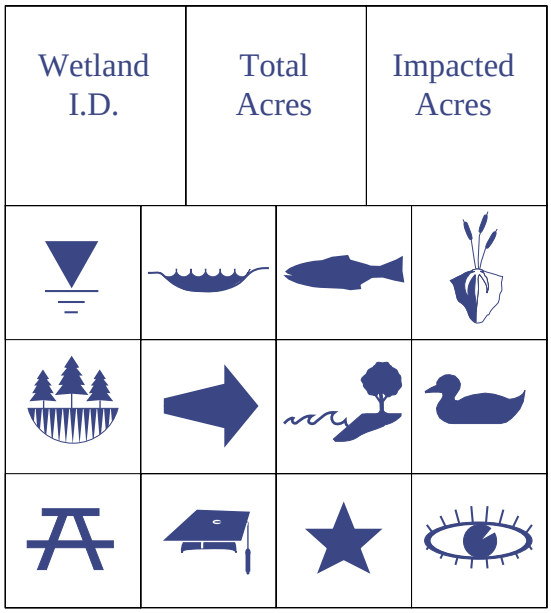
The Highway Methodology Workbook *Supplement*

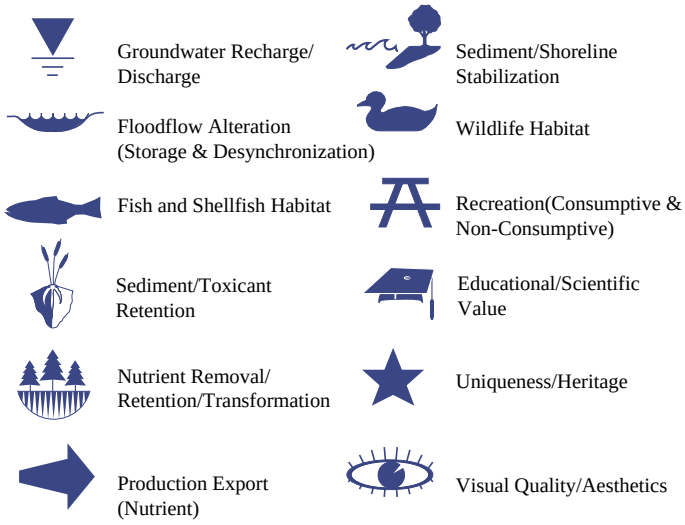
US Army Corps of Engineers®
New England District

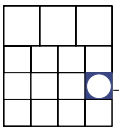
Wetland Functions and Values
A Descriptive Approach

Graphical Representation of Wetland Functions and Values



Symbols Key





Indicates Principal Function or Value

This graphical summary of wetland characteristics was developed as a tool to help construct an annotated map of functions and values for project analysis. Based on the findings reported on a data collection form, an icon box is prepared for each wetland investigated during Phase II of the Highway Methodology. The Endangered Species value may be added when present.

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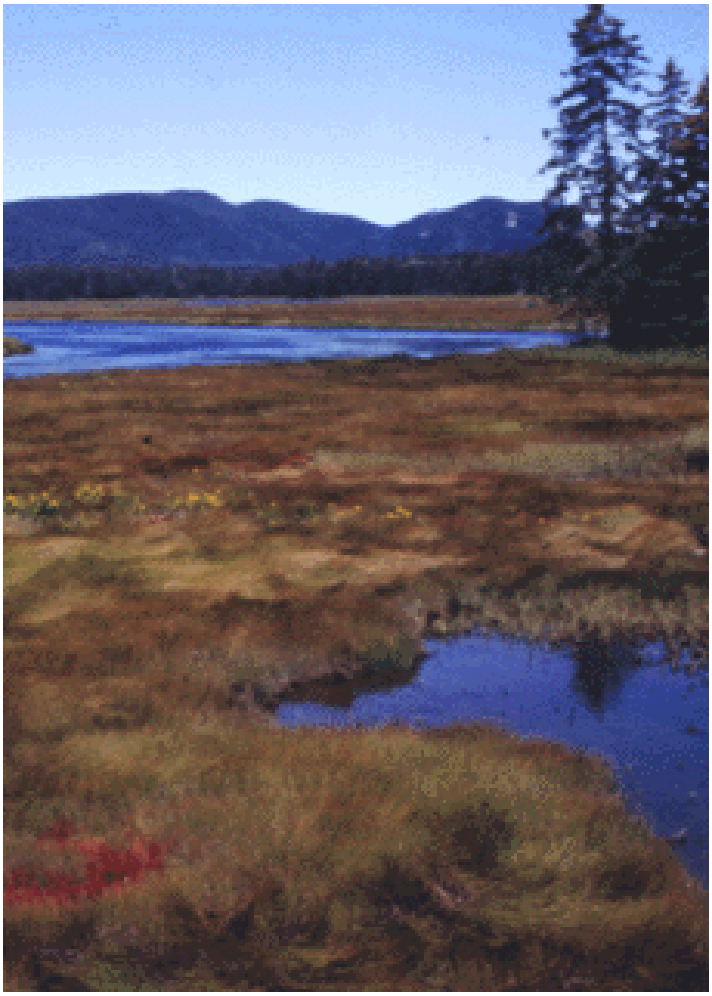
We wish to acknowledge both the Connecticut and New Hampshire Department of Transportation for the opportunities they provided to develop ideas and acquire experience reflected in this booklet.

Detailed questions regarding information contained in this booklet may be directed to Regulatory Branch, at the Corps, New England District at 1-800-362-4367 (within Massachusetts) or 1-800-343-4789 (outside Massachusetts).

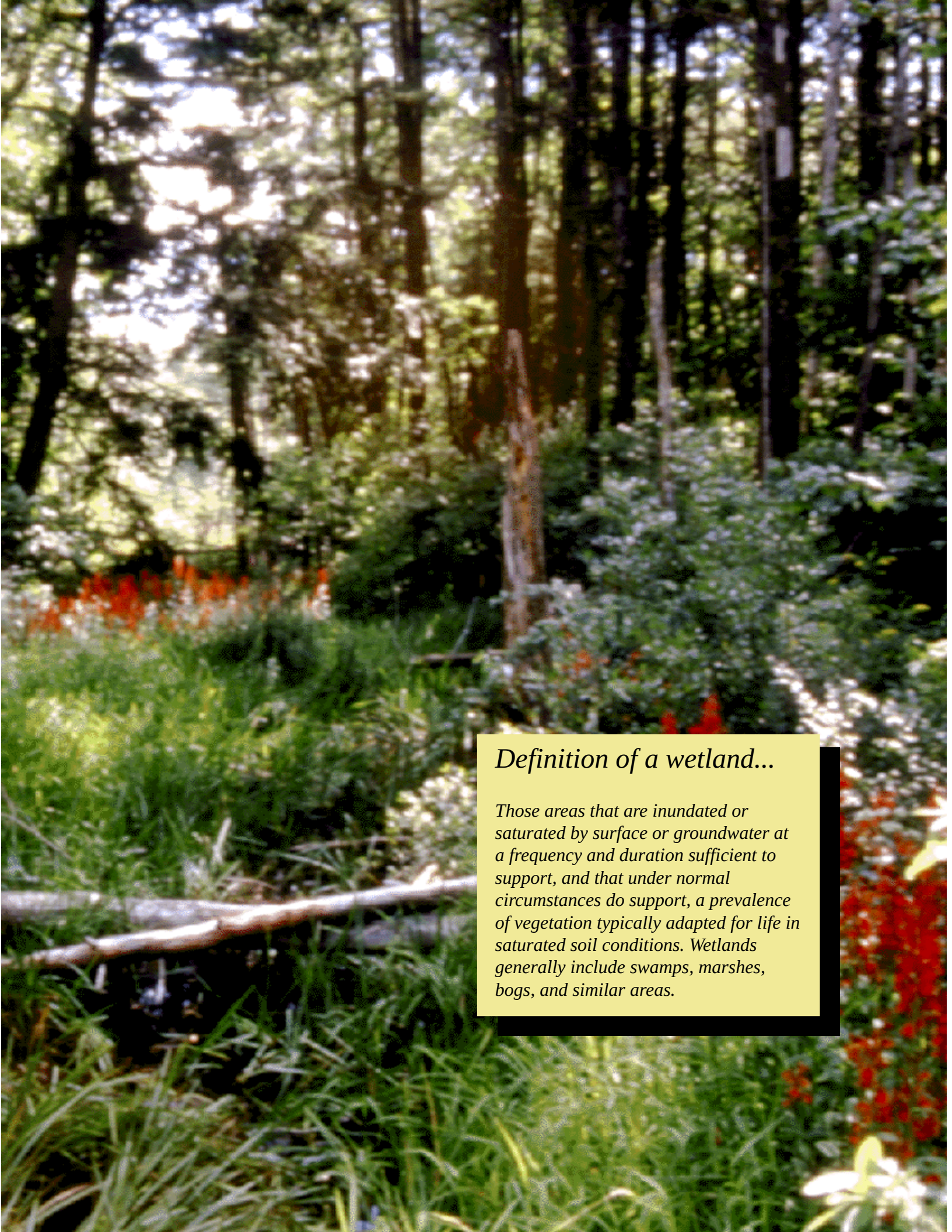
A New England forested wetland.

Preface

This booklet provides guidance to permit applicants, consultants, and U.S. Army Corps of Engineers project managers on how to identify and display wetland functions and values acceptable for the Corps New England District Regulatory Program. It is a supplement to the Highway Methodology Workbook published by the Regulatory Branch in 1993, which defines procedures to integrate Section 404 permit requirements with highway planning and engineering and the National Environmental Policy Act (NEPA). The evaluation of wetland functions and values is an integral part of the overall phased approach of the Highway Methodology. Use of this booklet for highway projects, and other projects with an integrated planning process, should be preceded by review of the Highway Methodology Workbook. The wetland functions and values "Descriptive Approach" presented in this booklet, however, can be used for any project where the characterization of wetland resources is necessary for Section 404 permit requirements. It is important to note that, although wetland evaluations form the base from which impact assessments are made, they are two distinct processes. Impact assessment is only briefly addressed in this booklet.



Wetlands add diversity and beauty to the landscape.



Definition of a wetland...

Those areas that are inundated or 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. Wetlands generally include swamps, marshes, bogs, and similar areas.

Introduction

For some years now, the Regulatory Branch has recognized the limitations of wetland assessment methodologies that generate numerical weightings, rankings, and/or averaging of dissimilar wetland functions, which unnecessarily bias a project reviewer. For many of these regional or national methods, the base data is not reported and it is difficult for the reviewer to reconstruct the indicators that were considered to predict the functions and values of a wetland. As a result, we advocate an approach that includes a qualitative description of the physical characteristics of the wetlands, identifies the functions and values exhibited, and most importantly, the bases for the conclusions using "best professional judgement." All readily available data are used by an interdisciplinary team for evaluation and subsequent consensus recommendations to the Corps decisionmaker.

There was an initial concern by applicants and consultants that a descriptive approach to evaluate wetlands would be unorganized, unpredictable, not legally defensible, and difficult to document. In response, we developed a format to collect and display this information which is described in this booklet.

Evaluating a wetland

In addition, and in the context of the Highway Methodology, this booklet takes the approach one step further and describes ways to graphically represent the functions and values of wetlands separately, as well as in relationship to other constraints or resources.

Visualizing geographical relationships between dissimilar resources is key to making permit decisions that are sensitive to all natural and human resources including, but not limited to, the protection of wetlands. As a consequence, study areas are depicted using multiple constraint graphics. These tools build on the McHarg (1969) overlay techniques of the 1960s. They are facilitated by the use of Computer Aided Drafting and Design (CADD) and Geographic Information Systems (GIS). Neither of these computer methods is necessary, however, they can save time and add flexibility to the planning process.

What are wetland functions and values?

Wetland functions and values form a very important part of Section 404 permit decisions by the Corps. **Functions** are self-sustaining properties of a wetland ecosystem that exist in the absence of society. Functions result from both living and non-living components of a specific wetland. These include all processes necessary for the self-maintenance of the wetland ecosystem such as primary production and nutrient cycling. Therefore, functions relate to the ecological significance of wetland properties without regard to subjective human values.

For example, a wetland that has slowly moving water performs the function of retaining sediments and toxicants. That is, the physical characteristic of a wetland that causes surface water to move slowly serves to let suspended particulates settle out of that water. This function traps sediments carried to it in runoff from uplands or upstream areas and clarifies the water. Identification of that function helps the Corps evaluate (1) whether the impacts of a project may impair that function and (2) whether such impacts are permissible.

Great Blue Heron

Values are benefits that derive from either one or more functions and the physical characteristics associated with a wetland. Most wetlands have corresponding societal value. This is recognized in various federal, state, and local wetland legislation that was enacted to protect these resources. The value of a particular wetland function, or combination thereof, is based on human judgment of the worth, merit, quality, or importance attributed to those functions. For example, a particular wetland might be considered valuable because it is known to store flood waters upgradient or adjacent to a developed area. That function is valuable to society because it attenuates flood waters which lessens the destructive severity of flood events. Another wetland might be valued because its combination of diverse wildlife habitat and picturesque setting offers various recreational and educational opportunities. The judgment of value is based on the opinion of recognized experts whose views are ultimately weighed and considered by the Corps in its permit process.

The proximity of development may alter wetland functions and values. Therefore, evaluation of the resource must consider not only the wetland, but also adjacent land use and associated interrelationships.

The "Descriptive Approach" to wetland functions and values presented in this booklet is twofold and incorporates both wetland science and human judgment of values. Intermixing science with value judgments in this way, while difficult, has proven to be both effective and acceptable. The evaluator first determines if a wetland is suitable for particular functions and values and why, followed by a determination of what functions and values are principal and why. (The purpose of designating a principal function and value category is discussed later in this booklet.) Functions and values can be principal if they are an important physical component of a wetland ecosystem (function only) and/or are considered of special value to society, from a local, regional, and/or national perspective.

What wetland functions and values are considered by the Corps in its Section 404 permit process?

The 13 functions and values that are considered by the Regulatory Branch for any Section 404 wetland permit are listed below. The list includes eight functions and five values. Values are grouped together at the end of the list.

These are not necessarily the only wetland functions and values possible, nor are they so precisely defined as to be unalterable. However, they do represent the best working "palette" of descriptors which can be used to paint an objective representation of the wetland resources associated with a proposed project.

GROUNDWATER RECHARGE/DISCHARGE — This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. Recharge should relate to the potential for the wetland to contribute water to an aquifer. Discharge should relate to the potential for the wetland to serve as an area where groundwater can be discharged to the surface.

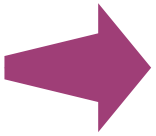
FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by attenuation of floodwaters for prolonged periods following precipitation events.

FISH AND SHELLFISH HABITAT — This function considers the effectiveness of seasonal or permanent waterbodies associated with the wetland in question for fish and shellfish habitat.

SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens.

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function relates to the effectiveness of the wetland to prevent adverse effects of excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

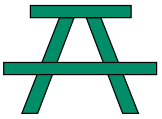
PRODUCTION EXPORT (Nutrient) — This function relates to the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



SEDIMENT/SHORELINE STABILIZATION — This function relates to the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.

WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.

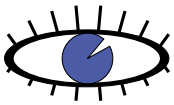
RECREATION (Consumptive and Non-Consumptive) — This value considers the effectiveness of the wetland and associated water-courses to provide recreational opportunities such as canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive activities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland, whereas non-consumptive activities do not.



EDUCATIONAL/SCIENTIFIC VALUE — This value considers the effectiveness of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.

UNIQUENESS/HERITAGE — This value relates to the effectiveness of the wetland or its associated waterbodies to produce certain special values. Special values may include such things as archaeological sites, unusual aesthetic quality, historical events, or unique plants, animals, or geologic features.

VISUAL QUALITY/AESTHETICS — This value relates to the visual and aesthetic qualities of the wetland.



THREATENED or ENDANGERED SPECIES HABITAT — This value relates to the effectiveness of the wetland or associated waterbodies to support threatened or endangered species.

ES

How are wetland functions and values applied to the Regulatory Program?

Wetland functions and values are used by the Corps in a variety of ways including to:

- describe site characteristics
- compare project alternatives
- avoid and minimize project impacts
- determine significance of impacts
- weigh environmental impacts against project benefits
- design and monitor compensatory mitigation

These required uses come from various statutes, regulations, and policies including:

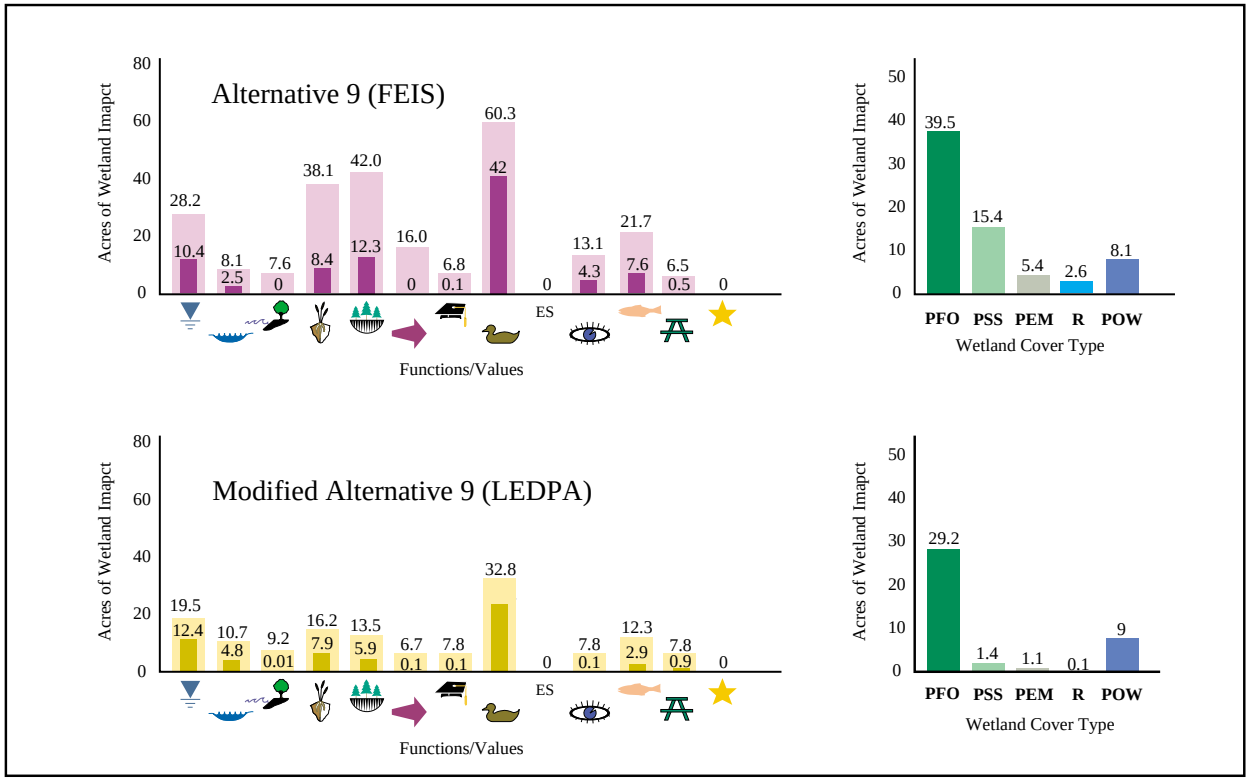
- Corps permit regulations, Title 33 Code of Federal Regulations (CFR) Parts 320 through 330
  - public notice and other permit decision documents including special conditions for compensatory mitigation.

- National Environmental Policy Act, 40 CFR, Parts 1500 - 1508 and Corps Appendix B implementing regulations.
  - environmental assessment or environmental impact statement.

- Clean Water Act Section 404(b)(1) Guidelines, 40 CFR, Part 230.
  - compliance determination including selection of the **least environmentally damaging practicable alternative (LEDPA),** significance of impacts and appropriate mitigation.

- Environmental Protection Agency / Department of the Army Memorandum of Agreement on Mitigation.
  - sequencing process to avoid, minimize, and only as a last resort, compensate for aquatic resource values impacted.
  - strive for no overall net loss of wetland functions and values.

Direct Impact Quantification for Wetland Functions/Values and Cover Types



Symbols Key

- Groundwater Recharge/ Discharge
- Sediment/Shoreline Stabilization
- Floodflow Alteration (Storage & Desynchronization)
- Wildlife Habitat
- Fish and Shellfish Habitat
- Recreation(Consumptive & Non-Consumptive)
- Sediment/Toxicant Retention
- Educational/Scientific Value
- Nutrient Removal/ Retention/Transformation
- Uniqueness/Heritage
- Production Export (Nutrient)
- Visual Quality/Aesthetics
- ES Endangered Species

Legend

- Function/Value
- Principal Function & Value Portion

- PFO-Palustrine Forested
- PSS-Palustrine Scrub-Shrub
- PEM-Palustrine Emergent
- R-Riverine
- POW-Palustrine Open Water

The above graphics display wetland cover types, functions/values, and principal functions and values portions quantified for acreage of direct impacts under the footprint of the fill. Other information, including impacts beyond the footprint, may be quantified as data exists, but dissimilar factors should not be combined or weighted. Also illustrated is a comparison of Alternative 9 with a modified alignment.

What wetland evaluation method does the Corps accept?

The Regulatory Branch advocates a qualitative, descriptive approach to wetland assessment based on consensus of an interdisciplinary team of professionals.

The team is normally comprised of the applicant's consultant, Corps staff, and state and Federal agency staff. The consultant should first seek guidance from the Corps, then evaluate the wetlands. The team could either be party to this effort directly or could review the consultant's work product and offer comments. Typically the end result is a consensus of the professionals involved; however, the Corps will make the final determination. This approach has proven to be practical, cost effective, and acceptable for the purpose intended.

The evaluation should be a qualitative description of the physical characteristics of the wetlands, including a determination of the principal functions and values exhibited, and the bases for the conclusions. Generally, readily available information from site visits and existing literature is used. On some occasions the Corps may require more extensive studies.

Consensus among professionals may be reached in the field during wetland investigations

The Wetland Evaluation Technique (WET II) is not an acceptable method. It is not regionally sensitive and does not consider wildlife habitat corresponding to the concerns of the Corps, particularly as expressed by the US Fish and Wildlife Service. WET II analyses typically include high, moderate, and low rankings, which can imply a more quantifiable data base than actually exists, thereby biasing the reviewing agencies.

Numerical methods in general are to be avoided unless the data is readily available to support the analysis. In no case, however, should arbitrary weighting be applied to wetland functions, nor should dissimilar functions be ranked.

Note: Where project conditions warrant, the Corps may require a more detailed method than described in this booklet.

Summary of Evaluation Results for Wetl

Ground Water Recharge	M		*
Ground Water Discharge	L	M	*
Floodflow Alteration	L	H	H
Sediment Stablization	L	M	*
Sediment/Toxicant Retention	H	L	M
Nutrient Removal/Transformation		M	L
Production Export		M	*
Wildlife Diversity/Abundance		*	*
Wildlife D/A Breeding	*	H	L
Wildlife D/A Migration	*	H	*
Wildlife D/A Wintering	*	L	*
Aquatic Diversity/Abu	L	L	*
Uniqueness/Heritag	L	*	*
ecreation	L	*	*

Note: "H"=High, "M"=Moderate, "L"=Low, "U"=Uncertain, and "*"'s identify where functions and values are not evaluated.

Methods using subjective weightings are not acceptable.

Does the Corps have a prescribed format for wetland evaluation?

Any appropriate format may be used. As a guide we developed a wetland evaluation form that can be used by the evaluator to organize various information consistent with wetland evaluation requirements discussed in the previous section. The form shown on the next page is structured such that it directs the evaluator to include all pertinent wetland information and draw the necessary conclusions about the presence or absence of functions and values, as well as principal function and value determinations. The form allows additional space for backup rationale and best professional judgement. Refer to Appendix A for a blank reproducible form.

To begin with, the area or extent of each wetland to be evaluated should be determined. For large projects with multiple wetlands, the Corps will typically coordinate this determination with the interdisciplinary team.

Interdisciplinary Team Coordination

Descriptive wetland information is recorded on the form either in the office or in the field. The top portion of the form allows space for a general description of the wetland with respect to the surrounding landscape and hydrologic systems. Information regarding potential impacts is also documented here.

The procedure then requires each wetland that is potentially impacted by a project alternative to be visited. Each is evaluated considering the presence or absence of the 13 wetland functions and values defined earlier. A simple yes or no column is checked and documentation supporting the presence or absence of a function and/or value is recorded. A standard, but flexible, list of rationale factors for each function and value, numbered for easy reference, will facilitate this documentation. A sample list is shown in Appendix A.

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made?_____ Is wetland part of a wildlife corridor?_____ or a "habitat island"?_____

Adjacent land use_____ Distance to nearest roadway or other development_____

Dominant wetland systems present_____ Contiguous undeveloped buffer zone present_____

Is the wetland a separate hydraulic system?_____ If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland?_____Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by:_____ Date_____

Wetland Impact:
Type_____Area_____

Evaluation based on:
Office_____ Field_____

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge					
Floodflow Alteration					
Fish and Shellfish Habitat					
Sediment/Toxicant Retention					
Nutrient Removal					
Production Export					
Sediment/Shoreline Stabilization					
Wildlife Habitat					
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage					
Visual Quality/Aesthetics					
ES Endangered Species Habitat					
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Evaluation Form - When completed, the above wetland evaluation form with backup information provides the permit reviewer with sufficient information regarding the wetland's overall characteristics.

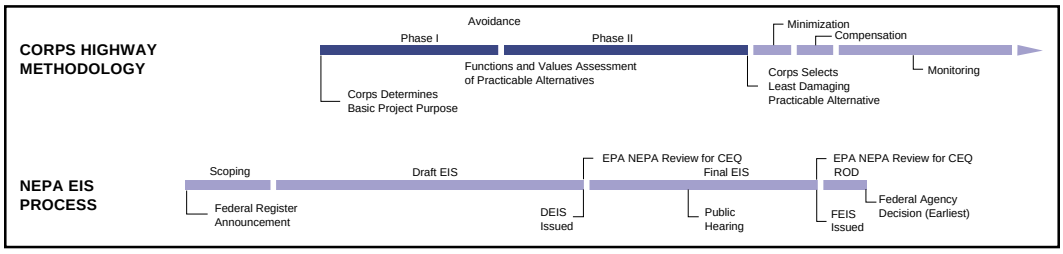
Next, the format requires the evaluator to check the column regarding the principal functions and values designation (Refer to page 4 for definition). Since wetlands are apt to contain most functions and values to some degree, it is helpful to identify those few that are most important.

Focusing on the principal functions and values helps the reviewer more easily assimilate information for large projects with multiple wetlands. The next column provides space for the evaluator to substantiate the principal function and value designation and/or to record other notes.

With the exception of reporting principal function and/or value, the forms do not report weighted or biased data. Therefore, each can be interpreted from the perspective and independent judgment of each reviewer. The bottom of the form provides space for additional narrative descriptions, including unusual or noteworthy conditions. The objective of the form is to document an unbiased record of the wetland, including its location, function, appearance and relationship to its adjacent land use.

Attachments to each form are recommended and should include a sketch of the wetland in relation to the impact area and surrounding landscapes, an inventory of vegetation and potential wildlife species, and a photo of the wetland. This additional information facilitates understanding functions and the subjective analysis of values.

How are the phases of the Highway Methodology incorporated?



Wetland resources are evaluated in both Phase I and Phase II of the Highway Methodology using different levels of information, commensurate with the project planning stage. They are evaluated further when the least environmentally damaging practicable alternative (LEDPA) is selected and when mitigation is considered.

For Phase I, a large number of alternatives may be under consideration and only limited field observations are made in order to screen out those which are obviously either not practicable or not a potential LEDPA. It is not necessary to complete the wetland evaluation forms at this stage because existing information is typically very general. Wetland boundaries are defined as a composite of National Wetland Inventory and Natural Resource Conservation Service maps. Cover types according to the Cowardin et. al. (1979) system (See Appendix A) and key wetland functions and values can be derived from the literature, limited field investigations, or public input. These should be noted on the wetland resource map.

For Phase II, additional field work is typically warranted but it is still of a limited nature sufficient to satisfy the selection of the LEDPA. The wetland evaluation forms should be completed for Phase II.

The LEDPA is then subjected to a three parameter delineation of the affected wetlands using the required Corps method and the New England District's field worksheets. At the same time, additional observations of wetland functions and values may be added to the Phase II field evaluation worksheets. The figure opposite illustrates the progression of wetland information from Phase II (black) to the LEDPA Phase (red).

The wetland evaluation should be complete for use in the Corps permit decision documents, including the determination of mitigation requirements.

A critical part of the Highway Methodology is the graphical display of project constraints, including wetland resources. Examples of ways to display wetland functions and values are shown in the next section.

Wetland Function-Value Evaluation Form

Total area of wetland 11.3 ac. Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Forest, Residential Distance to nearest roadway or other development 0'

Dominant wetland systems present POWH, PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Mid

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. WD1-1

Latitude N41°44'54.86 Longitude W71°44'54.86

Prepared by: LDC, JCL Date 12-7-92

Wetland Impact:
Type Fill Area 4.9 AC

Evaluation based on:
Office ✓ Field ✓

Corps manual wetland delineation completed? Y ✓ N

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		2,6,7,9,10,11,12,13		A layer of organic soil blankets the thin glacial till overburden in this area, this wetland is an expression of groundwater discharge.
Floodflow Alteration	~~X~~	X	~~2,5,6,7,8,9,11,13,14~~		Water flow constricted by culvert, some detention occurring in this ponded, well-saturated area. Portion of wetland at impact area does not store floodwater.
Fish and Shellfish Habitat		X	1,5,(6),9,10,14,15,16,17		Culvert restricts access, wetland is relatively small, fisheries site #15.
Sediment/Toxicant Retention	X		3,4,5,6,7,8,9,10,12		Sediments can drop out in the ponded section.
Nutrient Removal	X		2,3,5-15		Potential for sediment and nutrient removal exists, logging activities have occurred adjacent to wetland.
Production Export		X	1,2,4,5,6,7,9,10,12,14		Outflow is constricted, little transport occurs via wildlife, wetland is predominantly attenuating nutrients.
Sediment/Shoreline Stabilization		X	4,6,9,10,12,13,14,15		Low flow velocities.
Wildlife Habitat	X		1,2,4,5,6,7,8,(13),16,17, 18,19,21	X	Except for minor road, this wetland is well buffered, and directly connected to the Hop River. Good amphibian habitat.
Recreation	X		2,4,5,6,8,9,10		Wetland is easily accessible, and has some potential to function as educational and recreational area.
Educational/Scientific Value	X		2,3,5,8,9,10,11,12,13		Potential for pond study to occur. No known educational use.
Uniqueness/Heritage	X	~~X~~	7,(14),17,18,20,22,29	X	Prehistoric archaelogic sensitive sites adjacent to wetlands. Archaelogic artifacts found adjacent to wetland by local archaeologist.
Visual Quality/Aesthetics	X		1,2,3,4,5,6,7,8,9,10,11,12		Direct view of wetland exists from roadway. Open water contrasts with surrounding forest land.
ES Endangered Species Habitat		X	None		None found or known to occur here.
Other					

Notes: Additional vegetative species noted at 3/24/93 Wetland Delineation field visit (Refer to Wetland Delineation Form). Phase II wetland assessment is relatively indicative of functions and values present at impact area.

* Refer to backup list of considerations.

Are there good examples to follow?

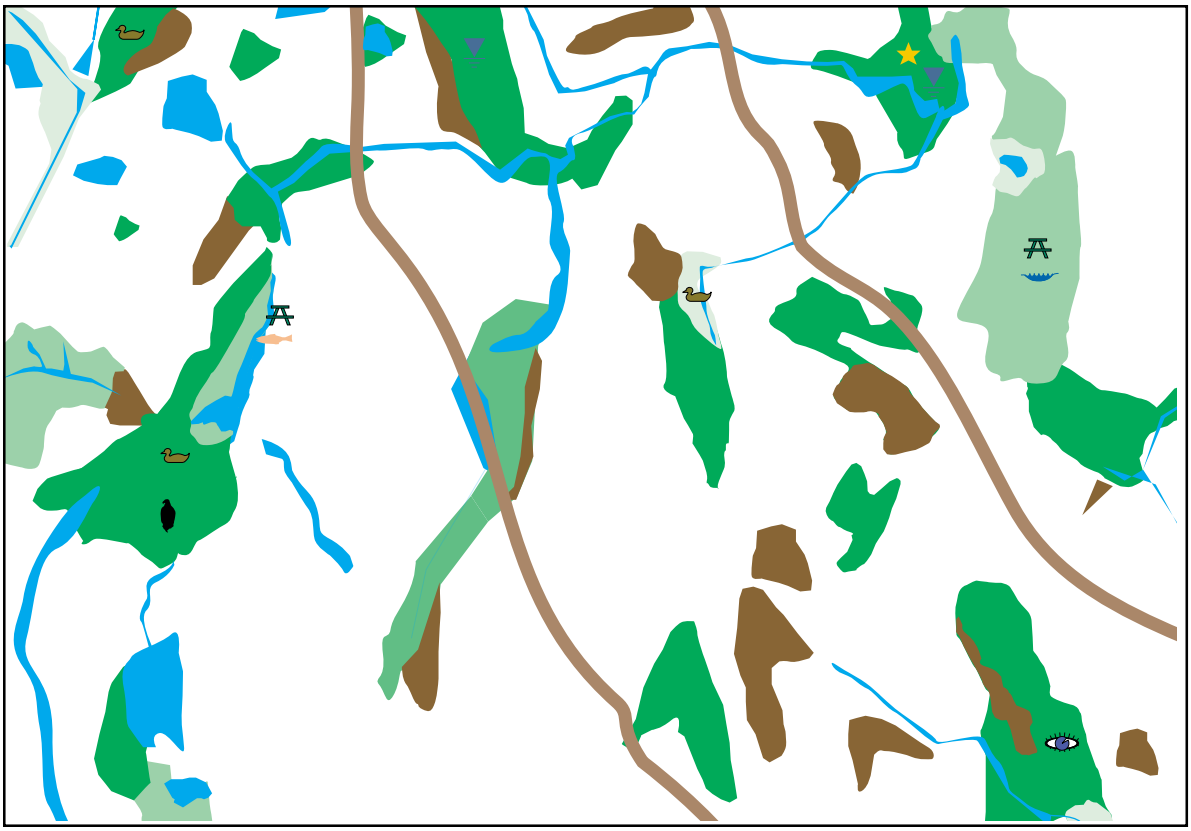
Good examples describe the wetland system and its individual components clearly with factual supporting data at an appropriate scale and level of detail commensurate with the project development stage. The objective is to graphically display complex wetland information in a format that facilitates assimilation by reviewers and expedites regulatory decisions. The figures in this section represent some good examples of wetland evaluation graphics at various phases in the process.

The figure on the next page defines a portion of an 80 square mile Phase I study area and illustrates the general distribution and configuration of wetlands based on data from National Wetland Inventory and Natural Resource Conservation Service (formerly Soil Conservation Service) maps augmented with approximately two person weeks of field investigations. Principal functions and values that can be identified using existing literature or limited field investigations are shown.

The figure on the following page illustrates the various aspects of the wetland evaluation process, including the completed wetland evaluation form with corresponding backup information and an entire study area graphic that includes information on the functions and values for all wetlands evaluated. This graphic is an example of what is used in Phase II of the Highway Methodology to faciliate the LEDPA decision.

From this graphic, a reviewer can analyze such things as wetland position in the landscape, configuration, cover type, and corresponding functions and values. Potential impacts to each system can be implied by the relative location of the highway with respect to each wetland, considering typical impacts associated with highways (e.g., runoff, noise, habitat fragmentation).

To make a complete, informed decision regarding other project impacts and the practicability of an alternative, multiple constraints must also be shown and evaluated.



A typical Phase I wetlands constraint graphic.

Symbols Key

- Groundwater Recharge/ Discharge
- Floodflow Alteration (Storage & Desynchronization)
- Fish and Shellfish Habitat
- Sediment/Toxicant Retention
- Nutrient Removal/ Retention/Transformation
- Production Export (Nutrient)
- Sediment/Shoreline Stabilization
- Wildlife Habitat
- Recreation(Consumptive & Non-Consumptive)
- Educational/Scientific Value
- Uniqueness/Heritage
- Visual Quality/Aesthetics
- ES Endangered Species

Legend

- H.S.-Hydric Soil
- PEM-Palustrine Emergent
- PSS-Palustrine Scrub-Shrub
- PFO-Palustrine Forested
- L-Lacustrine
- R-Riverine

US Army Corps of Engineers®
New England District

Graphical Approach to Wetland Evaluation

Wetland Function-Value Evaluation Form

Total area of wetland 11.5 ac. Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Forest, Residential Distance to nearest roadway or other development 0'

Dominant wetland systems present POWH, PFO1E Contiguous undeveloped buffer zone present Yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Mid

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. WD1-1
Latitude N41°44'54.86 Longitude W71°44'54.86
Prepared by: LDG, JCL Date 12-7-92
Wetland Impact:
Type Fill Area 4.9 AC

Evaluation based on:
Office ✓ Field ✓
Corps manual wetland delineation completed? Y ✓ N

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X		2,6,7,9,10,11,12,13		A layer of organic soil blankets the thin glacial till overburden in this area, this wetland is an expression of groundwater discharge.
Floodflow Alteration	~~X~~	X	~~2,5,6,7,8,9,11,13,14~~		Water flow constricted by culvert, some detention occurring in this ponded, well-saturated area. Portion of wetland at impact area does not store floodwater.
Fish and Shellfish Habitat		X	1,3,(6),9,10,14,15,16,17		Culvert restricts access, wetland is relatively small, fisheries site #13.
Sediment/Toxicant Retention	X		3,4,5,6,7,8,9,10,12		Sediments can drop out in the ponded section.
Nutrient Removal	X		2,3,5-13		Potential for sediment and nutrient removal exists, logging activities have occurred adjacent to wetland.
Production Export		X	1,2,4,5,6,7,9,10,12,14		Outflow is constricted, little transport occurs via wildlife, wetland is predominantly attenuating nutrients.
Sediment/Shoreline Stabilization		X	4,6,9,10,12,13,14,15		Low flow velocities.
Wildlife Habitat	X		1,2,4,5,6,7,8,(13),16,17, 18,19,21	X	Except for minor road, this wetland is well buffered, and directly connected to the Hop River. Good amphibian habitat.
Recreation	X		2,4,5,6,8,9,10		Wetland is easily accessible, and has some potential to function as educational and recreational area.
Educational/Scientific Value	X		2,3,5,8,9,10,11,12,13		Potential for pond study to occur. No known educational use.
Uniqueness/Heritage	X	~~X~~	7,(14),17,18,20,22,29	X	Prehistoric archaeologic sensitive sites adjacent to wetlands. Archaeologic artifacts found adjacent to wetland by local archaeologist.
Visual Quality/Aesthetics	X		1,2,3,4,5,6,7,8,9,10,11,12		Direct view of wetland exists from roadway. Open water contrasts with surrounding forest land.
ES Endangered Species Habitat		X	None		None found or known to occur here.
Other					

Notes: Additional vegetative species noted at 3/24/93 Wetland Delineation field visit (Refer to Wetland Delineation Form). Phase II wetland assessment is relatively indicative of functions and values present at impact area.

* Refer to backup list of considerations.

Completed Wetlands Functions and Values Evaluation Field Observation Form

Species List WD1-1

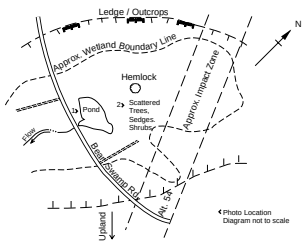
Vegetative

Common Name	Scientific Name
Slippery Elm	*Ulmus rubra*
Yellow Birch	*Betula lutea*
Poplar	*Populus sp.*
White Oak	*Quercus alba*
Shagbark Hickory	*Carya ovata*
Grey Birch	*Betula populifolia*
Ash	*Fraxinus sp.*
Speckled Alder	*Alnus rugos*
American Hornbeam	*Carpinus caroliniana*
American Hop Hornbeam	*Ostrya virginiana*
Winterberry	*Ilex verticillata*
Maleberry	*Lyonia ligustrina*
Hazelnut	*Corylus americana*
Highbush Blueberry	*Vaccinium corymbosum*
Sweet Pepperbush	*Clethra alnifolia*
Azalea	*Rhododendron sp.*
Dogwood	*Cornus sp.*
Sensitive Fern	*Onoclea sensibilis*
Cattail	*Typha latifolia*
Meadowsweet	*Spiraea latifolia*
Sphagnum Moss	*Sphagnum sp.*
Skunk Cabbage	*Symplocarpus foetidus*

Wildlife

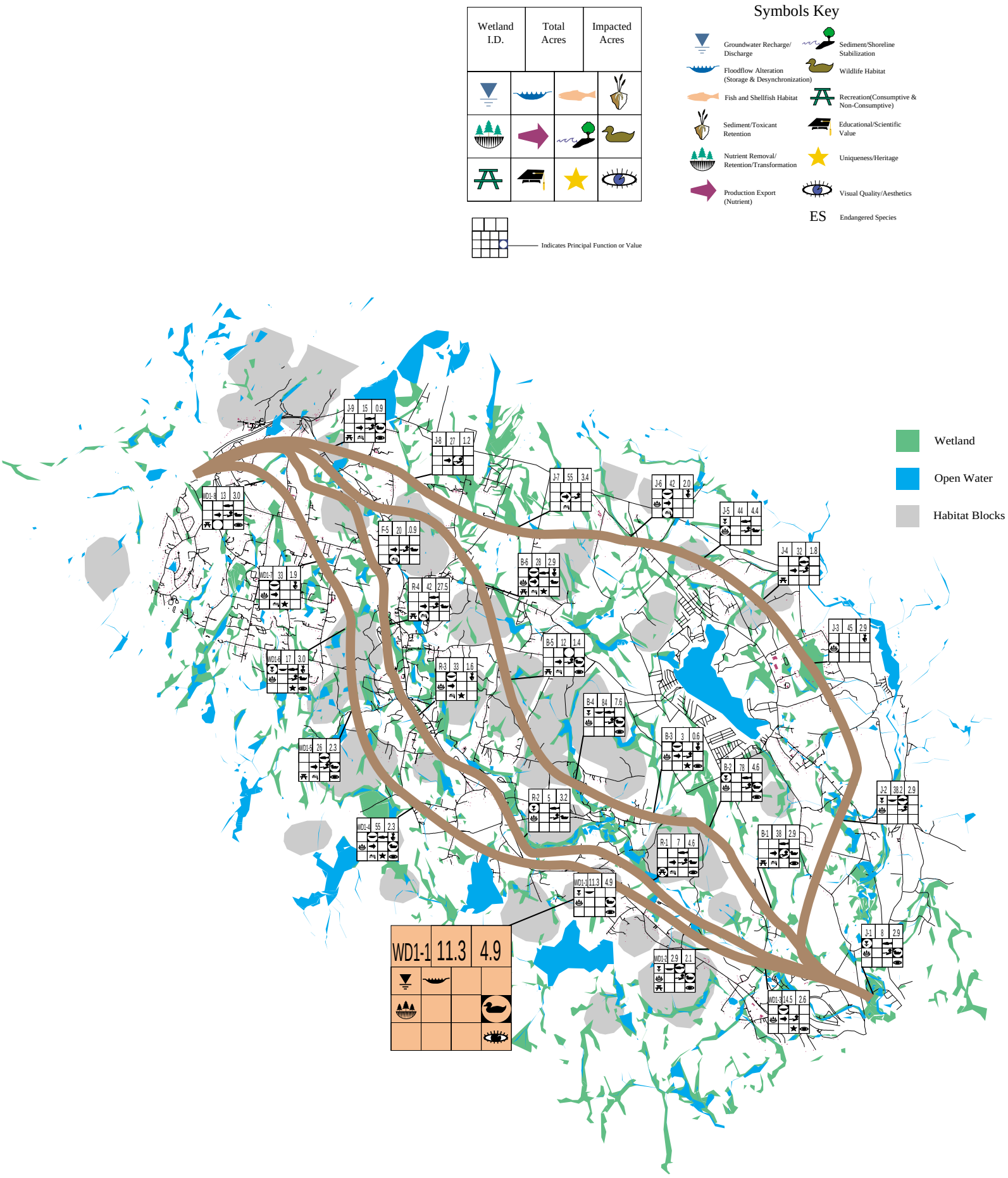
Common Name	Scientific Name
Blue Jay	*Cyanocitta cristata*
White-tailed Deer	*Odocoileus virginianus*
Muskrat	*Ondatra zibethicus*
Raccoon	*Procyon lotor*
Black-capped Chickadee	*Parus atricapillus*
Tufted Titmouse	*Parus bicolor*
American Goldfinch	*Cardeulis tristis*

WD1-1 Vegetation and wildlife species list



Photographs of WD1-1 wetland

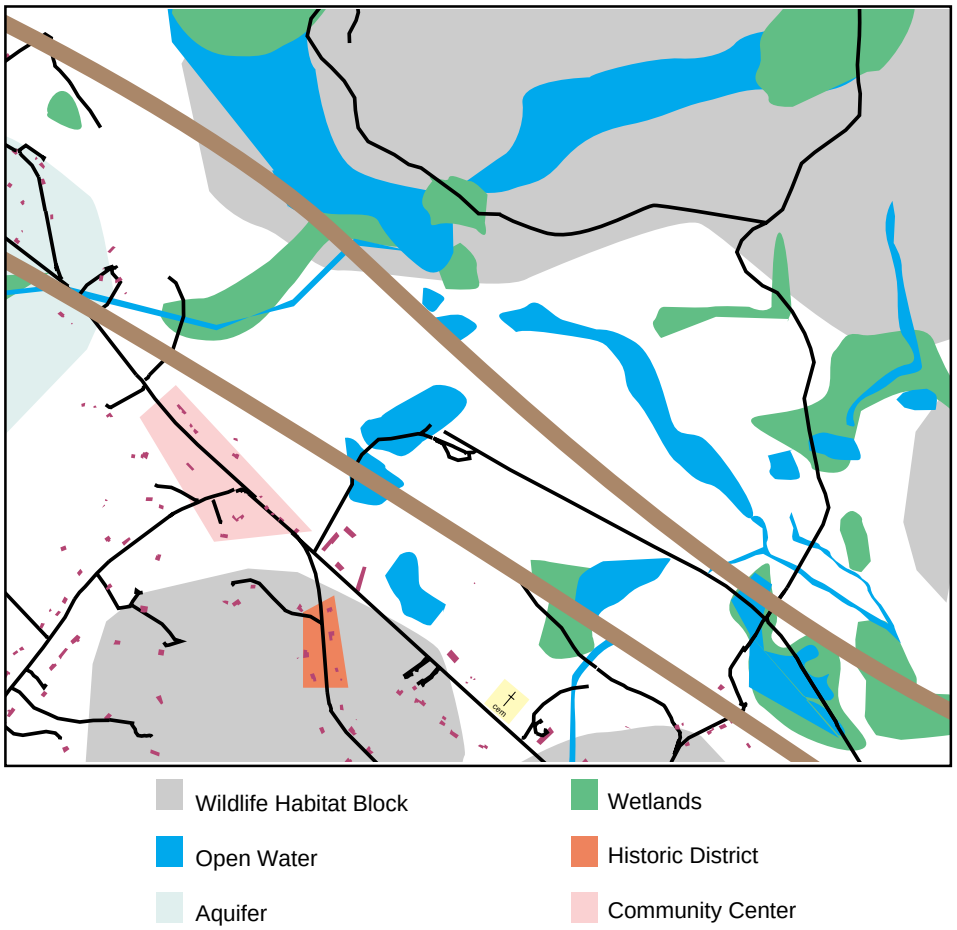
The above information constitutes a complete wetland function/value package. It can easily be converted into descriptive text for environmental documents or graphical display as shown on the right.


Wetland I.D.
Total Acres
Impacted Acres
Indicates Principal Function or Value
Symbols Key
Groundwater Recharge/ Discharge
Floodflow Alteration (Storage & Desynchronization)
Fish and Shellfish Habitat
Sediment/Toxicant Retention
Nutrient Removal/ Retention/Transformation
Production Export (Nutrient)
Sediment/Shoreline Stabilization
Wildlife Habitat
Recreation(Consumptive & Non-Consumptive)
Educational/Scientific Value
Uniqueness/Heritage
Visual Quality/Aesthetics
ES
Endangered Species
Wetland
Open Water
Habitat Blocks
J-9 15 0.9
J-8 27 1.2
J-7 55 3.4
J-6 42 2.0
J-5 44 4.4
J-4 32 1.8
J-3 45 2.9
J-2 38.2 2.9
J-1 8 2.9
WD1-8 13 3.0
WD1-7 33 1.9
WD1-6 17 3.0
WD1-5 26 2.3
WD1-4 55 2.3
WD1-3 14.5 2.6
WD1-2 2.9 2.1
WD1-1 11.3 4.9
F-5 20 0.9
R-4 42 27.5
R-3 33 1.6
R-2 5 3.2
R-1 7 4.6
B-6 28 2.9
B-5 12 1.4
B-4 84 7.6
B-3 3 0.6
B-2 78 4.6
B-1 38 2.9
WD1-1 11.3 4.9

How are resources other than wetlands considered in the Corps permit decision?

Wetlands may appear to receive disproportionate attention in the Corps permit process because the Section 404(b)(1) Guidelines require the Corps to permit the practicable alternative that has the least adverse impact on the aquatic ecosystem, provided there are no other significant adverse environmental consequences (among other tests). Impacts on other resources of concern, including such things as aquifers, wildlife habitat blocks, and socio-economic constraints must therefore be considered before a LEDPA can be determined.

It is important that these other resources be displayed along with the wetland functions and values in order to give the decisionmaker a complete picture when evaluating alternatives. A typical multi-constraint map overlay is shown in the figure below.



Natural resources and community factors must all be considered in light of the multi-constraints that define the study area.

Appendix A

Wetland evaluation supporting documentation; Reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.

GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other

FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.

CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
2. Abundance of cover objects present.

STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE

3. Size of this wetland is able to support large fish/shellfish populations.
4. Wetland is part of a larger, contiguous watercourse.
5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
6. Stream width (bank to bank) is more than 50 feet.
7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
8. Streamside vegetation provides shade for the watercourse.
9. Spawning areas are present (submerged vegetation or gravel beds).
10. Food is available to fish/shellfish populations within this wetland.
11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
12. Evidence of fish is present.
13. Wetland is stocked with fish.
14. The watercourse is persistent.
15. Man-made streams are absent.
16. Water velocities are not too excessive for fish usage.
17. Defined stream channel is present.
18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other

SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
5. Wetland saturated for most of the season. Ponded water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained fine grained mineral or organic soils are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Opportunity for nutrient attenuation exists.
11. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

12. Waterflow through this wetland is diffuse.
13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
14. Water moves slowly through this wetland.
15. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.

CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. “Flushing” of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/SHORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.

CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10’) borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other

WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.[1]

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersion of vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

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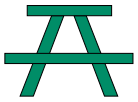
[1]In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.

CONSIDERATIONS/QUALIFIERS

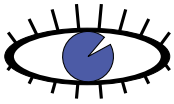
1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

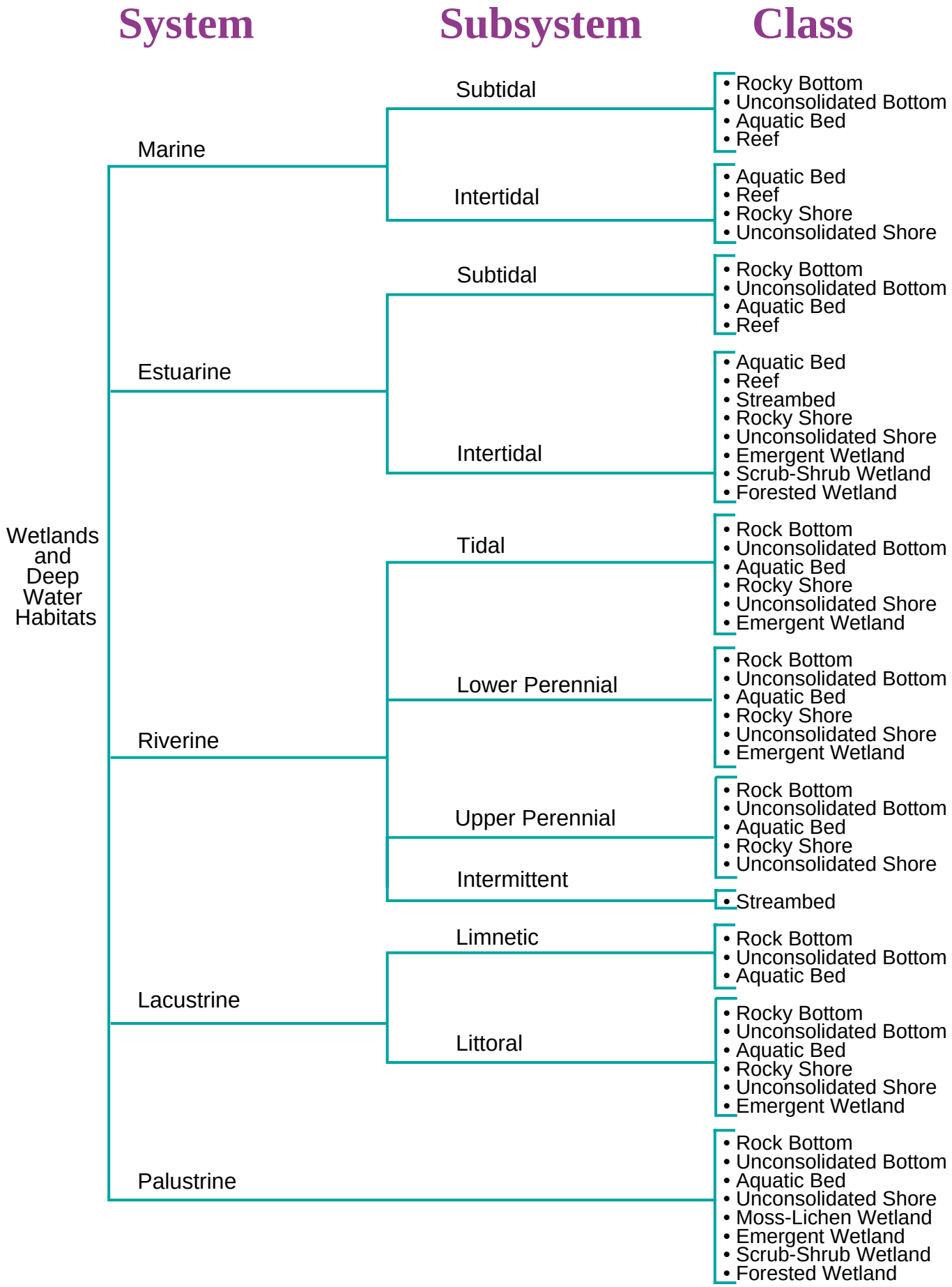
1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

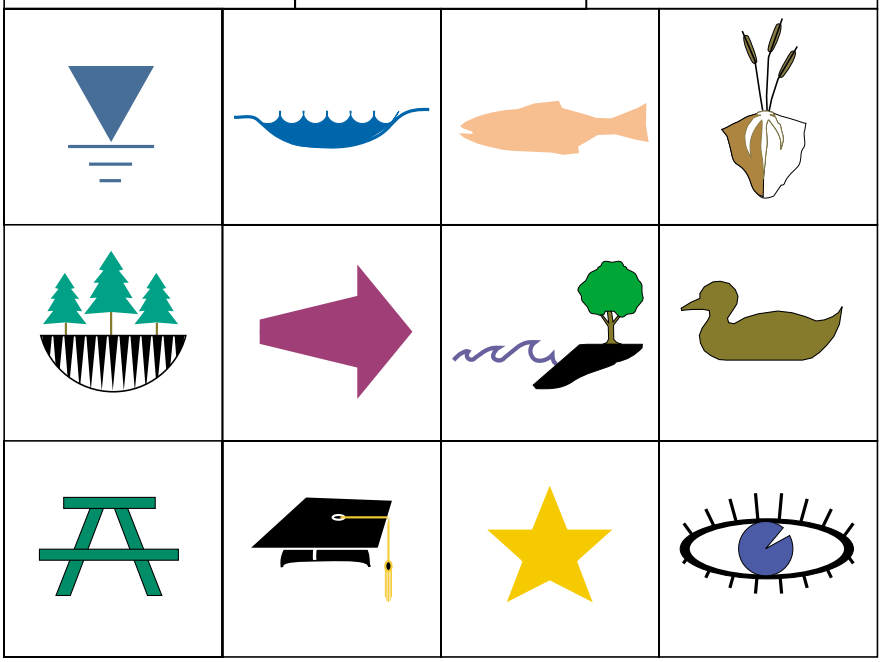
ES

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.


System
Subsystem
Class
Wetlands and Deep Water Habitats
Marine
Subtidal
• Rocky Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Reef
Intertidal
• Aquatic Bed
• Reef
• Rocky Shore
• Unconsolidated Shore
Estuarine
Subtidal
• Rocky Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Reef
Intertidal
• Aquatic Bed
• Reef
• Streambed
• Rocky Shore
• Unconsolidated Shore
• Emergent Wetland
• Scrub-Shrub Wetland
• Forested Wetland
Riverine
Tidal
• Rock Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Rocky Shore
• Unconsolidated Shore
• Emergent Wetland
Lower Perennial
• Rock Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Rocky Shore
• Unconsolidated Shore
• Emergent Wetland
Upper Perennial
• Rock Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Rocky Shore
• Unconsolidated Shore
Intermittent
• Streambed
Lacustrine
Limnetic
• Rock Bottom
• Unconsolidated Bottom
• Aquatic Bed
Littoral
• Rocky Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Rocky Shore
• Unconsolidated Shore
• Emergent Wetland
Palustrine
• Rock Bottom
• Unconsolidated Bottom
• Aquatic Bed
• Unconsolidated Shore
• Moss-Lichen Wetland
• Emergent Wetland
• Scrub-Shrub Wetland
• Forested Wetland

Wetland I.D.	Total Acres	Impacted Acres



Symbols Key

Groundwater Recharge/ Discharge

Floodflow Alteration (Storage & Desynchronization)

Fish and Shellfish Habitat

Sediment/Toxicant Retention

Nutrient Removal/ Retention/Transformation

Production Export (Nutrient)

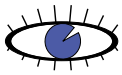
Sediment/Shoreline Stabilization

Wildlife Habitat

Recreation(Consumptive & Non-Consumptive)

Educational/Scientific Value

Uniqueness/Heritage


Visual Quality/Aesthetics

ES Endangered Species

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made?_____ Is wetland part of a wildlife corridor?_____ or a "habitat island"?_____

Adjacent land use_____ Distance to nearest roadway or other development_____

Dominant wetland systems present_____ Contiguous undeveloped buffer zone present_____

Is the wetland a separate hydraulic system?_____ If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland?_____Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by:_____ Date_____

Wetland Impact:
Type_____Area_____

Evaluation based on:
Office_____ Field_____

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge					
Floodflow Alteration					
Fish and Shellfish Habitat					
Sediment/Toxicant Retention					
Nutrient Removal					
Production Export					
Sediment/Shoreline Stabilization					
Wildlife Habitat					
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage					
Visual Quality/Aesthetics					
ES Endangered Species Habitat					
Other					

Notes:

* Refer to backup list of numbered considerations.

Bibliography

Adamus, P.R., E.J. Clairain, Jr., R.O. Smith, and R.E. Young. 1987. Wetland Evaluation Technique (WET); Volume II: Methodology. Operational Draft Technical Report FHWA-IP-88-029. US Army Engineer Waterways Experiment Station. Vicksburg, MI. 279 pp.

Ammann, A.P. and A.L. Stone. 1991. Method for the comparative evaluation of nontidal wetlands in New Hampshire. New Hampshire Department of Environmental Services. NHDES-WRD-1991-3.

Ammann, A.P., R.W. Franzen, and J.L. Johnson. 1986. Method for the evaluation of inland wetlands in Connecticut. Connecticut Department of Environmental Protection. Bulletin No. 9.

Barkman, J.J., H. Doing, and S. Segal. 1964. Kritische Bemerkungen und Vorschlage zur quantitativen Vegetations analyse. Acta Botanica Neerlandica. 13:394-419.

Brinson, M.M (1993). "A hydrogeomorphic classification for wetlands," Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Council on Environmental Quality. 1978. National Environmental Policy Act. Implementation of Procedural Provisions. 40 CFR 1500.

Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. US Government Printing Office. Washington D.C. GPO 024-010-00524-6.103 pp.

FHWA. 1988. Applying The Section 404 Permit Process to Federal-Aid Highway Projects. Washington, D.C. Publication No. FHWA-RE-88-028.

Golet, F.C., J.S. Larson. 1974. Classification of freshwater wetlands in the glaciated Northeast. U.S. Fish Wildl. Serv., Resour. Publ. 116. 56 pp.

Larson, J.S. 1976. Models for Assessment of Freshwater Wetlands. Water Resources Research Center. University of Massachusetts at Amherst. Publication 32, 91 pp.

Larson, J.S., P.R. Adamus, and E.J. Clairain. 1989. Functional Assessment of Freshwater Wetlands: A Manual and Training Outline. Publication No. 89-6. University of Massachusetts. Amherst, Massachusetts. 62 p.

McHarg, I. 1969. Design with Nature. Natural History Press. 198 pp. (Reprinted in 1992 by John Wiley & Sons, Inc. New York.)

Mitsch, W.J. and J.G. Gosselink. 1993. Wetlands, 2nd edition. Van Nostrand Reinhold Company Inc., New York, N.Y.

Richardson, C.J. 1994. Ecological functions and human values in wetlands: A framework for assessing forestry impacts. Wetlands. 14(1). 1-9 pp.

The National Wetlands Policy Forum. 1988. Protecting America's Wetlands: an action agenda. The Conservation Foundation, Washington, DC. 69 pp.

Tufte, E.R. 1983. The Visual Display of Quantitative Information. Graphics Press. Cheshire, Connecticut. 197 pp.

Tufte, E.R. 1990, Envisioning Information. Graphics Press. Cheshire, Connecticut. 126 pp.

USACOE. 1986. Regulatory Programs of the Corps of Engineers. 33 CFR Parts 320 through 330. Fed. Reg. 52(7):1182. 51(219):41206-41260.

USACOE. 1990. Memorandum—Section 404 Mitigation Memorandum of Agreement. CECW-OR. Washington, D.C. 8 pp.

USACOE. 1991. Memorandum for Regulatory Staff—WET II Assessment Methodology. CENED-OD-R (1145-2-303b) Waltham, Massachusetts

USACOE. 1991. Nationwide Permit Program Regulations and Issue, Reissue, and Modify Nationwide Permits. 33 CFR Part 330. Fed. Reg. 56(226):59110-59147.

USACOE. 1993. The Highway Methodology Workbook. US Army Corps of Engineers New England Division. 28 pp. NEDEP-360-1-30.

USACOE. 1993. Clean Water Act Regulatory Programs. 33 CFR Parts 323 and 328. Fed. Reg. 58(163):45008-45038.

Wigley, T.B. and T.H. Roberts. 1994. Wildlife changes in southern bottomland hardwoods due to forest management practices. Wetlands 14:(in press).

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