Storage.**	*5.2* ---
2. What is the wetland's ability to trap sediments?		Average score from **9 – Sediment Trapping.**	*7.9* ---
3. **What is the extent (percent cover) of persistent emergent vegetation, trees and/or shrubs within the wetland?**		Record answer from **9- Sediment Trapping**, Question 6	*5* ---
4. What hydroperiod occurs over more than 50% of the wetland?	*Hydroperiods E & F (NWI codes) apply to approximately equal acreages.* *E = Seasonally saturated/flooded* *F = Semi-permanently Flooded*	a. Semi-permanently flooded, seasonally flooded/saturated, or saturated b. Seasonally flooded, seasonally flooded/well drained or temporarily flooded c. Permanently flooded or intermittently exposed	10 *7.5* 5 1
5. What soils cover the greatest percentage of the wetland?	*Dominant wetland soil type is 97 (Greenwood & Ossipee, Ponded)*	a. Wetland is dominated by fine textured soils (refer to Table A, Appendix D) b. Wetland is dominated by organic and/or peat soils (refer to Table B, Appendix D) c. Wetland is dominated by sands and gravels (refer to Table C, Appendix D)	10 5 1

AVERAGE SCORE FOR NUTRIENT TRANSFORMATION

(Add scores for each question and divide by 5) *6.1*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

11 – SHORELINE ANCHORING

If there is no stream, river, lake or pond within or adjacent to the wetland, leave this Functional out of the evaluation.

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the gradation of wetland vegetation types along the shoreline?	*Many trees recently removed by logging following tornado, July, 2008. There is a narrow shrub edge on most of the rest of the wetland.*	a. Three or more wetland vegation types present (PAB, PEM, PSS or PFO) b. Two wetland vegetation types present c. One wetland vegetation type present	10 (5) 1
2. What is the vegetation density in the wetland bordering watercourse, lake or pond?	*Almost 100% (Observation)*	a. High: More than 90% woody or persistent vegetation cover b. Moderate: From 70-90 woody or persistent % vegetation cover c. Low: Less than 70% woody or persistent vegetation cover	(10) 5 1
3. How wide is the wetland bordering the watercourse, lake or pond?	*Estimated 500ft. average, using NH Wetlands Mapper Distance Measuring Tool.*	a. More than 20 feet b. From 10-20 feet c. Less than 10 feet	(10) 5 1
4. How "rough" is the substrate of the wetland at the shoreline of the waterbody?	*Based on observation and not substrate sampling. Though soil substrate may not be rough, there are many tree trunks at or beneath the surface of the water that will function as a rough substrate for some time.*	a. Wetland substrate characterized by many boulders, stones or cobbles and woody material b. Wetland substrate has few boulders, stones or cobbles and little woody material , or substrate is mostly gravel or coarse sands c. Wetland substrate is uniformly smooth and is comprises of clays, silts or very fine sands or organic materials and no woody material.	(10) 5 1

AVERAGE SCORE FOR SHORELINE ANCHORING

(Add scores for each question and divide by 4) *7.5*

Wetland Name/Code: *Sample Wetland, Deerfield NH* Evaluation Date: *July 2, 2010* Evaluator: *Frank Mitchell*

12 – NOTEWORTHINESS

Describe noteworthy features in the wetland narrative

Note that the scores for this function are summed and NOT averaged

Evaluation Questions	Observations & Notes	Answers	Score
1. Is the wetland located in or within 500 ft of an area of Highest Ranked Habitat (state or regional level), as identified on the NH Wildlife Action Plan Highest Ranked Habitat Condition map?	*of Highest Ranked Habitat t includes about half the wetland., based on 2015 Wildlife Action Plan Maps*	a. (Yes)	(10)
2. Does the wetland have local significance because has consistently high scores for all functions and/or is among the top 10 largest wetlands in town?	*This wetland was evaluated alone as a sample, but it was evaluated in 1992 and scored a "yes" for this question when compared with other wetlands in town.*	a. (Yes)	(10)
3. Does the wetland have local or regional significance, e.g. is it located in a priority area in a local or regional conservation plan, or it is one of the largest in the region?	*Is a priority in the Bear-Paw Regional Greenways and NH Coastal Conservation Plans*	a. (Yes)	(10)
4. Does the wetland have known biological, geological, or other features that are locally rare or unique locally or on a regional or statewide scale?	*Blanding's turtle observed in vicinity historically, but no current records*	a. Yes	10
5. Is the wetland known to contain an important historical or archaeological site?		a. Yes	10
6. Is the wetland hydrologically connected to a state or federally designated river within ¼ mile of the wetland's outlet?		a. Yes	10
7. Is the wetland one of just a few left in an urban setting?	*Not applicable*	a. Yes	10

<u>TOTAL SCORE</u> FOR NOTEWORTHINESS *30*

<u>Add up the scores</u> for all questions which received a YES answer.
The total score is the score for this function (**note that this score is not averaged).**
For example, if you answered YES to four questions, the score would be 40.
If you answered YES to only one question, the score is 10

Sample Wetland Evaluation - Foss Meadow, Deerfield, NH

Updated November 2015

Red Text shows information inserted for Foss Meadow,
derived from the *NH Wetlands Mapper and other sources*

Appendix B (NH Method)

QUESTIONS TO ANSWER BEFORE THE FIELD VISIT: USING THE NH WETLANDS MAPPER AND OTHER SOURCES

(Remaining questions are answered during field checking)

Each of the questions in the table on the following page requires using the **NH Wetlands Mapper,** unless otherwise noted. **Record answers on the *NH Method* Data Sheets** (can be done online using the **NH Wetlands Mapper.**

BEFORE USING THE NH WETLANDS MAPPER:

- Go to the NH Wetlands Mapper web site home page (**NHWetlandsMapper.org**). Click on the **Welcome tab** (upper left) for instructions on using the Wetlands Mapper.
- Review the tools available in the NH Wetlands Mapper by clicking on the **Help tab** (upper left) and learning how the mapping tools work and the content of the tabs (layers, legend, wetland tools, zoom, download, print). Try each function on a sample wetland and become familiar with the Mapper's capacity and limitations before using it in conjunction with the NH Method evaluation forms

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
1 - Ecological Integrity		
Question 1	Sources of water quality degradation in the watershed Logging and associated stream/wet area crossings following the 2008 tornado have probably created sources of sediment on one side of the wetland.	**From NH Wetlands Mapper:** • Display Imagery > **USGS 7.5 min. Topos** (topographic map). • Display **Water and Watersheds > Watersheds (HUC 12).** • Read **Appendix G in the NH Method** to learn how to delineate a watershed boundary using a topographic map. • Go **to "Wetlands & Watersheds" > User Defined Wetlands"** and use the drawing tool to draw the watershed boundary on the topographic background. In many cases, the "HUC 12" Watersheds will include a portion of your wetland's watershed boundary, so you can use the HUC 12 Watersheds' boundaries as part of your wetland watershed boundaries, tracing over them with the Drawing Tool. • With the drawn watershed displayed in the Watersheds Tab, click on the watershed boundary line and the acreage will be displayed on the right, in the bar at the bottom of the screen. (This measurement will stay displayed until you click a different feature.) • Review the watershed together with the aerial photo to determine potential sources of contamination. Print the map, choosing "print pdf map" from the print menu and save a copy of the pdf of the map.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 7	Road, railroad or driveway crossings within 500 ft. of the wetland A logging road crosses the stream entering the wetland just upstream of the wetland and Logging trails/roads were extensive on the east side of the wetland following the 2008 tornado.	**From NH Wetlands Mapper:** • Review the target wetland with the most recent **Aerial Photo** background available for your region of the state (it varies). Use the **Transportation/Railroads** or **Topographic map** layers to identify road crossings. • Confirm road crossings with ***field checking***.
Question 8	Level of human activity **in the upland** within 500 feet of the wetland edge (land disturbance, clearing, logging, trails, roads, etc.) Little human activity is in the 500 ft. zone. The dominant land use is forested, but Griffin Road runs just outside the 500 ft. zone around the wetland.	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** background turned on, go to Wetlands & Watersheds > User Defined Wetlands and select a wetland you've defined (step 6, above), then choose "Edit". You can then enter a "buffer interval" in feet. After doing so & clicking "OK", the map will be redrawn showing a semi-transparent zone around the wetland that's the width you specified (500 ft. for this question). Record any signs of human activity observable in the photo. (Keep this map open for the next question) • Confirm human activity with ***field checking***.
Question 9	Percent of impervious surface area within 500 ft. of the wetland edge None, though there are several buildings within 700 ft.	**From NH Wetlands Mapper** • Use the same map with a 500 ft. "buffer" zone around the wetland in question 8, above, and measure the area of buildings and other impervious areas within 500 ft of the wetland. • Confirm the number of extent of impervious surfaces with ***field checking***.
2 - Wetland-Dependent Wildlife Habitat		
Question 1	Wetland size (acres, including upland "islands") 61 acres (drawn wetland polygon from NH Wetlands Mapper).	**From NH Wetlands Mapper** • Turn on either the **NHDES Wetlands Base Map** or the **NWI** (National Wetlands Inventory) **layer** & **the Hydric Soils** layer, in the **Water and Watersheds** layers. Turn the legend on. Areas shown as **Palustrine** are freshwater wetlands. • Left click your mouse on the **Identify Tool** ("**i**" icon) to activate it**.** Click on each wetland vegetation type polygon to access the data, including acreage. • Alternatively, draw the wetland boundary as described in the NH Wetlands Mapper Help Tab and Wetlands Tab (Create New Wetland button) • ***Field checking*** *is necessary to calculate the final wetland size.*
Question 4	Area of shallow, permanent open water and streams (less than 6.6 ft deep) 7.9 acres of PUB (NH Wetlands Mapper) Round to 8 acres to include stream channel.	Click on the **Identify Tool** to activate it. Use it to get the acreage of all PAB and PUB wetland vegetation classes by clicking on them. I window will appear with the acreage.. • Click on the **Measure Line tool** to activate it. Use the tool to measure stream length. Click on the start of the stream at the wetland edge, then along its length as needed to approximate its curves. Double click on the last point. You will

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
		see a line between your click points and the total distance will appear in the bar near the bottom of the screen. Distance will show in feet if under a mile in and miles if more. Multiply the resulting stream length by the stream channel width (observe in the field and on aerial photo) to get the stream area in square feet, and then convert to acres. • Add the stream acreage to the acreage of shallow permanent open water (PUB and PAB codes).
Question 5	Deepwater habitat associated with the wetland (lake, pond or river) deeper than 6.6ft. No (small stream only)	**From NH Wetlands Mapper** • Turn on the **NHDES Wetlands Base Map** or the **NWI** layers in the **Water and Watersheds** layers. Turn the legend on. Areas shown as **Lacustrine** are lakes and ponds • Use the **Identify Tool** to get the acreage of lakes and ponds. • Check the NH DES List of 4th Order and Higher Streams at http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-08-9.pdf to identify any 4th order or higher streams. You can also determine the stream order of a stream on the map by activating the identify button and clicking on the stream channel. • Use the **Measure Line tool** to measure the length of the 4th order or higher stream associated with the wetland.
Question 6	Wetland vegetation class diversity, including upland "islands" (NWI codes) 4 classes: PUB, PEM, PSS, PFO (NH Wetlands Mapper)	**From NH Wetlands Mapper** • Turn on the **NHDES Wetlands Base Map** or the **NWI layer** in the **Water and Watersheds** layers and choose "Labels on" to label the NWI classes. • Use the **Identify Tool** to get the acreage of NWI wetland vegetation classes. Confirm this information with ***field checking.***
Question 7	Other wetlands in close proximity to the study wetland One larger (16.6 acres) wetland & one smaller (0.2) acres) one are within 0.25 miles.	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** background and **the NHDES Wetlands Base Map** or the **NWI layer** & **the Hydric Soils** layer and **Hydric soils** layer(s) turned on, use the **Measure Line tool** to determine distance to nearby wetlands. • Confirm this information with ***field checking.***
Question 8	Wildlife access to other wetlands. Griffin Rd. James Rd & houses along them constitute barriers to animal movement.	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** and **the NHDES Wetlands Base Map** or the **NWI** layer turned on, identify areas of apparently natural vegetation between wetlands that could function as wildlife travel routes. • Confirm this information with ***field checking.***
Question 9	Percent of wetland edge bordered by upland wildlife habitat Estimated > 90% is bordered by natural land cover, within 500 ft., though about half the wetland edge was cleared following the 2008 tornado.	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** and **the NHDES Wetlands Base Map** or the **NWI** layer turned on, use the **buffer** tool to identify areas of apparently natural vegetation within 500 ft of the wetland edge. (See Section 1, Question 8 for instructions on the buffer tool.) • Estimate the percentage of 500 ft. buffer area that is undisturbed upland habitat. • Confirm this information with ***field checking.***

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
	Griffin Rd. is within 500 ft. of the wetland at one point, hence the >90% estimate.	
3 – Fish & Aquatic Life Habitat		
Question 1	Dominant land use in watershed Mostly wooded	**From NH Wetlands Mapper** • Go **to "Wetlands & Watersheds" > User Defined Wetlands"** and use the drawing tool to draw the watershed boundary on the topographic background. In many cases, the "HUC 12" Watersheds will include a portion of your wetland's watershed boundary, so you can use the HUC 12 Watersheds' boundaries as part of your wetland watershed boundaries, tracing over them with the Drawing Tool. • With the most recent **Aerial Photo** background turned on, and the watershed of your wetland of interest showing (Go to "Wetlands & Watersheds" > User Defined Wetlands"), observe the land uses in the watershed and determine the dominant category in the question. • Confirm this information with ***field checking.***
Question 4	Acres of deepwater habitats (deeper than 6.6ft) None	**From NH Wetlands Mapper** Similar to Section 2, Question 5: • Turn on the **NHDES Wetlands Base Map** or the **NWI** layer in the **Water and Watersheds** layers. Turn the legend on. Areas shown as **Lacustrine** are lakes and ponds • Use the **Identify Tool** to get the acreage of lakes and ponds.
Question 6	Does the stream channel appear to havebeen recently altered? No	**From NH Wetlands Mapper** • With the most recent **Aerial Photo** turned on, identify any stream sections that appear straightened and note them for field observation. • Confirm this information with ***field checking.***
Question 11	Rare or endangered wildlife present? None documented, but Blanding's and Spotted turtles have been documented in the town and could occur in this wetland habitat.	See the NH Natural Heritage web site at, http://www.nhdfl.org/about-forests-and-lands/bureaus/natural-heritage-bureau/about-us/rare-plants.aspx and select the town in question (listed in alphabetical order). See if any species that use wetlands are listed and determine their habitat type(s). Use this as a guide for possible observations of rare species in those habitats.
4 – Scenic Quality		
Question 2	Public access Not posted against access but public access not guaranteed.	**From NH Wetlands Mapper** • Using the **Conservation&Public Lands layer** with the wetland displayed, Using the **Identify Tool,** determine if the wetland is on a property that has public access (public land). This may require Public access is not specifically indicated in the **NH Wetlands Mapper**, so this may require further research to determine access for some conservation properties. This might include checking deeds and asking the town Conservation Commission). • Confirm this information with ***field checking.***

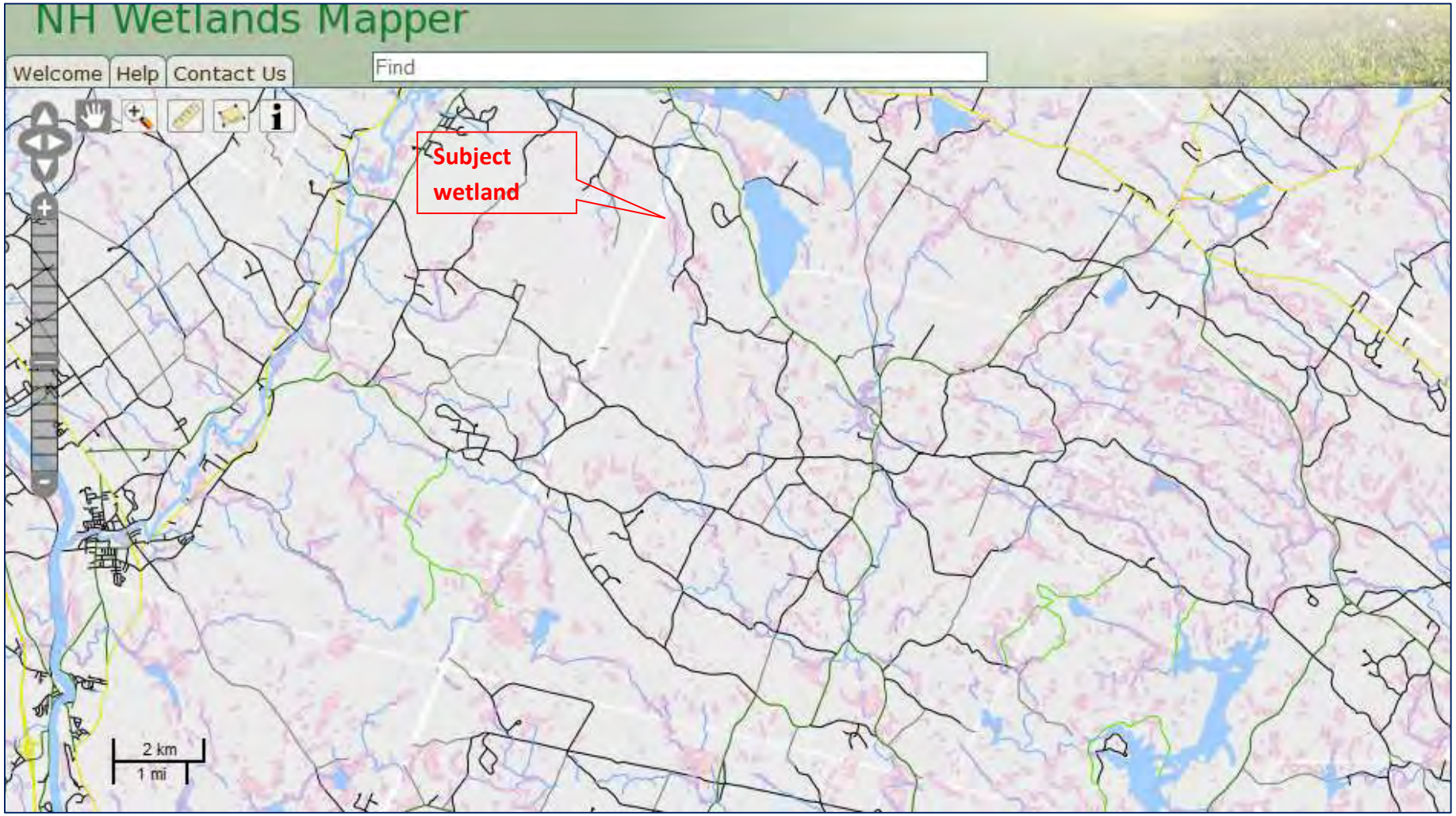
Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 4	Open water visible Estimated 10 acres including stream.	**From NH Wetlands Mapper:** • Use the **Identify Tool** to get the acreage of all PAB and PUB wetland vegetation classes and any pond or lake (Lacustrine) acreage. Estimate size of large open river areas (**Measure Line tool** may be useful). The question is broad: Is the open water area less than one acre, more than three acres, or somewhere in between? • Confirm this information with ***field checking.***
5 – Educational Potential		
Question 4	Public or private property with public access Not posted against access but public access not guaranteed.	**From NH Wetlands Mapper (Same as Section 4, Question 2)** • Using the **Conservation&Public Lands layer** with the wetland displayed, Use the **Identify Tool to** determine if the wetland is on a property that has public access (public land). This may require Public access is not specifically indicated in the **NH Wetlands Mapper**, so this may require further research to determine access for some conservation properties. This might include checking deeds and asking the town Conservation Commission). • Confirm this information with ***field checking.***
Question 6	Number and accessibility of wetland classes accessible or potentially accessible for study at educational site 4 classes: PUB, PEM, PSS, PFO (NH Wetlands Mapper)	Similar to Section 2, Wetland Dependent Wildlife Habitat, Question 6, but only for areas from which the wetland is likely to be viewed: • Turn on the **NHDES Wetlands Base Map** or the **NWI** layer in the **Water and Watersheds** layers and choose "Labels on" to label the NWI classes • Identify those that would be visible from the wetland's primary viewing location(s). • Use the most recent **Aerial Photo** imagery to refine your observation of the NWI map. • Confirm this information with ***field checking.***
6 – Wetland-based recreation - NO DATA NEEDED FROM NH WETLANDS MAPPER		
7 – Floodwater Storage		
Question 1	Wetland acres, not including upland "islands" 53.32 acres (drawn wetland polygon from NH Wetlands Mapper).	**From NH Wetlands Mapper:** • Using the same instructions from Section 2, Wetland Dependent Wildlife Habitat, Question 1, calculate Wetland acreage, excluding the area of any upland islands. Subtract the acreage of any upland islands from the total wetland acreage and use this adjusted acreage in this calculation.
Question 2	Watershed acres 839.01 acres (drawn watershed in NH Wetlands Mapper)	**From NH Wetlands Mapper:** **The watershed will have been drawn already for Question 1.1.** To get the watershed size: • With the drawn watershed displayed in the Watersheds Tab, click on the watershed boundary line and the acreage will be displayed on the right, in the bar at the bottom of the screen. (This measurement will stay displayed until you click a different feature.) • Print the map, choosing "print pdf map" from the print menu and save a copy of the pdf of the map.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 7	Location within the watershed The wetland has a first order perennial stream entering and discharging from it. It becomes second order within 1000 ft. of leaving the wetland.	**From NH Wetlands Mapper:** • Use the buffer function in the Wetlands Tab to determine the wetland's location in the watershed • To determine stream order, see: **NH DES List of Fourth Order and Higher Streams** **NH Statewide Map Atlas "Fourth Order and Higher Streams**
8 – Groundwater Recharge		
Question 1	Does the wetland overlie a stratified drift aquifer? No	**From NH Wetlands Mapper:** • Display the **Aquifer** layer and determine if the wetland overlies stratified drift aquifer.
Question 2	Is the wetland in a potential public water supply area? No	**Use Forest Society Website:** **http://clca.forestsociety.org/nhcl/fgwa.asp** • Using the Favorable Gravel Well map provided on this website, zoom to the town, and locate the area with the wetland. Once you have located the town, you will need to zoom in to at least 600%. • Determine if the wetland overlies or is immediately adjacent to a Favorable Gravel Well area.
Question 3	Public wellhead protection area? No	• See instructions in the NH Method, Section 3. (To get a paper map showing the data for your town, or for GIS users wanting to obtain the data set, contact Pierce Rigrod, NH DES Drinking Water and Groundwater Bureau, at pierce.rigrod@des.nh.gov or 603-271-0688.)
Question 4	Percent coverage of highly permeable soils **within 100 ft**. of the wetland 447B, 547B, 140C and 140D are the principal soil types within 100 ft. of the wetland (NH Wetlands Mapper) 547 B is the only potential recharge soil. It occupies approximately 18% of the 100 ft. zone.	**From NH Wetlands Mapper:** • Display the **Soils (All Soils)** layer with soil polygons labeled. • Create a 100 ft. "buffer" area around the wetland, following the instructions for Section 1, Ecological Integrity, Question 8. • Visually determine the dominant soil type within 100 ft of the wetland. • Determine whether the dominant sol type is on the list of sand and gravel soil types in **Table 3 on p. 27 of the NH Method**.
.	Percent coverage of highly permeable soils **within the wetland** 97 (Greenwood & Ossipee, Ponded) comprise almost all the wetland and are organic, non-recharge soils.	• Display the **Soils (All Soils)** layer with soil polygons labeled. • Visually determine the dominant soil type within the wetland. • Determine whether the dominant sol type is on the list of "recharge" soil types in **Table 4 on p. XX of Section 3, NH Method**.
9 - Sediment Trapping		
Question 2	Character of outlet There is an outlet, subject to beaver dams. .	**From NH Wetlands Mapper:** • Display Imagery > **USGS 7.5 min. Topos** (topographic map) and use it to locate any outlet/s or lack of. (May not be evident on the map) • Confirm this information with ***field checking***, and check the degree of constriction of the outlet in the field.

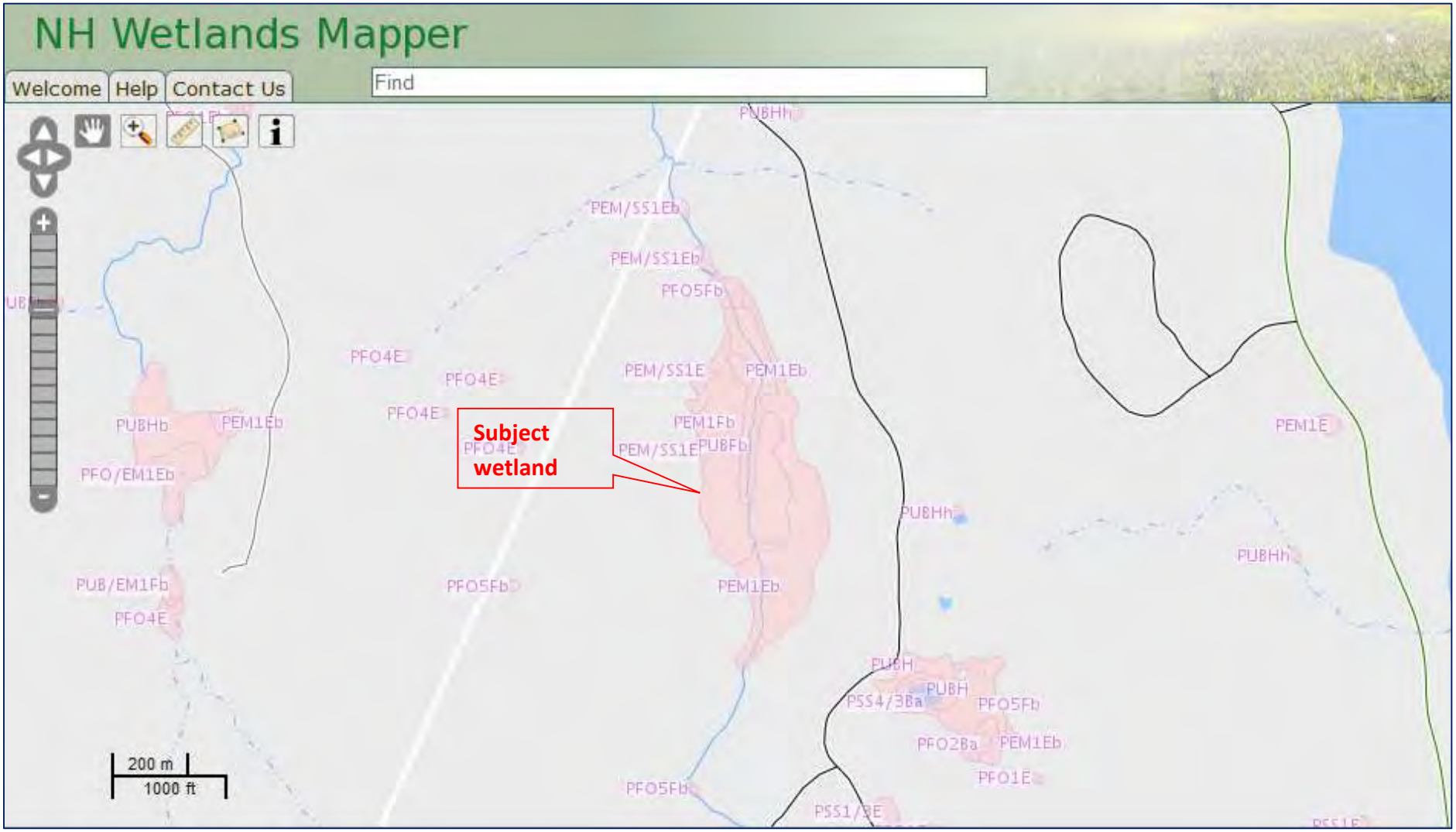
Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
Question 3	Character of water flow through the wetland Stream channel is relatively straight, though appearing natural.	**From NH Wetlands Mapper:** • Use the most recent **Aerial Photo** imagery and the **Water Resources** layers to determine the shape of the stream channel in the wetland, if any. • Confirm this information with ***field checking.***
Question 5	Gradient of Wetland 731.2(inlet) - 721.2 (outlet) = 10 ft 10 ÷ 3,888 ft. wetland length = 0.25 % gradient	**From the printed map or NH Wetlands Mapper:** • Using the **Elevation > DEM** (digital elevation model) layer, determine the highest and lowest elevation of the wetland along its longest axis by clicking on the inlet and outlet ends of the wetland. Zoom in closely to do this, or the Mapper may display more than one elevation value. Click on the wetland inlet with the **Identify Tool.** A window will appear containing the elevations of the point clicked. Repeat for the outlet. Subtract the two elevations to get the elevation difference. • Alternatively, you can use **Google Earth**. As you hold the cursor over a point on a map, the elevation will be displayed in the lower left part of the screen. Determine the elevation at the highest and lowest ends of the wetland on the Google Earth map.
Question 6	Percentage cover of persistent, sediment trapping vegetation in the wetland Persistent Emergent (PEM) classes occupy about 75% of the wetland.	**From the printed map or NH Wetlands Mapper:** • With a wetland layer on, use the identify tool to find acreages of vegetation classes PFO, PSS & PEM. Add the acreage of these types. • Confirm this information with ***field checking.***
10 - Nutrient Trapping/Retention/Transformation – NO DATA NEEDED FROM NH WETLANDS MAPPER		
Question 3	Percent cover of wetland vegetation classes Persistent Emergent (PEM) classes occupy about 75% of the wetland.	• Same procedures as for Section 9, Sediment Trapping, Question 6. • Transfer your answer. Confirm this information with ***field checking.***
Question 4	Hydroperiod of wetland Hydroperiods E & F (NWI codes) apply to about half the wetland each. E = Seasonally saturated/flooded F = Semi-permanently Flooded	**From NH Wetlands Mapper** • Turn on the **NHDES Wetlands Base Map** or the **NWI layer** & **the Hydric Soils** layer in the **Water and Watersheds** layers and choose "Labels on" to label the NWI classes. • Identify the hydroperiod code for the NWI polygons and record this information. • Determine the acreage of each hydric soil polygon using the **Identify Tool** and record this information. • Determine which hydrologic regime dominates the wetland (> 50% of NWI polygons acreage). • Confirm this information with ***field checking***.
Question 5	Wetland soils Dominant wetland soil type is 97 (Greenwood & Osspiee, Ponded) - Organic soil types	**From NH Wetlands Mapper:** • Display the **Hydric Soils** layer with soil polygons **labeled**. • Determine the acreage of each hydric soil polygon using the **Identify Tool** and record this information. • Using **Appendix D in the NH Method**, determine whether the wetland is dominated (>50%) by fine textured soils, organic soils, or sands & gravels.

Question #	Feature	Get answers using the NH Wetlands Mapper online tools and Printed Maps
11 - Shoreline Anchoring		
Question 1	Gradation of vegetation types Almost all trees were removed by logging on the east side of the wetland following the tornado in July, 2008. There is a narrow shrub edge on most of the rest of the wetland.	• Same instructions as for Section 2, Wetland-Dependent Wildlife Habitat, Question 9. Determine the number of wetland classes *along the shoreline*.
Question 3	How wide is the wetland bordering the watercourse, lake or pond? Est. 500 ft.	**From NH Wetlands Mapper or Printed Maps:** • Use the **Measure Line Tool, a wetland layer** and aerial photography in the NH Wetlands Mapper to estimate the average wetland width. Confirm with ***field checking.*** • Confirm this information with ***field checking***.
12. Noteworthiness		
Question 1	Is wetland within 500 ft. of Highest Ranked Habitats? Yes, Marsh and shrub wetland shown on WAP Habitat Map.	**From NH Wetlands Mapper or Printed Maps:** • Using the **Wildlife Action Plan Highest Ranked Habitat** data, identify any highest ranked habitat (statewide significance – pink; or regional significance – green) in or near the wetland
Question 6	Connection to a state designated river Not connected.	Refer to the list of rivers in the NH Rivers Management and Protection Program **From NH Wetlands Mapper:** • Use the **Measure Line tool** to determine distance to the nearest state designated river, if applicable.
Question 8	Is the wetland one of just a few left in an urban setting? Not applicable	**From NH Wetlands Mapper:** • In an urban area, use one or more of the wetland layers to determine the local significance of the subject wetland and if other wetlands are present.

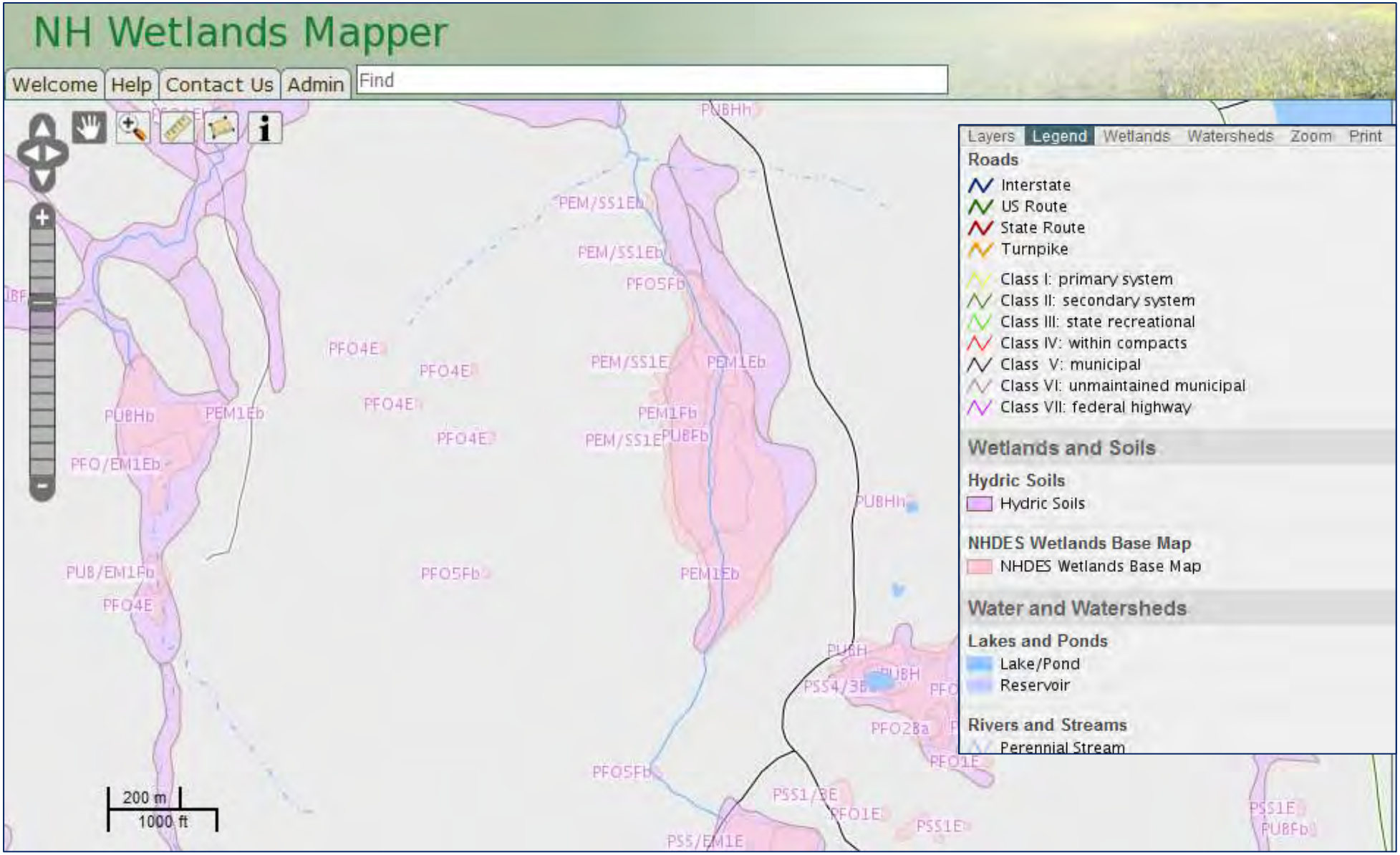
FOSS MEADOW - TOWN-WIDE WETLANDS INVENTORY MAP



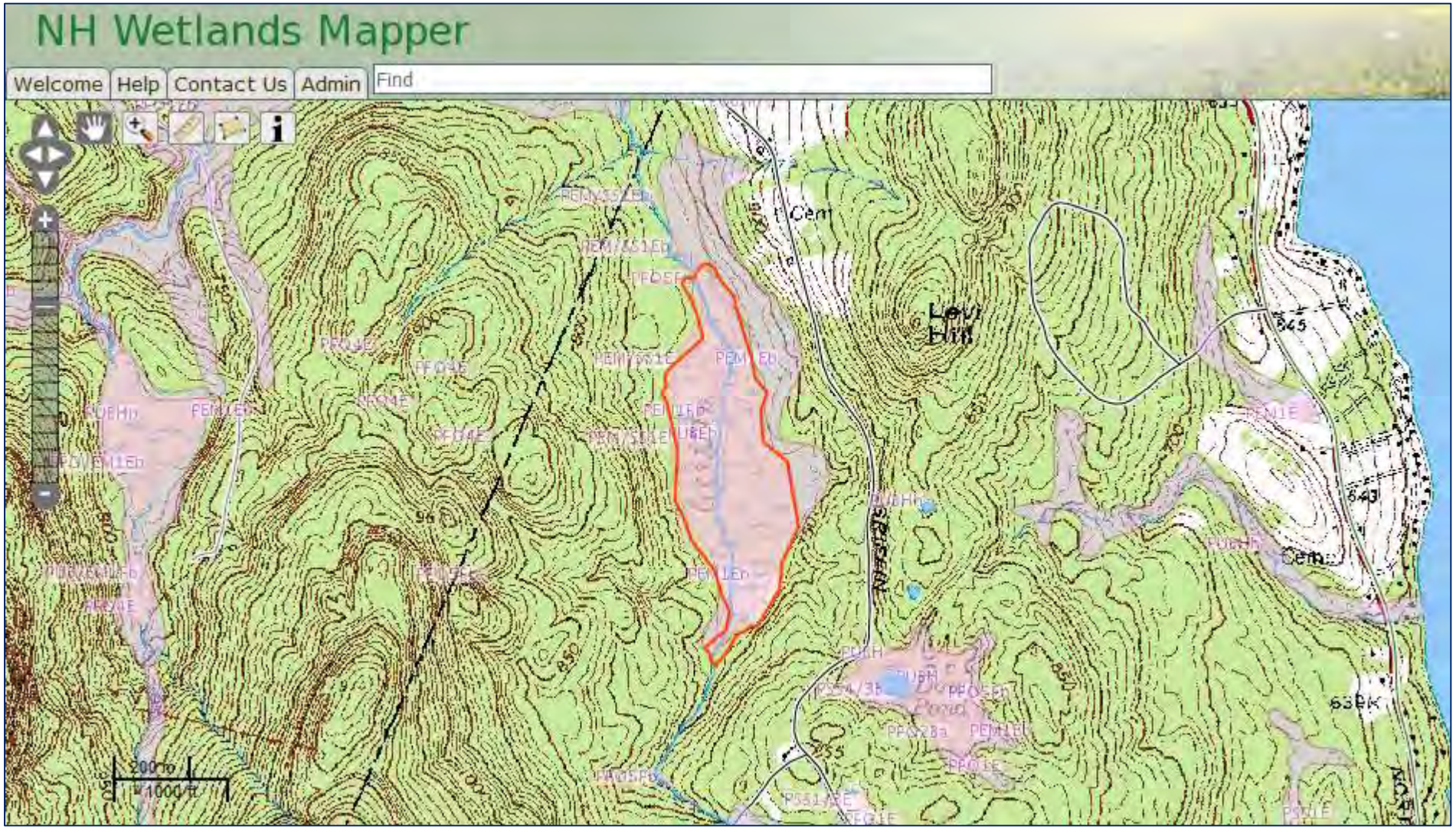
FOSS MEADOW – NHDES WETLANDS BASE MAP



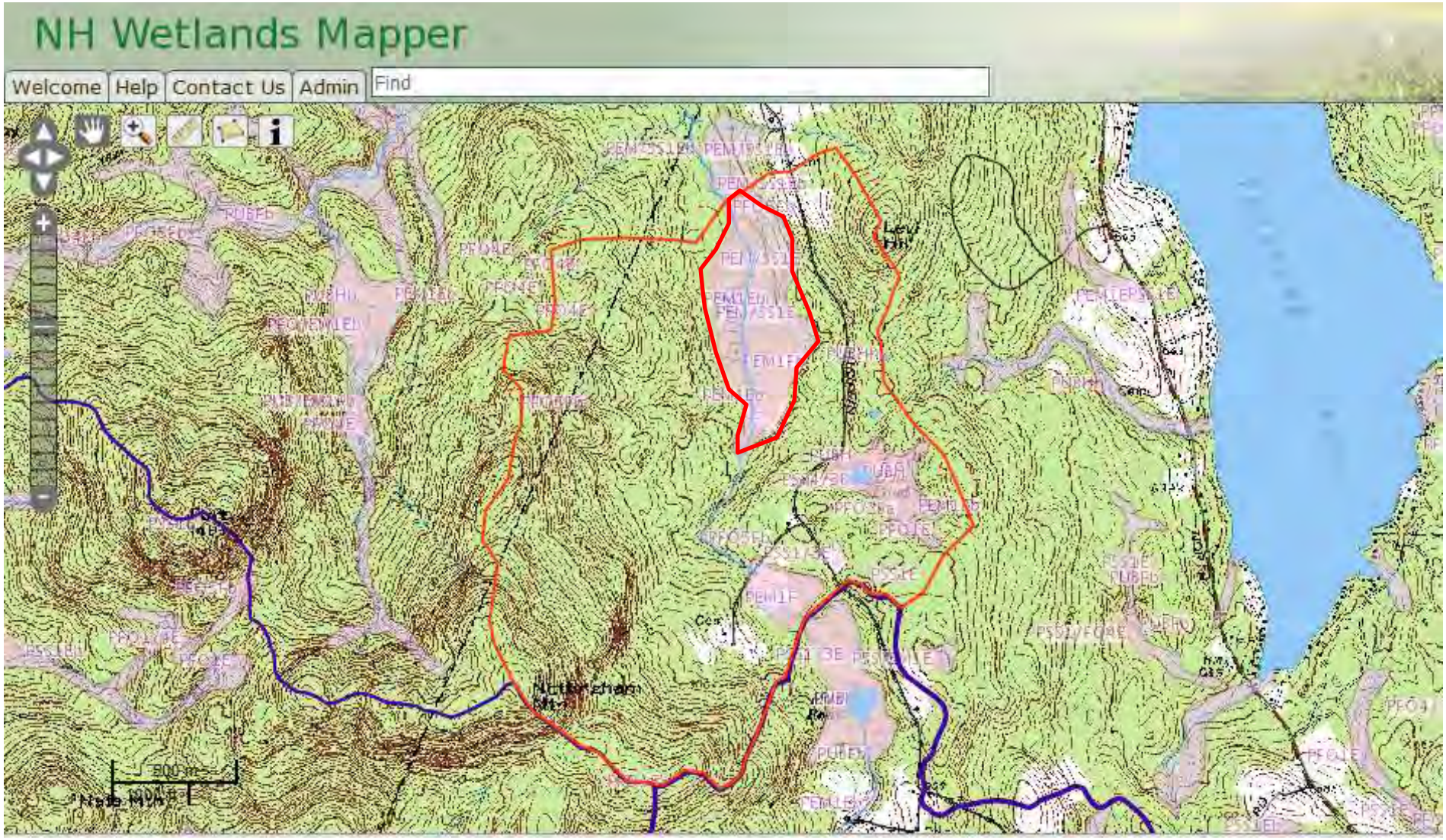
FOSS MEADOW - NHDES WETLANDS BASE MAP & HYDRIC SOILS



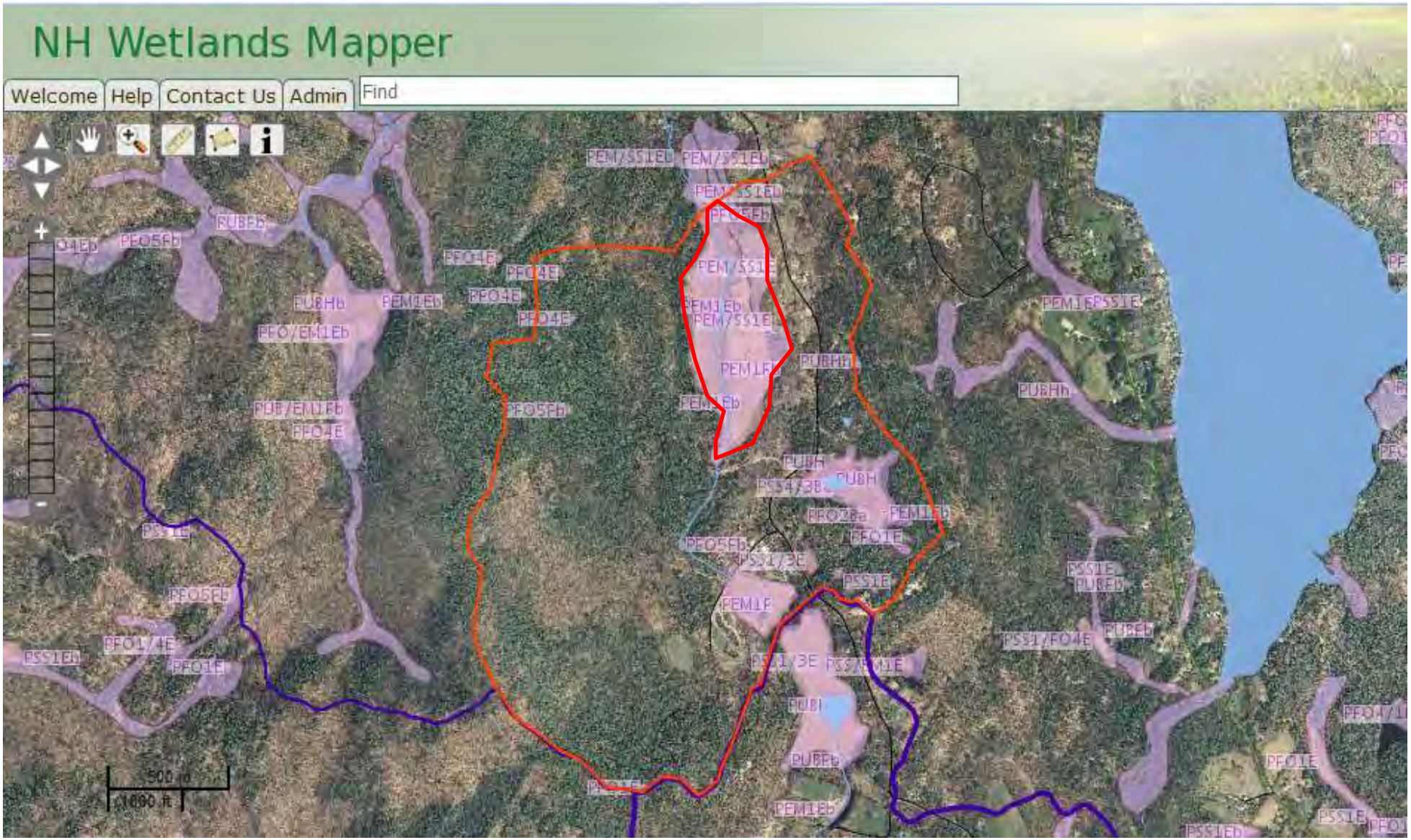
FOSS MEADOW – DRAWN WETLAND



FOSS MEADOW – DRAWN WETLAND AND WATERSHED

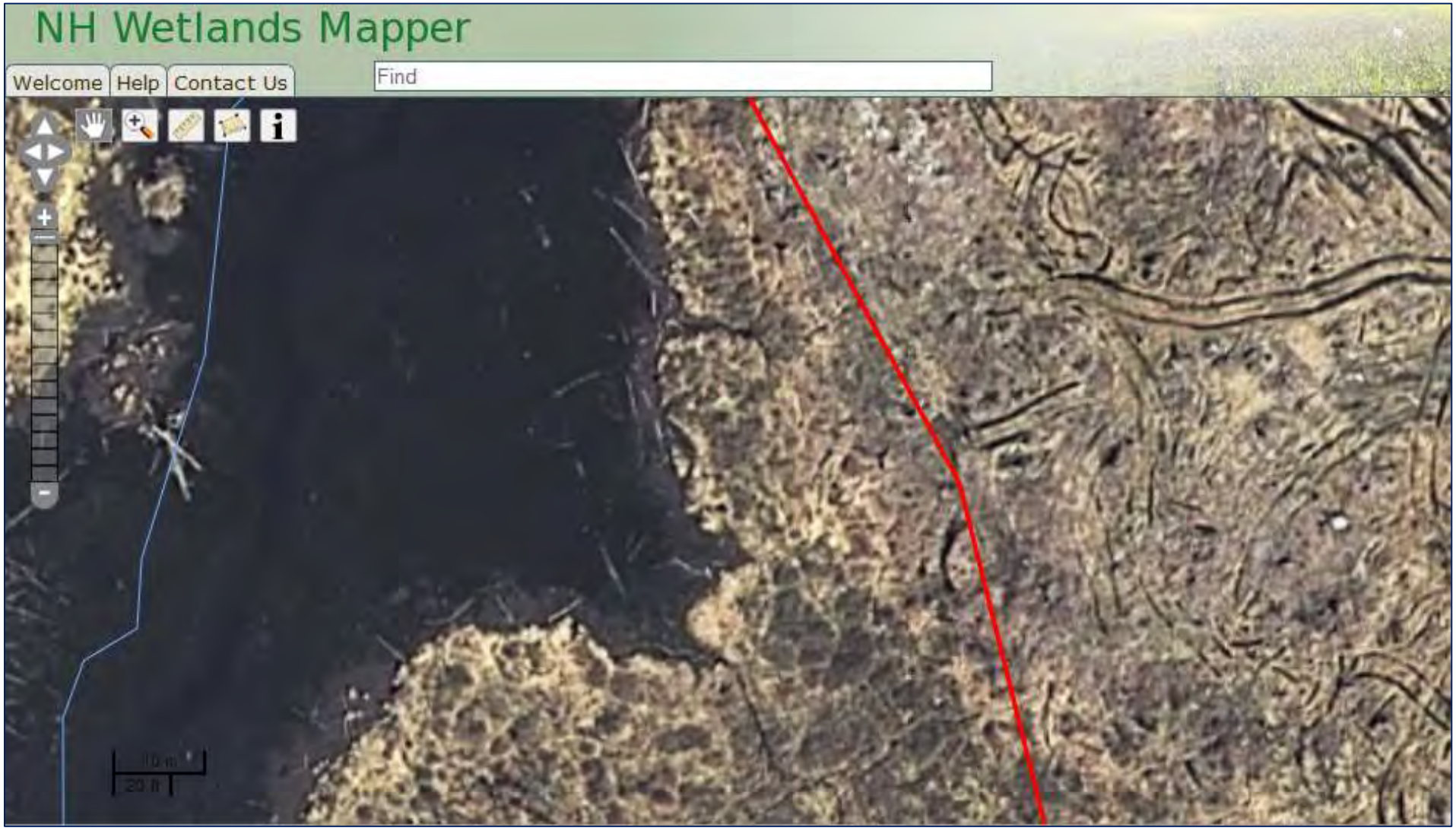


FOSS MEADOW – DRAWN WETLAND AND WATERSHED



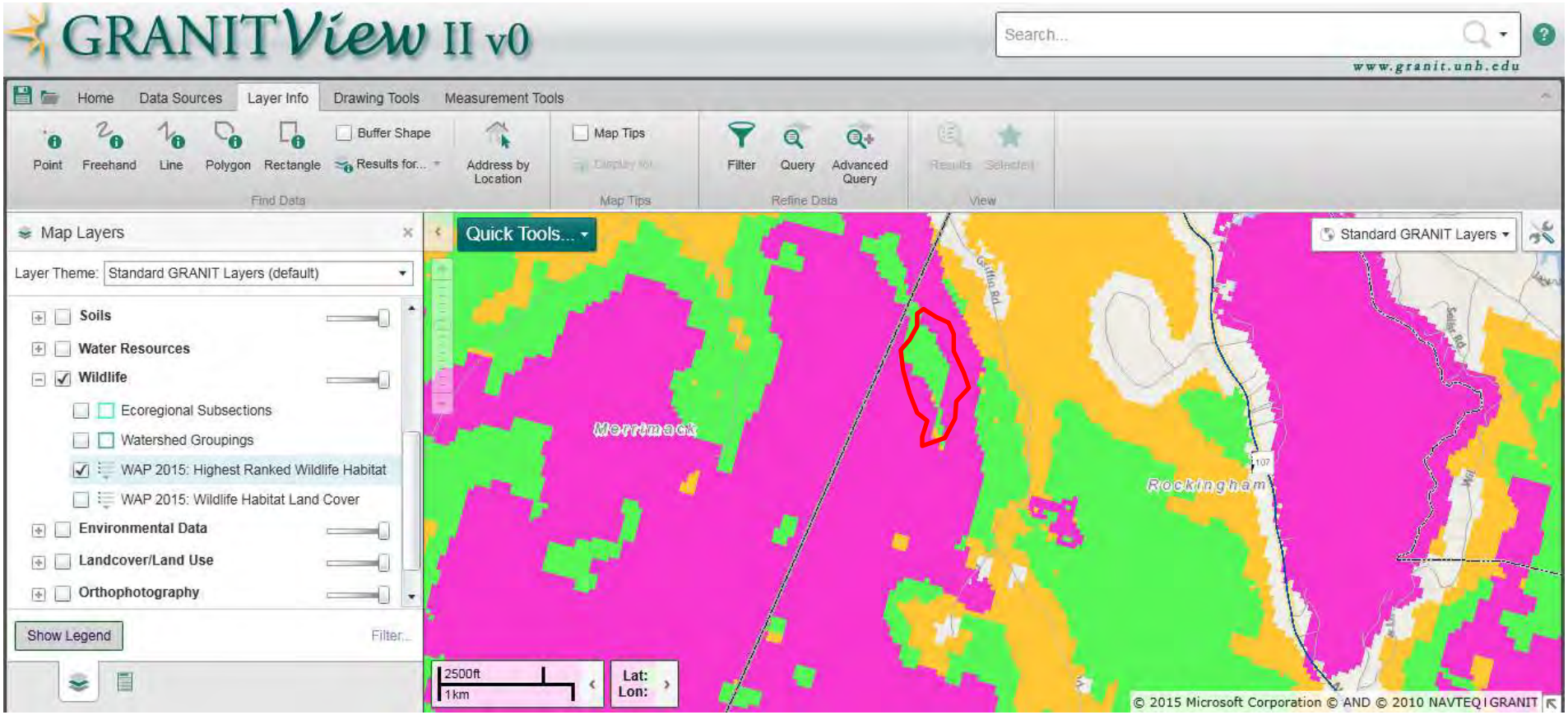
FOSS MEADOW – WETLAND WITH 100 & 500 FT BUFFER AREAS

FOSS MEADOW – DRAWN WETLAND MAXIMUM CLOSE-UP (2010 Aerial Photo)

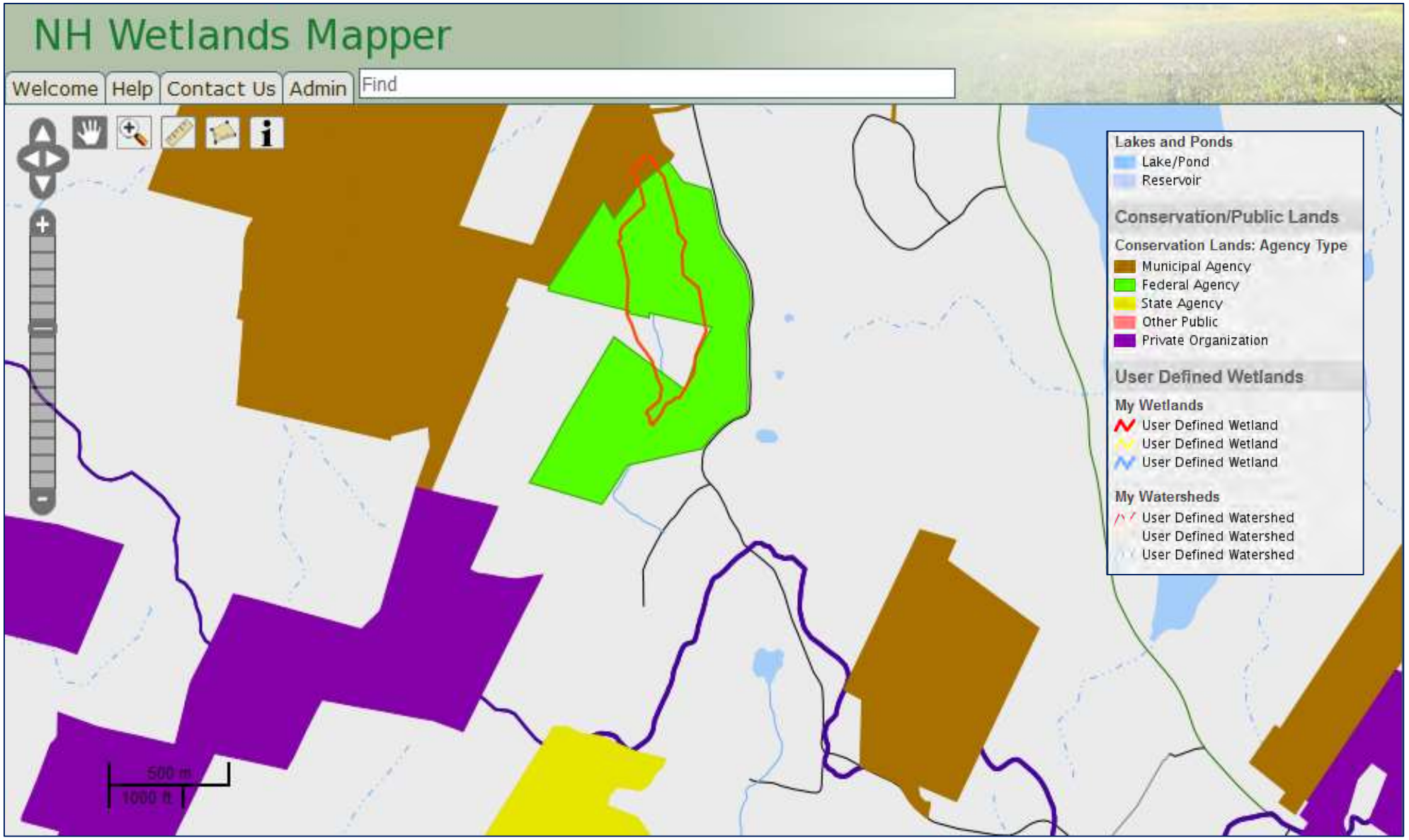


FOSS MEADOW – HIGHEST RANKED WILDLIFE HABITATS

(2015 data was not available on NH Wetlands Mapper (Nov, 2015), so was accessed from GRANITView, see below)



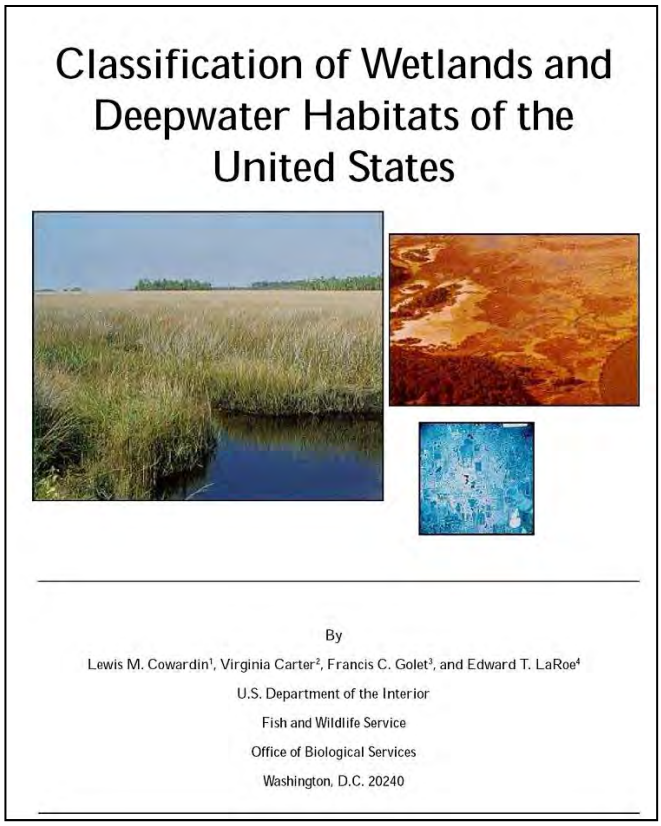
FOSS MEADOW – CONSERVATION LAND



APPENDIX F

THE COWARDIN SYSTEM OF WETLAND CLASSIFICATION (1979) AND THE NATIONAL WETLANDS INVENTORY (NWI)

In 1979, the U.S. Fish & Wildlife Service (USFWS) published a classification of wetlands and deepwater habitats (Cowardin et al.). This serves as the national standard for wetland classification and was used to classify wetlands identified on the National Wetlands Inventory (NWI) maps. Note that the NWI maps were based on 1985 infrared aerial photograph interpretation, and some wetland classes will have changed over time, e.g. as a result of beaver activity, etc.


Classification of Wetlands and Deepwater Habitats of the United States

By

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Visit the USFWS National Wetlands Inventory website for more detailed information. For a complete explanation of the classification system, reference the original publication, *Classification of Wetlands and Deepwater Habitats of the US*.

In the Cowardin classification system, wetlands and deepwater habitats are defined as follows:

WETLANDS:
Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water less than 6.6 ft deep. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (wetland plants); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season.

DEEPWATER HABITATS:
Includes permanently flooded deepwater areas that are deeper than 6.6 feet. Shallower waters that are often vegetated with emergent plans are regarded as wetlands rather than deepwater habitats.

The structure of the classification scheme is hierarchical, with systems forming the highest level of the classification hierarchy (Figure C-1), followed by subsystems, classes, subclasses and modifiers (water regime, water chemistry, soil and special modifiers such as beaver activity). Wetland codes and a code interpreter is located at: http://www.fws.gov/wetlands/Data/WetlandCodes.html. This also includes a link to the diagram of the Wetlands and Deepwater Habitats Classification Hierarchy as show in Figure C-1.
http://www.fws.gov/wetlands/_documents/gNSDI/WetlandsDeepwaterHabitatsClassification.pdf

Of the five major systems, three are of interest in inland watersheds:

1. **Riverine System** – All fresh water rivers and their tributaries are included in this system.
2. **Lacustrine System** – Includes areas of open water greater than 20 acres or more that 6.6 feet in depth.
3. **Palustrine System** – All nontidal wetlands dominated by trees, shrubs, and persistent emergent herbaceous plants (see explanation below).

PALUSTRINE SYSTEM

The Palustrine System includes all freshwater wetlands (such as marshes, bogs, and swamps) dominated by trees, shrubs, emergent herbaceous plants, floating leaved and submergent plants, and mosses and lichens. It also includes wetlands lacking such vegetation, but with all of the following characteristics:

(1) area <20 acres
(2) maximum water depth, 6.6 feet
(3) salinity <0.5‰

Palustrine wetlands may be situated shoreward of lakes or river channels, on floodplains, isolated from water bodies, or on slopes. The Palustrine System is subdivided into a several wetland classes, the most common of which are:

Unconsolidated Bottom: Areas of water with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%.

Aquatic Bed: Areas of water dominated by plants that grow principally on or below the surface of water for most of the growing season, e.g. floating-leaved plants, pondweeds, waterlilies, and submergent plants such as bladderwort.

Emergent: Wetland characterized by rooted herbaceous and grasslike plants which stand erect above the water or ground surface (excluding mosses or lichens). Vegetation is present for most of the growing season in most years. Emergent wetlands include marshes, meadows, and fens.

Persistent: Plant species that normally remain standing until the beginning of the next growing season in most years, e.g. cattails, bulrushes, reeds.

Non-persistent: Plant species that fall below the surface of the water at the end of the growing season so that at certain seasons of the year there is no obvious sign of emergent vegetation, e.g. pickerel weed, arrowheads, ferns.

Scrub-Shrub: Wetland dominated by woody vegetation less than 20 feet tall. Plant species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Scrub-Shrub wetlands include shrub swamps and bogs:

Broad-leaved deciduous: e.g. buttonbush, alders, willows, dogwoods, and saplings (e.g. red maple).
Needle-leaved deciduous: e.g. young or stunted trees, such as tamarack or cypress
Broad-leaved evergreen: e.g. bog rosemary, bog laurel, leatherleaf
Needle-leaved evergreen: e.g. young or stunted trees such as white pine, spruce

Forested: Wetland dominated by woody vegetation 20 feet or taller. Forested wetlands, e.g. forested swamps, generally include an overstory of trees, an understory of young trees and shrubs, and a herbaceous layer.

Broad-leaved deciduous: e.g. red maple, American elm
Needle-leaved deciduous: e.g. tamarack, cypress
Broad-leaved evergreen: e.g. red bay, holly
Needle-leaved evergreen: e.g. black spruce, Atlantic White Cedar

A NOTE on the use of the Cowardin System of Wetland Classification:

The general rule of thumb when classifying wetlands according to their cover class is the '5-30 rule', that is, a wetland type must have a minimum of 5% cover in order to be mapped, and if uppermost vegetative stratum exceeds 30% it becomes the dominant cover class. For example, if a wetland has 10% scrub-shrub cover and 30% forest cover, it gets mapped as a forested wetland (i.e. PFO). However, if neither cover class appears to exceed 30%, *or* if two classes appear to be co-dominant, then a combination of classes is written – e.g. PFO/SS or PSS/EM. Usually the uppermost layer gets noted first (e.g. PEM/AB) but occasionally the slightly more dominant class takes precedence (e.g. PSS/FO). The same goes for the numerical subscripts that modify the cover classes, e.g. PFO1/4E for a palustrine forested wetland that has slightly more deciduous trees than evergreen trees. See the examples of NWI classifications for wetlands below.

EXAMPLES OF NWI CLASSIFICATIONS FOR THE PALUSTRINE SYSTEM:

PEM1Eb **P**alustrine, **EM**ergent, persistent (**1**), seasonally flooded/saturated (**E**), beaver activity (**b**)

PSS1Fh **P**alustrine, **S**crub-**S**hrub, broadleaved deciduous (**1**), semipermanently flooded (**F**), impounded/diked (**h**)

PFO1E **P**alustrine, **FO**rested, broadleaved deciduous (**1**), seasonally flooded/saturated (**E**)

PFO5 **P**alustrine, **FO**rested, Dead **(5)**

PSS1/EM1 **P**alustrine, dominantly **S**crub-**S**hrub, broadleaved deciduous (**1**), mixed with **Em**ergent, persistent (**1**)

PEM1/SS1 **P**alustrine, dominantly **Em**ergent, persistent (**1**), mixed with **S**crub-**S**hrub, broadleaved deciduous (**1**)

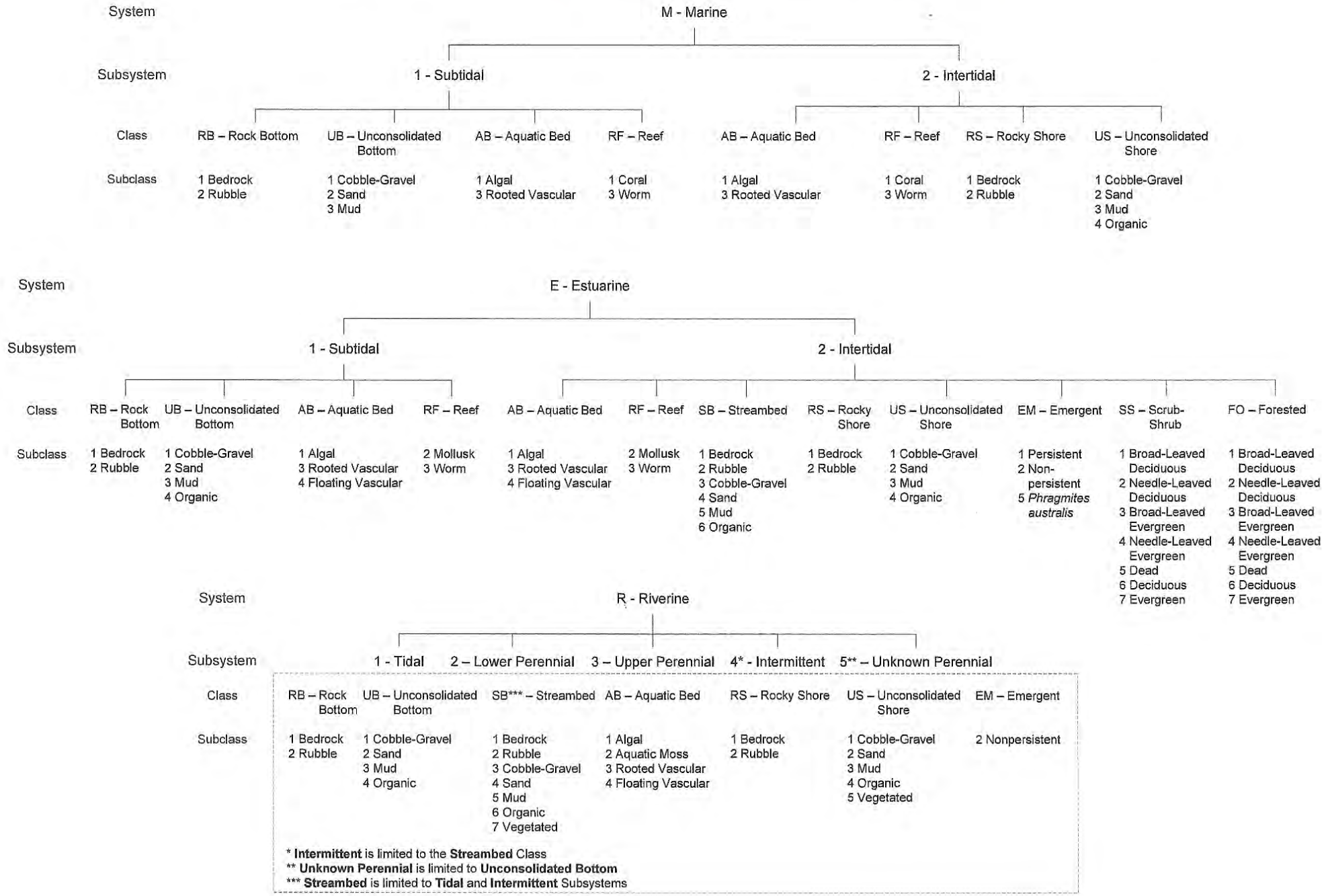
PFO4/SS4 **P**alustrine, dominantly **FO**rested, needle-leaved evergreen (**4**), mixed with **S**crub-**S**hrub, needle-leaved evergreen (**4**)

PSS1/FO4 **P**alustrine, dominantly **S**crub-**S**hrub, broadleaved deciduous (**1**), mixed with **Fo**rested needle-leaved evergreen (**4**)

U = Island or areas of upland within a wetland

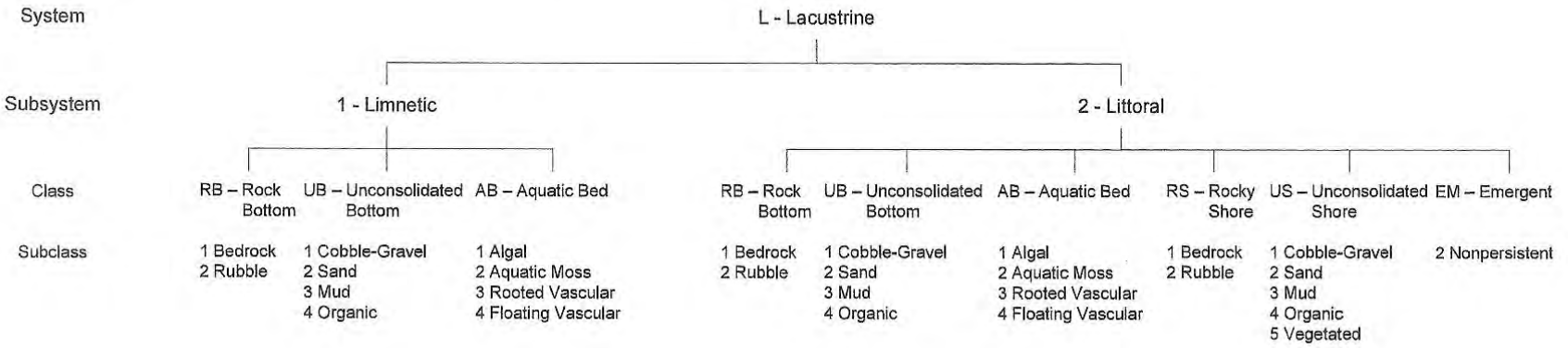
Figure F-1

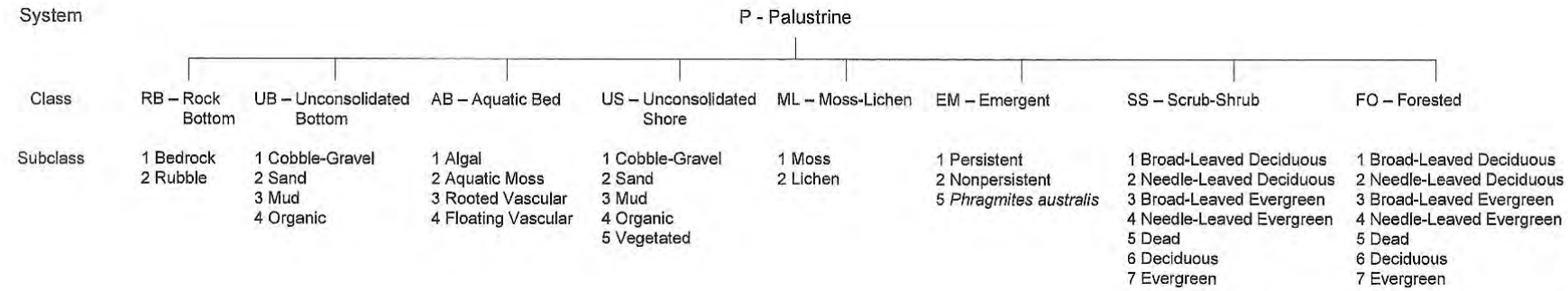
WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



Classification of Wetlands and Deepwater Habitats of the United States, Cowardin *et al.* 1979

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION





MODIFIERS

In order to more adequately describe the wetland and deepwater habitats, one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

Water Regime			Special Modifiers	Water Chemistry			Soil
Nontidal	**Saltwater Tidal**	**Freshwater Tidal**		**Coastal Halinity**	**Inland Salinity**	**pH Modifiers for all Fresh Water**	
A Temporarily Flooded	L Subtidal	S Temporarily Flooded-Tidal	b Beaver	1 Hyperhaline	7 Hypersaline	a Acid	g Organic
B Saturated	M Irregularly Exposed	R Seasonally Flooded-Tidal	d Partly Drained/Ditched	2 Euhaline	8 Eusaline	t Circumneutral	n Mineral
C Seasonally Flooded	N Regularly Flooded	T Semipermanently Flooded-Tidal	f Farmed	3 Mixohaline (Brackish)	9 Mixosaline	l Alkaline	
E Seasonally Flooded/ Saturated	P Irregularly Flooded	V Permanently Flooded-Tidal	h Diked/Impounded	4 Polyhaline	0 Fresh		
F Semipermanently Flooded			r Artificial	5 Mesohaline			
G Intermittently Exposed			s Spoil	6 Oligohaline			
H Permanently Flooded			x Excavated	0 Fresh			
J Intermittently Flooded							
K Artificially Flooded							

APPENDIX G

Interpreting Topographic Maps and Drawing Watershed Boundaries

A watershed or drainage basin can be defined as the geographic area that contributes surface water runoff to a watercourse and/or wetland. The NH Method uses watersheds to answer several evaluation questions, so it is important that the user understands the basic principles of drawing a watershed boundary. Some users will use GIS tools to draw watershed boundaries and calculate acreage. Others may prefer to extrapolate watersheds from existing data sets, or to draw them manually.

INTERPRETING TOPOGRAPHIC MAPS

To draw a watershed boundary, the user needs to understand how to interpret topography off a topographic map.

Each contour line on a topographic map represents a ground elevation or vertical distance above a reference point such as sea level. A contour line is level with respect to the earth's surface just like the top of a building foundation. All points along any one contour line are at the same elevation.

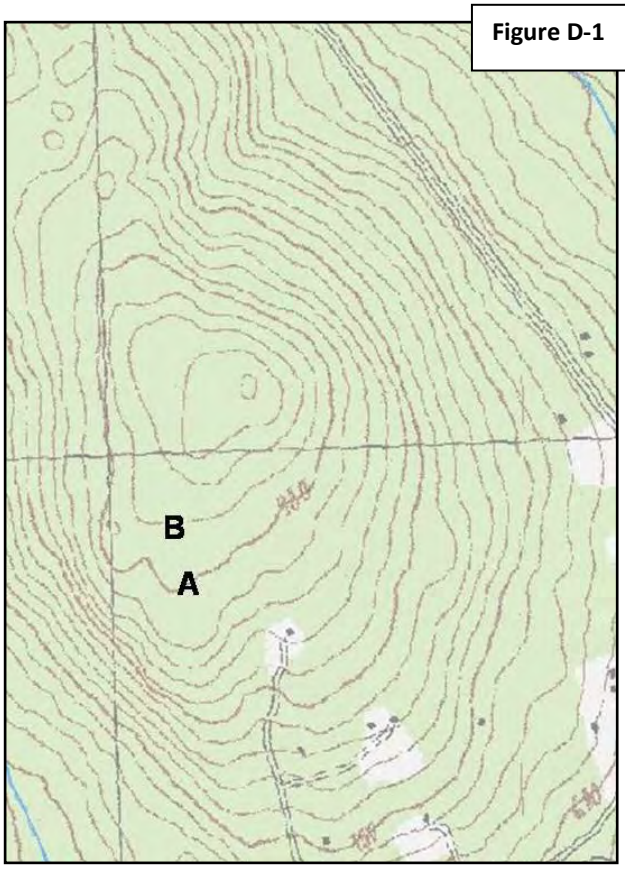


Figure D-1

The difference in elevation between two adjacent contours is called the contour interval. This is typically given in the map legend. It represents the vertical distance you would need to climb or descend from one contour elevation to the next.

The horizontal distance between contours, on the other hand, is determined by the steepness of the landscape and can vary greatly on a given map. On relatively flat ground, two 20 foot contours can be far apart horizontally. On a steep cliff face two 20 foot contours might be directly above and below each other. In each case the vertical distance between the contour lines would still be 20 feet.

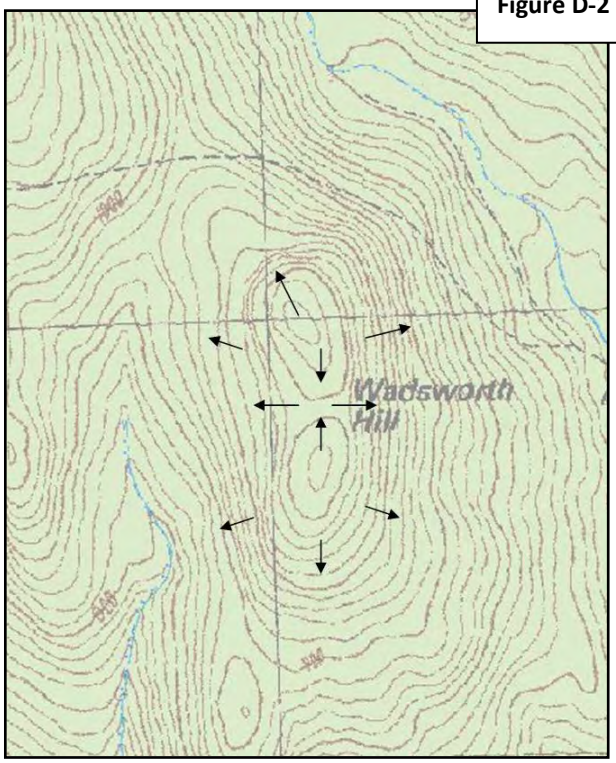
One of the easiest landscapes to visualize on the topographic map is an isolated hill. The map will show the hill as a series of more or less concentric circles (Figure D-1). If two people start walking in opposite directions on the same contour line, beginning at point A, they will eventually meet face to face.

If these same two people start out in opposite directions on different contours, beginning at points A and B respectively, they will pass each other somewhere on the hill and their vertical

distance apart would remain 20 feet. Their horizontal distance apart could be great or small depending on the steepness of the hillside where they pass.

A more complex situation is where two hills are connected by a saddle (Figure D-2). Here each hill is circled by contours but at some point toward the base of the hills, contours begin to circle both hills.

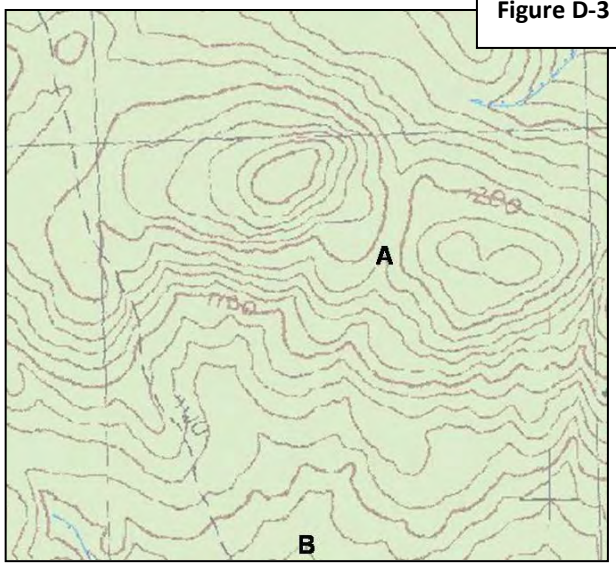
Figure D-2



Water always flows downhill and is generally perpendicular to contour lines. In the case of the isolated hill, water flows down on all sides of the hill. Water flows from the top of the saddle or ridge, down each side in the same way water flows down each side of a garden wall (See arrows on Figure D-2).

As the water continues downhill, it flows into defined water courses (streams and rivers) that get progressively larger as they flow towards the ocean. Any point on a watercourse can be used to define a watershed. For example, entire drainage area of a major river like the Merrimack is a watershed, but the drainage areas of each of its tributaries are also watersheds. Each tributary has smaller tributaries, and each one of these smaller tributaries also has a watershed. This process of subdivision can continue until very small, local watersheds are defined which might only drain a few acres, and might not contain a defined watercourse, but may include a wetland.

Figure D-3



A general rule of thumb is that topographic lines always point upstream. With that in mind, it is not difficult to make out drainage patterns and the direction of flow on the landscape even when there is no stream depicted on the map. In Figure D-3, for example, the direction of streamflow is from point A to point B.

As one proceeds upstream, successively higher and higher contour lines first parallel then cross the stream. This is because the floor of a river valley rises as you go upstream. Like-wise the valley slopes upward on each side of the stream. Ultimately, you must reach the highest point upstream. This is the head of the watershed, beyond which the land slopes away into another watershed. At each point on the stream the land slopes up on each side to some high point then down into another watershed. If you were to join all of these high points around the stream, you would have the watershed boundary. (High points are generally hill tops, ridge lines, or saddles).

DRAWING A WATERSHED BOUNDARY

This example shows how to locate and connect all of the high points around a watershed on a topographic map (Figures D-4 and D-5).

1. Draw a circle at the outlet or downstream point of the wetland in question (Figure D-4)

2. Put small "X's" at the high points along both sides of the watercourse, working your way upstream towards the headwaters of the watershed (Figure D-4)..

3. Starting at the circle (wetland outlet) that was made in step one, draw a line connecting the "X's" along one side of the water course (Figure D-5). This line should always cross the contours at right angles, i.e., it should be perpendicular to each contour line it crosses).

4. Continue the line until it passes around the head of the watershed and down the opposite side of the water course. Eventually it will connect with the circle from which you started. At this point you have drawn the watershed boundary for the wetland being evaluated.

The watershed boundary is shown in Figure D-5 as a broken line around the watercourse. Surface water runoff from rain falling anywhere in this area will ultimately drain to the outlet point, whether this is a wetland outlet or a point on a stream.

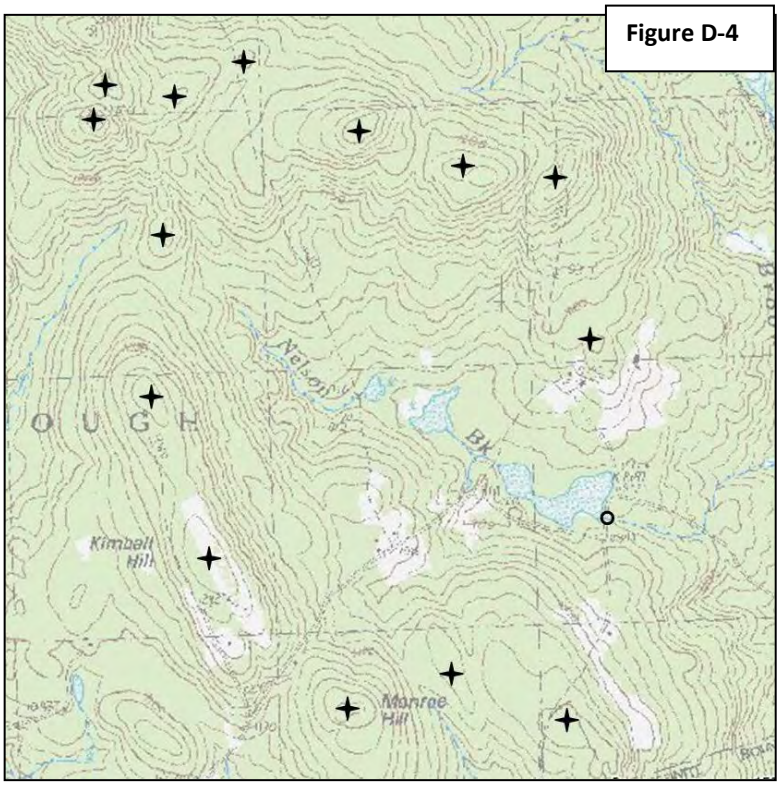


Figure D-4

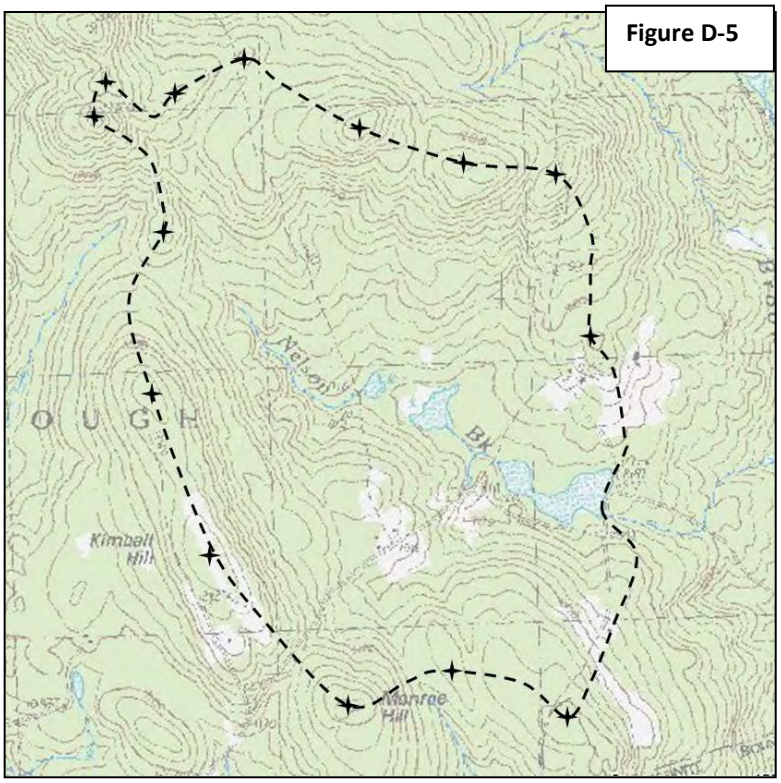


Figure D-5

CALCULATING WATERSHED ACREAGE

1. Watershed acreage can be easily calculated using GIS tools.
2. The grid method uses a sheet of acetate or Mylar, with a series of squares of a known area. This is laid over the map area to be measured. The user counts the squares that fall within the area to be measured and multiplies by a scale factor to determine the area.

Questions in the NH Method That Can Indicate Potential Need for Restoration or Improved Ecological Management

Note: This list is meant to identify opportunities for wetland restoration or improved management. It does not include questions relative to management that could enhance "social" rather than ecological functions and values, such as improved parking near a wetland for better educational use.

Superscript numbers reference *Potential Restoration or Improved Management Practices*, listed on page 2.

Section 1 – Ecological Integrity

1. Are there land uses **in the wetland's watershed** that could degrade water quality in the wetland? (Used again in Section 2, Question 3 and Section 3, Question 2) [1]
2. Is there evidence of fill **in the wetland**? [2]
3. What percentage **of the wetland** has been altered by agricultural activities? [3]
4. What percentage **of the wetland** has been adversely impacted by logging activity within the last 10 years? [4]
5. How much human activity is taking place in the wetland (e.g. ATV use, trails, cars, dumping, etc.)? [5]
6. What percentage of the wetland is occupied by invasive species? [1, 6]
7. Are there roads, driveways and/or railroads crossing or adjacent to the wetland or within 500 ft. of the wetland? [7, 8]
8. How much human activity is taking place **in the upland** within 500 feet of the wetland edge? [5]
9. What is the percent of impervious surface within 500 feet of the wetland edge? [3,7,10,11]
10. Is there a human-made structure that controls water level or is undersized present in the wetland, or in the water body directly connected to the wetland? [9]

Section 2 – Wetland-Dependent Wildlife Habitat

8. Are there wildlife travel corridors allowing access between wetlands? [10]
9. What percentage of the wetland edge is bordered by undisturbed woodland or idle land (e.g. shrub land or abandoned fields) at least 500 feet in width? (Repeated in Section 11, Question 4) [11]
10. What percentage of the wetland is occupied by invasive plant species? [6]

Section 3 – Fish and Aquatic Habitat

2. Could water quality in the wetland been degraded by land use in the watershed? [1,3,4,8,10,11,12,13]
6. Does the stream channel appear to have been recently altered? [12]
8. How abundant are coarse woody material and large rocks? [14]

10. Barrier(s) to aquatic life, especially anadromous fish (such as dams, elevated culverts, bridge with a width less than the natural stream channel, road crossings, etc.) along the stream reach associated with the wetland. [8, 9]
11. Presence of rare or endangered fish or aquatic life [13]

Section 12- Noteworthiness

4. Does the wetland have known biological, geological, or other features that are locally or regionally rare or unique? [13]
5. Is the wetland known to contain an important historical or archaeological site? [13]
7. Is the wetland one of just a few left in an urban setting? [13]

Potential Restoration or Improved Management Practices

1. Improved stormwater management in the watershed
2. Remove fill
3. Restore topography, fill drainage ditches, exclude livestock
4. Stabilize erosion areas, especially roads and stream crossings
5. Remove trash, litter, regularly monitor property, restrict access
6. Remove Invasive species, if detected early
7. Close roads or driveways if possible
8. Install adequately sized bridge, culvert or other structure
9. Remove dam & allow wetland to revegetate
10. Restore vegetation in potential wildlife travel routes areas
11. Restore vegetation in riparian areas
12. Restore stream channel
13. Monitoring and/or improved management
14. Add woody material to wetland (trees felled at edge, etc.) if practical

December 2015

Questions to be answered in the field

Criteria that are labeled with *(field check)* use data from the NH Wetlands Mapper or GIS, but also need verification in the field

1. Ecological integrity

1. Water quality in wetland based on land use
2. Fill in wetland
3. Amount altered by agriculture
4. Amount impacted by logging
5. Human activity in wetland
6. Invasive species coverage
7. Roads, driveways & railroads (recent)
8. Human activity in 500-foot buffer *(field check)*
9. % Impervious within 500 feet *(field check)*
10. Structures controlling water within ½ mile

2. Wetland-dependent Wildlife Habitat

4. Area of shallow permanent water *(field check)*
5. Amount of deepwater (> 6.6 feet) *(field check)*
6. Diversity of wetland classes *(field check)*
7. Other wetlands nearby? *(field check)*
8. Wildlife corridors? *(field check)*

3. Fish & Aquatic Life Habitat

4. Acreage of deepwater habitat
5. Width of stream
6. Stream altered?
7. Substrate diversity
8. Woody material & large rocks (cover) in open water areas
9. Amount of floating & submerged vegetation
10. Artificial barriers to aquatic life
11. Rare or endangered species and/or habitat *(field check)*

4. Scenic Quality (need viewpoint/s)

1. Visible vegetation classes
2. Public access *(field check)*
3. Visible extent across wetland

4. Scenic Quality (continued)

4. Extent of visible open water
5. Landscape contrast
7. General appearance

5. Educational Potential

4. Public or private access *(field check)*
5. Proximity to off-road parking suitable for school bus or multiple cars
6. Vegetation classes accessible
7. Access to open water
9. Disabled access?

6. Wetland-based Recreation

2. Open water (for canoe/kayak)
3. Trails present?
4. Off-trail opportunities?
5. Off-road parking for > 2cars?

7. Flood Storage

3. Water storage depth

8. Groundwater Recharge

[No field-based questions unless soil sampling being performed]

9. Sediment Trapping

2. Outlet
3. Character of waterflow (such as sinuosity, impoundment, etc.)
6. Areal extent of vegetation that will trap sediments
7. Average water depth

10. Nutrient Trapping/Retention/Transformation

4. Hydroperiod of wetland *(field check)*

11. Shoreline Anchoring

1. Gradation of vegetation types along shoreline
2. Vegetation density bordering watercourse
3. Wetland width along water body
4. Substrate roughness

12. Noteworthiness (features observed in the field)

4. Rare or unique biological, geological or other features
5. Historical or Archaeological site? *(field check)*