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**AN EVALUATION OF WETLANDS
IN THE FRAZIER BROOK WATERSHED
WARNER, NEW HAMPSHIRE**

Stephanie D'Agostino
Final Masters Project
Antioch New England Graduate School
February, 1992

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**AN EVALUATION OF WETLANDS
IN THE FRAZIER BROOK WATERSHED
WARNER, NEW HAMPSHIRE**

**A Masters Project
Presented By
Stephanie D'Agostino**

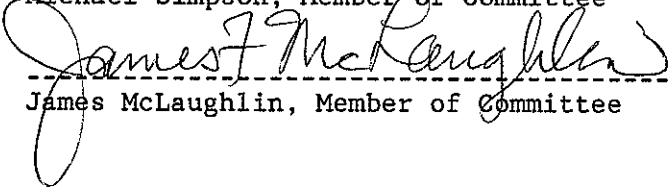
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ABSTRACT

The assessment of the functional values of wetlands is an increasingly important facet of wetlands science. Such assessments are used by communities, planners and scientists in the management, protection, and restoration of wetland resources. There are several different evaluation techniques which are used by resource managers. Some techniques require professional knowledge and training, others are designed for use by nonprofessionals such as local conservation commissions. In order to avoid improper decisionmaking, wetlands evaluation methods should be used only for the specific purposes for which they were designed.

This project focused on the assessment of fourteen functional values (e.g. wildlife habitat, flood control potential, nutrient attenuation, etc.) of wetlands in the Frazier Brook watershed, in Warner New Hampshire. Functional values were assessed and calculated using the Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire (Amman, et al.), which is intended for use in broad scale planning. A total of sixteen wetlands were mapped and evaluated. Of these wetlands, three scored first or second in all of the functional values. This was attributed to their large size (over 20 acres) and their proximity to a waterbody or watercourse.

Specific recommendations for the use of the information generated by the evaluation project are contained in this report. Such recommendations include: designation of prime wetlands; educational activities; and enactment of local regulations.

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I. INTRODUCTION

Project Purpose

Wetlands evaluation is defined as " the process of determining the value of a wetland based on an assessment of the potential and/or functional values of that wetland" (Amman et. al, 1991). The purpose of this project is to assess the functional values of wetlands located in the Frazier Brook watershed, using the Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire, (Amman et.al, 1991).

Information generated by this project will be used to provide the Town of Warner Conservation Commission and Planning Board with a basis for pursuing one or more of the following options for wetlands protection:

1. Development/update of zoning regulations;
2. Use in review by the Planning Board of subdivision and site plans;
3. Commenting to the state Wetlands Board on dredge and fill applications;
4. Commenting to the U. S. Army Corps of Engineers on dredge and fill applications;
5. Designation of Prime Wetlands; and
6. Acquisition of wetlands.

In order to more effectively plan for growth and development many communities undertake inventories and assessments of their resources, both natural and cultural. These inventories help communities to identify those resources most in need of protection, and select the most appropriate protection and/or management techniques. The primary goal of this project is to facilitate local planning and resource management efforts by providing information on the wetlands located in the Frazier Brook watershed, of Warner, New Hampshire.

Evaluation Methods

The results of this project should be used with caution, as wetlands evaluation methods such as the NH Method, are designed to be used as general planning tools only. The NH Method is not a site-specific assessment technique, and is not appropriate for use in impact analysis. It's primary function is to provide information on the comparative values of a group of wetlands for certain functions (e.g. flood control, wildlife habitat, etc.), and point out those areas are potentially high value, or which may require more in-depth investigation.

Evaluation methods do exist which are designed for site-specific analysis, however, they can be complex, time-consuming, and expensive to use, and must be performed by trained professionals.

Project Description

This project focuses on the assessment of the functional values of sixteen wetlands in the Frazier Brook watershed, within the Town of Warner, New Hampshire. In order to assess the functional values of wetlands it is important to understand what wetlands are, and how they are defined and regulated, therefore a general discussion of wetlands is included in this report. Also included in this document are: a description of the watershed study area, including zoning and land use; a description and critique of the methodology used; individual profiles of the sixteen wetlands evaluated in the target watershed, including vegetation, soils and hydrologic regime; research results and conclusions; and recommendations on how to use the information generated by this study.

This is the first phase of a multi-phase wetlands project being undertaken by the Warner Conservation Commission on a watershed basis.

II. WETLANDS DESCRIBED AND DEFINED

What Are Wetlands?

Wetlands can be broadly described as areas which are intermediate between upland ecosystems and open bodies of water. Most wetlands develop in low places in the landscape and are categorized generally as swamps, bogs, and marshes. Each wetland type has its own characteristic vegetation: swamps are dominated by woody vegetation such as trees and shrubs; bogs are characterized by plants and

trees adapted to highly acidic conditions; and marshes are treeless wetlands characterized by soft-stemmed herbaceous plants.

New Hampshire regulations refer to wetlands in terms of marsh, swamp and bog, which are not really useful in identifying regulated wetlands. Cowardin et. al (1979) was recently cited as the classification source for wetlands in New Hampshire, and is more scientifically accurate. Unfortunately, the NH Wetlands Board regulations state a preference for protection of wetlands based on these generic terms, e.g. bogs are given higher status than marshes, and swamps are considered least valuable based on their abundance.

The U.S. Army Corps of Engineers defines wetlands as "those areas that are saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions". This definition is also used in the application of the NH Method, upon which this project is based.

Other agencies, local, state, and federal, may define wetlands in a slightly different manner, however all the definitions are essentially concerned with the three basic elements described below; vegetation, hydrology, and soils.

Vegetation

Plants which are used as wetland indicators are known as hydrophytic species and are adapted to growing in water or in saturated soil conditions. Hydrophytes are defined as "macrophytic plant life growing in water, soil, or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (USCOE et.al, 1989).

Hydrology

According to Mitsch and Gosselink (1986), hydrology is considered to be the most significant factor in determining the establishment and maintenance of specific types of wetlands and wetland processes. An area is considered to have wetland hydrology when "saturated to the surface or inundated at some point in time during an average rainfall year" (USCOE et. al, 1989). Water movement and storage in wetlands affects how the soils develop and what vegetation is present. This in turn affects the functions which are performed by a wetland.

Soils

Soil is defined as solid earth material that has been altered by physical, chemical, and organic processes, such that it can support rooted plant life (Keller, 1976). The factors that are important in the formation of soils include climate, topography, time, parent material, and activities of plants and animals (SCS, 1989).

Hydric (wetland) soil is defined by the U.S. Department of Agriculture, Soil Conservation Service (USDA/SCS) as "soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part". Usually, soils which are saturated or ponded for seven days or more during the growing season exhibit hydric characteristics. There are two basic classifications of hydric soils: organic soils (Histosols) and mineral soils (Tiner, 1985). Generally, soils that have at least 18 inches of organic matter in the upper layer are considered to be organic, and soils with less organic matter are considered to be mineral (Tiner, 1985). A listing of hydric soils found in Merrimack County is contained in Appendix 3.

Wetland Functions and Values

Wetlands provide many different beneficial functions, including flood water storage, wildlife habitat, nutrient attenuation, recreational opportunity, and groundwater protection. However, it is important to note that not all wetlands perform all functions, nor do they perform them to the same degree. The functions which a wetland performs may also vary on a seasonal basis, especially functions such as flood water storage, groundwater recharge/discharge, nutrient attenuation, and sediment trapping.

Wetlands Regulation

Wetlands are regulated at both the state and federal levels. At the state level, the New Hampshire Wetlands Board is responsible for reviewing projects which involve filling, dredging or other alteration of wetlands and submerged lands, and granting or denying permits based on the potential impacts of a project. At the federal level, the U.S. Army Corps of Engineers (COE) has primary responsibility for the regulation of wetland impacts, with input from the Environmental Protection Agency and the Fish & Wildlife Service.

State and federal regulatory authorities often overlap, and it may be confusing for an applicant or local Conservation Commission to determine when a state Wetlands Board permit is required, and when both Wetlands Board and COE permits are required. In general, the Corps jurisdiction is similar to the Wetlands Boards, but the Corp does exempt certain activities in small, isolated wetlands which cause minimal environmental damage. Contacting the regional Corps of Engineers Office is the most prudent course of action if there is uncertainty on the part of the developer, landowner or local Conservation Commission on whether a federal permit is required.

In New Hampshire, local communities may also enact wetlands ordinances which may be more restrictive than state or federal laws. Inventory and assessment projects can provide valuable information to communities seeking to enhance protection of their wetland resources through local regulations.

III. DESCRIPTION OF WATERSHED STUDY AREA

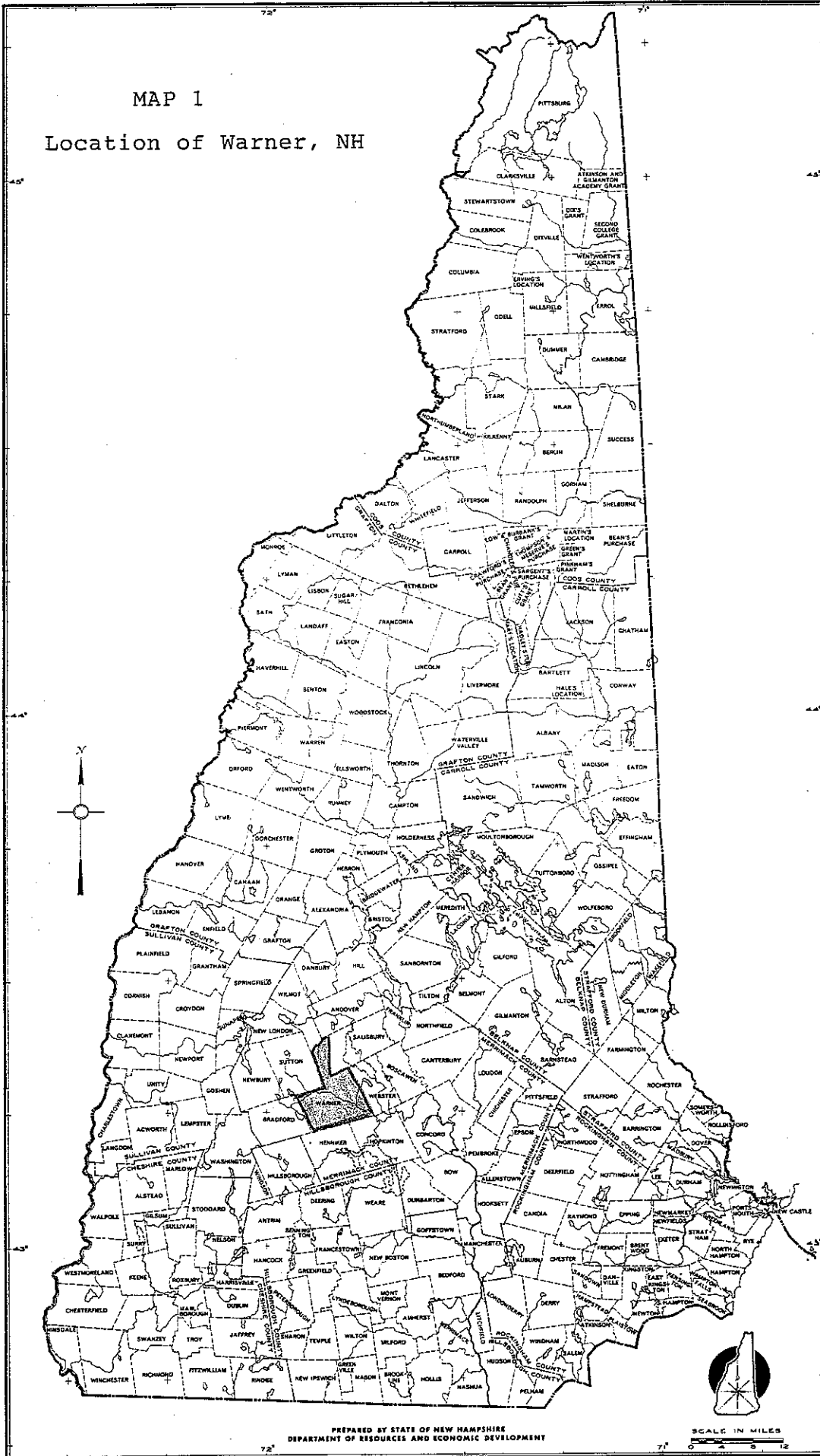
The study area is the Frazier Brook watershed, located in the Town of Warner, New Hampshire (MAP 1). The watershed is approximately 4.3 square miles and is rural in nature (MAP 1A). The terrain is fairly steep and rugged, and is primarily forested.

Land uses in the watershed consist of those which are compatible with a rural setting, including: forestry, some agricultural use, and limited single family residential housing.

The entire study area falls within either the R3 or OC1 zoning districts, which are described below.

Low Density Residential District (R3): "Designated for residential and agricultural uses on land remote from municipal water and sewer services which because of its character requires large minimum lot sizes to handle the individual family's water and sewer disposal needs. Uses normally associated with residential neighborhoods such as schools, churches, and parks are permitted, and certain businesses are permitted by special exception". The R3 zone requires a 250' minimum frontage, and a 3 acre minimum lot size. Any building lot which borders a public lake or pond must have a minimum of 100' of shoreline. (Warner Zoning Ordinance, 1991).

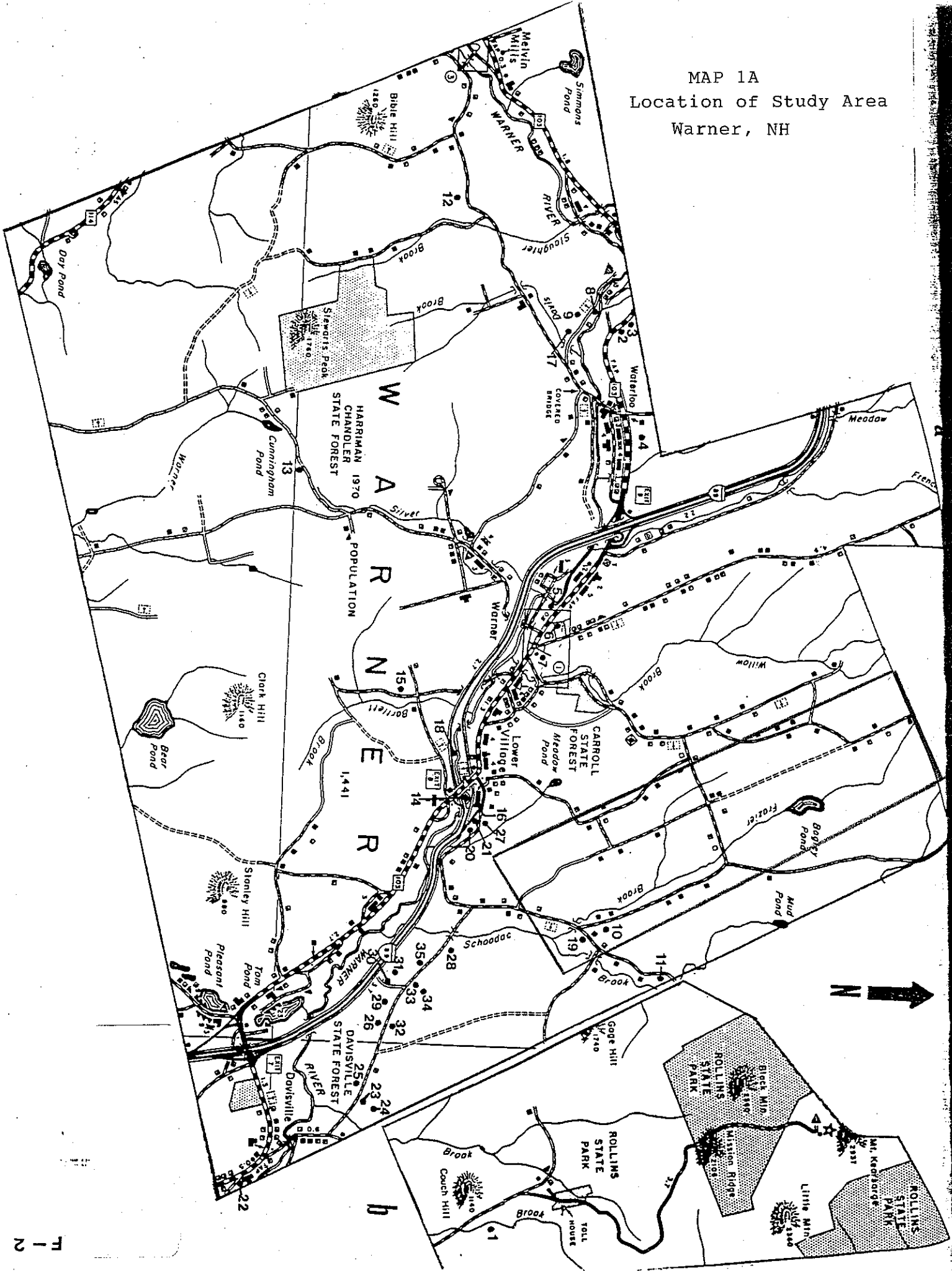
MAP 1
Location of Warner, NH



PREPARED BY STATE OF NEW HAMPSHIRE
DEPARTMENT OF RESOURCES AND ECONOMIC DEVELOPMENT

SCALE IN MILES
0 1 2 3 4 5 6 7 8 9 10 11 12

MAP 1A
 Location of Study Area
 Warner, NH



Open Conservation District (OC1): "Designated for agricultural, forestry, and very limited residential uses on inaccessible land which because of steepness of slope, poor drainage, or periodic flooding shall not be intensively developed" (Warner Zoning Ordinance, 1991).

The OC1 district requires minimum frontage of 300', and a minimum lot size of 5 acres. Any lot bordering the shoreline of a public lake or pond must have a minimum of 200' of shoreline.

Other Zoning Provisions: The General Provisions section of the Warner Zoning Ordinance states that "All buildings, including storage tanks shall be set back a minimum of 75 feet from the Warner River, ponds greater than 10 acres and all other perennial waterways and streams as shown on standard 7 1/2 minute USGS quadrangle maps. In addition, a maximum of 50% of the existing natural vegetation shall remain as a buffer". (Warner ZO, Article IV, 1991).

IV. METHODOLOGY

The Methodology used for this project is The Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire. This method is based on a similar method developed for the state of Connecticut and was adapted for use by New Hampshire communities by the Audubon Society of New Hampshire, the New Hampshire Department of Environmental Services (NH DES), and the US Department of Agriculture, Soil Conservation Service (USDA/SCS) in 1991. The NH Method

involves the use of numerical rating system for assessing the 14 functional values listed and described below.

1. **Ecological Integrity** - Evaluates the overall health and function of the wetland ecosystem.
2. **Wildlife Habitat** - Evaluates the suitability of the wetland as a habitat for those animals typically associated with wetlands and wetland edges. No single species is emphasized.
3. **Finfish Habitat** - Evaluates the suitability of watercourses, ponds, or lakes associated with the wetland for either warm water or cold water fish. No single species or group of species is emphasized.
4. **Educational Potential** - Evaluates the suitability of the wetland as a site for an "outdoor classroom".
5. **Groundwater Use Potential** - Evaluates the potential use of the underlying aquifer as a drinking water supply.
6. **Nutrient Attenuation** - Evaluates the potential of the wetland to reduce the impacts of excess nutrients in runoff water on downstream lakes and ponds.
7. **Sediment Trapping** - Evaluates the potential of the wetland to trap sediment in runoff water from surrounding upland.
8. **Shoreline Anchoring And Dissipation of Erosive Forces** - Evaluates the effectiveness of the wetland in preventing shoreline erosion.
9. **Visual/Aesthetic Quality** - Evaluates the visual and aesthetic quality of the wetland.
10. **Water-based Recreation** - Evaluates the suitability of the wetland and associated watercourses for non-powered boating, fishing, and other similar recreational activities.
11. **Flood Control Potential** - Evaluates the effectiveness of the wetland in storing floodwaters and reducing downstream flood peaks.
12. **Urban Quality of Life** - Evaluates the potential for the wetland to enhance the quality of urban life by providing wildlife habitat and other natural values in an urban setting.
13. **Historical Site Potential** - Evaluates for indications of use by early settlers.
14. **Noteworthiness** - Evaluates the wetland for certain special values such as critical habitat for endangered species, etc.

Application of the NH Method involves answering a series of predetermined questions for each functional value. Each question is allocated a point value, and when all questions have been answered the point total is added up and divided by the number of questions to give an average number called the Functional Value Index (FVI). The FVI is then multiplied by the acreage of the wetland and the final result is the Wetland Value Unit (WVU). The WVUs for each functional value are used to make comparisons between wetlands within the study area. Only scores for like functional values are compared, for example, the scores for all wetlands will be compared for wildlife habitat to determine which wetland scored highest. Appendix 4 contains a sample data sheet.

The NH Method requires that wetlands in the study area be mapped prior to evaluation of functional values. Mapping for this project involved the production of a mylar base map and two mylar overlays. One overlay includes soils information, and the other overlay includes land use/zoning, and wetland boundaries. The base map was produced by enlarging the watershed area using an existing USGS mylar quad, from 1:24,000 scale to 1:12,000 scale. Soils maps (USDS/SCS, 1965) National Wetlands Inventory Maps (USF&W Service, 1990), were also modified so that all maps/overlays are at the same scale.

The wetlands in the study area were mapped and classified based on the U.S. Fish & Wildlife system found in Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et. al, 1979), and maps developed by the Fish & Wildlife Service through the National Wetlands Inventory (NWI) Project. For the most part the NWI maps accurately portrayed the type of wetland (scrub-shrub, forested, etc.) found during field investigations. The only two discrepancies

noted were in: (1) Bagley Pond (MAP 3), which contained an area of scrub-shrub vegetation in the southeast corner designated on the NWI map as open water, and an area of emergent vegetation in the northwest corner, which is also designated as open water on the NWI map; and (2) FBT 1 (MAP 5), which contained an area of dense emergent vegetation designated as open water on the NWI map. These vegetated areas could have grown in after the aerial photographs (which the NWI maps are based on) were taken.

All wetlands greater than 1 acre in size within the Frazier Brook watershed were mapped and evaluated. In addition, all wetlands adjacent and/or connected to a waterbody or watercourse were mapped and evaluated, regardless of size. The total number of wetlands evaluated was sixteen. Each wetland was given a code based on its position in the watershed (Map 2).

Evaluations conducted for each wetland were based on field observations made between September 1 and October 30, 1991. Summary data sheets for each wetland are contained in Appendix 5.

It should be noted that the New Hampshire Method is a wetlands evaluation method and its main purpose is to assess the functional values of a group of wetlands in order to determine their relative importance. Wetlands evaluation should not be confused with wetlands delineation, which involves determining the extent of wetland boundaries in the field.

V. PROFILE OF WETLANDS IN THE FRAZIER BROOK WATERSHED

As previously mentioned, wetlands were coded based on their position in the watershed (MAP 2). Table 1 summarizes the physical and biological characteristics of the wetlands found in the study area. In addition, all wetlands are briefly described below.

TABLE 1. WETLANDS OF THE FRAZIER BROOK WATERSHED

Wetland Code	Wetland Classifications	Wetland Acreage	Watershed Acreage	Watershed Slope
FB1	PEM/SSIE, PFOIE, PUBH	31.0	790	12%
FB2	R3UBH	0.9	49	9%
BP	PUBH, PSS3B	24.5	310	11%
FB3	PFO4E, PEMIE	4.3	75	10%
FB4	R3UBH	0.9	26	10%
FB5	PSSIE	18.0	258	11%
FB6	R3UBH	1.4	59	10%
FB-SB	PSSIA, PEMIA, PEMIE, PSSIE	30.0	614	9%
FBT1	PEMIE, PUBH, PSSIF, PFO1/4	20.5	221	9%
FBT2	PSSIE	0.9	10	2.5%
FBT3	PUBHh, PFOIE	5.0	92	10%
FBT4	PSSIEb	2.8	103	11%
FBI1	PFOIE	2.15	34	10%
FBI2	PEMIE, PSSIE	6.45	62	8%
FBI3	PSSIE, PFOIE	5.8	24	6%
FBI4	PSSIE	2.15	28	6%

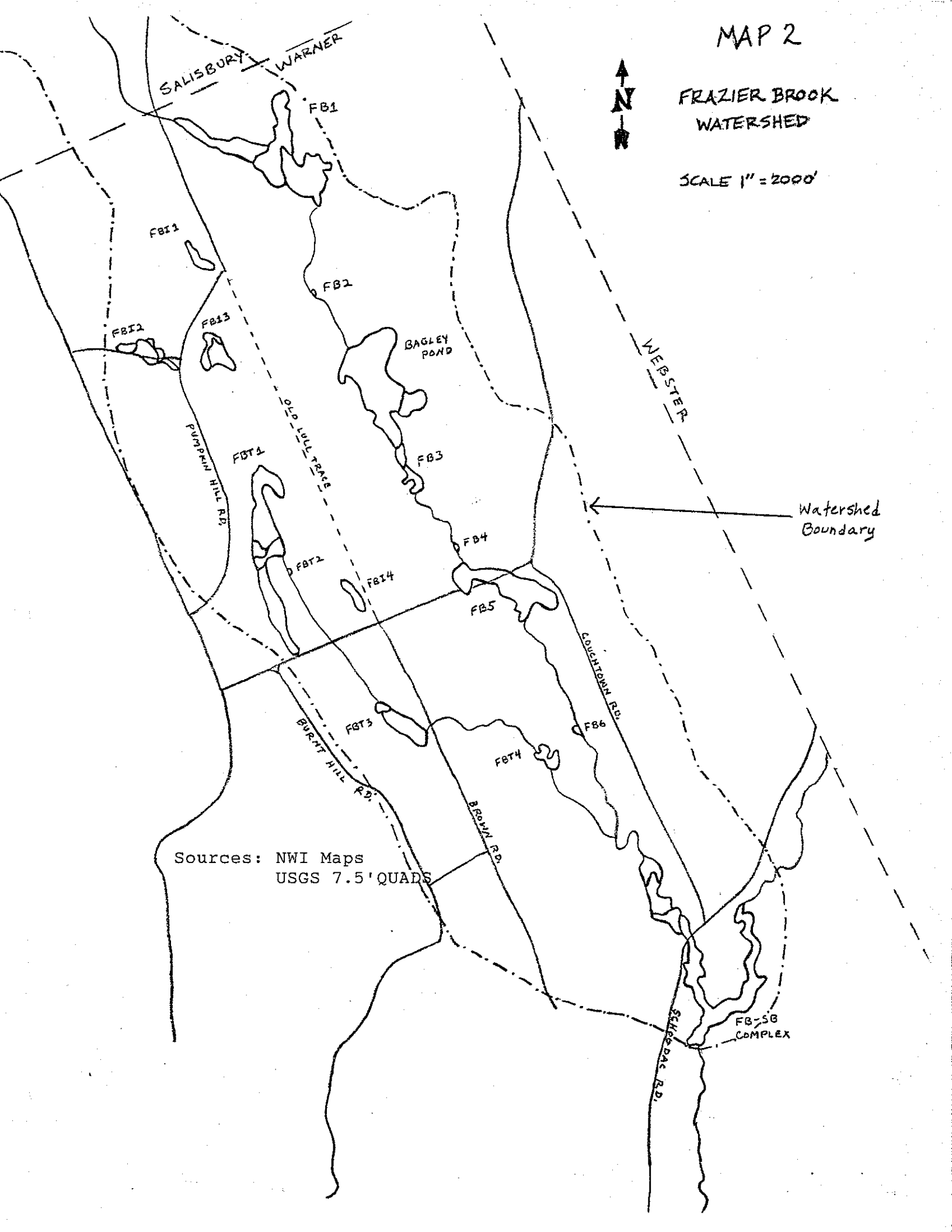
Note 1: Watershed acreage refers to the size of the land area that drains into that particular wetland. Watershed slope refers to the average slope of the watershed for the individual wetland.

Note 2: A detailed explanation of the Cowardin Wetland Classification System can be found in Appendix 1.

MAP 2

FRAZIER BROOK WATERSHED

SCALE 1" = 2000'



Sources: NWI Maps
USGS 7.5' QUADS

Watershed
Boundary

FB-SB
COMPLEX

Frazier Brook (FB) Wetlands (MAPS 3,4)

Frazier Brook originates on Sawyer Hill in the Town of Salisbury, and flows south into Warner. It is approximately 6 miles in length and empties into Schoodac Brook, which is a tributary of the Warner River. All wetlands in this category are hydrologically connected to Frazier Brook.

FB1 is a 31 acre wetland just over the Warner/Salisbury town line and is divided into three separate vegetated cover classes: Palustrine Emergent/Scrub-shrub; Palustrine Forested; and Palustrine Unconsolidated Bottom. Evidence of beaver activity is seen throughout this large wetland complex. Soils are either muck and peat, or open water.

Vegetation in this complex is diverse and ranges from forest species such as Red Maple (*Acer rubrum*), White Ash (*Fraxinus americana*), and Eastern Hemlock (*Tsuga canadensis*) to various emergent grasses, sedges, and rushes, to shrubs such as Buttonbush (*Cephalanthus occidentalis*) and Speckled Alder (*Alnus rugosa*), to floating aquatics such as *Potamogeton* spp., and Water Lilly (*Nymphaea odorata*).

FB2, FB4, and FB6 were very similar in appearance and size, and so are discussed together: These three wetlands are classified as Riverine Upper Perennial Unconsolidated Bottom, and are approximately 1 acre in size. They are located directly within the Frazier Brook stream channel, and are characterized by various mosses and lichens, and have very little floodplain development. Water velocity and stream channel gradient are both fairly high.

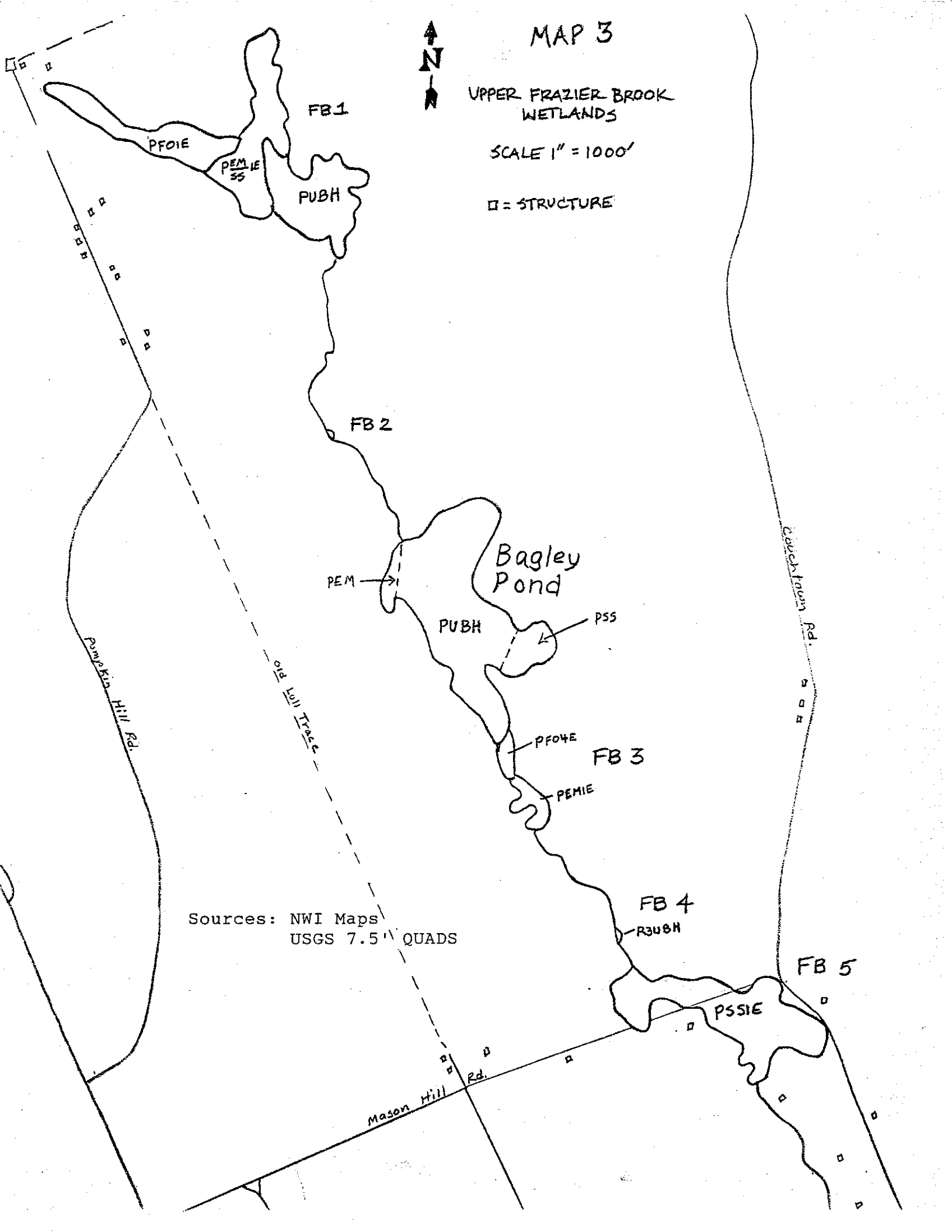
MAP 3



UPPER FRAZIER BROOK
WETLANDS

SCALE 1" = 1000'

□ = STRUCTURE



Sources: NWI Maps
USGS 7.5' QUADS

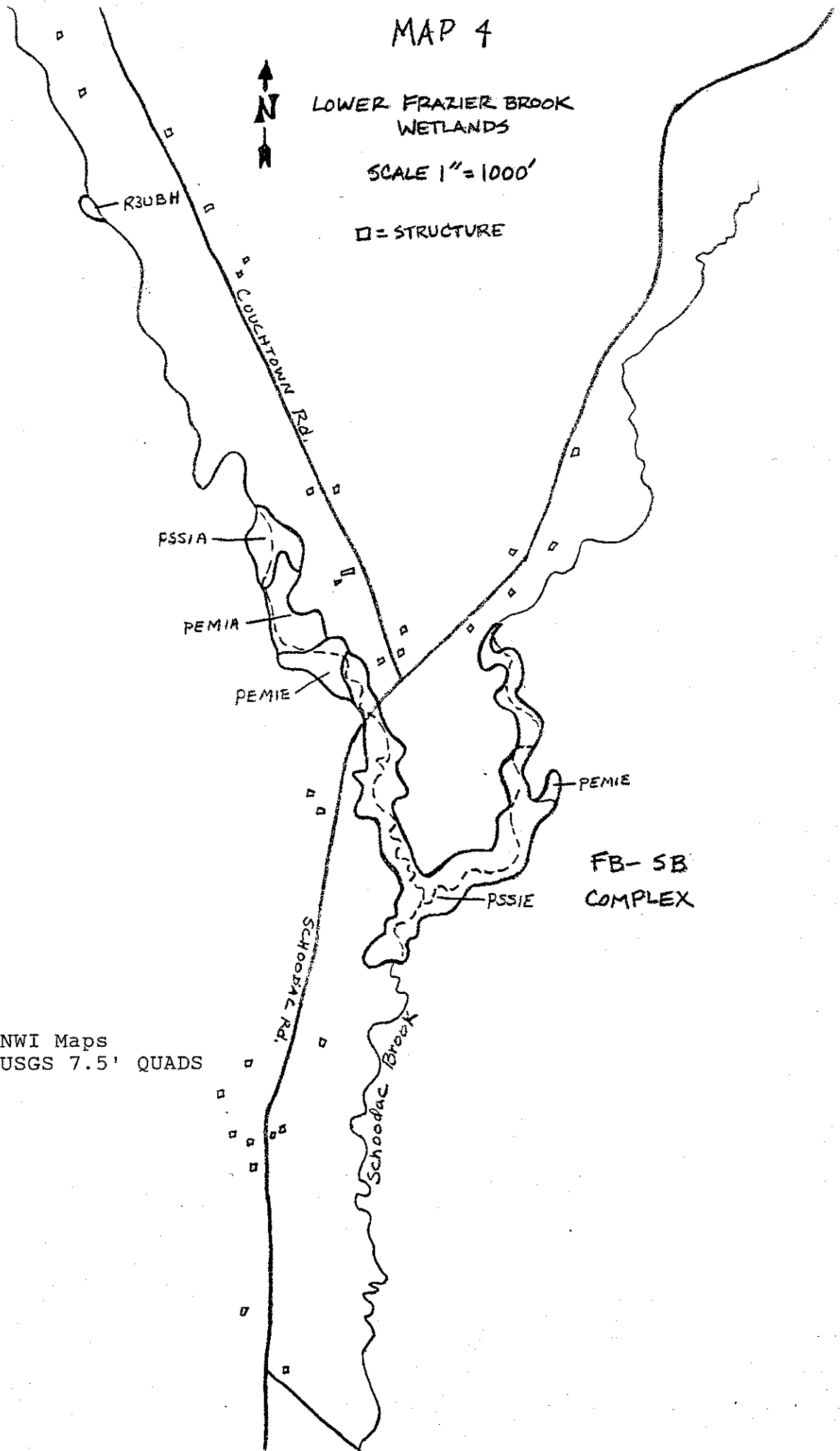
MAP 4



LOWER FRAZIER BROOK
WETLANDS

SCALE 1" = 1000'

□ = STRUCTURE



Sources: NWI Maps
USGS 7.5' QUADS

BP (Bagley Pond) is a large Palustrine Unconsolidated Bottom wetland. Including adjacent vegetated wetlands, BP is approximately 24.5 acres in size. Most of this area is covered by open water, however, there are two distinct vegetated areas; one area is in the northwest corner and is dominated by Three-way Sedge (*Dulichium arundinaceum*); the other area is found in the southeast corner of the pond and is dominated by scrub-shrub vegetation such as Leatherleaf (*Chamaedaphne calyculata*), stunted Red Maple (*Acer rubrum*), and Sheep Laurel (*Kalmia angustifolia*) (see Map 3). These vegetated areas have characteristic Marsh soils.

FB3 is a 5 acre wetland divided into two distinct cover classes, Palustrine Forested and Palustrine Emergent. This wetland is located directly downstream of the outlet of Bagley Pond, and is partially dependent upon the existence of a beaver dam. Vegetation in forested areas is dominated by Eastern Hemlock (*Tsuga canadensis*) and Red Maple (*Acer rubrum*). Emergent plant species include various hydrophytic sedges, grasses and rushes.

FB5 is an 18 acre wetland complex dominated by scrub-shrub vegetation such as Speckled Alder (*Alnus rugosa*) and Winterberry Holly (*Ilex verticillata*). Soils are a combination of Muck and Peat, and Ridgebury and Whitman very stony loams (greater than 50% of the wetland). This wetland has survived some significant man-made impacts including filling for road construction and culvert placement.

FB-SB Complex: This 30 acre wetland includes the lower stretch of Frazier Brook, its confluence with Schoodac Brook, and a portion of Schoodac Brook itself. Although part of this wetland falls within the Schoodac Brook watershed it is a continuous hydrologic unit and was evaluated as such.

This wetland complex is very diverse and is dominated by scrub-shrub vegetation in some areas, and emergent vegetation in others. Scrub-shrub species include dense thickets of Speckled Alder (*Alnus rugosa*), Winterberry Holly (*Ilex verticillata*) and Silky Dogwood (*Cornus ammomum*). Emergent areas were dominated by grasses such as Bluejoint (*Calamagrostis canadensis*), and Rattlesnake (*Glyceria canadensis*), as well as Bur-reed (*Sparganium* spp.) Soils of this wetland are classified as Scarboro (Sc) fine sandy loam.

Frazier Brook Tributary (FBT) Wetlands (MAP 5)

Frazier Brook tributary originates in a large wetland area between Pumpkin Hill Road and the Old Lull Trace and flows in a southeast direction for approximately 2 miles to where it joins Frazier Brook. All wetlands in this category are hydrologically connected to Frazier Brook tributary.

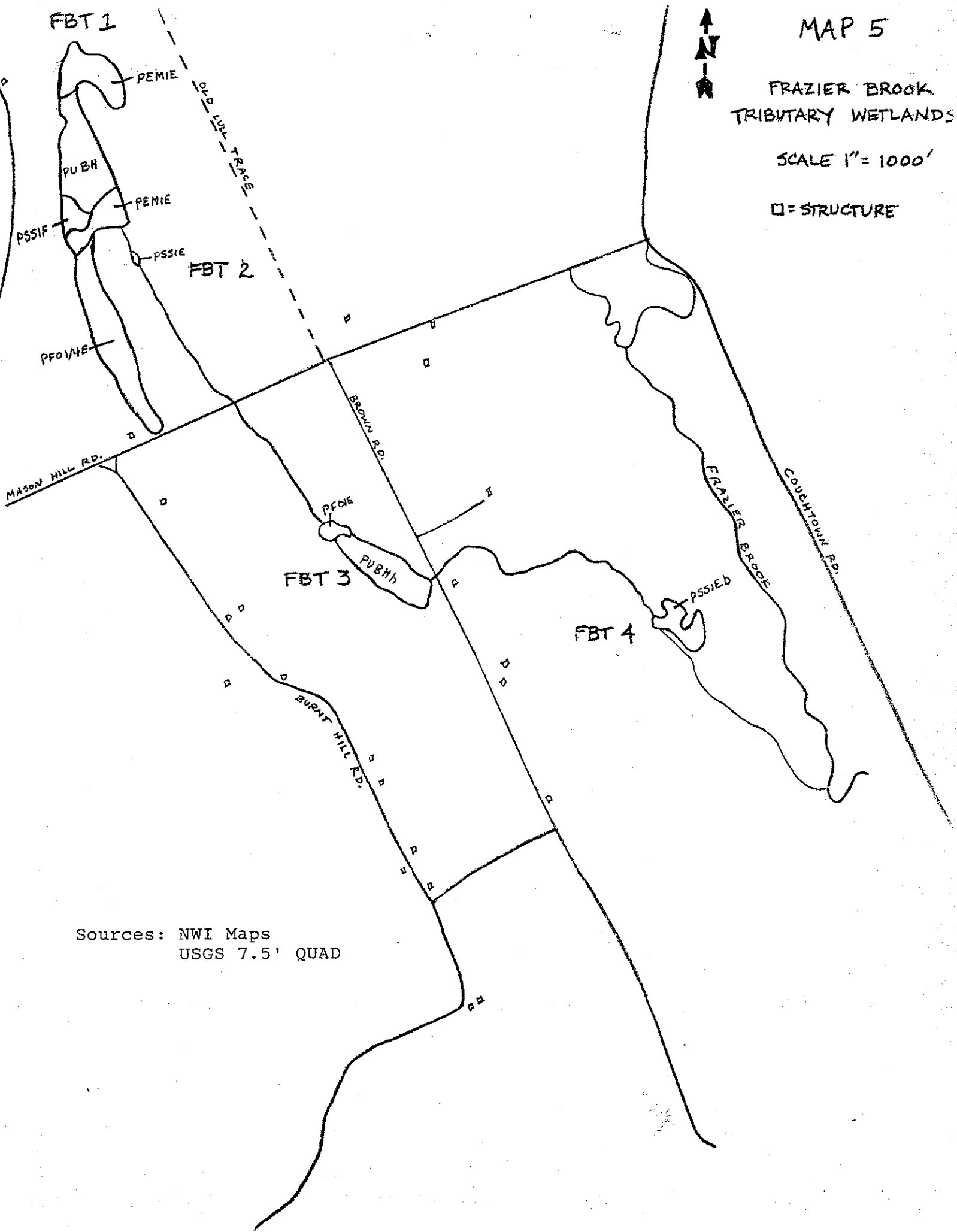
FBT1 is a 20.5 acre wetland which forms the headwaters of the Frazier Brook tributary. It is very diverse and is characterized by several different Palustrine vegetated cover classes: Forested, Emergent, Scrub-Shrub, and Open Water. Forested areas are dominated by Eastern Hemlock (*Tsuga canadensis*) and Red Maple (*Acer rubrum*); scrub-shrub areas are dominated by Winterberry Holly and (*Ilex verticillata*), Highbush Blueberry (*Vaccinium corymbosum*); emergent areas

MAP 5

FRAZIER BROOK
TRIBUTARY WETLANDS

SCALE 1" = 1000'

□ = STRUCTURE



Sources: NWI Maps
USGS 7.5' QUAD

are dominated by Cat-tail (*Typha latifolia*), and various species of sedges, rushes and grasses. Soils are classified as Muck and Peat (greater than 50% of the wetland) and Ridgebury and Whitman very stony loam (RdA).

FBT2 is less than 1 acre in size and is located just downstream of FBT1. It is classified as Palustrine scrub-shrub and is dominated by Speckled Alder (*Alnus rugosa*). Soils are classified as Ridgebury and Whitman very stony loam (RdA).

FBT3 is a 5.74 acre wetland classified mainly as Palustrine Unconsolidated Bottom, with a small area of Forested wetland on the northern end. The forested area of FBT3 is dominated by Red Maple (*Acer rubrum*). The rest of the wetland is dominated by open water, with some fringing areas of emergent and scrub-shrub vegetation.

FBT3 has been filled at the southern edge, and a 36" diameter culvert is located at the outlet of the wetland, and provides a conduit for the Frazier Brook tributary. Soils are classified as Ridgebury and Whitman very stony loam.

FBT4 is a 2.8 acre wetland which is the result of beaver activity. It is classified as Palustrine scrub-shrub, and is dominated by Speckled Alder (*Alnus rugosa*), Highbush Blueberry (*Vaccinium corymbosum*) and Winterberry Holly (*Ilex verticillata*).

Soils are characterized as Gloucester extremely stony sandy loam (GsD).

Frazier Brook Isolated (FBI) Wetlands (MAP 6).

The wetlands described in this category are found scattered throughout the watershed. These isolated wetlands are not connected to a waterbody or watercourse, but are found in low areas of the landscape, and receive runoff from the surrounding uplands.

FBI1 is a 2.15 acre wetland classified as Palustrine Forested, and is dominated by broad-leaved deciduous species such as White Ash (*Fraxinus americana*) and Red Maple (*Acer rubrum*). The understory of this wetland contains various species of shrubs such as Winterberry Holly (*Ilex verticillata*) and Highbush Blueberry (*Vaccinium corymbosum*). Other vegetation included various hydrophytic ferns, and Sphagnum moss (*Sphagnum spp.*). Soils are classified as Gloucester very stony sandy loam (GrB), but field observations indicated several inches of muck, and the area was saturated to the surface.

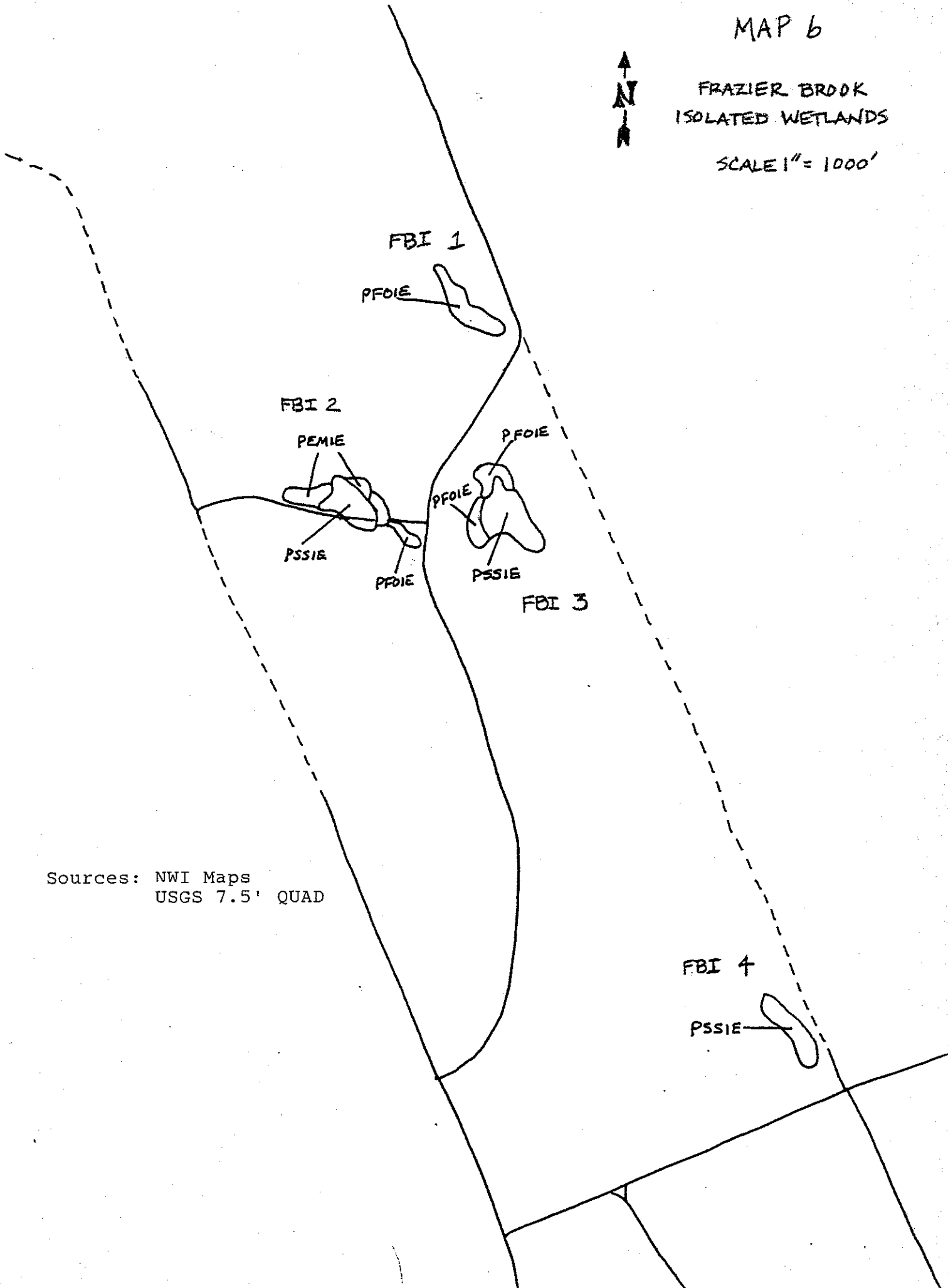
FBI2 is 6.45 acre wetland with three different areas of dominant vegetation: Forested, Emergent, and Scrub-shrub. The dominant forest species is Red Maple (*Acer rubrum*), the dominant shrub species is Speckled Alder (*Alnus rugosa*), and emergent species include sedges of the genus *Carex*. This wetland is bisected by Duck Pond Lane. Soils are classified as Gloucester very stony sandy loam (GsD), but the surface layer consists of several inches of muck.

FBI3 is a 5.8 acre Palustrine wetland with areas of Forested vegetation, and scrub-shrub vegetation. Forested areas are dominated by Red Maple (*Acer rubrum*) and Eastern Hemlock (*Tsuga canadensis*), and scrub-shrub areas are

MAP 6

FRAZIER BROOK
ISOLATED WETLANDS

SCALE 1" = 1000'



Sources: NWI Maps
USGS 7.5' QUAD

dominated by Highbush Blueberry (*Vaccinium corymbosum*) and Huckleberry (*Gaylussacia baccata*). There is also a layer of *Sphagnum* moss covering the floor of the wetland. Soils are classified as Muck and Peat (Mp).

FBI4 is a 2.15 acre wetland classified as Palustrine Scrub-shrub. Dominant shrub species include Winterberry Holly (*Ilex verticillata*), Silky Dogwood (*Cornus amomum*), and Highbush Blueberry (*Vaccinium corymbosum*). Also present were emergent species such as Cat-tail (*Typha latifolia*), Bur-reed (*Sparganium* spp.) and various grasses, sedges and rushes. Soils are classified as Ridgebury and Whitman very stony loam (RdA).

VI. RESULTS

The evaluation results are presented below in both written and graphic form.

Highest Ranking Wetlands

Three wetlands ranked #1 in one or more functional value: Bagley Pond, FB1, and FB-SB Complex. This is not surprising due to their size (over 20 acres) and proximity to a waterbody or watercourse. The New Hampshire Method uses the acreage of a wetland as a multiplier, therefore larger wetlands usually score higher. Several of the Functional Values are also based on a wetlands relationship to open water, and wetlands which are not associated with a waterbody will score lower.

FB1 ranked first in ecological integrity, wildlife habitat, flood control potential, nutrient attenuation (tied with FB-SB Complex), and noteworthiness.

FB-SB Complex ranked first in finfish habitat - stream, groundwater use potential, sediment trapping, nutrient attenuation (tied with FB1), shoreline anchoring, and historical site potential.

Bagley Pond ranked first in finfish habitat-pond, educational potential, visual/aesthetic quality, and water-based recreation.

The same three wetlands also ranked second in most of the functional values. The only other wetlands that ranked in the top two in any of the functional values were FBT4: 2nd in shoreline anchoring, and FBT1: 2nd in flood control potential, and nutrient attenuation.

Other High Ranking Wetlands

FB5 ranked high in several functional values: ecological integrity, wildlife habitat, flood control potential, sediment trapping, and nutrient attenuation.

FBT1 ranked high in ecological integrity, wildlife habitat, flood control potential, and sediment trapping.

Special Findings

Groundwater Potential - FB-SB complex is the only wetland which had a positive value in groundwater potential, which is due to its proximity to a potential aquifer. These results are based on groundwater mapping work done by the US Geological Survey in 1976, which is the most current information available. More detailed studies are currently being undertaken by the USGS, however the information has not yet been released.

Rare and Endangered Species - According to a review completed by the New Hampshire Natural Heritage Inventory, Department of Resources and Economic Development, there are no known or documented occurrences of rare and/or endangered species within the Frazier Brook watershed. It should be noted, however, that this information is not based on a recent field surveys, and is subject to change pending additional field work.

Urban Quality of Life - None of the wetlands in the study area met the minimum criteria to be assessed for this value, due to existing "open space" zoning, and rural land use. All wetlands scored 0 points for this functional value.

Finfish Habitat, Water-based Recreation - Those isolated wetlands within the watershed did not score in the Finfish Habitat or Water-based Recreation values because they are not connected to a waterbody or watercourse, and have little or no open surface water, which is a minimum requirement for these functional values.

Noteworthiness - Only three wetlands scored in this category: FB1, FB-SB Complex, and Bagley Pond. These wetlands ranked high in Noteworthiness due to their number 1 ranking in one or more of the other functional values. As was previously mentioned, these wetlands are also the largest in acreage, and are all associated with a waterbody or watercourse.

Graphic Presentation of Results

Tables 2-4: Wetland Value Units

Tables 2, 3, and 4 give an overview of all the wetlands and how they scored in the evaluation. Those scores which are underlined represent the highest score for a particular functional value. Scores which are double underlined represent the second highest score for a particular functional value. Wetlands which have the greatest number of underlines and/or double underlines are those which dominate the study area. These high ranking values indicate areas to be avoided in assessing development impacts, or areas which may require a site specific evaluation when proposed for development.

TABLE 2. WETLAND VALUE UNITS - FRAZIER BROOK WETLANDS

W E T L A N D

FUNCTIONAL VALUE	FB1	FB2	BP	FB3	FB4	FB5
Ecological Integrity	<u>29.8</u>	.90	24.5	4.4	.84	14.0
Wildlife Habitat	<u>28.9</u>	.61	18.1	3.2	.56	18.0
Finfish Habitat - stream	<u>.3</u>	.02	0.0	0.2	.02	0.2
Finfish Habitat - pond	<u>10.8</u>	0.0	<u>15.8</u>	0.0	0.0	0.0
Educational Potential	<u>7.3</u>	.46	<u>9.2</u>	2.8	.44	4.6
Visual/Aesthetic Quality	<u>9.5</u>	.59	<u>12.8</u>	2.9	.59	6.2
Water-based Recreation	<u>8.2</u>	.57	<u>17.0</u>	2.9	.45	.86
Flood Control	<u>31.0</u>	0.0	24.5	0.0	0.0	18.0
Groundwater Potential	0.0	0.0	0.0	0.0	0.0	0.0
Sediment Trapping	<u>23.6</u>	.16	15.4	1.4	.15	14.6
Nutrient Attenuation	<u>24.0</u>	.16	12.7	2.2	.13	11.9
Shoreline Anchoring	.05	.025	.05	.23	.03	.92
Urban Quality of Life	0.0	0.0	0.0	0.0	0.0	0.0
Historic Site Potential	<u>2.2</u>	.23	.75	.28	.25	1.7
Noteworthiness	<u>31.0</u>	0.0	24.5	0.0	0.0	0.0

00.0 = Highest Score

00.0 = 2nd Highest Score

TABLE 3. WETLAND VALUE UNITS - FRAZIER BROOK AND
FRAZIER BROOK TRIBUTARY WETLANDS

W E T L A N D

FUNCTIONAL VALUE	FB6	FB-SB	FBT1	FBT2	FBT3	FBT4
Ecological Integrity	1.4	<u>26.4</u>	20.5	.90	5.5	2.5
Wildlife Habitat	.95	<u>20.7</u>	17.2	.52	4.6	2.1
Finfish Habitat-stream	.04	<u>1.2</u>	0.0	.02	0.0	.08
Finfish Habitat-pond	0.0	0.0	5.0	0.0	2.2	0.0
Educational Potential	.60	2.7	5.1	.48	3.2	.23
Visual/Aesthetic Quality	.90	1.2	6.9	.50	3.9	.31
Water-based Recreation	.73	7.1	4.5	.50	3.2	.50
Flood Control Potential	0.0	20.5	20.5	0.0	5.7	2.8
Groundwater Use Potential	0.0	0.0	0.0	0.0	0.0	0.0
Sediment Trapping	.24	<u>24.0</u>	<u>16.6</u>	.23	4.6	2.3
Nutrient Attenuation	.24	<u>24.0</u>	<u>13.5</u>	.32	3.8	1.6
Urban Quality of Life	0.0	0.0	0.0	0.0	0.0	0.0
Shoreline Anchoring	.04	<u>2.7</u>	0.5	.04	.70	2.3
Historical Site Potential	.40	<u>2.8</u>	2.0	.25	.42	.14
Noteworthiness	0.0	<u>30.0</u>	0.0	0.0	0.0	0.0

00.0 = Highest Score

00.0 = 2nd Highest Score

TABLE 4. WETLAND VALUE UNITS
 FRAZIER BROOK ISOLATED WETLANDS

W E T L A N D

FUNCTIONAL VALUE	FBI1	FBI2	FBI3	FBI4
Ecological Integrity	1.6	4.8	5.0	1.7
Wildlife Habitat	1.2	3.9	3.0	1.2
Finfish Habitat-stream	0.0	0.0	0.0	0.0
Finfish Habitat-pond	0.0	0.0	0.0	0.0
Educational Potential	.23	1.0	.25	.50
Visual/Aesthetic Quality	.25	.53	.23	.59
Water-based Recreation	0.0	0.0	0.0	0.0
Flood Control Potential	2.2	6.5	5.8	1.9
Groundwater Use Potential	0.0	0.0	0.0	0.0
Sediment Trapping	.80	2.4	1.9	.65
Nutrient Attenuation	.97	2.9	2.3	.95
Urban Quality of Life	0.0	0.0	0.0	0.0
Shoreline Anchoring	0.0	0.0	0.0	0.0
Historical Site Potential	.03	.10	.03	.03
Noteworthiness	0.0	0.0	0.0	0.0

00.0 = Highest Score

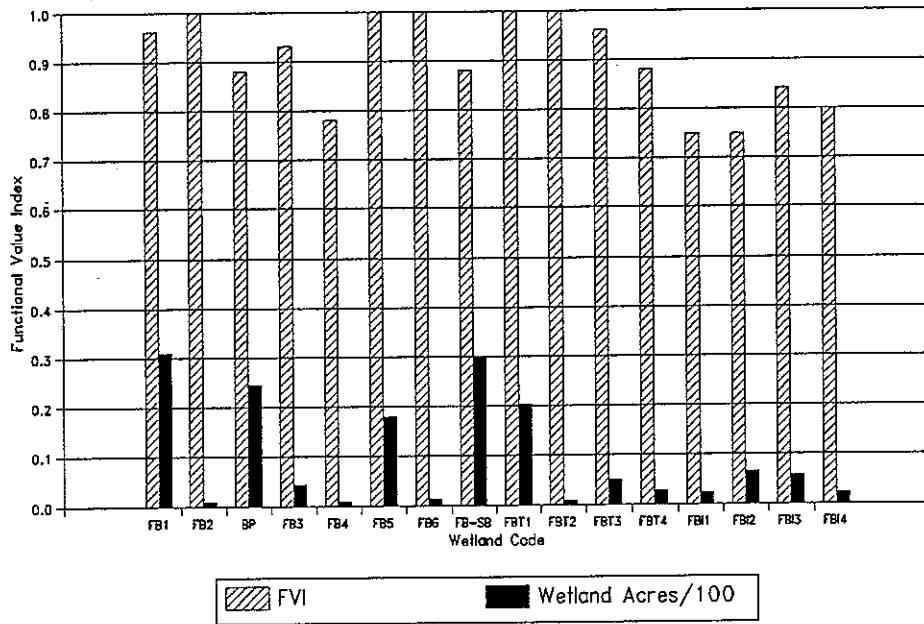
00.0 = 2nd Highest Score

NOTE: None of the wetlands in Table 4 scored either first or second in any of the functional values.

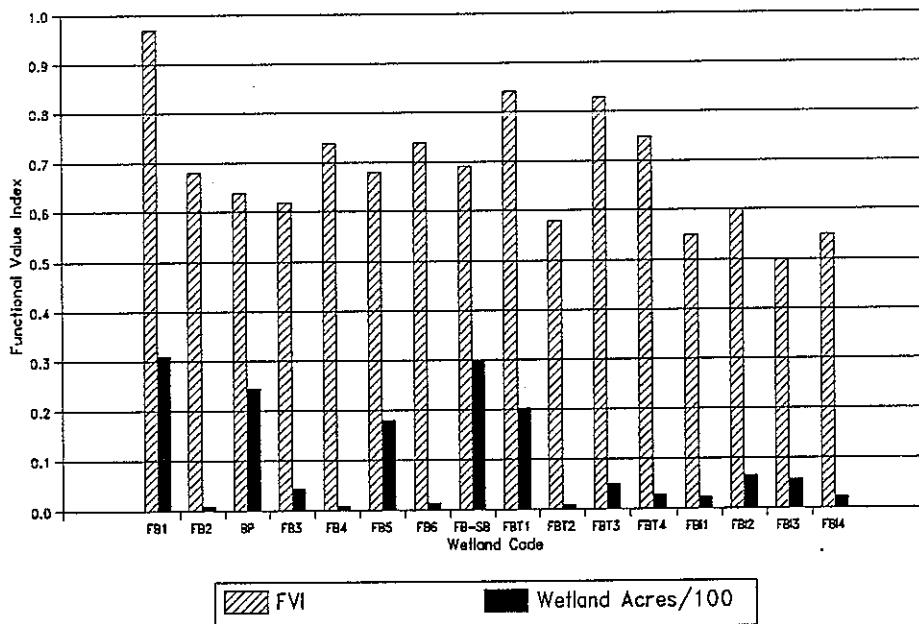
Bar Graphs for Functional Values

The bar graphs presented below are used to simplify the presentation of numerical results. The x-axis displays the wetland code name, and the y-axis represents the range of functional values. The bars represent only the Functional Value Index (FVI) (average score) from the summary sheet and not the Wetland Value Unit (average score x wetland acreage) for the wetland. Wetland size (divided by 100) is also included so that a comparison can be made between the area of a wetland and its FVI score.

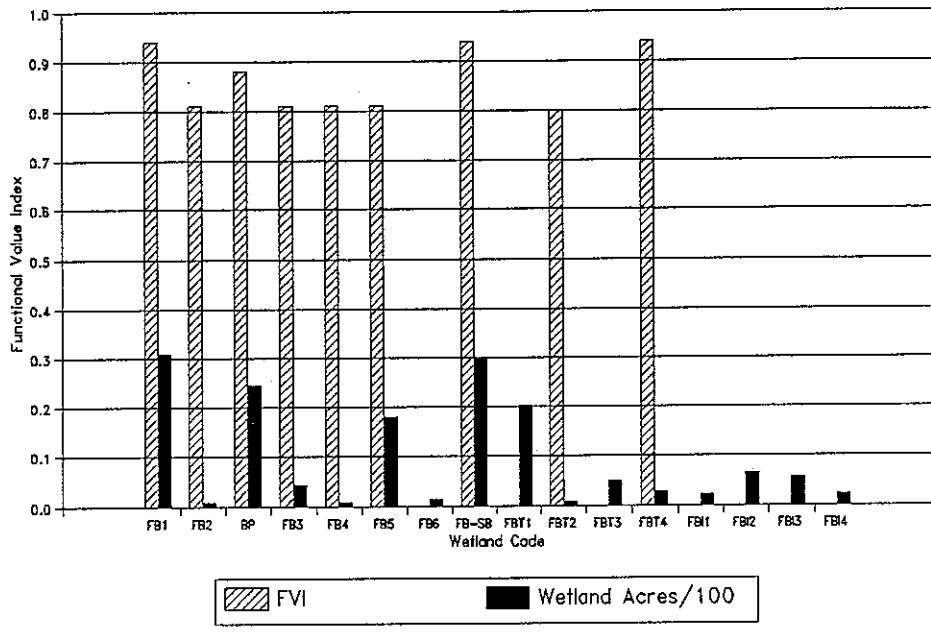
Ecological Integrity



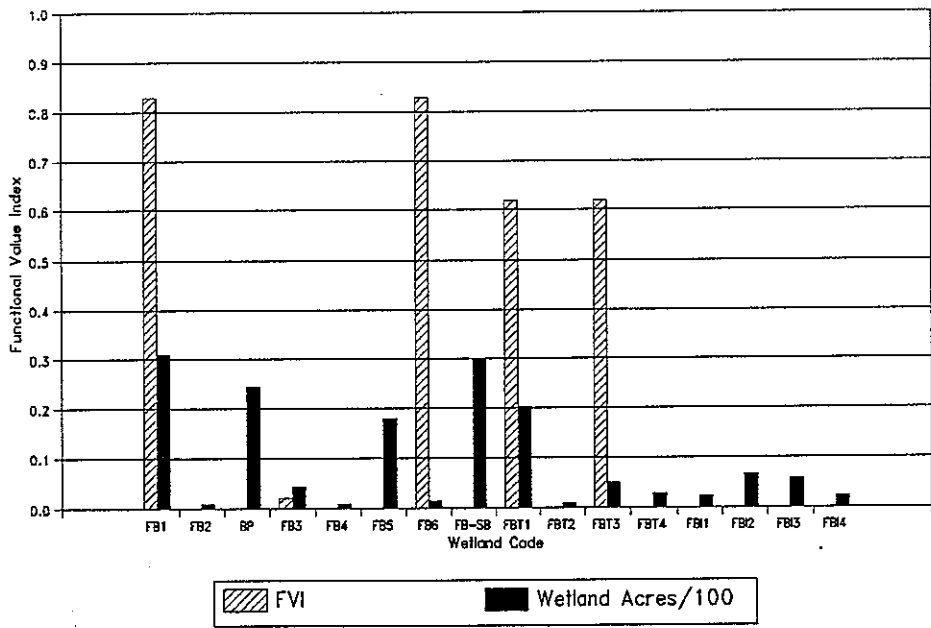
Wildlife Habitat



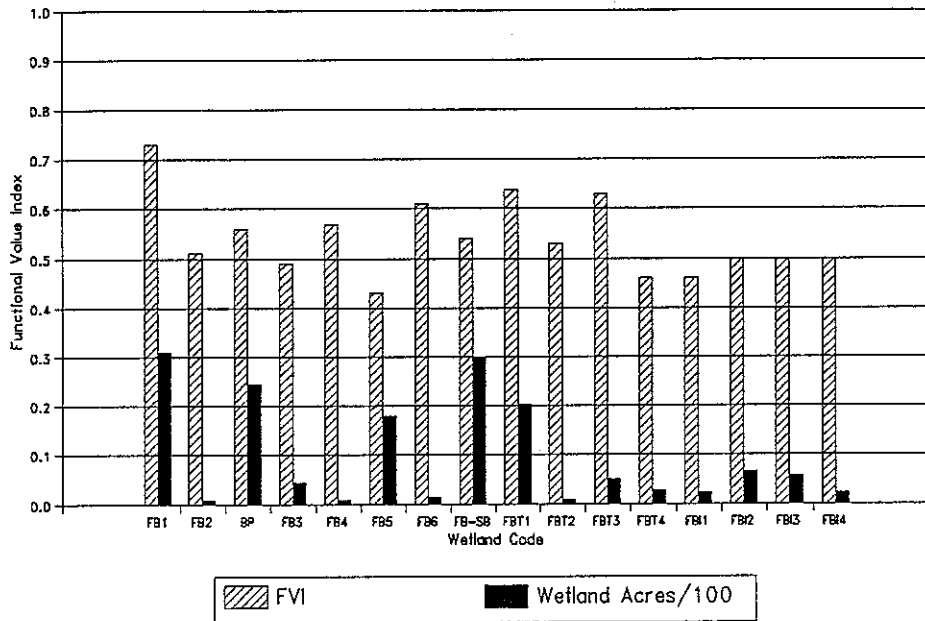
Finfish Habitat – Stream



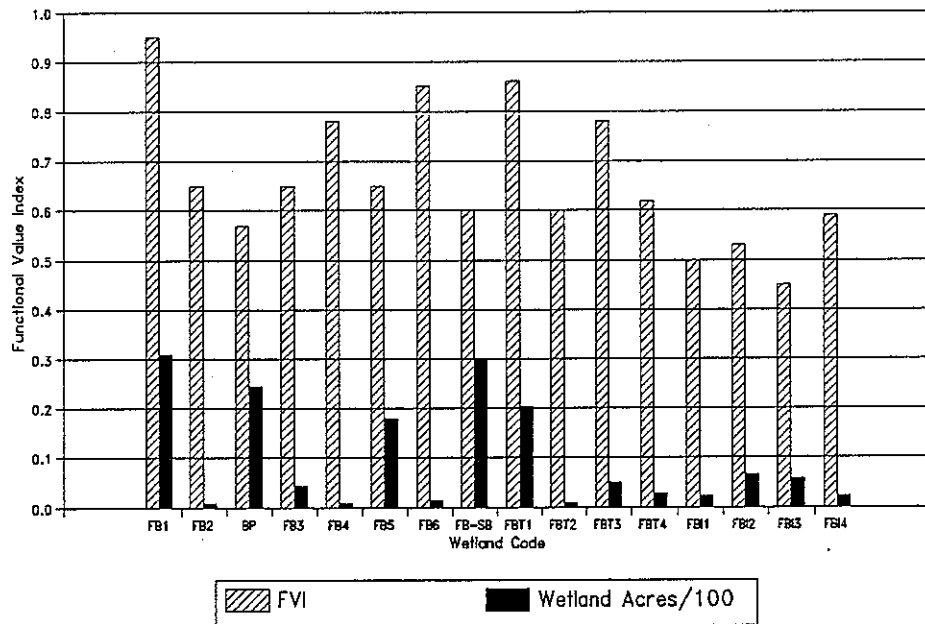
Finfish Habitat – Pond



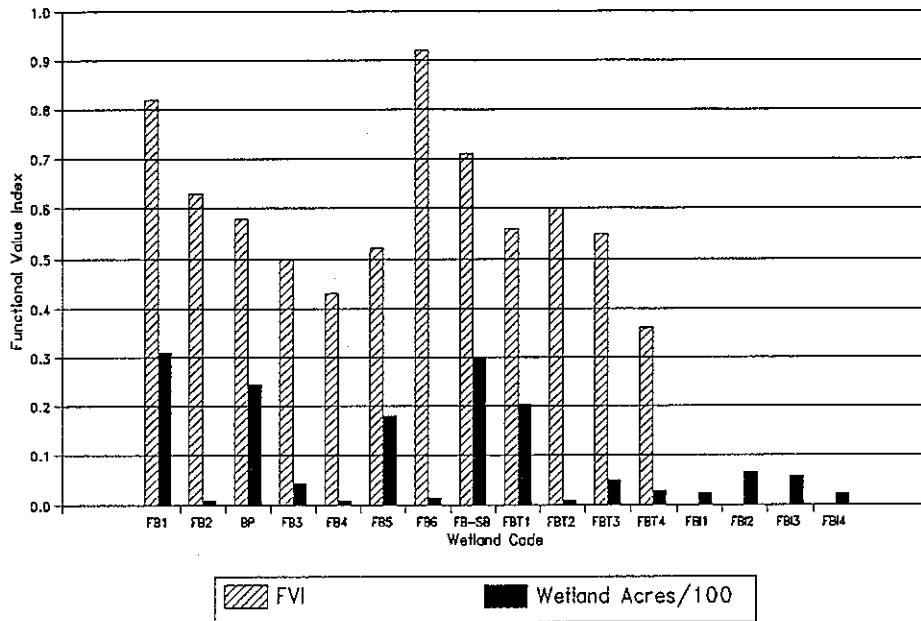
Educational Potential



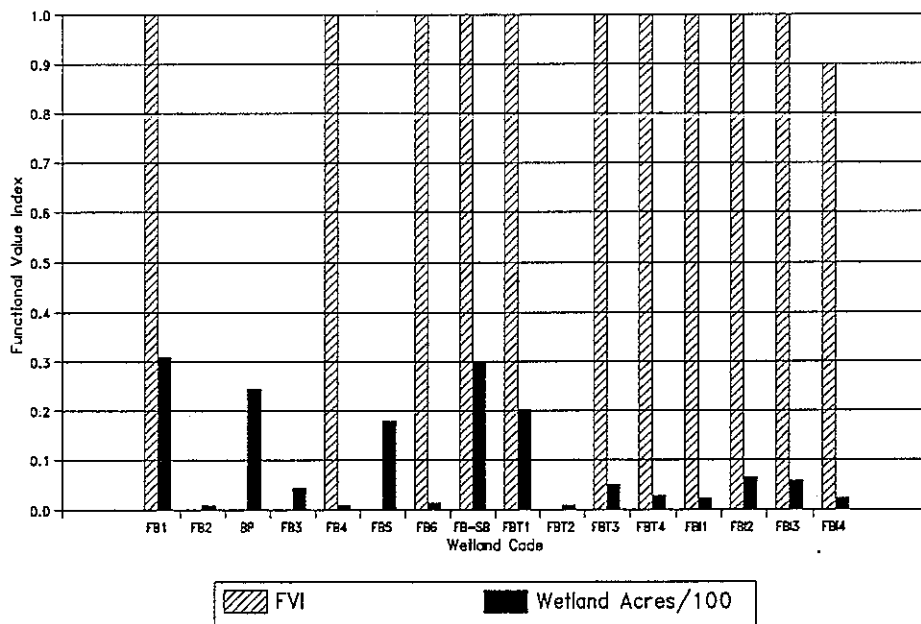
Visual/Aesthetic Quality



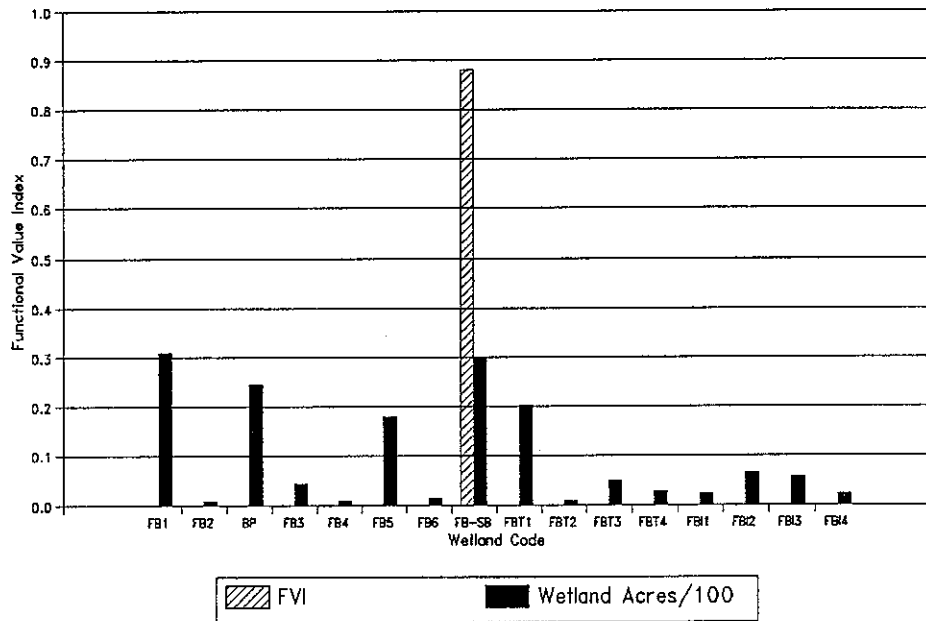
Water-Based Recreation



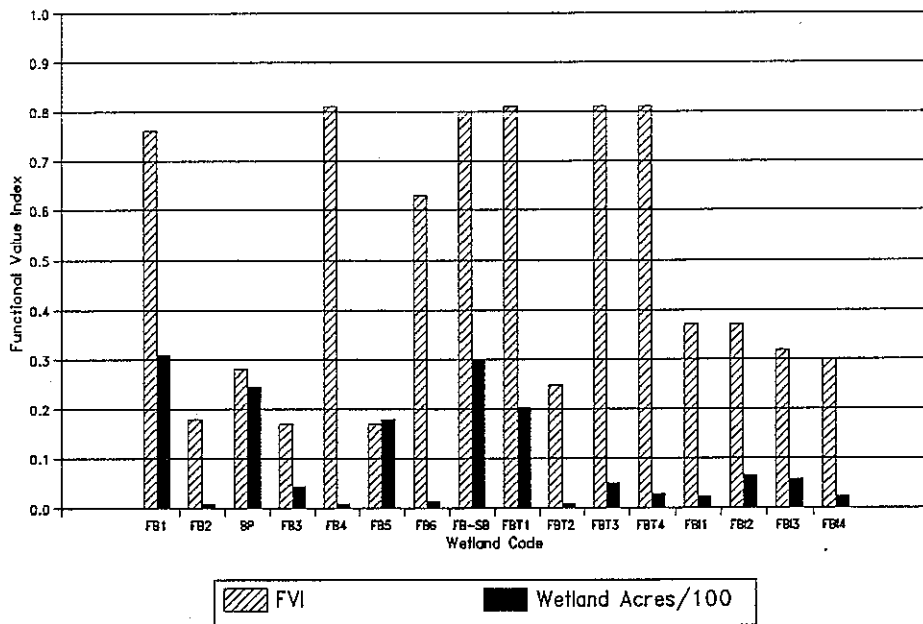
Flood Control Potential



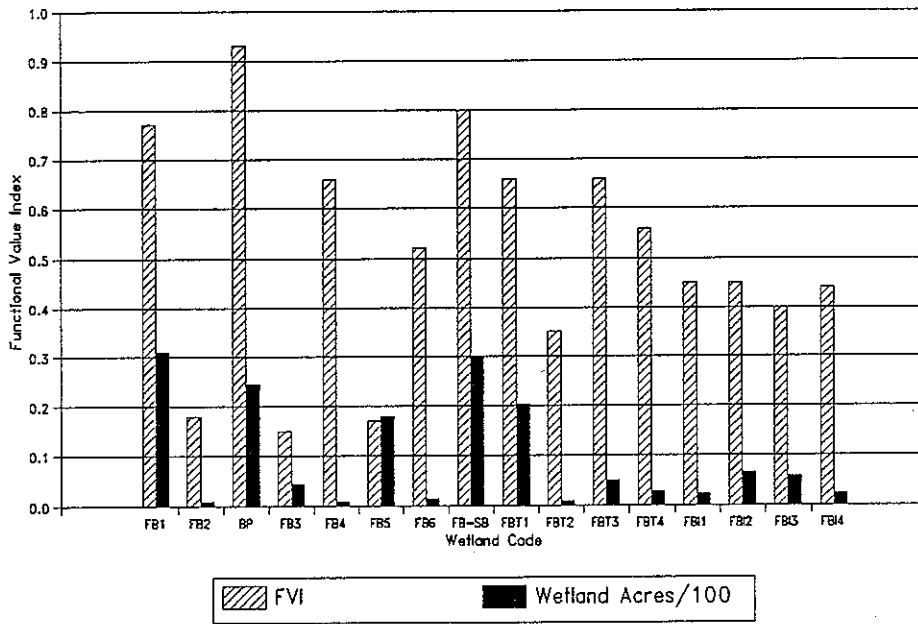
Groundwater Use Potential



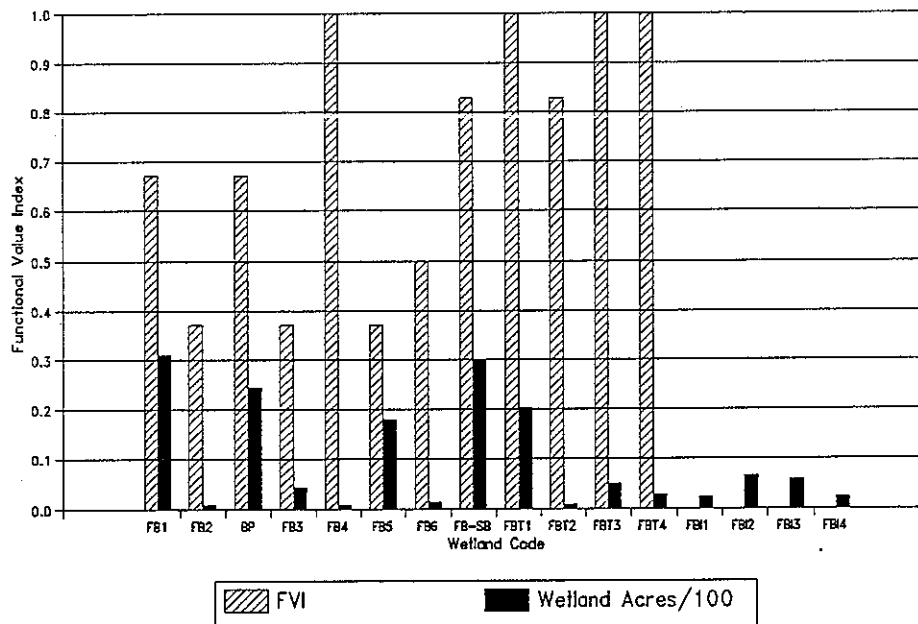
Sediment Trapping



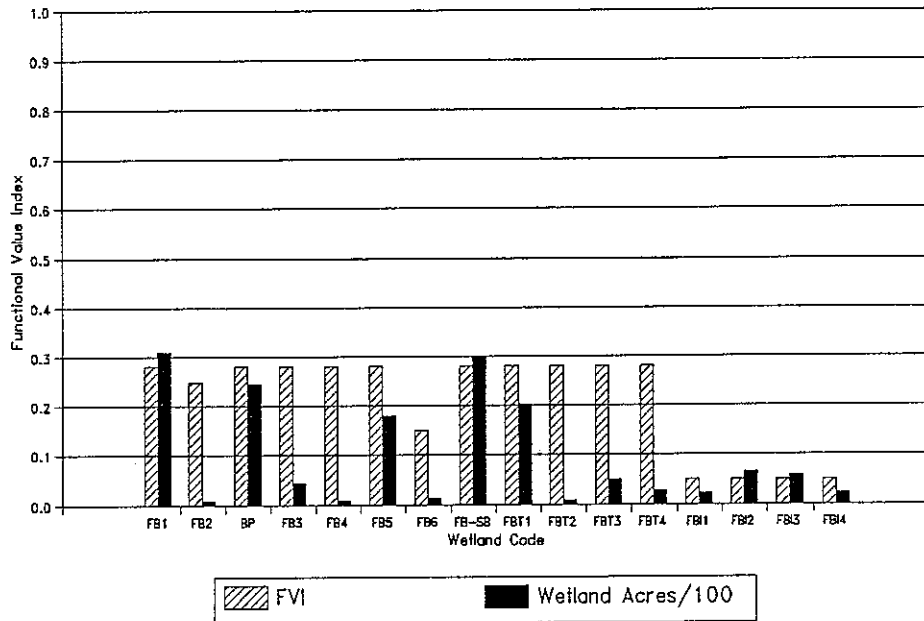
Nutrient Attenuation



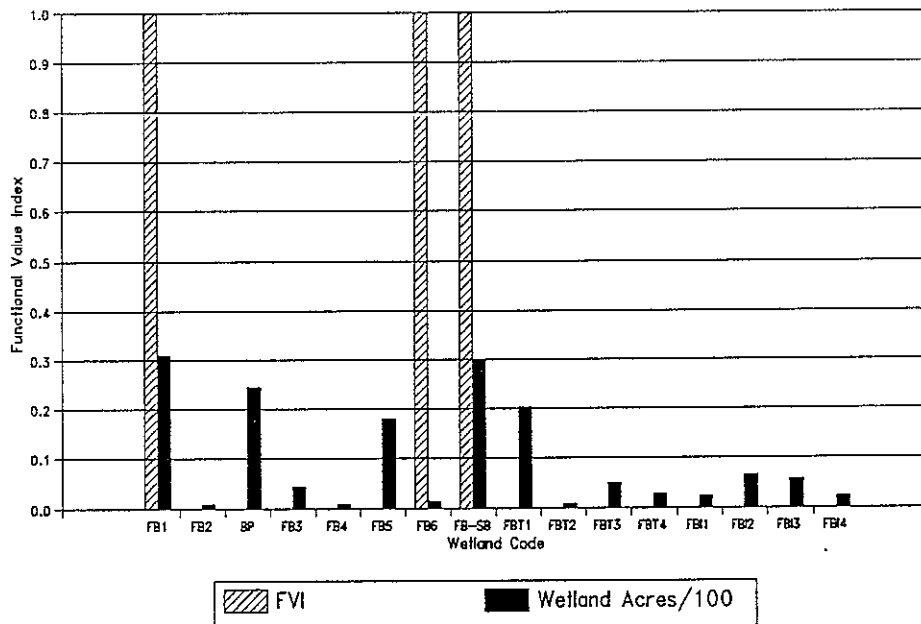
Shoreline Anchoring



Historical Site Potential



Noteworthiness



VII. CONCLUSION

Wetlands such as bogs, swamps and marshes, are valued habitats which provide many benefits to society and to the plants and animals which depend upon them. Functional values provided by wetlands include: flood water storage, nutrient absorption, groundwater protection, recreational potential, educational potential and aesthetic qualities. Each wetland provides different functions depending upon factors such as its location in the landscape, proximity to a waterbody or watercourse, and size.

Wetlands are defined and regulated by several agencies at all levels of government; local, state and federal. Although there may be some minor differences between agency definitions, most of them are based on three major environmental parameters: hydrology, vegetation, and soils.

Wetland inventories and assessments are essential tools for planners and resource managers to use in developing resource protection priorities. They are also valuable when used in educational efforts which raise awareness of the important benefits that wetlands provide to society. If used properly, techniques such as The Method for the Comparative Evaluation of NonTidal Wetlands in New Hampshire are valuable planning tools but they can have certain limitations. The NH Method is not a site specific evaluation method, and it measures only the potential values of wetland, not the actual values. It is not intended to be used in assessing the impacts of a specific activity on a particular wetland, and if so used could result in improper decisionmaking.

The NH Method uses the size of a wetland as a multiplier in computing scores for each functional value. This may result in low scores for small wetlands. Use of the Noteworthiness category somewhat compensates for this drawback in that it provides for wetlands which have special values that may be unrelated to size e.g. endangered/threatened species habitat or historical importance. Wetlands evaluation techniques such as the NH Method are still evolving, and should only be used in the proper context.

Another potential drawback of the New Hampshire Method is that certain valuable wetland types such as vernal pools and seep wetlands are not specifically addressed. These wetland types are often small in acreage and seasonal in nature, but they may be extremely important to the ecology of an area. For instance, vernal pools are important breeding areas for amphibians, and seeps often provide habitat for rare or unique flora. Perhaps as the scientific information base increases on these wetland types future efforts will be made to incorporate them into evaluation systems.

Of the sixteen wetlands that were evaluated, three consistently scored either first or second in one or more of the functional values: Bagley Pond (BP), FB-SB Complex, and FB1. FB5 also ranked high in several functional values, although it was not first or second. These wetlands probably scored high because they are large (20 acres +) and hydrologically connected to a waterbody or watercourse. Conversely, the small, isolated wetlands did not score high in any of the functional values. It is important to stress that although a small group of wetlands scored significantly higher in some or all of the functional values,

the fact that a wetland scored at all in the evaluation shows that the function does exist and is part of the natural resource assets of the community.

VIII. RECOMMENDATIONS

Recommendations for the use of information presented in this study are presented below.

1. *The Warner Conservation Commission should use the results of this study to pursue prime wetlands designation for wetlands in the Frazier Brook watershed which meet the criteria.*

Under state law (RSA 482-A, Fill and Dredge in Wetlands) there are provisions which allow a community to designate wetlands which have outstanding values as "prime". Prime wetlands are those that "deserve special consideration, review, and protection due to their uniqueness, fragility, and/or unspoiled character" (Wetlands Board, 1990). Prime wetlands designation means that projects in or adjacent to a designated wetland receive a higher level of review by the NH Wetlands Board. Wetlands must meet certain criteria in order to be approved for prime designation by the state Wetlands Board.

In order to be designated as prime a wetland is evaluated by the following characteristics: (1) must have very poorly drained soils (open water is included in this category); (2) high plant diversity or presence of rare/endangered flora; (3) frequented by a high number or great diversity of fauna or rare/endangered fauna; (4) high food chain productivity; (5)

hydrologic value(s) e.g. flood water storage; (6) historical site value; (7) unique or noteworthy characteristics; (8) high aesthetic value(s). In addition, size of the wetland is taken into account (See Appendix 6 for more detailed information on prime wetlands criteria).

Once a community decides which wetland(s) it wishes to nominate as prime, a report detailing how these wetlands meet the prime criteria must be submitted to the New Hampshire Wetlands Board, along with maps (at the same scale as town tax maps), which delineate the wetlands within the nearest 50 feet.

This study provides information on the functional values and physical and biological characteristics of the sixteen wetlands in the target watershed, thus it can be used to determine which wetlands will qualify as prime candidates. Suggested candidates for prime wetlands study should, at a minimum, include the following: FB1, FB5, FB-SB Complex, FBT1, and Bagley Pond.

2. *The Warner Conservation Commission should conduct an inventory of landowners whose property includes or abuts prime wetland candidates.*

The commission could use such an inventory to contact landowners in order to (1) educate them about the value of wetlands found on their properties, and (2) determine their interest in donating or selling land/easements to the town. Information on landowners can be obtained through the Town tax records and maps.

3. *The Warner Conservation Commission should present the results of this study to the Zoning Board of Adjustment, Planning Board, and Board of Selectmen.*

The purpose of this presentation would be to provide town officials with information which could be used for more informed decisionmaking in their respective areas. The author of this report, or a member of the Conservation Commission would be a good choice to undertake such a presentation.

4. *The Warner Conservation Commission should present a public program on the results of this study to members of the community.*

Such a presentation will serve as an educational tool by providing information on the functions and values of wetlands in the Frazier Brook watershed. It will also provide a means by which to solicit support for prime wetland candidates, which must be approved for submission by a vote at Town Meeting. The presentation should stress the benefits provided by wetlands which are associated with cost avoidance for the town as a whole as well as individual property owners. The author of this report, or a member of the Conservation Commission would be a good choice to undertake such a presentation.

5. *The Warner Conservation Commission should conduct evaluation projects using the NH Method for the other watersheds within the community.*

Conducting such inventories/evaluations provides information which can be used by the Conservation Commission and the Planning Board in reviewing development proposals and their potential impacts on wetland resources. This is a proactive, rather than reactive approach to land use planning, and can result in better management of wetlands. Such inventories and evaluations can be accomplished through the use of volunteers with some knowledge of natural resources/wetlands. The NH Method requires a minimal amount of training which is available through NH Audubon for a modest fee. If funding is available, the Town could also hire an environmental consulting firm to complete the assessment

6. *The Warner Conservation Commission should use the information contained in this report as the basis for pursuing the enactment of a local wetlands protection ordinance.*

Local ordinances can provide an added measure of protection for wetland resources, especially those which have unusual characteristics or high functional values on a town-wide basis. Several of the towns surrounding Warner have already enacted such protective measures. Model ordinances and technical assistance regarding the writing and procedure for enactment of local wetland ordinances are available through the New Hampshire Central Regional Planning Commission.