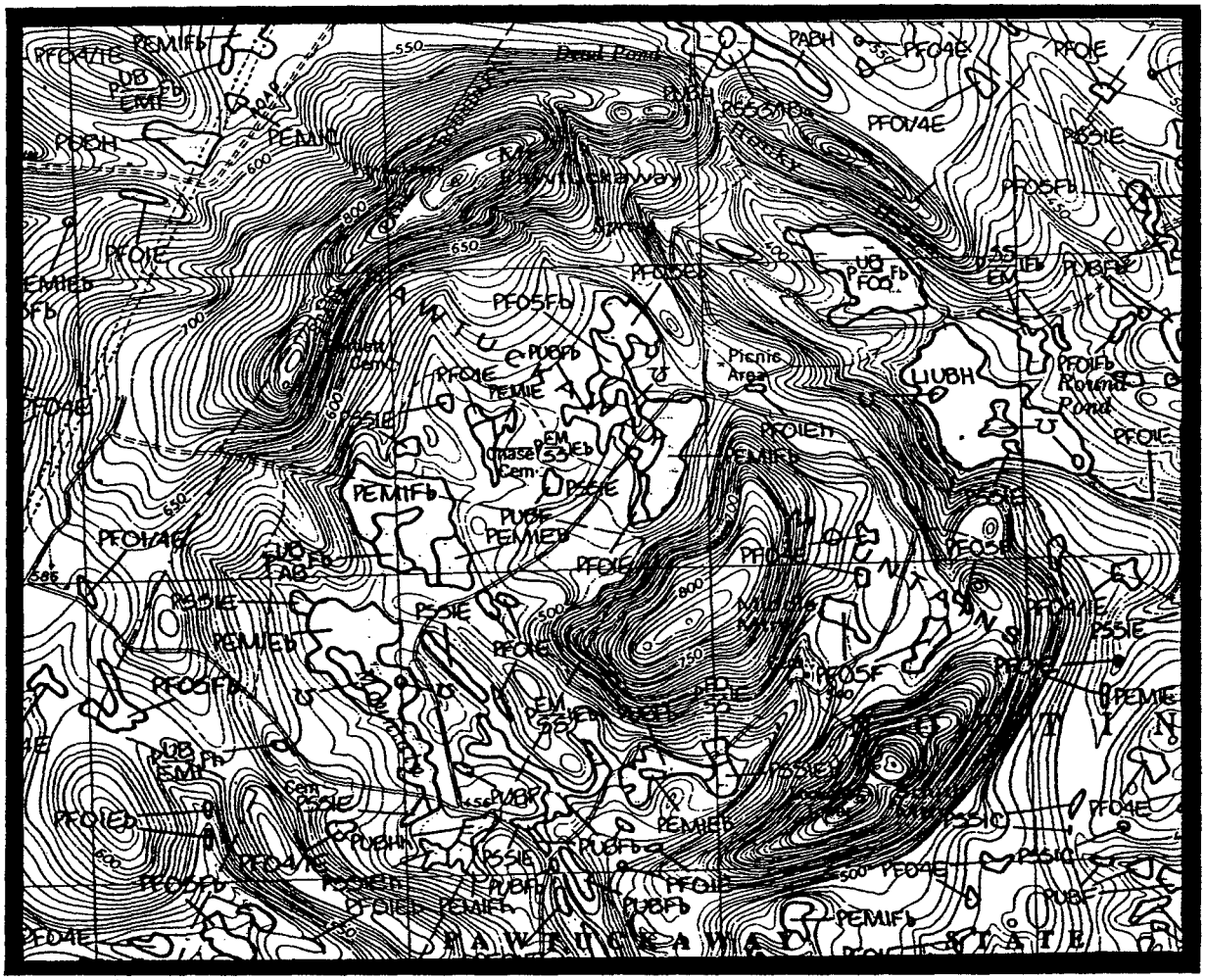
NWI MAPS MADE EASY

A User's Guide to National Wetlands Inventory Maps of the Northeast Region



NWI MAPS MADE EASY

A User's Guide to National Wetlands Inventory Maps of the Northeast Region

by

Glenn S. Smith
U.S. Fish & Wildlife Service
Ecological Services - NWI
Hadley, MA 01035-9589

November 1991

Additional copies may be ordered from:

U.S. Fish & Wildlife Service
Ecological Services - NWI
300 Westgate Center Drive
Hadley, MA 01035-9589

Introduction

The purpose of this document is to explain how to read and interpret information from a National Wetlands Inventory map. By following the "decoding" procedure examples, the user will learn to quickly decipher the wetland classification code. The user will be given definitions of specific terms, and examples of wetland types are presented in the accompanying tables. This User's Guide also clarifies some of the seemingly complex wetland terminology and provides a quick reference table to general wetland types.

National Wetlands Inventory

The U.S. Fish & Wildlife Service's National Wetlands Inventory Project (NWI) was established in 1974 to produce information on the characteristics, locations and extent of wetlands and deepwater habitats on a nationwide basis. The two main types of information produced are wetland maps and status and trends reports. The maps are used for local and regional site-specific planning and management purposes, while the status and trends reports provide information on the type, amount, location and causes of wetland changes on a regional and national scale.

Classification System

In order to provide national consistency of wetland concepts, terminology and classification for its National Wetlands Inventory Project, the U.S. Fish and Wildlife Service developed a new classification system, Classification of Wetlands and Deepwater Habitats of the United States. The classification system was developed in 1979, and takes a hierarchical approach to classifying different wetland types. It first describes wetlands broadly by five *systems*: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The term *system* is defined as "...a complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors" (Table 1). Each system (with the exception of the Palustrine System) is divided into *subsystems* based on major hydrologic characteristics (Table 2). Subsystems are subdivided into *classes*, describing the general vegetative types or substrate types (Table 3). The classes are then divided into *subclasses* which describe specific vegetative and substrate types. Additional "modifiers" describing hydrologic and soil properties, water chemistry, or physical modifications of the wetland, are commonly used following the class or subclass level designation (Tables 4, 5 ,6 and 7).

The National Wetlands Inventory (NWI) Map

The main product of the National Wetlands Inventory is the large-scale NWI map. These maps show approximate boundaries and wetland classifications on a 1:24,000 scale* U.S. Geological Survey topographic base map (Figure 1). Actual wetland classifications are abbreviated on the map as alpha-numeric codes. These map codes can betranslated using the map legend located in this guide and at the bottom of each NWI map.

The classification system, its terminology, and alpha-numeric map codes may seem overwhelming at first, but the user does not need a thorough understanding of the classification system to use the maps. The following section shows how quick and easy it is to translate any map code into a meaningful description of a particular wetland type.

Most maps are produced at the 1:24,000 scale, however, some maps are only available at the 1:25,000 or 1:62,500 scale.

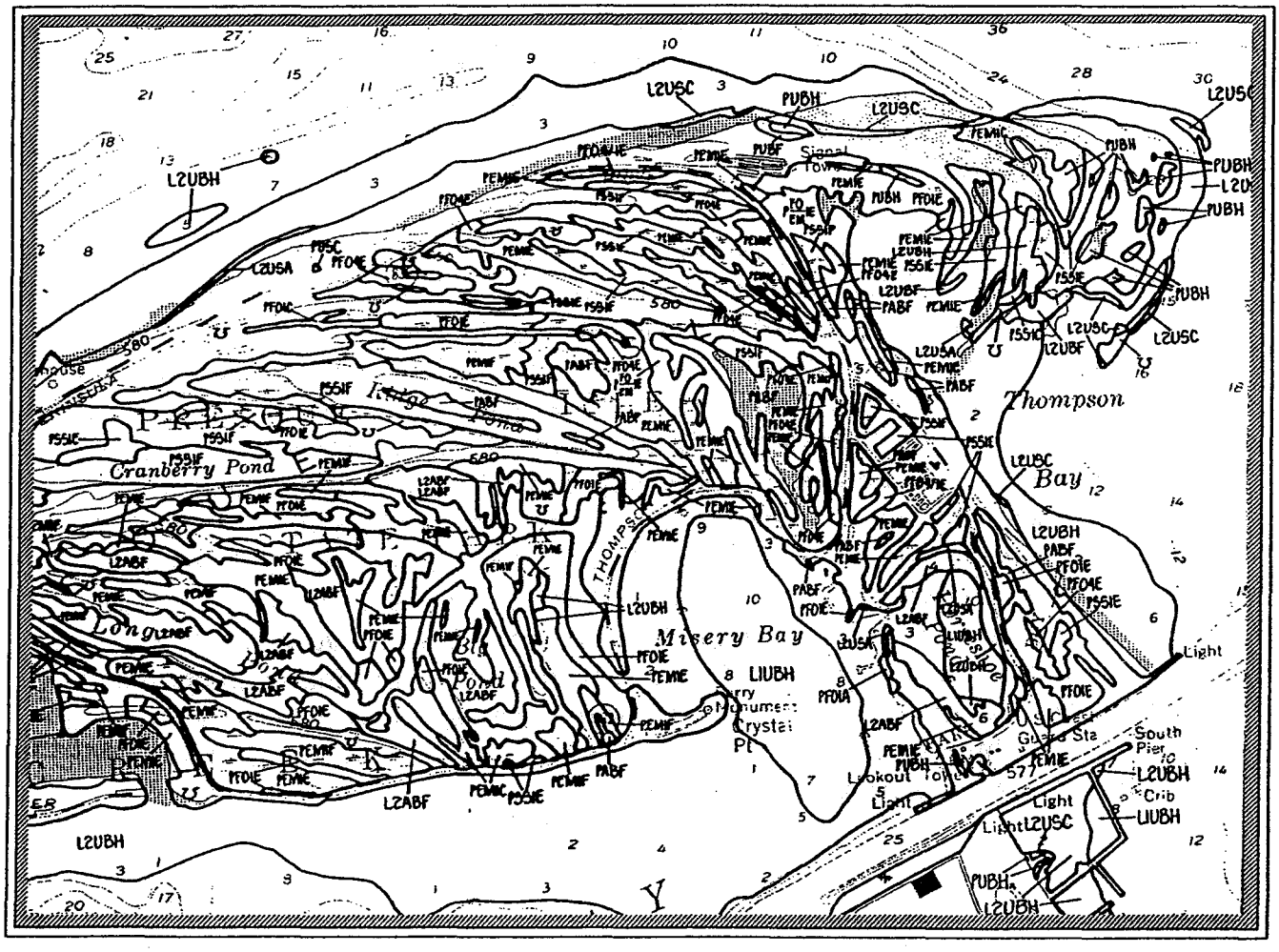


Figure 1. Section of NWI map - Presque Isle Peninsula - Erie North Quadrangle, Pennslyvania

How To Interpret the Map Codes

Each map code consists of an ordered series of letters and numbers (alpha-numeric) that reflect certain characteristics of wetlands and deepwater habitats. While the number of characters in each map code may vary from three to ten symbols depending on the date of the map production, most codes will have from five to seven characters. All maps will have at least three characters for the system, subsystem and class. All map codes are identified under the appropriate system in the map legend at the bottom of each map. The most commonly used codes will be described in the tables of this guide.

Since Palustrine (inland freshwater) and Estuarine (coastal salt and brackish) wetlands are the most common types of wetlands on the maps, they will be used as examples.

Example #1: E2EM1P6

Step 1. *The first character is an upper case letter representing which SYSTEM the wetland belongs to.*

E = the ESTUARINE SYSTEM (salt and brackish tidal wetland)

(Refer to Table 1 for descriptions of SYSTEMS.)

Step 2. *The second character is a number, (except in the Palustrine System - no Subsystems) which represents the SUBSYSTEM.*

2 = the INTERTIDAL SUBSYSTEM (periodically flooded by tides).

(Refer to Table 2 for descriptions of SUBSYSTEMS.)

Step 3. *The third character is a set of two upper case letters representing the CLASS.*

EM = the EMERGENT CLASS (non-woody vegetation)

(Refer to Table 3 for descriptions of CLASSES.)

Step 4. *The next character is a <u>number</u> representing the SUBCLASS.*

1	= the PERSISTENT EMERGENT SUBCLASS (vegetation remains throughout the year)

(Note: To determine SUBCLASS, you ***must*** refer to the legend under the appropriate CLASS to find the proper subclass, i.e., SUBCLASS codes are ***not*** interchangeable between CLASSES.)

(The SUBCLASSES are generally self explanatory; refer to map legend.)

Step 5. *The next character is an <u>upper case letter</u> representing the WATER REGIME MODIFIER.*

P	= the IRREGULARLY FLOODED, TIDAL WATER REGIME (flooded less than once daily)

(Refer to Tables 4, 5 and 6 for descriptions of WATER REGIMES.)

Step 6. *Following the WATER REGIME MODIFIER, there may be additional numbers or lower case letters identifying WATER CHEMISTRY or SPECIAL MODIFIERS.*

6	= the OLIGOHALINE WATER CHEMISTRY MODIFIER (salinity between 0.5 and 5.0 ppt)

(Refer to Table 7 for descriptions of commonly used additional MODIFIERS.)

There is no limit to how many additional modifiers may be used to describe a wetland. Generally, however, there will be only one modifier following the WATER REGIME MODIFIER.

Solution: **E2EM1P6** means **ESTUARINE, INTERTIDAL, PERSISTENT EMERGENT WETLAND, IRREGULARLY FLOODED, OLIGOHALINE** (common name = slightly brackish marsh).

Example #2: PFO1Cb

Step 1. *The first character is an upper case letter representing which SYSTEM the wetland belongs to.*

P = the PALUSTRINE SYSTEM (freshwater wetland)

(Refer to Table 1 for descriptions of SYSTEMS.)

Remember, there are no SUBSYSTEMS in the Palustrine System. Proceed to Step 2 to determine the CLASS.

Step 2. *The second character in a Palustrine wetland classification, is a set of two upper case letters representing the CLASS.*

FO = the FORESTED CLASS (tree-dominated)

(Refer to Table 3 for description of CLASS.)

Step 3. *The next character is a number representing the SUBCLASS.*

1 = the BROADLEAF DECIDUOUS SUBCLASS (hardwoods that drop their leaves annually)

(Note: To determine subclass, you ***must*** refer to the legend under the appropriate CLASS to find the proper subclass, i.e., subclass codes are ***not*** interchangeable between classes.)

(The SUBCLASSES are generally self explanatory; refer to map legend.)

Step 4. *The next character is an upper case letter which represents the WATER REGIME MODIFIER.*

C = the NONTIDAL SEASONALLY FLOODED WATER REGIME (flooded for two weeks or more during the growing season)

(Refer to Tables 4, 5 and 6 for descriptions of WATER REGIMES.)

Step 5. *Following the WATER REGIME MODIFIER, there may be additional numbers or lower case letters identifying WATER CHEMISTRY or SPECIAL MODIFIERS.*

b	= the BEAVER SPECIAL MODIFIER (created by or modified by beaver activity)

(Refer to Table 7 for descriptions of commonly used additional modifiers.)

Solution: **PFO1Cb** means: **PALUSTRINE, FORESTED WETLAND, BROADLEAF DECIDUOUS, SEASONALLY FLOODED, BEAVER MODIFIED** (common name - wooded swamp).

Review of Examples #1 and # 2:

MAP CODE	SYSTEM	SUB-SYSTEM	CLASS	SUBCLASS	WATER REGIME	SPECIAL MODIFIER	COMMON NAME
E2EM1P6	E	2	EM	1	P	6	**brackish marsh**
PFO1Cb	P	--	FO	1	C	b	**wooded swamp**

NWI Map Uses and Limitations

The brief statement below, found in the map legend, outlines how the map was produced and some limitations of map use.

> ***SPECIAL NOTE***
>
> *This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with* ***Classification of Wetlands and Deepwater Habitats of the United States,*** *(FWS/OBS - 79/31 December 1979).The aerial photographs typically reflect conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.*
>
> *Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies.* ***Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.***

The information on the NWI map is an excellent source of general wetland locations, boundaries and characteristics, however, as stated in the **SPECIAL NOTEit is *not* a substitute for intensive on-ground, site-specific investigations when detailed information is required.** Due to the limitations of the photointerpretation process, all wetlands are not shown on the NWI map. Certain wetland types such as evergreen forests can be difficult to identify on aerial photographs and are sometimes missed. Aquatic bed wetlands are often not visible on early spring photography, making identification nearly impossible without the use of collateral information. Also, the drier wetland types are difficult to detect, especially on aerial photography taken during drier seasons, dry years or during drought conditions. NWI maps are utilized by a wide variety of users such as engineers, environmental consultants, local conservation commissions, foresters, hunters and fisherman, planning commissions as well as local, county, state and federal conservation and regulatory agencies. Some of the common uses of the maps include project review, analysis of wildlife habitat, comprehensive management plans, land acquisition, oil spill contingency plans, baseline data, environmental impact assessment, identification and education, permit review, wetland evaluation, and utility corridor and facility siting.

TABLE 1. GENERAL CHARACTERISTICS OF SYSTEMS

SYSTEM (MAP CODE)	DESCRIPTION
Marine (M)	Open ocean and its high energy shoreline; salinity > 30 ppt*
Estuarine (E)	Tidal ecosystems, usually semi-enclosed by land, with varying salinities
Riverine (R)	Freshwater flowing water contained within a channel; salinity <0.5 ppt
Lacustrine (L)	Fresh waterbodies, generally >20 acres, >2 meters deep at low water
Palustrine (P)**	Mostly freshwater wetlands; and waterbodies <20 acres and <2 meters deep at low water.

**ppt = parts per thousand*

***Examples of this system are ponds, freshwater swamps, marshes and bogs.*

TABLE 2. GENERAL CHARACTERISTICS OF SUBSYSTEMS*

SUBSYSTEM (MAP CODE)	DESCRIPTION	RELEVANT SYSTEMS
Subtidal (1)	Permanently flooded (below mean low tide level)	Marine,Estuarine
Intertidal (2)	Periodically flooded and exposed by tides	Marine,Estuarine
Tidal (1)	Fresh water, tidally influenced river	Riverine
Lower Perennial (2)	Slow-moving river, with low gradient, and well developed floodplain	Riverine
Upper Perennial (3)	Fast moving river with high gradient and little floodplain development	Riverine
Intermittent (4)	Seasonally flowing river	Riverine
Unknown (5)	River sharing characteristics of other subsystems	Riverine
Limnetic (1)	Lake water greater than 2 meters deep	Lacustrine
Littoral (2)	Shallow lake water and adjacent shoreline, less than 2 meters deep	Lacustrine

**NOTE: There are no Subsystems in Palustrine system..*

TABLE 3. GENERAL CHARACTERISTICS OF THE CLASSES

CLASS (MAP CODE)	DESCRIPTION
Rock Bottom (RB)	Permanently flooded bedrock or large chunks of bedrock
Unconsolidated Bottom (UB)*	Permanently flooded sand, gravel, mud or cobble substrate
Unconsolidated Shore (US)	Periodically exposed sand, mud or gravel substrate
Aquatic Bed (AB)	Floating or floating-leaved submerged aquatic vegetation (e.g., duckweed, pondweed, algae)
Reef (RF)	Substrate composed of living organisms (e.g. mussels, oysters)
Rocky Shore (RS)	Periodically exposed bedrock or large chunks of bedrock
Open Water (OW)*	Open water, no visible vegetation
Streambed (SB)	Periodically flooded channel composed of gravel, sand or bedrock
Emergent Wetland (EM)	Herbaceous (non-woody) vegetation (e.g., grasses, sedges, rushes and flowering herbs)
Scrub/Shrub Wetland (SS)	Woody vegetation < 20 feet tall (includes dwarf trees in bogs, shrubs and saplings)
Forested Wetland (FO)	Woody vegetation 20 feet or taller (trees)
Moss/Lichen Wetland (ML)	Dominant vegetative cover of mosses, lichens or both

**Earlier NWI maps used the Open Water (OW) class, while present mapping conventions use the Unconsolidated Bottom (UB) class.*

TABLE 4. TIDAL WATER REGIMES (used for Marine and Estuarine systems where salinities > 0.5 ppt)

WATER REGIME (MAP CODE)	DESCRIPTION OF WATER REGIME
Subtidal (L)	Permanently flooded by tides all year long
Irregularly Exposed (M)	Flooded most times except extreme low tides
Regularly Flooded (N)	Flooded and exposed by tides at least once daily
Irregularly Flooded (P)	Flooded less often than once daily by tides

TABLE 5. NONTIDAL WATER REGIMES (used for Riverine, Lacustrine, Palustrine Systems)

WATER REGIME (MAP CODE)	DESCRIPTION OF WATER REGIME
Temporarily Flooded (A)	Floods most years for less than two weeks during growing season; usually dry by mid-growing season
Saturated (B)	Substrate is saturated for most of growing season (commonly year round) and rarely floods
Seasonally Flooded (C)	Floods most years for two weeks or more during growing season, usually dry by end of growing season
Seasonally Flooded/Saturated (E)*	Floods most years for two weeks or more during growing season and remains saturated near the surface for most of the growing season
Semipermanently Flooded (F)	Remains flooded throughout the growing season in most years
Intermittently Exposed (G)	Nearly permanently flooded, exposed only during drought conditions
Permanently Flooded (H)	Remains flooded throughout the year in all years
Intermittently Flooded (J)	Exposed most years, but flooded(usually briefly) during growing season on an irregular basis
Artificial (K)	Flooding controlled by pumps, siphons, etc.

**Not used on all maps*

TABLE 6. FRESHWATER - TIDAL. These areas have freshwater (having salinities of < 0.5 ppt) that fluctuates with tidal movements.

WATER REGIME (MAP CODE)	DESCRIPTION OF WATER REGIME
Temporarily Flooded-Tidal (S)	Floods most years less than two weeks during growing season, but also periodically inundated by freshwater tides*
Seasonally Flooded-Tidal (R)	Floods for two weeks or more during growing season, but also periodically inundated by freshwater tides*
Semipermanently Flooded-Tidal (T)	Remains flooded through most of growing season in most years and is affected by freshwater tides
Permanently Flooded-Tidal (V)	Remains flooded throughout the year in all years and is influenced by freshwater tides
Regularly Flooded-Tidal (N)**	Flooded and exposed at least once daily by freshwater tides

**Periodically inundated means flooded less than once daily by freshwater tides*

***This tidal (salt water) modifier is also used in the Lacustrine, Palustrine, and Riverine systems to describe the water regime of freshwater areas that are flooded (regularly) at least once daily by freshwater tides.*

TABLE 7. COMMONLY USED MODIFIERS

MODIFIER (MAP CODE)	GENERAL DESCRIPTION
Oligohaline (6)	Used to distinguish transitional zone (slightly brackish) between freshwater tidal systems and brackish tidal systems; salinity = 0.5-5.0 ppt
Acid (a)	Used to distinguish floating mat, kettlehole type acidic bogs from other non-acidic wetland types
Beaver (b)	Used to indicate an area that has been either created by, or hydrologically affected by beaver dams
Partially ditched/drained (d)	Used to show an area that has been visibly ditched or partially drained, but maintains wetland hydrology and functions
Farmed (f)	Used in this region (Northeast) to identify commercial cranberry bogs
Artificial (r)	Used to identify manmade impoundments with artificial bottoms (i.e., concrete fish ponds, sewage treatment ponds); also used to identify wetlands created by bench mining of coal
Diked/Impounded (h)	Used to identify areas that have been hydrologically altered or created by construction of a dike or dam which obstructs or stops water flow
Excavated (x)	Created or modified by excavation and removal of existing substrate (i.e., quarries, gravel pits, farm ponds, channelized rivers, drainage ditches)

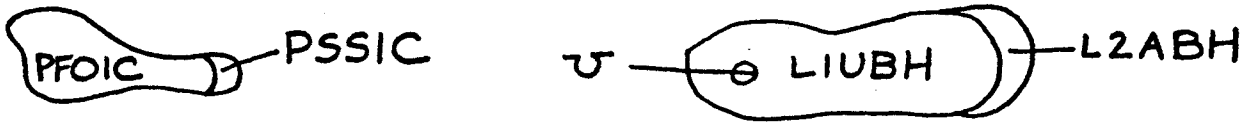
TABLE 8. QUICK CROSS REFERENCE OF MAP CODES TO COMMON WETLAND TYPES (Using System, Subsystem and Class)

MAP CODE	COMMON NAME or WETLAND TYPE
PFO	FORESTED OR WOODED SWAMP OR BOG
PSS	SHRUB SWAMP OR BOG
PEM	EMERGENT MARSH, FEN, OR WET MEADOW
PUB	POND
PUS	POND SHORELINE
PAB	POND WITH FLOATING OR SUBMERGED AQUATIC VEGETATION (DUCKWEEDS, POND LILIES)
R1UB	FRESHWATER TIDAL RIVER
R2UB	SLOW MOVING RIVER WITH FLOODPLAIN
R2AB	RIVER WITH AQUATIC VEGETATION(PICKERELWEED)
R3US	BANK OR SHORELINE OF FAST FLOWING RIVER
R4SB	INTERMITTENT STREAM CHANNEL
R5UB	RIVER SHOWING CHARACTERISTICS OF BOTH UPPER AND LOWER PERENNIAL RIVERS
M1UB	OPEN OCEAN WITH UNCONSOLIDATED BOTTOM
M2AB	INTERTIDAL SEAWEED BED IN OCEAN
M2RF	INTERTIDAL OYSTER AND MUSSEL REEFS IN OCEAN
E2EM	SALT OR BRACKISH TIDAL MARSH
E2SS	ESTUARINE SHRUB SWAMP
E2US	ESTUARINE FLATS, BEACH, OR SAND BARS
E1UB	OPEN WATER ESTUARY
L1UB	DEEPWATER ZONE OF LAKE
L2US	LAKE SHORE OR SHALLOW WATER ZONE OF LAKE
L2AB	AQUATIC VEGETATION IN LAKE
L2UB	SHALLOW WATER ZONE OF LAKE

ADDITIONAL TIPS FOR INTERPRETING THE NWI MAP

*The inverted omega symbol ℧ represents non-wetlands or uplands.

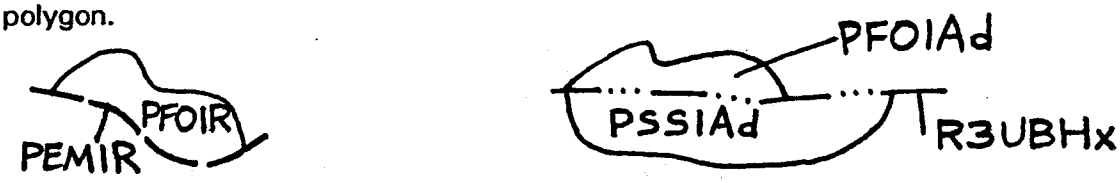
*All wetland polygons are labelled with a map code; the label is located either inside the polygon or a leader line runs from the map code into the appropriate polygon.



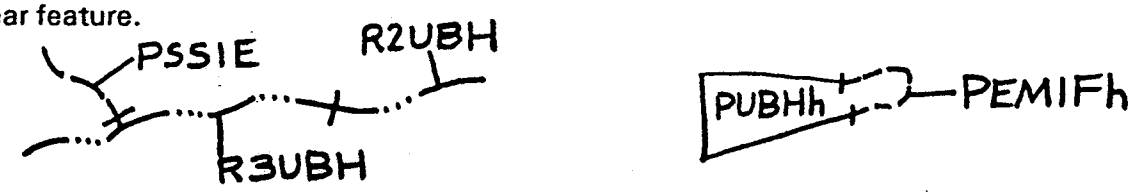
*Wetlands that are too narrow to be delineated with polygons are identified by linear symbols consisting of a dashed line, or a series of dots and dashes.

*Each linear wetland is labelled with a leader line running from the map code.

*A linear wetland may form the boundary of a wetland polygon, or run through a wetland polygon.



*The ends of a linear segment which form the boundary of a wetland polygon, or a classification change along a linear segment, are shown by a short dash, perpendicular to the linear feature.



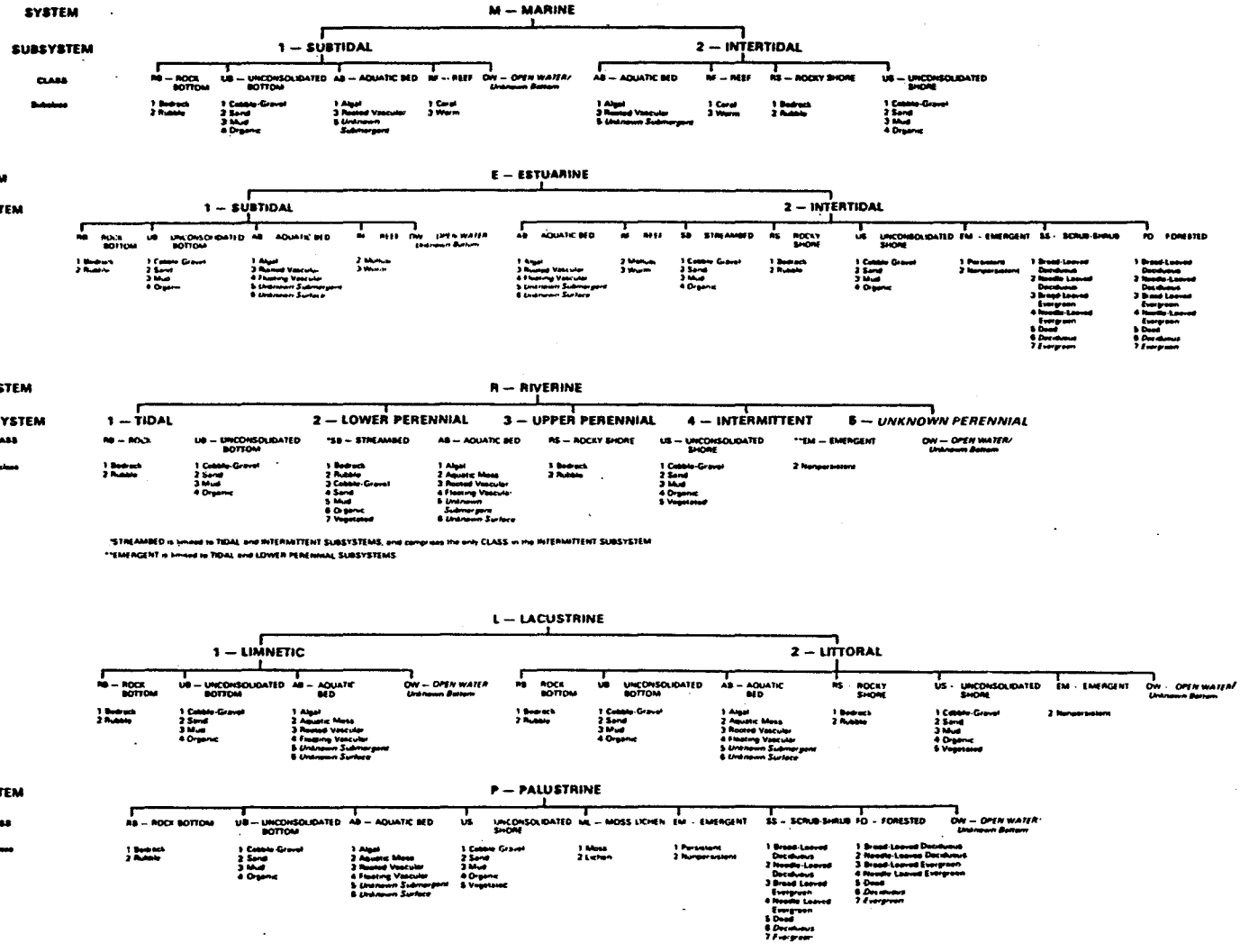
*Some map codes indicate a mixture of either *classes* or *subclasses* within a single polygon. The *class* or *subclass* listed <u>first</u> in the mixed map code is dominant in terms of the amount of surface area covered by that classification type.

mixed class PFO1/SS1E or $P\frac{FO}{SS}1E$

mixed subclass PSS1/3Ba or $PSS\frac{1}{3}Ba$

NWI MAP LEGEND

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION



MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal

- A Temporarily Flooded
- B Saturated
- C Seasonally Flooded
- D Seasonally Flooded/ Well Drained
- E Seasonally Flooded/ Saturated
- F Semipermanently Flooded
- G Intermittently Exposed
- H Permanently Flooded
- J Intermittently Flooded
- K Artificially Flooded
- W Intermittently Flooded/ Temporary
- Y Saturated/ Semipermanent/ Seasonal
- Z Intermittently Exposed/ Permanent
- U Unknown

Tidal

- L Subtidal
- M Irregularly Exposed
- N Regularly Flooded
- P Irregularly Flooded
- *S Temporary Tidal
- *R Seasonal Tidal
- *T Semipermanent Tidal
- *V Permanent Tidal
- U Unknown

*These water regimes are only used in tidally influenced freshwater systems.

WATER CHEMISTRY

Coastal Salinity

- 1 Hypersaline
- 2 Eusaline
- 3 Mixosaline (Brackish)
- 4 Polysaline
- 5 Mesosaline
- 6 Oligosaline
- 0 Fresh

Inland Salinity

- 7 Hypersaline
- 8 Eusaline
- 9 Mixosaline

pH Modifiers for all Fresh Water

- a Acid
- i Circumneutral
- z Alkaline

SOIL

- g Organic
- n Mineral

SPECIAL MODIFIERS

- b Beaver
- d Partially Drained/ Ditched
- f Farmed
- h Diked/ Impounded
- r Artificial Substrate
- s Spoil
- x Excavated

(FOUND AT THE BOTTOM OF EACH NWI MAP)

LIST OF NATIONAL WETLANDS INVENTORY
MAP DISTRIBUTION OUTLETS FOR THE NORTHEASTERN U.S.

U.S. Fish and Wildlife Service - Region 5

State Outlets (verified 4/97)

CT Al Levere
CT Dept. Env'l. Protection
Natural Resources Center
Maps and Publication Sales
79 Elm Street
Hartford, CT 06106
860-424-3643

DE ***For Quantities of 1-5 Only***:
Delaware Dept. of Natural Resources
Wetlands Section
89 Kings Highway
P.O. Box 1401
Dover, DE 19903
302-739-4691

For Any Size Order:
Gerald A. Donovan Associates, Inc.
429 South Governors Avenue
Dover, DE 19904
302-674-2903

ME Bob Tucker
Maine Geological Survey
22 State House Station
Augusta, ME 04333-0022
207-287-2801

MD Maryland Geological Survey
Dale Shelton, Publications
2300 St. Paul Street
Baltimore, MD 21218
410-554-5505

* **MA, PA, VA** Dennis Swartwout
Earth Science Information Office
Blaisdell House
Univ. of Massachusetts
Amherst, MA 01003
413-545-0359
413-545-2304 FAX

NH Bea Jillette
Office of State Planning
State of New Hampshire
2 1/2 Beacon Street
Concord, NH 03301
603-271-2155

NJ NJ Dept. Env'l. Protection
Office of Support Services
Maps and Publications - CN-420
Trenton, NJ 08625-0420
609-777-1038

NY Institute for Resource Information Systems (IRIS)
Resource Information Lab
Cornell University
462 Hollister Hall
Ithaca, NY 14853
607-255-4864

RI Dept. of Environmental Mgmt.
Div. of Freshwater Wetlands
235 Promenade Street
Providence, RI 02908
401-277-6820

VT Patty Usle
Dept. of Env'l. Conservation
Water Quality Division
103 South Main St., Bldg. 10-N
Waterbury, VT 05671-0408
802-241-3770

WV Barbara Sargent
Natural Heritage Program
WV Div. of Natural Resources
P.O. Box 67 - Ward Road
Elkins, WV 26241
304-637-0245

National Outlet
Eastern Mapping Center - NCIC
Earth Science Info. Center
U.S. Geological Survey
Reston, VA 22092
703-648-6045
OR
1-800-USA-MAPS (outside of Area Code 703)

*Also distributes NWI maps for AZ, AR, IA, ID, MS, MO, and NM.