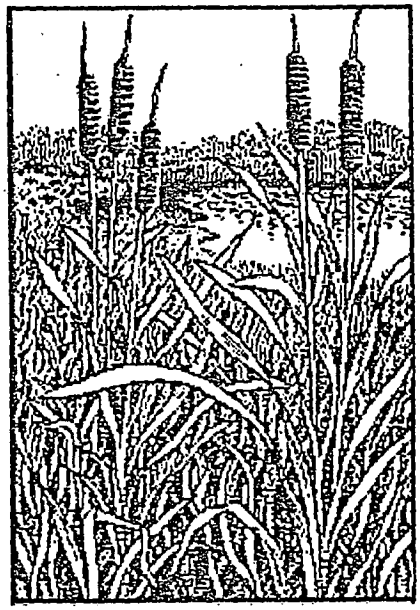
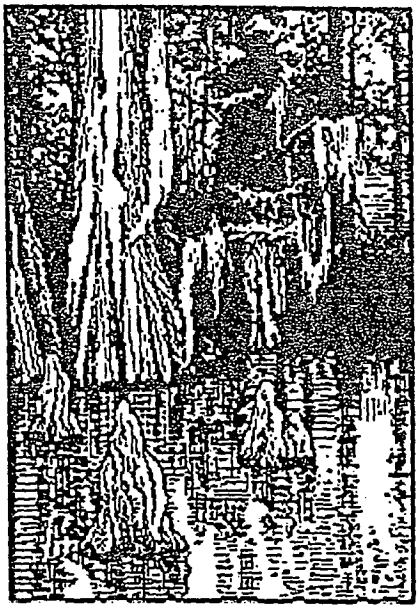
US Army Corps
of Engineers
Waterways Experiment
Station

Wetlands Research Program Technical Report Y-87-1 (on-line edition)

Corps of Engineers Wetlands Delineation Manual

by Environmental Laboratory





January 1987 - Final Report
Approved For Public Release; Distribution Is Unlimited

Wetlands Research Program

Technical Report Y-87-1
January 1987

Corps of Engineers Wetlands Delineation Manual

by Environmental Laboratory

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Final report

Approved for public release; distribution is unlimited

Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000

Contents

Preface to the On-Line Edition v

Preface to the Original Edition vii

Conversion Factors, Non-SI to SI Units of Measurement ix

Part I: Introduction 1

- Background 1
- Purpose and Objectives 1
- Scope 2
- Organization 3
- Use 5

Part II: Technical Guidelines 9

- Wetlands 9
- Deepwater Aquatic Habitats 10
- Nonwetlands 11

Part III: Characteristics and Indicators of Hydrophytic Vegetation, Hydric Soils, and Wetland Hydrology 12

- Hydrophytic Vegetation 12
- Hydric Soils 20
- Wetland Hydrology 28

Part IV: Methods 35

- Section A. Introduction 35
- Section B. Preliminary Data Gathering and Synthesis 36
- Section C. Selection of Method 44
- Section D. Routine Determinations 45
  - Subsection 1 - Onsite Inspection Unnecessary 45
  - Subsection 2 - Onsite Inspection Necessary 49
    - Areas Equal To or Less Than 5 Acres in Size 52
    - Areas Greater Than 5 Acres in Size 55
  - Subsection 3 - Combination of Levels 1 and 2 60
- Section E. Comprehensive Determinations 61
- Section F. Atypical Situations 73
  - Subsection 1 - Vegetation 74

Subsection 2 - Soils 77
Subsection 3 - Hydrology 80
Subsection 4 - Man-Induced Wetlands 82
Section G. Problem Areas 84

References 87

Bibliography 90

Appendix A: Glossary A1

Appendix B: Blank and Example Data Forms B1

Appendix C: Vegetation C1

Appendix D: Hydric Soils D1

SF 298

List of Figures

Figure 1. General schematic diagram of activities leading to a wetland/nonwetland determination 7

Figure 2. Generalized soil profile 23

Figure 3. Organic soil 24

Figure 4. Gleyed soil 26

Figure 5. Soil showing matrix (brown) and mottles (reddish-brown) 26

Figure 6. Iron and manganese concretions 27

Figure 7. Watermark on trees 32

Figure 8. Absence of leaf litter 33

Figure 9. Sediment deposit on plants 33

Figure 10. Encrusted detritus 33

Figure 11. Drainage pattern 34

Figure 12. Debris deposited in stream channel 34

Figure 13. Flowchart of steps involved in making a wetland determination when an onsite inspection is unnecessary 47

Figure 14. Flowchart of steps involved in making a routine wetland determination when an onsite visit is necessary 50

Figure 15. General orientation of baseline and transects (dotted lines) in a hypothetical project area. Alpha characters represent different plant communities. All transects start at the midpoint of a baseline segment except the first, which was repositioned to include community type A 56

Figure 16. Flowchart of steps involved in making a comprehensive wetland determination (Section E) 63

Figure 17. General orientation of baseline and transects in a hypothetical project area. Alpha characters represent different plant communities. Transect positions were determined using a random numbers table 66

List of Tables

Table 1. Plant Indicator Status Categories 14

Table 2. List of CE Preliminary Wetland Guides 15

Table 3. List of Ecological Profiles Produced by the FWS Biological Services Program 16

Table 4. List of Some Useful Taxonomic References 19

Table 5. Hydrologic Zones - Nontidal Areas 30

Preface to the On-Line Edition

This is an electronic version of the 1987 *Corps of Engineers Wetlands Delineation Manual* (the 1987 Manual). The 1987 Manual is the current Federal delineation manual used in the Clean Water Act Section 404 regulatory program for the identification and delineation of wetlands. Except where noted in the manual, the approach requires positive evidence of hydrophytic vegetation, hydric soils, and wetland hydrology for a determination that an area is a wetland.

The original manual and this on-line edition were prepared by the Environmental Laboratory (EL) of the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi. The work was sponsored by Headquarters, U.S. Army Corps of Engineers (HQUSACE), through the Wetlands Research Program.

The manual was originally published in January 1987, following several years of development and testing of draft versions. Since that time, the use and interpretation of the 1987 Manual have been clarified and updated through a series of guidance documents and memoranda from HQUSACE. This electronic edition does not change the intent or jurisdictional area of the 1987 Manual. It does, however, attempt to clarify the manual and current guidance by including a number of boxed "USER NOTES" indicating where the original manual has been augmented by more recent information or guidance. USER NOTES were written by Dr. James S. Wakeley, EL, WES. Due to re-formatting of the text and insertion of the USER NOTES, page numbers in this edition do not match those in the original edition. Some obsolete material appears in this document as struck-out text (e.g., ~~obsolete material~~), and hypertext links are provided to sources of important supplementary information (e.g., hydric soils lists, wetland plant lists). References cited in the USER NOTES refer to the following guidance documents from HQUSACE:

"Clarification of the Phrase "Normal Circumstances" as it pertains to Cropped Wetlands," Regulatory Guidance Letter (RGL) 90-7 dated 26 September 1990.

"Implementation of the 1987 Corps Wetland Delineation Manual," memorandum from John P. Elmore dated 27 August 1991.

"Questions & Answers on the 1987 Manual," memorandum from John F. Studt dated 7 October 1991.

"Clarification and Interpretation of the 1987 Manual," memorandum from Major General Arthur E. Williams dated 6 March 1992.

"Revisions to National Plant Lists," memorandum from Michael L. Davis dated 17 January 1996.

"NRCS Field Indicators of Hydric Soils," memorandum from John F. Studt dated 21 March 1997.

Copies of the original published manual are available through the National Technical Information Service (phone 703-487-4650, NTIS document number ADA 176734/2INE). The report should be cited as follows:

Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Useful supplementary information for making wetland determinations can also be found at the following sites on the World Wide Web:

- Hydric soils definition, criteria, and lists
- National list of plant species that occur in wetlands
- Analyses of normal precipitation ranges and growing season limits
- National Wetlands Inventory maps and databases

Preface to the Original Edition

This manual is a product of the Wetlands Research Program (WRP) of the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS. The work was sponsored by the Office, Chief of Engineers (OCE), U.S. Army. OCE Technical monitors for the WRP were Drs. John R. Hall and Robert J. Pierce, and Mr. Phillip C. Pierce.

The manual has been reviewed and concurred in by the Office of the Chief of Engineers and the Office of the Assistant Secretary of the Army (Civil Works) ~~as a method approved for voluntary use in the field for a trial period of 1 year~~.

~~This manual is not intended to change appreciably the jurisdiction of the Clean Water Act (CWA) as it is currently implemented. Should any District find that use of this method appreciably contracts or expands jurisdiction in their District as the District currently interprets CWA authority, the District should immediately discontinue use of this method and furnish a full report of the circumstances to the Office of the Chief of Engineers~~.

USER NOTES: Use of the 1987 Manual to identify and delineate wetlands potentially subject to regulation under Section 404 is now mandatory. (HQUSACE, 27 Aug 91)

This manual describes technical guidelines and methods using a multiparameter approach to identify and delineate wetlands for purposes of Section 404 of the Clean Water Act. Appendices of supporting technical information are also provided.

The manual is presented in four parts. Part II was prepared by Dr. Robert T. Huffman, formerly of the Environmental Laboratory (EL), WES, and Dr. Dana R. Sanders, Sr., of the Wetland and Terrestrial Habitat Group (WTHG), Environmental Resources Division (ERD), EL. Dr. Huffman prepared the original version of Part II in 1980, entitled "Multiple Parameter Approach to the Field Identification and Delineation of Wetlands." The original version was distributed to all Corps field elements, as well as other Federal resource and environmental regulatory agencies, for review and comments. Dr. Sanders revised the original version in 1982, incorporating review comments. Parts I, III, and IV

were prepared by Dr. Sanders, Mr. William B. Parker (formerly detailed to WES by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS)) and Mr. Stephen W. Forsythe (formerly detailed to WES by the U.S. Department of the Interior, Fish and Wildlife Service (FWS)). Dr. Sanders also served as overall technical editor of the manual. The manual was edited by Ms. Jamie W. Leach of the WES Information Products Division.

The authors acknowledge technical assistance provided by: Mr. Russell F. Theriot, Mr. Ellis J. Clairain, Jr., and Mr. Charles J. Newling, all of WTHG, ERD; Mr. Phillip Jones, former SCS detail to WES; Mr. Porter B. Reed, FWS, National Wetland Inventory, St. Petersburg, Fla.; Dr. Dan K. Evans, Marshall University, Huntington, W. Va.; and the USDA-SCS. The authors also express gratitude to Corps personnel who assisted in developing the regional lists of species that commonly occur in wetlands, including Mr. Richard Macomber, Bureau of Rivers and Harbors; Ms. Kathy Mulder, Kansas City District; Mr. Michael Gilbert, Omaha District; Ms. Vicki Goodnight, Southwestern Division; Dr. Fred Weinmann, Seattle District; and Mr. Michael Lee, Pacific Ocean Division. Special thanks are offered to the CE personnel who reviewed and commented on the draft manual, and to those who participated in a workshop that consolidated the field comments.

The work was monitored at WES under the direct supervision of Dr. Hanley K. Smith, Chief, WTHG, and under the general supervision of Dr. Conrad J. Kirby, Jr., Chief, ERD. Dr. Smith, Dr. Sanders, and Mr. Theriot were Managers of the WRP. Dr. John Harrison was Chief, EL.

Director of WES during the preparation of this report was COL Allen F. Grum, USA. During publication, COL Dwayne G. Lee, CE, was Commander and Director. Technical Director was Dr. Robert W. Whalin.

This report should be cited as follows:

> Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
acres	0.4047	hectares
Fahrenheit degrees	5/9	Celsius degrees[1]
feet	0.3048	metres
inches	2.54	centimetres
miles (U.S. statute)	1.6093	kilometres
square inches	6.4516	square centimetres

[1] To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: C = (5/9) (F - 32).

Part I: Introduction

Background

1. Recognizing the potential for continued or accelerated degradation of the Nation's waters, the U.S. Congress enacted the Clean Water Act (hereafter referred to as the Act), formerly known as the Federal Water Pollution Control Act (33 U.S.C. 1344). The objective of the Act is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States. Section 404 of the Act authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the United States, including wetlands.

Purpose and Objectives

Purpose

2. The purpose of this manual is to provide users with guidelines and methods to determine whether an area is a wetland for purposes of Section 404 of the Act.

Objectives

3. Specific objectives of the manual are to:

a. Present technical guidelines for identifying wetlands and distinguishing them from aquatic habitats and other nonwetlands.[1]

b. Provide methods for applying the technical guidelines.

c. Provide supporting information useful in applying the technical guidelines.

---

[1] Definitions of terms used in this manual are presented in the Glossary, Appendix A.

Scope

4. This manual is limited in scope to wetlands that are a subset of "waters of the United States" and thus subject to Section 404. The term "waters of the United States" has broad meaning and incorporates both deep-water aquatic habitats and special aquatic sites, including wetlands (*Federal Register* 1982), as follows:

a. The territorial seas with respect to the discharge of fill material.

b. Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands.

c. Tributaries to navigable waters of the United States, including adjacent wetlands.

d. Interstate waters and their tributaries, including adjacent wetlands.

e. All others waters of the United States not identified above, such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not a part of a tributary system to interstate waters or navigable waters of the United States, the degradation or destruction of which could affect interstate commerce.

Determination that a water body or wetland is subject to interstate commerce and therefore is a "water of the United States" shall be made independently of procedures described in this manual.

Special aquatic sites

5. The Environmental Protection Agency (EPA) identifies six categories of special aquatic sites in their Section 404 b.(l) guidelines (*Federal Register* 1980), including:

a. Sanctuaries and refuges.

b. Wetlands.

c. Mudflats.

d. Vegetated shallows.

e. Coral reefs.

f. Riffle and pool complexes.

Although all of these special aquatic sites are subject to provisions of the Clean Water Act, this manual considers only wetlands. By definition, wetlands are vegetated. Thus, unvegetated special aquatic sites (e.g., mudflats lacking macrophytic vegetation) are not covered in this manual.

Relationship to wetland classification systems

6. The technical guideline for wetlands does not constitute a classification system. It only provides a basis for determining whether a given area is a wetland for purposes of Section 404, without attempting to classify it by wetland type.

7. Consideration should be given to the relationship between the technical guideline for wetlands and the classification system developed for the Fish and Wildlife Service (FWS), U.S. Department of the Interior, by Cowardin et al. (1979). The FWS classification system was developed as a basis for identifying, classifying, and mapping wetlands, other special aquatic sites, and deepwater aquatic habitats. Using this classification system, the National Wetland Inventory (NWI) is mapping the wetlands, other special aquatic sites, and deepwater aquatic habitats of the United States, and is also developing both a list of plant species that occur in wetlands and an associated plant database. These products should contribute significantly to application of the technical guideline for wetlands. The technical guideline for wetlands as presented in the manual includes most, but not all, wetlands identified in the FWS system. The difference is due to two principal factors:

a. The FWS system includes all categories of special aquatic sites identified in the EPA Section 404 b.(l) guidelines. All other special aquatic sites are clearly within the purview of Section 404; thus, special methods for their delineation are unnecessary.

b. The FWS system requires that a positive indicator of wetlands be present for any one of the three parameters, while the technical guideline for wetlands requires that a positive wetland indicator be present for each parameter (vegetation, soils, and hydrology), except in limited instances identified in the manual.

Organization

8. This manual consists of four parts and four appendices. Part I presents the background, purpose and objectives, scope, organization, and use of the manual.

9. Part II focuses on the technical guideline for wetlands, and stresses the need for considering all three parameters (vegetation, soils, and hydrology) when making wetland determinations. Since wetlands occur in an intermediate posi-

tion along the hydrologic gradient, comparative technical guidelines are also presented for deepwater aquatic sites and nonwetlands.

10. Part III contains general information on hydrophytic vegetation, hydric soils, and wetland hydrology. Positive wetland indicators of each parameter are included.

11. Part IV, which presents methods for applying the technical guideline for wetlands, is arranged in a format that leads to a logical determination of whether a given area is a wetland. Section A contains general information related to application of methods. Section B outlines preliminary data-gathering efforts. Section C discusses two approaches (routine and comprehensive) for making wetland determinations and presents criteria for deciding the correct approach to use. Sections D and E describe detailed procedures for making routine and comprehensive determinations, respectively. The basic procedures are described in a series of steps that lead to a wetland determination.

12. The manual also describes (Part IV, Section F) methods for delineating wetlands in which the vegetation, soils, and/or hydrology have been altered by recent human activities or natural events, as discussed below:

a. The definition of wetlands contains the phrase "under normal circumstances," which was included because there are instances in which the vegetation in a wetland has been inadvertently or purposely removed or altered as a result of recent natural events or human activities. Other examples of human alterations that may affect wetlands are draining, ditching, levees, deposition of fill, irrigation, and impoundments. When such activities occur, an area may fail to meet the diagnostic criteria for a wetland. Likewise, positive hydric soil indicators may be absent in some recently created wetlands. In such cases, an alternative method must be employed in making wetland determinations.

USER NOTES: "Normal circumstances" has been further defined as "the soil and hydrologic conditions that are normally present, without regard to whether the vegetation has been removed." The determination of whether normal circumstances exist in a disturbed area "involves an evaluation of the extent and relative permanence of the physical alteration of wetlands hydrology and hydrophytic vegetation" and consideration of the "purpose and cause of the physical alterations to hydrology and vegetation." (RGL 90-7, 26 Sep 90; HQUSACE, 7 Oct 91).

b. Natural events may also result in sufficient modification of an area that indicators of one or more wetland parameters are absent. For example, changes in river course may significantly alter hydrology, or beaver dams may create new wetland areas that lack hydric soil conditions. Catastrophic events (e.g., fires, avalanches, mudslides,

and volcanic activities) may also alter or destroy wetland indicators on a site.

Such atypical situations occur throughout the United States, and all of these cannot be identified in this manual.

13. Certain wetland types, under the extremes of normal circumstances, may not always meet all the wetland criteria defined in the manual. Examples include prairie potholes during drought years and seasonal wetlands that may lack hydrophytic vegetation during the dry season. Such areas are discussed in Part IV, Section G, and guidance is provided for making wetland determinations in these areas. However, such wetland areas may warrant additional research to refine methods for their delineation.

14. Appendix A is a glossary of technical terms used in the manual. Definitions of some terms were taken from other technical sources, but most terms are defined according to the manner in which they are used in the manual.

15. Data forms for methods presented in Part IV are included in Appendix B. Examples of completed data forms are also provided.

16. Supporting information is presented in Appendices C and D. ~~Appendix C contains lists of plant species that occur in wetlands. Section 1 consists of regional lists developed by a Federal interagency panel. Section 2 consists of shorter lists of plant species that commonly occur in wetlands of each region.~~

USER NOTES: CE-supplied plant lists are obsolete and have been superseded by the May 1988 version of the "National List of Plant Species that Occur in Wetlands" published by the U.S. Fish and Wildlife Service and available on the World Wide Web. (HQUSACE, 27 Aug 91)

Section 3 describes morphological, physiological, and reproductive adaptations associated with hydrophytic species, as well as a list of some species exhibiting such adaptations. Appendix D discusses procedures for examining soils for hydric soil indicators, ~~and also contains a list of hydric soils of the United States~~.

USER NOTES: The hydric soil list published in the 1987 Corps Manual is obsolete. Current hydric soil definition, criteria, and lists are available over the World Wide Web from the U.S.D.A. Natural Resources Conservation Service (NRCS). (HQUSACE, 27 Aug 91, 6 Mar 92)

Use

17. Although this manual was prepared primarily for use by Corps of Engineers (CE) field inspectors, it should be useful to anyone who makes wetland determinations for purposes of Section 404 of the Clean Water Act. The user is

directed through a series of steps that involve gathering of information and decisionmaking, ultimately leading to a wetland determination. A general flow diagram of activities leading to a determination is presented in Figure 1. However, not all activities identified in Figure 1 will be required for each wetland determination. For example, if a decision is made to use a routine determination procedure, comprehensive determination procedures will not be employed.

Premise for use of the manual

18. Three key provisions of the CE/EPA definition of wetlands include:

a. Inundated or saturated soil conditions resulting from permanent or periodic inundation by ground water or surface water.

b. A prevalence of vegetation typically adapted for life in saturated soil conditions (hydrophytic vegetation).

c. The presence of "normal circumstances."

19. Explicit in the definition is the consideration of three environmental parameters: hydrology, soil, and vegetation. Positive wetland indicators of all three parameters are normally present in wetlands. Although vegetation is often the most readily observed parameter, sole reliance on vegetation or either of the other parameters as the determinant of wetlands can sometimes be misleading. Many plant species can grow successfully in both wetlands and nonwetlands, and hydrophytic vegetation and hydric soils may persist for decades following alteration of hydrology that will render an area a nonwetland. The presence of hydric soils and wetland hydrology indicators in addition to vegetation indicators will provide a logical, easily defensible, and technical basis for the presence of wetlands. The combined use of indicators for all three parameters will enhance the technical accuracy, consistency, and credibility of wetland determinations. Therefore, all three parameters were used in developing the technical guideline for wetlands and all approaches for applying the technical guideline embody the multiparameter concept.

Approaches

20. The approach used for wetland delineations will vary, based primarily on the complexity of the area in question. Two basic approaches described in the manual are (a) routine and (b) comprehensive.

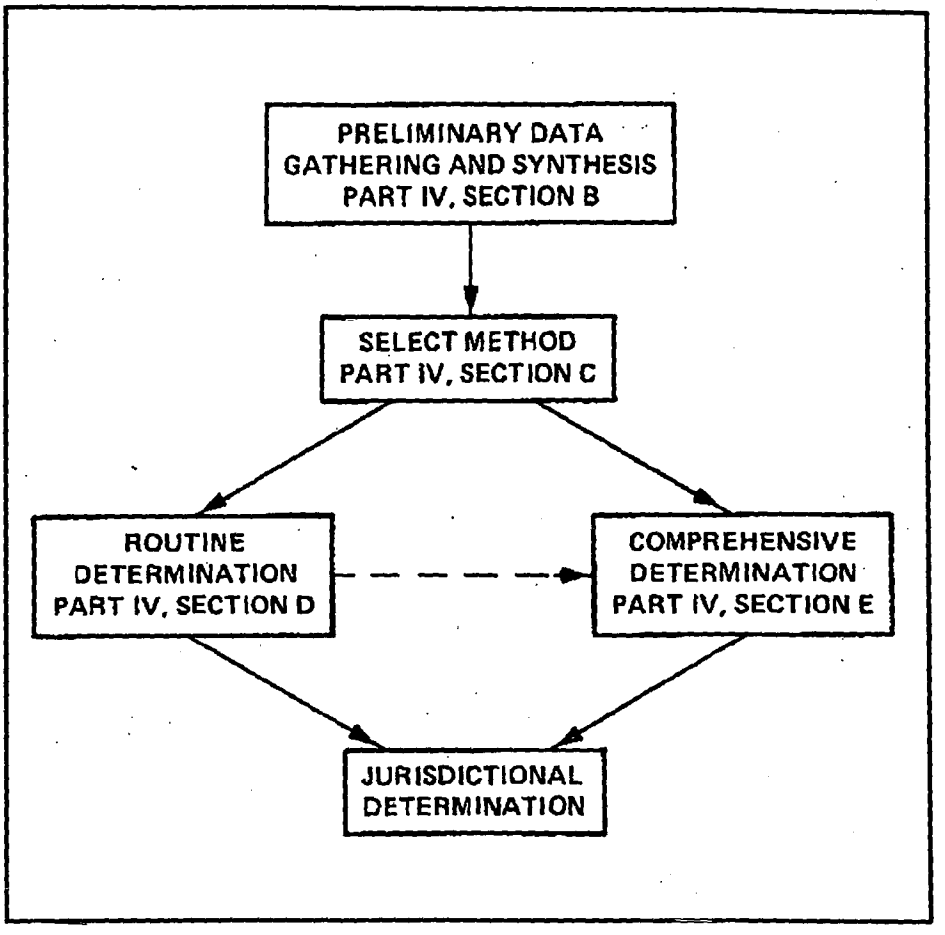


Figure 1. General schematic diagram of activities leading to a wetland/non-wetland determination

21. **Routine approach.** The routine approach normally will be used in the vast majority of determinations. The routine approach requires minimal level of effort, using primarily qualitative procedures. This approach can be further subdivided into three levels of required effort, depending on the complexity of the area and the amount and quality of preliminary data available. The following levels of effort may be used for routine determinations:

a. *Level 1 - Onsite inspection unnecessary.* (Part IV, Section D, Subsection 1).

b. *Level 2 - Onsite inspection necessary.* (Part IV, Section D, Subsection 2).

c. *Level 3 - Combination of Levels 1 and 2.* (Part IV, Section D, Subsection 3).

22. **Comprehensive approach.** The comprehensive approach requires application of quantitative procedures for making wetland determinations. It should

seldom be necessary, and its use should be restricted to situations in which the wetland is very complex and/or is the subject of likely or pending litigation. Application of the comprehensive approach (Part IV, Section E) requires a greater level of expertise than application of the routine approach, and only experienced field personnel with sufficient training should use this approach.

Flexibility

23. Procedures described for both routine and comprehensive wetland determinations have been tested and found to be reliable. However, site-specific conditions may require modification of field procedures. For example, slope configuration in a complex area may necessitate modification of the baseline and transect positions. Since specific characteristics (e.g., plant density) of a given plant community may necessitate the use of alternate methods for determining the dominant species, the user has the flexibility to employ sampling procedures other than those described. However, the basic approach for making wetland determinations should not be altered (i.e., the determination should be based on the dominant plant species, soil characteristics, and hydrologic characteristics of the area in question). The user should document reasons for using a different characterization procedure than described in the manual. *CAUTION: Application of methods described in the manual or the modified sampling procedures requires that the user be familiar with wetlands of the area and use his or her training, experience, and good judgment in making wetland determinations.*

Part II: Technical Guidelines

24. The interaction of hydrology, vegetation, and soil results in the development of characteristics unique to wetlands. Therefore, the following technical guideline for wetlands is based on these three parameters, and diagnostic environmental characteristics used in applying the technical guideline are represented by various indicators of these parameters.

25. Because wetlands may be bordered by both wetter areas (aquatic habitats) and by drier areas (nonwetlands), guidelines are presented for wetlands, deepwater aquatic habitats, and nonwetlands. However, procedures for applying the technical guidelines for deepwater aquatic habitats and nonwetlands are not included in the manual.

Wetlands

26. The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for the identification and delineation of wetlands:

a. *Definition.* The CE (*Federal Register* 1982) and the EPA (*Federal Register* 1980) jointly define wetlands as: Those areas that are inundated or saturated by surface or ground water 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.

b. *Diagnostic environmental characteristics.* Wetlands have the following general diagnostic environmental characteristics:

(1) *Vegetation.* The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions described in *a* above. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic

soil conditions.[1] Indicators of vegetation associated with wetlands are listed in paragraph 35.

(2) *Soil.* Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions. Indicators of soils developed under reducing conditions are listed in paragraphs 44 and 45.

(3) *Hydrology.* The area is inundated either permanently or periodically at mean water depths ≤ 6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.[2] Indicators of hydrologic conditions that occur in wetlands are listed in paragraph 49.

c. *Technical approach for the identification and delineation of wetlands.* Except in certain situations defined in this manual, evidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland determination.

Deepwater Aquatic Habitats

27. The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for deepwater aquatic habitats:

a. *Definition.* Deepwater aquatic habitats are areas that are permanently inundated at mean annual water depths >6.6 ft or permanently inundated areas ≤ 6.6 ft in depth that do not support rooted-emergent or woody plant species.[3]

b. *Diagnostic environmental characteristics.* Deepwater aquatic habitats have the following diagnostic environmental characteristics:

(1) *Vegetation.* No rooted-emergent or woody plant species are present in these permanently inundated areas.

(2) *Soil.* The substrate technically is not defined as a soil if the mean water depth is >6.6 ft or if it will not support rooted emergent or woody plants.

---

[1] Species (e.g., *Acer rubrum*) having broad ecological tolerances occur in both wetlands and nonwetlands.

[2] The period of inundation or soil saturation varies according to the hydrologic/soil moisture regime and occurs in both tidal and nontidal situations.

[3] Areas ≤6.6 ft mean annual depth that support only submergent aquatic plants are vegetated shallows, not wetlands.

(3) *Hydrology.* The area is permanently inundated at mean water depths >6.6 ft.

c. *Technical approach for the identification and delineation of deepwater aquatic habitats.* When any one of the diagnostic characteristics identified in *b* above is present, the area is a deepwater aquatic habitat.

Nonwetlands

28. The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for the identification and delineation of nonwetlands:

a. *Definition.* Nonwetlands include uplands and lowland areas that are neither deepwater aquatic habitats, wetlands, nor other special aquatic sites. They are seldom or never inundated, or if frequently inundated, they have saturated soils for only brief periods during the growing season, and, if vegetated, they normally support a prevalence of vegetation typically adapted for life only in aerobic soil conditions.

b. *Diagnostic environmental characteristics.* Nonwetlands have the following general diagnostic environmental characteristics:

(1) *Vegetation.* The prevalent vegetation consists of plant species that are typically adapted for life only in aerobic soils. These mesophytic and/or xerophytic macrophytes cannot persist in predominantly anaerobic soil conditions.[1]

(2) *Soil.* Soils, when present, are not classified as hydric, and possess characteristics associated with aerobic conditions.

(3) *Hydrology.* Although the soil may be inundated or saturated by surface water or ground water periodically during the growing season of the prevalent vegetation, the average annual duration of inundation or soil saturation does not preclude the occurrence of plant species typically adapted for life in aerobic soil conditions.

c. *Technical approach for the identification and delineation of nonwetlands.* When any one of the diagnostic characteristics identified in *b* above is present, the area is a nonwetland.

---

[1] Some species, due to their broad ecological tolerances, occur in both wetlands and nonwetlands (e.g., *Acer rubrum*).

Part III: Characteristics and Indicators of Hydrophytic Vegetation, Hydric Soils, and Wetland Hydrology

Hydrophytic Vegetation

Definition

29. **Hydrophytic vegetation.** Hydrophytic vegetation is defined herein as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. The vegetation occurring in a wetland may consist of more than one plant community (species association). The plant community concept is followed throughout the manual. Emphasis is placed on the assemblage of plant species that exert a controlling influence on the character of the plant community, rather than on indicator species. Thus, the presence of scattered individuals of an upland plant species in a community dominated by hydrophytic species is not a sufficient basis for concluding that the area is an upland community. Likewise, the presence of a few individuals of a hydrophytic species in a community dominated by upland species is not a sufficient basis for concluding that the area has hydrophytic vegetation. *CAUTION: In determining whether an area is "vegetated" for the purpose of Section 404 jurisdiction, users must consider the density of vegetation at the site being evaluated. While it is not possible to develop a numerical method to determine how many plants or how much biomass is needed to establish an area as being vegetated or unvegetated, it is intended that the predominant condition of the site be used to make that characterization. This concept applies to areas grading from wetland to upland, and from wetland to other waters. This limitation would not necessarily apply to areas which have been disturbed by man or recent natural events.*

30. **Prevalence of vegetation.** The definition of wetlands includes the phrase "prevalence of vegetation." Prevalence, as applied to vegetation, is an imprecise, seldom-used ecological term. As used in the wetlands definition, prevalence refers to the plant community or communities that occur in an area at some point in time. Prevalent vegetation is characterized by the dominant species comprising the plant community or communities. Dominant plant species are those that contribute more to the character of a plant community than other species present, as estimated or measured in terms of some ecological parameter or parameters. The two most commonly used estimates of dominance are basal area (trees) and percent areal cover (herbs). Hydrophytic vegetation is prevalent in an area when the dominant species comprising the plant community or communities are typically adapted for life in saturated soil conditions.

USER NOTES: The "50/20 rule" is the recommended method for selecting dominant species from a plant community when quantitative data are available. The rule states that for each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50% of the total dominance measure for the stratum, plus any additional species that individually comprise 20% or more of the total dominance measure for the stratum. The list of dominant species is then combined across strata. (HQUSACE, 6 Mar 92)

31. **Typically adapted.** The term "typically adapted" refers to a species being normally or commonly suited to a given set of environmental conditions, due to some morphological, physiological, or reproductive adaptation (Appendix C, Section 3). As used in the CE wetlands definition, the governing environmental conditions for hydrophytic vegetation are saturated soils resulting from periodic inundation or saturation by surface or ground water. These periodic events must occur for sufficient duration to result in anaerobic soil conditions. When the dominant species in a plant community are typically adapted for life in anaerobic soil conditions, hydrophytic vegetation is present. Species ~~listed in Appendix C, Section 1 or 2,~~ that have an indicator status of OBL, FACW, or FAC[1] (Table 1) are considered to be typically adapted for life in anaerobic soil conditions (see paragraph 35*a*).

Influencing factors

32. Many factors (e.g., light, temperature, soil texture and permeability, man-induced disturbance, etc.) influence the character of hydrophytic vegetation. However, hydrologic factors exert an overriding influence on species that can occur in wetlands. Plants lacking morphological, physiological, and/or reproductive adaptations cannot grow, effectively compete, reproduce, and/or persist in areas that are subject to prolonged inundation or saturated soil conditions.

---

[1] Species having a FAC- indicator status are not considered to be typically adapted for life in anaerobic soil conditions.

Table 1
Plant Indicator Status Categories[1]

Indicator Category	Indicator Symbol	Definition
Obligate Wetland Plants	OBL	Plants that occur almost always (estimated probability >99 percent) in wetlands under natural conditions, but which may also occur rarely (estimated probability <1 percent) in nonwetlands. Examples: *Spartina alterniflora, Taxodium distichum.*
Facultative Wetland Plants	FACW	Plants that occur usually (estimated probability >67 percent to 99 percent) in wetlands, but also occur (estimated probability 1 percent to 33 percent) in nonwetlands. Examples: *Fraxinus pennsylvanica, Cornus stolonifera.*
Facultative Plants	FAC	Plants with a similar likelihood (estimated probability 33 percent to 67 percent) of occurring in both wetlands and nonwetlands. Examples: *Gleditsia triacanthos, Smilax rotundifolia.*
Facultative Upland Plants	FACU	Plants that occur sometimes (estimated probability 1 percent to <33 percent) in wetlands, but occur more often (estimated probability >67 percent to 99 percent) in nonwetlands. Examples: *Quercus rubra, Potentilla arguta.*
Obligate Upland Plants	UPL	Plants that occur rarely (estimated probability <1 percent) in wetlands, but occur almost always (estimated probability >99 percent) in nonwetlands under natural conditions. Examples: *Pinus echinata, Bromus mollis.*

[1] Categories were originally developed and defined by the USFWS National Wetlands Inventory and subsequently modified by the National Plant List Panel. The three facultative categories are subdivided by (+) and (–) modifiers ~~(see Appendix C, Section 1)~~.

Geographic diversity

33. Many hydrophytic vegetation types occur in the United States due to the diversity of interactions among various factors that influence the distribution of hydrophytic species. General climate and flora contribute greatly to regional variations in hydrophytic vegetation. Consequently, the same associations of hydrophytic species occurring in the southeastern United States are not found in the Pacific Northwest. In addition, local environmental conditions (e.g., local climate, hydrologic regimes, soil series, salinity, etc.) may result in broad variations in hydrophytic associations within a given region. For example, a coastal saltwater marsh will consist of different species than an inland freshwater marsh in the same region. An overview of hydrophytic vegetation occurring in each region of the Nation has been published by the CE in a series of eight preliminary wetland guides (Table 2), and a group of wetland and estuarine ecological profiles (Table 3) has been published by FWS.

Classification

34. Numerous efforts have been made to classify hydrophytic vegetation. Most systems are based on general characteristics of the dominant species occurring in each vegetation type. These range from the use of general physiognomic categories (e.g., overstory, subcanopy, ground cover, vines) to specific vegetation types (e.g., forest type numbers as developed by the Society of American Foresters). In other cases, vegetational characteristics are combined with hydrologic features to produce more elaborate systems. The most recent example of such a system was developed for the FWS by Cowardin et al. (1979).

Table 2
List of CE Preliminary Wetland Guides

Region	Publication Date	WES Report No.
Peninsular Florida	February 1978	TR Y-78-2
Puerto Rico	April 1978	TR Y-78-3
West Coast States	April 1978	TR-Y-78-4
Gulf Coastal Plain	May 1978	TR Y-78-5
Interior	May 1982	TR Y-78-6
South Atlantic States	May 1982	TR Y-78-7
North Atlantic States	May 1982	TR Y-78-8
Alaska	February 1984	TR Y-78-9

Table 3
List of Ecological Profiles Produced by the FWS Biological Services Program

Title	Publication Date	FWS Publication No.
"The Ecology of Intertidal Flats of North Carolina"	1979	79/39
"The Ecology of New England Tidal Flats"	1982	81/01
"The Ecology of the Mangroves of South Florida"	1982	81/24
"The Ecology of Bottomland Hardwood Swamps of the Southeast"	1982	81/37
"The Ecology of Southern California Coastal Salt Marshes"	1982	81/54
"The Ecology of New England High Salt Marshes"	1982	81/55
"The Ecology of Southeastern Shrub Bogs (Pocosins) and Carolina Bays"	1982	82/04
"The Ecology of the Apalachicola Bay System"	1984	82/05
"The Ecology of the Pamlico River, North Carolina"	1984	82/06
"The Ecology of the South Florida Coral Reefs"	1984	82/08
"The Ecology of the Sea Grasses of South Florida"	1982	82/25
"The Ecology of Tidal Marshes of the Pacific Northwest Coast"	1983	82/32
"The Ecology of Tidal Freshwater Marshes of the U.S. East Coast"	1984	83/17
"The Ecology of San Francisco Bay Tidal Marshes"	1983	82/23
"The Ecology of Tundra Ponds of the Arctic Coastal Plain"	1984	83/25
"The Ecology of Eelgrass Meadows of the Atlantic Coast"	1984	84/02
"The Ecology of Delta Marshes of Louisiana"	1984	84/09
"The Ecology of Eelgrass Meadows in the Pacific Northwest"	1984	84/24
"The Ecology of Irregularly Flooded Marshes of Northeastern Gulf of Mexico"	(In press)	85(7.1)
"The Ecology of Giant Kelp Forests in California"	1985	85(7.2)

Indicators of hydrophytic vegetation

35. Several indicators may be used to determine whether hydrophytic vegetation is present on a site. However, the presence of a single individual of a hydrophytic species does not mean that hydrophytic vegetation is present. The strongest case for the presence of hydrophytic vegetation can be made when

several indicators, such as those in the following list, are present. However, any one of the following is indicative that hydrophytic vegetation is present:[1]

a. *More than 50 percent of the dominant species are OBL, FACW, or FAC[2] (Table 1) on lists of plant species that occur in wetlands.* A national interagency panel has prepared a National List of Plant Species that occur in wetlands. This list categorizes species according to their affinity for occurrence in wetlands. ~~Regional subset lists of the national list, including only species having an indicator status of OBL, FACW, or FAC, are presented in Appendix C, Section 1. The CE has also developed regional lists of plant species that commonly occur in wetlands (Appendix C, Section 2). Either list may be used.~~

USER NOTES: CE-supplied plant lists are obsolete and have been superseded by the May 1988 version of the "National List of Plant Species that Occur in Wetlands" published by the U.S. Fish and Wildlife Service and available on the World Wide Web. Subsequent changes to the May 1988 national plant list, or regional versions of the national list, should not be used until they receive official review and approval. (HQUSACE, 27 Aug 91 and 17 Jan 96)

Note: A District that, on a subregional basis, questions the indicator status of FAC species may use the following option: When FAC species occur as dominants along with other dominants that are not FAC (either wetter or drier than FAC), the FAC species can be considered as neutral, and the vegetation decision can be based on the number of dominant species wetter than FAC as compared to the number of dominant species drier than FAC. When a tie occurs or all dominant species are FAC, the nondominant species must be considered. The area has hydrophytic vegetation when more than 50 percent of all considered species are wetter than FAC. When either all considered species are FAC or the number of species wetter than FAC equals the number of species drier than FAC, the wetland determination will be based on the soil and hydrology parameters. Districts adopting this option should provide documented support to the Corps representative on the regional plant list panel, so that a change in indicator status of FAC species of concern can be pursued. Corps representatives on the regional and national plant list panels will continually strive to ensure that plant species are properly designated on both a regional and subregional basis.

---

[1] Indicators are listed in order of decreasing reliability. Although all are valid indicators, some are stronger than others. When a decision is based on an indicator appearing in the lower portion of the list, re-evaluate the parameter to ensure that the proper decision was reached.

[2] FAC+ species are considered to be wetter (i.e., have a greater estimated probability of occurring in wetlands) than FAC species, while FAC- species are considered to be drier (i.e., have a lesser estimated probability of occurring in wetlands) than FAC species.

USER NOTES: The FAC-neutral option can not be used to exclude areas as wetlands that meet the basic vegetation rule (i.e., more than 50% of dominant species are FAC, FACW, or OBL) and meet wetland hydrology and hydric soil requirements. Presence of a plant community that satisfies the FAC-neutral option may be used as a secondary indicator of wetland hydrology. (HQUSACE, 6 Mar 92)

b. Other indicators. Although there are several other indicators of hydrophytic vegetation, it will seldom be necessary to use them. However, they may provide additional useful information to strengthen a case for the presence of hydrophytic vegetation. Additional training and/or experience may be required to employ these indicators.

(1) *Visual observation of plant species growing in areas of prolonged inundation and/or soil saturation.* This indicator can only be applied by experienced personnel who have accumulated information through several years of field experience and written documentation (field notes) that certain species commonly occur in areas of prolonged (>10 percent) inundation and/or soil saturation during the growing season. Species such as *Taxodium distichum, Typha latifolia,* and *Spartina alterniflora* normally occur in such areas. Thus, occurrence of species commonly observed in other wetland areas provides a strong indication that hydrophytic vegetation is present. *CAUTION: The presence of standing water or saturated soil on a site is insufficient evidence that the species present are able to tolerate long periods of inundation. The user must relate the observed species to other similar situations and determine whether they are normally found in wet areas, taking into consideration the season and immediately preceding weather conditions.*

(2) *Morphological adaptations.* Some hydrophytic species have easily recognized physical characteristics that indicate their ability to occur in wetlands. A given species may exhibit several of these characteristics, but not all hydrophytic species have evident morphological adaptations. A list of such morphological adaptations and a partial list of plant species with known morphological adaptations for occurrence in wetlands are provided in Appendix C, Section 3.

(3) *Technical literature.* The technical literature may provide a strong indication that plant species comprising the prevalent vegetation are commonly found in areas where soils are periodically saturated for long periods. Sources of available literature include:

(a) *Taxonomic references.* Such references usually contain at least a general description of the habitat in which a species occurs. A habitat description such as, "Occurs in water of streams and lakes and in alluvial floodplains subject to

periodic flooding," supports a conclusion that the species typically occurs in wetlands. Examples of some useful taxonomic references are provided in Table 4.

Table 4
List of Some Useful Taxonomic References

Title	Author(s)
Manual of Vascular Plants of Northeastern United States and Adjacent Canada	Gleason and Cronquist (1963)
Gray's Manual of Botany, 8th edition	Fernald (1950)
Manual of the Southeastern Flora	Small (1933)
Manual of the Vascular Flora of the Carolinas	Radford, Ahles, and Bell (1968)
A Flora of Tropical Florida	Long and Lakela (1976)
Aquatic and Wetland Plants of the Southwestern United States	Correll and Correll (1972)
Arizona Flora	Kearney and Peebles (1960)
Flora of the Pacific Northwest	Hitchcock and Cronquist (1973)
A California Flora	Munz and Keck (1959)
Flora of Missouri	Steyermark (1963)
Manual of the Plants of Colorado	Harrington (1979)
Intermountain Flora - Vascular Plants of the Intermountain West, USA - Vols I and II	Cronquist et al. (1972)
Flora of Idaho	Davis (1952)
Aquatic and Wetland Plants of the Southeastern United States - Vols I and II	Godfrey and Wooten (1979)
Manual of Grasses of the U.S.	Hitchcock (1950)

(b) *Botanical journals.* Some botanical journals contain studies that define species occurrence in various hydrologic regimes. Examples of such journals include: *Ecology, Ecological Monographs, American Journal of Botany, Journal of American Forestry, and Wetlands: The Journal of the Society of Wetland Scientists.*

(c) *Technical reports.* Governmental agencies periodically publish reports (e.g., literature reviews) that contain information on plant species occurrence in relation to hydrologic regimes. Examples of such publications include the CE preliminary regional wetland guides (Table 2) published by the U.S. Army Engineer Waterways Experiment Station (WES) and the wetland community and estuarine profiles of various habitat types (Table 3) published by the FWS.

(d) *Technical workshops, conferences, and symposia.* Publications resulting from periodic scientific meetings contain valuable information that can be used to support a decision regarding the presence of hydrophytic vegetation. These usually address specific regions or wetland types. For example, distribution of bottomland hardwood forest species in relation to hydrologic regimes was examined at a workshop on bottomland hardwood forest wetlands of the Southeastern United States (Clark and Benforado 1981).

(e) *Wetland plant database.* The NWI is producing a Plant Database that contains habitat information on approximately 5,200 plant species that occur at some estimated probability in wetlands, as compiled from the technical literature. When completed, this computerized database will be available to all governmental agencies.

(4) *Physiological adaptations.* Physiological adaptations include any features of the metabolic processes of plants that make them particularly fitted for life in saturated soil conditions. *NOTE: It is impossible to detect the presence of physiological adaptations in plant species during onsite visits.* Physiological adaptations known for hydrophytic species and species known to exhibit these adaptations are listed and discussed in Appendix C, Section 3.

(5) *Reproductive adaptations.* Some plant species have reproductive features that enable them to become established and grow in saturated soil conditions. Reproductive adaptations known for hydrophytic species are presented in Appendix C, Section 3.

Hydric Soils

Definition

36. ~~A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) 1985, as amended by the National Technical Committee for Hydric Soils (NTCHS) in December 1986).~~

Criteria for hydric soils

37. ~~Based on the above definition, the NTCHS developed the following criteria for hydric soils:~~

a. ~~All Histosols[1] except Folists;~~

b. ~~Soils in Aquic suborders, Aquic subgroups, Albolls suborder, Salorthids great group, or Pell great groups of Vertisols that are:~~

(1) ~~Somewhat poorly drained and have a water table less than 0.5 ft[2] from the surface for a significant period (usually a week or more) during the growing season, or~~

(2) ~~Poorly drained or very poorly drained and have either:~~

(a) ~~A water table at less than 1.0 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches; or~~

(b) ~~A water table at less than 1.5 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is less than 6.0 in/hr in any layer within 20 inches; or~~

c. ~~Soils that are ponded for long or very long duration during the growing season; or~~

d. ~~Soils that are frequently flooded for long duration or very long duration during the growing season.~~

USER NOTES: The hydric soil definition and criteria published in the 1987 Corps Manual are obsolete. Current hydric soil definition, criteria, and lists are available over the World Wide Web from the U.S.D.A. Natural Resources Conservation Service (NRCS). (HQUSACE, 27 Aug 91, 6 Mar 92)

A hydric soil may be either drained or undrained, and a drained hydric soil may not continue to support hydrophytic vegetation. Therefore, not all areas having hydric soils will qualify as wetlands. Only when a hydric soil supports hydrophytic vegetation and the area has indicators of wetland hydrology may the soil be referred to as a "wetland" soil.

38. A drained hydric soil is one in which sufficient ground or surface water has been removed by artificial means such that the area will no longer support hydrophyte vegetation. Onsite evidence of drained soils includes:

---

[1] Soil nomenclature follows USDA-SCS (1975).

[2] A table of factors for converting Non-SI Units of Measurement to SI (metric) units is presented on page x.

a. Presence of ditches or canals of sufficient depth to lower the water table below the major portion of the root zone of the prevalent vegetation.

b. Presence of dikes, levees, or similar structures that obstruct normal inundation of an area.

c. Presence of a tile system to promote subsurface drainage.

d. Diversion of upland surface runoff from an area.

Although it is important to record such evidence of drainage of an area, a hydric soil that has been drained or partially drained still allows the soil parameter to be met. However, the area will not qualify as a wetland if the degree of drainage has been sufficient to preclude the presence of either hydrophytic vegetation or a hydrologic regime that occurs in wetlands. *NOTE: The mere presence of drainage structures in an area is not sufficient basis for concluding that a hydric soil has been drained; such areas may continue to have wetland hydrology.*

General information

39. Soils consist of unconsolidated, natural material that supports, or is capable of supporting, plant life. The upper limit is air and the lower limit is either bedrock or the limit of biological activity. Some soils have very little organic matter (mineral soils), while others are composed primarily of organic matter (Histosols). The relative proportions of particles (sand, silt, clay, and organic matter) in a soil are influenced by many interacting environmental factors. As normally defined, a soil must support plant life. The concept is expanded to include substrates that could support plant life. For various reasons, plants may be absent from areas that have well-defined soils.

40. A soil profile (Figure 2) consists of various soil layers described from the surface downward. Most soils have two or more identifiable horizons. A soil horizon is a layer oriented approximately parallel to the soil surface, and usually is differentiated from contiguous horizons by characteristics that can be seen or measured in the field (e.g., color, structure, texture, etc.). Most mineral soils have A-, B-, and C-horizons, and many have surficial organic layers (O-horizon). The A-horizon, the surface soil or topsoil, is a zone in which organic matter is usually being added to the mineral soil. It is also the zone from which both mineral and organic matter are being moved slowly downward. The next major horizon is the B-horizon, often referred to as the subsoil. The B-horizon is the zone of maximum accumulation of materials. It is usually characterized by higher clay content and/or more pronounced soil structure development and lower organic matter than the A-horizon. The next major horizon is usually the C-horizon, which consists of unconsolidated parent material that has not been sufficiently weathered to exhibit characteristics of the B-horizon. Clay content and degree of soil structure development in the C-horizon are usually less than in the B-horizon. The lowest major horizon, the R-horizon, consists of consoli-

dated bedrock. In many situations, this horizon occurs at such depths that it has no significant influence on soil characteristics.

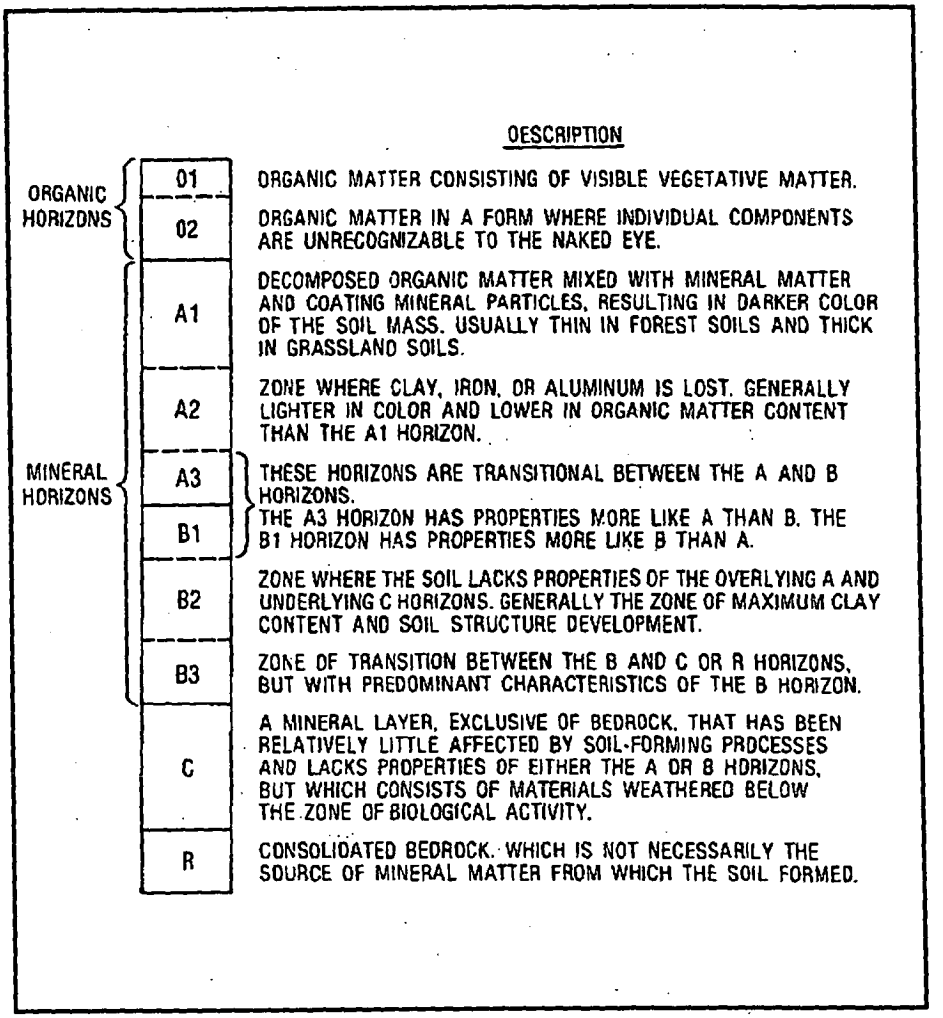


Figure 2. Generalized soil profile

Influencing factors

41. Although all soil-forming factors (climate, parent material, relief, organisms, and time) affect the characteristics of a hydric soil, the overriding influence is the hydrologic regime. The unique characteristics of hydric soils result from the influence of periodic or permanent inundation or soil saturation for sufficient duration to effect anaerobic conditions. Prolonged anaerobic soil conditions lead to a reducing environment, thereby lowering the soil redox potential. This results in chemical reduction of some soil components (e.g., iron and manganese oxides), which leads to development of soil colors and other physical characteristics that usually are indicative of hydric soils.

Classification

42. Hydric soils occur in several categories of the current soil classification system, which is published in *Soil Taxonomy* (USDA-SCS 1975). This classification system is based on physical and chemical properties of soils that can be seen, felt, or measured. Lower taxonomic categories of the system (e.g., soil series and soil phases) remain relatively unchanged from earlier classification systems.

43. Hydric soils may be classified into two broad categories: organic and mineral. Organic soils (Histosols) develop under conditions of nearly continuous saturation and/or inundation. All organic soils are hydric soils except Folists, which are freely drained soils occurring on dry slopes where excess litter accumulates over bedrock. Organic hydric soils are commonly known as peats and mucks. All other hydric soils are mineral soils. Mineral soils have a wide range of textures (sandy to clayey) and colors (red to gray). Mineral hydric soils are those periodically saturated for sufficient duration to produce chemical and physical soil properties associated with a reducing environment. They are usually gray and/or mottled immediately below the surface horizon (see paragraph 44*d*), or they have thick, dark-colored surface layers overlying gray or mottled subsurface horizons.

Wetland indicators (nonsandy soils)

44. Several indicators are available for determining whether a given soil meets the definition and criteria for hydric soils. Any one of the following indicates that hydric soils are present:[1]

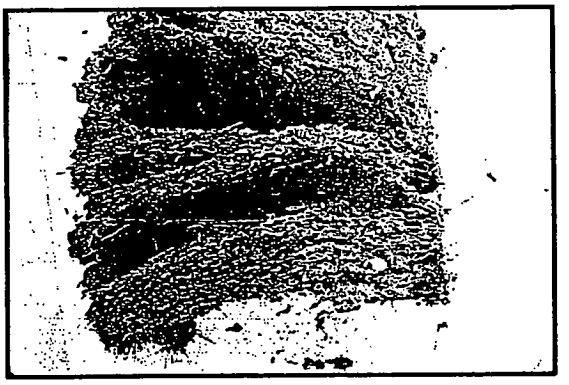


Figure 3. Organic soil

a. *Organic soils (Histosols).* A soil is an organic soil when: (1) more than 50 percent (by volume) of the upper 32 inches of soil is composed of organic soil material;[2] or (2) organic soil material of any thickness rests on bedrock. Organic soils (Figure 3) are saturated for long periods and are commonly called peats or mucks.

b. *Histic epipedons.* A histic epipedon is an 8- to 16-inch layer at or near the surface of a mineral hydric soil that is saturated with

[1] Indicators are listed in order of decreasing reliability. Although all are valid indicators, some are stronger indicators than others. When a decision is based on an indicator appearing in the lower portion of the list, re-evaluate the parameter to ensure that the proper decision was reached.

[2] A detailed definition of organic soil material is available in USDA-SCS (1975).

water for 30 consecutive days or more in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent organic matter when clay content is 60 percent or greater. Soils with histic epipedons are inundated or saturated for sufficient periods to greatly retard aerobic decomposition of the organic surface, and are considered to be hydric soils.

c. *Sulfidic material.* When mineral soils emit an odor of rotten eggs, hydrogen sulfide is present. Such odors are only detected in waterlogged soils that are permanently saturated and have sulfidic material within a few centimeters of the soil surface. Sulfides are produced only in a reducing environment.

d. *Aquic or peraquic moisture regime.* An aquic moisture regime is a reducing one; i.e., it is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe (USDA-SCS 1975). Because dissolved oxygen is removed from ground water by respiration of microorganisms, roots, and soil fauna, it is also implicit that the soil temperature is above biologic zero (5° C) at some time while the soil is saturated. Soils with *peraquic* moisture regimes are characterized by the presence of ground water always at or near the soil surface. Examples include soils of tidal marshes and soils of closed, landlocked depressions that are fed by permanent streams.

e. *Reducing soil conditions.* Soils saturated for long or very long duration will usually exhibit reducing conditions. Under such conditions, ions of iron are transformed from a ferric valence state to a ferrous valence state. This condition can often be detected in the field by a ferrous iron test. A simple colorimetric field test kit has been developed for this purpose. When a soil extract changes to a pink color upon addition of α,α'-dipyridyl, ferrous iron is present, which indicates a reducing soil environment. *NOTE: This test cannot be used in mineral hydric soils having low iron content, organic soils, and soils that have been desaturated for significant periods of the growing season.*

f. *Soil colors.* The colors of various soil components are often the most diagnostic indicator of hydric soils. Colors of these components are strongly influenced by the frequency and duration of soil saturation, which leads to reducing soil conditions. Mineral hydric soils will be either gleyed or will have bright mottles and/or low matrix chroma. These are discussed below:

   (1) *Gleyed soils (gray colors).* Gleyed soils develop when anaerobic soil conditions result in pronounced chemical reduction of iron, manganese, and other elements, thereby producing gray soil colors. Anaerobic conditions that occur in waterlogged soils result in the predominance of reduction processes, and such soils are greatly reduced. Iron is one of the most abundant elements in soils. Under anaerobic conditions, iron in converted from the oxidized (ferric)

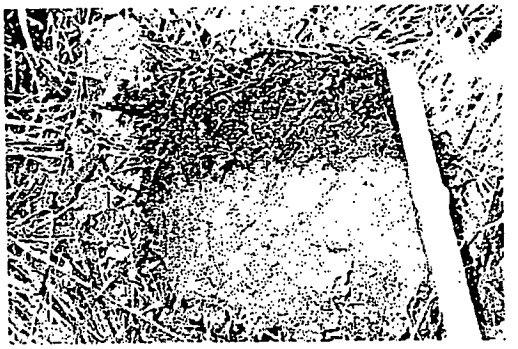


Figure 4. Gleyed soil

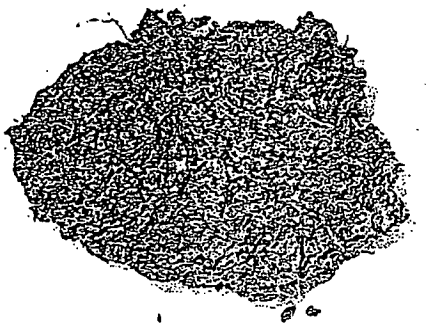


Figure 5. Soil showing matrix (brown) and mottles (reddish-brown)

state to the reduced (ferrous) state, which results in the bluish, greenish, or grayish colors associated with the gleying effect (Figure 4). Gleying immediately below the A-horizon or 10 inches (whichever is shallower) is an indication of a markedly reduced soil, and gleyed soils are hydric soils. Gleyed soil conditions can be determined by using the gley page of the Munsell Color Book (Munsell Color 1975).

(2) *Soils with bright mottles and/or low matrix chroma.* Mineral hydric soils that are saturated for substantial periods of the growing season (but not long enough to produce gleyed soils) will either have bright mottles and a low matrix chroma or will lack mottles but have a low matrix chroma (see Appendix D, Section 1, for a definition and discussion of "chroma" and other components of soil color). *Mottled* means "marked with spots of contrasting color." Soils that have brightly colored mottles and a low matrix chroma are indicative of a fluctuating water table. The soil *matrix* is the portion (usually more than 50 percent) of a given soil layer that has the predominant color (Figure 5). Mineral hydric soils usually have one of the following color features in the horizon immediately below the A-horizon or 10 inches (whichever is shallower):

(a) Matrix chroma of 2 or less[1] in mottled soils.

(b) Matrix chroma of 1 or less[1] in unmottled soils.

NOTE: The matrix chroma of some dark (black) mineral hydric soils will not conform to the criteria described in (a) and (b) above; in such soils, gray mottles occurring at 10 inches or less are indicative of hydric conditions.

[1] Colors should be determined in soils that have been moistened; otherwise, state that colors are for dry soils.

CAUTION: Soils with significant coloration due to the nature of the parent material (e.g., red soils of the Red River Valley) may not exhibit the above characteristics. In such cases, this indicator cannot be used.

g. *Soil appearing on hydric soils list.* Using the criteria for hydric soils (paragraph 37), the NTCHS has developed a list of hydric soils.

USER NOTES: The NRCS has developed local lists of hydric soil mapping units that are available from NRCS county and area offices. These local lists are the preferred hydric soil lists to use in making wetland determinations. (HQUSACE, 6 Mar 92)

Listed soils have reducing conditions for a significant portion of the growing season in a major portion of the root zone and are frequently saturated within 12 inches of the soil surface. ~~The NTCHS list of hydric soils is presented in Appendix D, Section 2.~~ *CAUTION: Be sure that the profile description of the mapping unit conforms to that of the sampled soil.*

h. *Iron and manganese concretions.* During the oxidation-reduction process, iron and manganese in suspension are sometimes segregated as oxides into concretions or soft masses (Figure 6). These accumulations are usually black or dark brown. Concretions >2 mm in diameter occurring within 7.5 cm of the surface are evidence that the soil is saturated for long periods near the surface.

Figure 6. Iron and manganese concretions

Wetland indicators (sandy soils)

45. Not all indicators listed in paragraph 44 can be applied to sandy soils. *In particular, soil color should not be used as an indicator in most sandy soils.* However, three additional soil features may be used as indicators of sandy hydric soils, including:

a. *High organic matter content in the surface horizon.* Organic matter tends to accumulate above or in the surface horizon of sandy soils that

are inundated or saturated to the surface for a significant portion of the growing season. Prolonged inundation or saturation creates anaerobic conditions that greatly reduce oxidation of organic matter.

b. *Streaking of subsurface horizons by organic matter.* Organic matter is moved downward through sand as the water table fluctuates. This often occurs more rapidly and to a greater degree in some vertical sections of a sandy soil containing high content of organic matter than in others. Thus, the sandy soil appears vertically streaked with darker areas. When soil from a darker area is rubbed between the fingers, the organic matter stains the fingers.

c. *Organic pans.* As organic matter is moved downward through sandy soils, it tends to accumulate at the point representing the most commonly occurring depth to the water table. This organic matter tends to become slightly cemented with aluminum, forming a thin layer of hardened soil (spodic horizon). These horizons often occur at depths of 12 to 30 inches below the mineral surface. Wet spodic soils usually have thick dark surface horizons that are high in organic matter with dull, gray horizons above the spodic horizon.

USER NOTES: The NRCS has developed regional lists of "Field Indicators of Hydric Soils in the United States" (Version 3.2, July 1996, or later). Until approved, these indicators do not supersede those given in the 1987 Corps Manual and supplemental guidance but may be used as supplementary information. Several of the NRCS indicators were developed specifically to help in identifying hydric soils in certain problem soil types (e.g., sandy soils, soils derived from red parent materials, soils with thick, dark surfaces). These indicators may be used under procedures given in the Problem Area section of the 1987 Manual. (HQUSACE, 21 Mar 97)

CAUTION: In recently deposited sandy material (e.g., accreting sandbars), it may be impossible to find any of these indicators. In such cases, consider this as a natural atypical situation.

Wetland Hydrology

Definition

46. The term "wetland hydrology" encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Such characteristics are usually present in areas that

are inundated or have soils that are saturated to the surface for sufficient duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic soil conditions. Hydrology is often the least exact of the parameters, and indicators of wetland hydrology are sometimes difficult to find in the field. However, it is essential to establish that a wetland area is periodically inundated or has saturated soils during the growing season.

USER NOTES: The 1987 Manual (see glossary, Appendix A) defines "growing season" as the portion of the year when soil temperature (measured 20 inches below the surface) is above biological zero (5° C or 41° F). This period "can be approximated by the number of frost-free days." Estimated starting and ending dates for the growing season are based on 28° F air temperature thresholds at a frequency of 5 years in 10 (HQUSACE, 6 Mar 92). This information is available in NRCS county soil survey reports or from the NRCS Water and Climate Center in Portland, Oregon, for most weather stations in the country.

Influencing factors

47. Numerous factors (e.g., precipitation, stratigraphy, topography, soil permeability, and plant cover) influence the wetness of an area. Regardless, the characteristic common to all wetlands is the presence of an abundant supply of water. The water source may be runoff from direct precipitation, headwater or backwater flooding, tidal influence, ground water, or some combination of these sources. The frequency and duration of inundation or soil saturation varies from nearly permanently inundated or saturated to irregularly inundated or saturated. Topographic position, stratigraphy, and soil permeability influence both the frequency and duration of inundation and soil saturation. Areas of lower elevation in a floodplain or marsh have more frequent periods of inundation and/or greater duration than most areas at higher elevations. Floodplain configuration may significantly affect duration of inundation. When the floodplain configuration is conducive to rapid runoff, the influence of frequent periods of inundation on vegetation and soils may be reduced. Soil permeability also influences duration of inundation and soil saturation. For example, clayey soils absorb water more slowly than sandy or loamy soils, and therefore have slower permeability and remain saturated much longer. Type and amount of plant cover affect both degree of inundation and duration of saturated soil conditions. Excess water drains more slowly in areas of abundant plant cover, thereby increasing frequency and duration of inundation and/or soil saturation. On the other hand, transpiration rates are higher in areas of abundant plant cover, which may reduce the duration of soil saturation.

Classification

48. Although the interactive effects of all hydrologic factors produce a continuum of wetland hydrologic regimes, efforts have been made to classify wet-

land hydrologic regimes into functional categories. These efforts have focused on the use of frequency, timing, and duration of inundation or soil saturation as a basis for classification. A classification system developed for nontidal areas is presented in Table 5. This classification system was slightly modified from the system developed by the Workshop on Bottomland Hardwood Forest Wetlands of the Southeastern United States (Clark and Benforado 1981). Recent research indicates that duration of inundation and/or soil saturation during the growing season is more influential on the plant community than frequency of inundation/ saturation during the growing season (Theriot, in press). Thus, frequency of inundation and soil saturation are not included in Table 5. ~~The WES has developed a computer program that can be used to transform stream gage data to mean sea level elevations representing the upper limit of each hydrologic zone shown in Table 5. This program is available upon request.~~[1]

USER NOTES: Based on Table 5 and on paragraph 55, Step 8.i., an area has wetland hydrology if it is inundated or saturated to the surface continuously for at least 5% of the growing season in most years (50% probability of recurrence). These areas are wetlands if they also meet hydrophytic vegetation and hydric soil requirements. (HQUSACE, 7 Oct 91 and 6 Mar 92)

Table 5
Hydrologic Zones[1] - Nontidal Areas

Zone	Name	Duration[2]	Comments
I[3]	Permanently inundated	100 percent	Inundation >6.6 ft mean water depth
II	Semipermanently to nearly permanently inundated or saturated	>75 - <100 percent	Inundation defined as ≤6.6 ft mean water depth
III	Regularly inundated or saturated	>25 - 75 percent	
IV	Seasonally inundated or saturated	>12.5 - 25 percent	
V	Irregularly inundated or saturated	≥5 - 12.5 percent	Many areas having these hydrologic characteristics are not wetlands
VI	Intermittently or never inundated or saturated	<5 percent	Areas with these hydrologic characteristics are not wetlands

[1] Zones adapted from Clark and Benforado (1981).
[2] Refers to duration of inundation and/or soil saturation during the growing season.
[3] This defines an aquatic habitat zone.

Wetland indicators

49. Indicators of wetland hydrology may include, but are not necessarily limited to: drainage patterns, drift lines, sediment deposition, watermarks,

[1] ~~R. F. Theriot, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180.~~

stream gage data and flood predictions, historic records, visual observation of saturated soils, and visual observation of inundation. Any of these indicators may be evidence of wetland hydrologic characteristics. Methods for determining hydrologic indicators can be categorized according to the type of indicator. Recorded data include stream gage data, lake gage data, tidal gage data, flood predictions, and historical records. Use of these data is commonly limited to areas adjacent to streams or other similar areas. Recorded data usually provide both short- and long-term information about frequency and duration of inundation, but contain little or no information about soil saturation, which must be gained from soil surveys or other similar sources. The remaining indicators require field observations. Field indicators are evidence of present or past hydrologic events (e.g., location and height of flooding). Indicators for recorded data and field observations include:[1]

a. *Recorded data.* Stream gage data, lake gage data, tidal gage data, flood predictions, and historical data may be available from the following sources:

(1) *CE District Offices.* Most CE Districts maintain stream, lake, and tidal gage records for major water bodies in their area. In addition, CE planning and design documents often contain valuable hydrologic information. For example, a General Design Memorandum (GDM) usually describes flooding frequencies and durations for a project area. Furthermore, the extent of flooding within a project area is sometimes indicated in the GDM according to elevation (height) of certain flood frequencies (1-, 2-, 5-, 10-year, etc.).

(2) *U.S. Geological Survey (USGS).* Stream and tidal gage data are available from the USGS offices throughout the Nation, and the latter are also available from the National Oceanic and Atmospheric Administration. CE Districts often have such records.

(3) *State, county, and local agencies.* These agencies often have responsibility for flood control/relief and flood insurance.

(4) *Soil Conservation Service Small Watershed Projects.* Planning documents from this agency are often helpful, and can be obtained from the SCS district office in the county.

(5) *Planning documents of developers.*

b. *Field data.* The following field hydrologic indicators can be assessed quickly, and although some of them are not necessarily indicative of hydrologic events that occur only during the growing season, they do provide evidence that inundation and/or soil saturation has occurred:

---

[1] Indicators are listed in order of decreasing reliability. Although all are valid indicators, some are stronger indicators than others. When a decision is based on an indicator appearing in the lower portion of the list, re-evaluate the parameter to ensure that the proper decision was reached.

(1) *Visual observation of inundation.* The most obvious and revealing hydrologic indicator may be simply observing the areal extent of inundation. However, because seasonal conditions and recent weather conditions can contribute to surface water being present on a nonwetland site, both should be considered when applying this indicator.

(2) *Visual observation of soil saturation.* Examination of this indicator requires digging a soil pit (Appendix D, Section 1) to a depth of 16 inches and observing the level at which water stands in the hole after sufficient time has been allowed for water to drain into the hole. The required time will vary depending on soil texture. In some cases, the upper level at which water is flowing into the pit can be observed by examining the wall of the hole. This level represents the depth to the water table. The depth to saturated soils will always be nearer the surface due to the capillary fringe.

For soil saturation to impact vegetation, it must occur within a *major portion of the root zone* (usually within 12 inches of the surface) of the prevalent vegetation. The major portion of the root zone is that portion of the soil profile in which more than one half of the plant roots occur. *CAUTION: In some heavy clay soils, water may not rapidly accumulate in the hole even when the soil is saturated. If water is observed at the bottom of the hole but has not filled to the 12-inch depth, examine the sides of the hole and determine the shallowest depth at which water is entering the hole. When applying this indicator, both the season of the year and preceding weather conditions must be considered.*

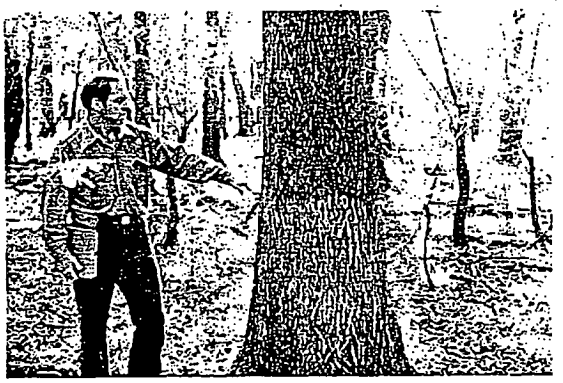


Figure 7. Watermark on trees

(3) *Watermarks.* Watermarks are most common on woody vegetation. They occur as stains on bark (Figure 7) or other fixed objects (e.g., bridge pillars, buildings, fences, etc.). When several watermarks are present, the highest reflects the maximum extent of recent inundation.

(4) *Drift lines.* This indicator is most likely to be found adjacent to streams or other

sources of water flow in wetlands, but also often occurs in tidal marshes. Evidence consists of deposition of debris in a line on the surface (Figure 8) or debris entangled in aboveground vegetation or other fixed objects. Debris usually consists of remnants of vegetation (branches, stems, and leaves), sediment, litter, and other waterborne materials deposited parallel to the direction of water flow. Drift lines provide an indication of the minimum portion of the area inundated during a flooding event; the maximum level of inundation is generally at a higher elevation than that indicated by a drift line.

Figure 8. Absence of leaf litter

(5) *Sediment deposits.* Plants and other vertical objects often have thin layers, coatings, or depositions of mineral or organic matter on them after inundation (Figure 9). This evidence may remain for a considerable period before it is removed by precipitation or subsequent inundation. Sediment deposition on vegetation and other objects provides an indication of the minimum inundation level. When sediments are primarily organic (e.g., fine organic material, algae), the detritus may become encrusted on or slightly above the soil surface after dewatering occurs (Figure 10).

Figure 9. Sediment deposit on plants

Figure 10. Encrusted detritus

(6) *Drainage patterns within wetlands.* This indicator, which occurs primarily in wetlands

Part IV: Methods

Section A. Introduction

50. Part IV contains sections on preliminary data gathering, method selection, routine determination procedures, comprehensive determination procedures, methods for determinations in atypical situations, and guidance for wetland determinations in natural situations where the three-parameter approach may not always apply.

51. Significant flexibility has been incorporated into Part IV. The user is presented in Section B with various potential sources of information that may be helpful in making a determination, but not all identified sources of information may be applicable to a given situation. *NOTE: The user is not required to obtain information from all identified sources.* Flexibility is also provided in method selection (Section C). Three levels of routine determinations are available, depending on the complexity of the required determination and the quantity and quality of existing information. Application of methods presented in both Section D (routine determinations) and Section E (comprehensive determinations) may be tailored to meet site-specific requirements, especially with respect to sampling design.

52. Methods presented in Sections D and E vary with respect to the required level of technical knowledge and experience of the user. Application of the qualitative methods presented in Section D (routine determinations) requires considerably less technical knowledge and experience than does application of the quantitative methods presented in Section E (comprehensive determinations). The user must at least be able to identify the dominant plant species in the project area when making a routine determination (Section D), and should have some basic knowledge of hydric soils when employing routine methods that require soils examination. Comprehensive determinations require a basic understanding of sampling principles and the ability to identify all commonly occurring plant species in a project area, as well as a good understanding of indicators of hydric soils and wetland hydrology. The comprehensive method should only be employed by experienced field inspectors.

adjacent to streams, consists of surface evidence of drainage flow into or through an area (Figure 11). In some wetlands, this evidence may exist as a drainage pattern eroded into the soil, vegetative matter (debris) piled against thick vegetation or woody stems oriented perpendicular to the direction of water flow, or the absence of leaf litter (Figure 8). Scouring is often evident around roots of persistent vegetation. Debris may be deposited in or along the drainage pattern (Figure 12).

Figure 11. Drainage pattern

Figure 12. Debris deposited in stream channel

CAUTION: Drainage patterns also occur in upland areas after periods of considerable precipitation; therefore, topographic position must also be considered when applying this indicator.

USER NOTES: The hydrology indicators described above are considered to be "primary indicators", any one of which is sufficient evidence that wetland hydrology is present when combined with a hydrophytic plant community and hydric soils. In addition, the following "secondary indicators" may also be used to determine whether wetland hydrology is present. In the absence of a primary indicator, any two secondary indicators must be present to conclude that wetland hydrology is present. Secondary indicators are: presence of oxidized rhizospheres associated with living plant roots in the upper 12 inches of the soil, presence of water-stained leaves, local soil survey hydrology data for identified soils, and the FAC-neutral test of the vegetation. (HQUSACE, 6 Mar 92)

Section B. Preliminary Data Gathering and Synthesis

53. This section discusses potential sources of information that may be helpful in making a wetland determination. When the routine approach is used, it may often be possible to make a wetland determination based on available vegetation, soils, and hydrology data for the area. However, this section deals only with identifying potential information sources, extracting pertinent data, and synthesizing the data for use in making a determination. Based on the quantity and quality of available information and the approach selected for use (Section C), the user is referred to either Section D or Section E for the actual determination. Completion of Section B is not required, but is recommended because the available information may reduce or eliminate the need for field effort and decrease the time and cost of making a determination. However, there are instances in small project areas in which the time required to obtain the information may be prohibitive. In such cases PROCEED to paragraph 55, complete STEPS 1 through 3, and PROCEED to Section D or E.

Data sources

54. Obtain the following information, when available and applicable:

a. *USGS quadrangle maps.* USGS quadrangle maps are available at different scales. When possible, obtain maps at a scale of 1:24,000; otherwise, use maps at a scale of 1:62,500. Such maps are available from USGS in Reston, VA, and Menlo Park, CA, but they may already be available in the CE District Office. These maps provide several types of information:

(1) Assistance in locating field sites. Towns, minor roads, bridges, streams, and other landmark features (e.g., buildings, cemeteries, water bodies, etc.) not commonly found on road maps are shown on these maps.

(2) Topographic details, including contour lines (usually at 5- or 10-ft contour intervals).

(3) General delineation of wet areas (swamps and marshes). *NOTE: The actual wet area may be greater than that shown on the map because USGS generally maps these areas based on the driest season of the year.*

(4) Latitude, longitude, townships, ranges, and sections. These provide legal descriptions of the area.

(5) Directions, including both true and magnetic north.

(6) Drainage patterns.

(7) General land uses, such as cleared (agriculture or pasture), forested, or urban.

CAUTION: Obtain the most recent USGS maps. Older maps may show features that no longer exist and will not show new features that have developed since the map was constructed. Also, USGS is currently changing the mapping scale from 1:24,000 to 1:25,000.

b. National Wetlands Inventory products.

(1) *Wetland maps.* The standard NWI maps are at a scale of 1:24,000 or, where USGS base maps at this scale are not available, they are at 1:62,500 (1:63,350 in Alaska). Smaller scale maps ranging from 1:100,000 to 1:500,000 are also available for certain areas. Wetlands on NWI maps are classified in accordance with Cowardin et al. (1979). *CAUTION: Since not all delineated areas on NWI maps are wetlands under Department of Army jurisdiction, NWI maps should not be used as the sole basis for determining whether wetland vegetation is present.* NWI "User Notes" are available that correlate the classification system with local wetland community types. An important feature of this classification system is the water regime modifier, which describes the flooding or soil saturation characteristics. Wetlands classified as having a temporarily flooded or intermittently flooded water regime should be viewed with particular caution since this designation is indicative of plant communities that are transitional between wetland and nonwetland. These are among the most difficult plant communities to map accurately from aerial photography. For wetlands "wetter" than temporarily flooded and intermittently flooded, the probability of a designated map unit on recent NWI maps being a wetland (according to Cowardin et al. 1979) at the time of the photography is in excess of 90 percent. *CAUTION: Due to the scale of aerial photography used and other factors, all NWI map boundaries are approximate.* The optimum use of NWI maps is to plan field review (i.e., how wet, big, or diverse is the area?) and to assist during field review, particularly by showing the approximate areal extent of the wetland and its association with other communities. NWI maps are available either as a composite with, or an overlay for, USGS base maps and may be obtained from the NWI Central Office in St. Petersburg, FL, the Wetland Coordinator at each FWS regional office, or the USGS.

USER NOTES: NWI products and information are available over the World Wide Web.

(2) *Plant database.* This database of approximately 5,200 plant species that occur in wetlands provides information (e.g., ranges, habitat, etc.) about each plant species from the technical literature. The database served as a focal point for development of a national list of plants that occur in wetlands (~~Appendix C, Section 1~~).

c. *Soil Surveys.* Soil surveys are prepared by the SCS for political units (county, parish, etc.) in a state. Soil surveys contain several types of information:

(1) General information (e.g., climate, settlement, natural resources, farming, geology, general vegetation types).

(2) Soil maps for general and detailed planning purposes. These maps are usually generated from fairly recent aerial photography. *CAUTION: The smallest mapping unit is 3 acres, and a given soil series as mapped may contain small inclusions of other series.*

(3) Uses and management of soils. Any wetness characteristics of soils will be mentioned here.

(4) Soil properties. Soil and water features are provided that may be very helpful for wetland investigations. Frequency, duration, and timing of inundation (when present) are described for each soil type. Water table characteristics that provide valuable information about soil saturation are also described. Soil permeability coefficients may also be available.

(5) Soil classification. Soil series and phases are usually provided. Published soil surveys will not always be available for the area. If not, contact the county SCS office and determine whether the soils have been mapped.

d. *Stream and tidal gage data.* These documents provide records of tidal and stream flow events. They are available from either the USGS or CE District office.

e. *Environmental impact assessments (EIAs), environmental impact statements (EISs), general design memoranda (GDM), and other similar publications.* These documents may be available from Federal agencies for an area that includes the project area. They may contain some indication of the location and characteristics of wetlands consistent with the required criteria (vegetation, soils, and hydrology), and often contain flood frequency and duration data.

f. *Documents and maps from State, county, or local governments.* Regional maps that characterize certain areas (e.g., potholes, coastal areas, or basins) may be helpful because they indicate the type and character of wetlands.

g. *Remote sensing.* Remote sensing is one of the most useful information sources available for wetland identification and delineation. Recent aerial photography, particularly color infrared, provides a detailed view of an area; thus, recent land use and other features (e.g., general type and areal extent of plant communities and degree of inundation of the area when the photography was taken) can be determined. The multiagency cooperative National High Altitude Aerial Photography Program (HAP) has 1:59,000-scale color infrared photography for approximately 85 percent (December 1985) of the coterminous United States from 1980 to 1985. This photography has excellent resolution and can be ordered enlarged to 1:24,000 scale from USGS. Satellite images provide similar information as aerial photography, although the much smaller scale makes observation of detail more difficult without sophisticated equipment and extensive training. Satellite images provide more recent coverage than aerial photography (usually at 18-day intervals). Individual satellite images are more expensive than aerial photography, but are not as expensive as having an area flown and photographed at low altitudes. However, better resolution imagery is now available with remote sensing equipment mounted on fixed-wing aircraft.

h. *Local individuals and experts.* Individuals having personal knowledge of an area may sometimes provide a reliable and readily available source of information about the area, particularly information on the wetness of the area.

i. *USGS land use and land cover maps.* Maps created by USGS using remotely sensed data and a geographical information system provide a systematic and comprehensive collection and analysis of land use and land cover on a national basis. Maps at a scale of 1:250,000 are available as overlays that show land use and land cover according to nine basic levels. One level is wetlands (as determined by the FWS), which is further subdivided into forested and nonforested areas. Five other sets of maps show political units, hydrologic units, census subdivisions of counties, Federal land ownership, and State land ownership. These maps can be obtained from any USGS mapping center.

j. *Applicant's survey plans and engineering designs.* In many cases, the permit applicant will already have had the area surveyed (often at 1-ft contours or less) and will also have engineering designs for the proposed activity.

Data synthesis

55. When employing Section B procedures, use the above sources of information to complete the following steps:

- *STEP 1 - Identify the project area on a map.* Obtain a USGS quadrangle map (1:24,000) or other appropriate map, and locate the area identified in the permit application. PROCEED TO STEP 2.

- *STEP 2 - Prepare a base map.* Mark the project area boundaries on the map. Either use the selected map as the base map or trace the area on a mylar overlay, including prominent landscape features (e.g., roads, buildings, drainage patterns, etc.). If possible, obtain diazo copies of the resulting base map. PROCEED TO STEP 3.

- *STEP 3 - Determine size of the project area.* Measure the area boundaries and calculate the size of the area. PROCEED TO STEP 4 OR TO SECTION D OR E IF SECTION B IS NOT USED.

- *STEP 4 - Summarize available information on vegetation.* Examine available sources that contain information about the area vegetation. Consider the following:

    a. USGS quadrangle maps. Is the area shown as a marsh or swamp? *CAUTION: Do not use this as the sole basis for determining that hydrophytic vegetation is present.*

    b. NWI overlays or maps. Do the overlays or maps indicate that hydrophytic vegetation occurs in the area? If so, identify the vegetation type(s).

    c. EIAs, EISs, or GDMs that include the project area. Extract any vegetation data that pertain to the area.

    d. Federal, State, or local government documents that contain information about the area vegetation. Extract appropriate data.

    e. Recent (within last 5 years) aerial photography of the area. Can the area plant community type(s) be determined from the photography? Extract appropriate data.

    f. Individuals or experts having knowledge of the area vegetation. Contact them and obtain any appropriate information. *CAUTION: Ensure that the individual providing the information has firsthand knowledge of the area.*

    g. Any published scientific studies of the area plant communities. Extract any appropriate data.

    h. Previous wetland determinations made for the area. Extract any pertinent vegetation data.

    When the above have been considered, PROCEED TO STEP 5.

- *STEP 5 - Determine whether the vegetation in the project area is adequately characterized.* Examine the summarized data (STEP 4) and determine whether the area plant communities are adequately characterized. For routine determinations, the plant community type(s) and the dominant species in each vegetation layer of each community type must be known. Dominant species are those that have the largest relative basal area (overstory),[1] height (woody understory), number of stems (woody vines), or greatest areal cover (herbaceous understory). For comprehensive determinations, each plant community type present in the project area must have been quantitatively described within the past 5 years using accepted sampling and analytical procedures, and boundaries between community types must be known. Record information on DATA FORM 1.[2] In either case, PROCEED TO Section F if there is evidence of recent significant vegetation alteration due to human activities or natural events. Otherwise, PROCEED TO STEP 6.

- *STEP 6 - Summarize available information on area soils.* Examine available information and describe the area soils. Consider the following:

    a. County soil surveys. Determine the soil series present and extract characteristics for each. *CAUTION: Soil mapping units sometimes include more than one soil series.*

    b. Unpublished county soil maps. Contact the local SCS office and determine whether soil maps are available for the area. Determine the soil series of the area, and obtain any available information about possible hydric soil indicators (paragraph 44 or 45) for each soil series.

    c. Published EIAs, EISs, or GDMs that include soils information. Extract any pertinent information.

    d. Federal, State, and/or local government documents that contain descriptions of the area soils. Summarize these data.

    e. Published scientific studies that include area soils data. Summarize these data.

    f. Previous wetland determinations for the area. Extract any pertinent soils data.

    When the above have been considered, PROCEED TO STEP 7.

---

[1] This term is used because species having the largest individuals may not be dominant when only a few are present. To use relative basal area, consider both the size and number of individuals of a species and subjectively compare with other species present.

[2] A separate DATA FORM 1 must be used for each plant community type.

- *STEP 7 - Determine whether soils of the project area have been adequately characterized.* Examine the summarized soils data and determine whether the soils have been adequately characterized. For routine determinations, the soil series must be known. For comprehensive determinations, both the soil series and the boundary of each soil series must be known. Record information on DATA FORM 1. In either case, if there is evidence of recent significant soils alteration due to human activities or natural events, PROCEED TO Section F. Otherwise, PROCEED TO STEP 8.

- *STEP 8 - Summarize available hydrology data.* Examine available information and describe the area hydrology. Consider the following:

  a. USGS quadrangle maps. Is there a significant, well-defined drainage through the area? Is the area within a major floodplain or tidal area? What range of elevations occur in the area, especially in relation to the elevation of the nearest perennial watercourse?

  b. NWI overlays or maps. Is the area shown as a wetland or deepwater aquatic habitat? What is the water regime modifier?

  c. EIAs, EISs, or GDMs that describe the project area. Extract any pertinent hydrologic data.

  d. Floodplain management maps. These maps may be used to extrapolate elevations that can be expected to be inundated on a 1-, 2-, 3-year, etc., basis. Compare the elevations of these features with the elevation range of the project area to determine the frequency of inundation.

  e. Federal, State, and local government documents (e.g., CE floodplain management maps and profiles) that contain hydrologic data. Summarize these data.

  f. Recent (within past 5 years) aerial photography that shows the area to be inundated. Record the date of the photographic mission.

  g. Newspaper accounts of flooding events that indicate periodic inundation of the area.

  h. SCS County Soil Surveys that indicate the frequency and duration of inundation and soil saturation for area soils. *CAUTION: Data provided only represent average conditions for a particular soil series in its natural undrained state, and cannot be used as a positive hydrologic indicator in areas that have significantly altered hydrology.*

i. Tidal or stream gage data for a nearby water body that apparently influences the area. Obtain the gage data and complete (1) below if the routine approach is used, or (2) below if the comprehensive approach is used (OMIT IF GAGING STATION DATA ARE UNAVAILABLE):

(1) *Routine approach.* Determine the highest water level elevation reached during the growing season for each of the most recent 10 years of gage data. Rank these elevations in descending order and select the fifth highest elevation. Combine this elevation with the mean sea level elevation of the gaging station to produce a mean sea level elevation for the highest water level reached every other year. *NOTE: Stream gage data are often presented as flow rates in cubic feet per second. In these cases, ask the CE District's Hydrology Branch to convert flow rates to corresponding mean sea level elevations and adjust gage data to the site.* Compare the resulting elevations reached biennially with the project area elevations. If the water level elevation exceeds the area elevation, the area is inundated during the growing season on average at least biennially.

(2) *Comprehensive approach.* Complete the following:

(a) *Decide whether hydrologic data reflect the apparent hydrology.* Data available from the gaging station may or may not accurately reflect the area hydrology. Answer the following questions:

- Does the water level of the area appear to fluctuate in a manner that differs from that of the water body on which the gaging station is located? (In ponded situations, the water level of the area is usually higher than the water level at the gaging station.)
- Are less than 10 years of daily readings available for the gaging station?
- Do other water sources that would not be reflected by readings at the gaging station appear to significantly affect the area? For example, do major tributaries enter the stream or tidal area between the area and gaging station?

If the answer to any of the above questions is YES, the area hydrology cannot be determined from the

gaging station data. If the answer to all of the above questions is NO, PROCEED TO (b).

(b) *Analyze hydrologic data.* Subject the hydrologic data to appropriate analytical procedures. Either use duration curves or a computer program developed by WES (available from the Environmental Laboratory upon request) for determining the mean sea level elevation representing the upper limits of wetland hydrology. In the latter case, when the site elevation is lower than the mean sea level elevation representing a 5-percent duration of inundation and saturation during the growing season, the area has a hydrologic regime that may occur in wetlands. *NOTE: Duration curves do not reflect the period of soil saturation following dewatering.*

When all of the above have been considered, PROCEED TO STEP 9.

- *STEP 9 - Determine whether hydrology is adequately characterized.* Examine the summarized data and determine whether the hydrology of the project area is adequately characterized. For routine determinations, there must be documented evidence of frequent inundation or soil saturation during the growing season. For comprehensive determinations, there must be documented quantitative evidence of frequent inundation or soil saturation during the growing season, based on at least 10 years of stream or ddal gage data. Record information on DATA FORM 1. In either case, if there is evidence of recent significant hydrologic alteration due to human activities or natural events, PROCEED TO Section F. Otherwise, PROCEED TO Section C.

Section C. Selection of Method

56. All wetland delineation methods described in this manual can be grouped into two general types: routine and comprehensive. Routine determinations (Section D) involve simple, rapidly applied methods that result in sufficient qualitative data for making a determination. Comprehensive methods (Section E) usually require significant time and effort to obtain the needed quantitative data. The primary factor influencing method selection will usually be the complexity of the required determination. However, comprehensive methods may sometimes be selected for use in relatively simple determinations when rigorous documentation is required.

57. Three levels of routine wetland determinations are described below. Complexity of the project area and the quality and quantity of available information will influence the level selected for use.

a. *Level 1 - Onsite Inspection Unnecessary.* This level may be employed when the information already obtained (Section B) is sufficient for making a determination for the entire project area (see Section D, Subsection 1).

b. *Level 2 - Onsite Inspection Necessary.* This level must be employed when there is insufficient information already available to characterize the vegetation, soils, and hydrology of the entire project area (see Section D, Subsection 2).

c. *Level 3 - Combination of Levels 1 and 2.* This level should be used when there is sufficient information already available to characterize the vegetation, soils, and hydrology of a portion, but not all, of the project area. Methods described for Level 1 may be applied to portions of the area for which adequate information already exists, and onsite methods (Level 2) must be applied to the remainder of the area (see Section D, Subsection 3).

58. After considering all available information, select a tentative method (see above) for use, and PROCEED TO EITHER Section D or E, as appropriate. *NOTE: Sometimes it may be necessary to change to another method described in the manual, depending on the quality of available information and/or recent changes in the project area.*

Section D. Routine Determinations

59. This section describes general procedures for making routine wetland determinations. It is assumed that the user has already completed all applicable steps in Section B,[1] and a routine method has been tentatively selected for use (Section C). Subsections 1 through 3 describe steps to be followed when making a routine determination using one of the three levels described in Section C. Each subsection contains a flowchart that defines the relationship of steps to be used for that level of routine determinations. *NOTE: The selected method must be considered tentative because the user may be required to change methods during the determination.*

Subsection 1 - Onsite Inspection Unnecessary

60. This subsection describes procedures for making wetland determinations when sufficient information is already available (Section B) on which to base

[1] If it has been determined that it is more expedient to conduct an onsite inspection than to search for available information, complete STEPS 1 through 3 of Section B, and PROCEED TO Subsection 2.

the determination. A flowchart of required steps to be completed is presented in Figure 13, and each step is described below.

Equipment and materials

61. No special equipment is needed for applying this method. The following materials will be needed:

a. Map of project area (Section B, STEP 2).

b. Copies of DATA FORM 1 (Appendix B).

c. Appendices C and D to this manual.

Procedure

62. Complete the following steps, as necessary:

- *STEP 1 - Determine whether available data are sufficient for entire project area.* Examine the summarized data (Section B, STEPS 5, 7, and 9) and determine whether the vegetation, soils, and hydrology of the entire project area are adequately characterized. If so, PROCEED TO STEP 2. If all three parameters are adequately characterized for a portion, but not all, of the project area, PROCEED TO Subsection 3. If the vegetation, soils, and hydrology are not adequately characterized for any portion of the area, PROCEED TO Subsection 2.

- *STEP 2 - Determine whether hydrophytic vegetation is present.* Examine the vegetation data and list on DATA FORM 1 the dominant plant species found in each vegetation layer of each community type. *NOTE: A separate DATA FORM 1 will be required for each community type.* Record the indicator status for each dominant species ~~(Appendix C, Section 1 or 2)~~. When more than 50 percent of the dominant species in a plant community have an indicator status of OBL, FACW, and/or FAC,[1] hydrophytic vegetation is present. If one or more plant communities comprise hydrophytic vegetation, PROCEED TO STEP 3. If none of the plant communities comprise hydrophytic vegetation, none of the area is a wetland. Complete the vegetation section for each DATA FORM 1.

[1] For the FAC-neutral option, see paragraph 35*a*.

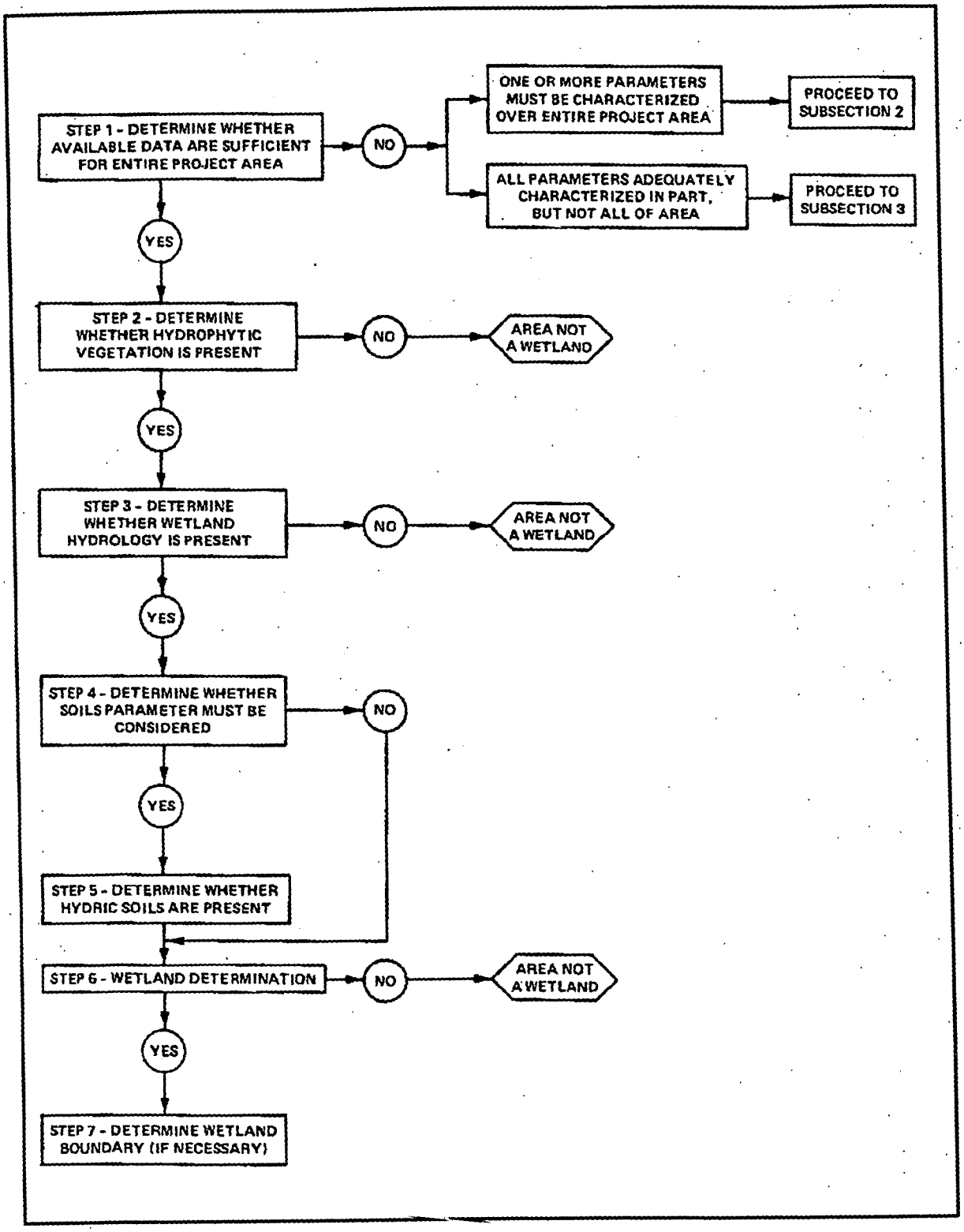


Figure 13. Flowchart of steps involved in making a wetland determination when an onsite inspection is unnecessary

- *STEP 3 - Determine whether wetland hydrology is present.* When one of the following conditions applies (STEP 2), it is only necessary to confirm that there has been no recent hydrologic alteration of the area:

    a. The entire project area is occupied by a plant community or communities in which all dominant species are OBL ~~(Appendix C, Section 1 or 2)~~.

    b. The project area contains two or more plant communities, all of which are dominated by OBL and/or FACW species, and the wetland-nonwetland boundary is abrupt[1] (e.g., a *Spartina alterniflora* marsh bordered by a road embankment).

  If either *a* or *b* applies, look for recorded evidence of recently constructed dikes, levees, impoundments, and drainage systems, or recent avalanches, mudslides, beaver dams, etc., that have significantly altered the area hydrology. If any significant hydrologic alteration is found, determine whether the area is still periodically inundated or has saturated soils for sufficient duration to support the documented vegetation (*a* or *b* above). When *a* or *b* applies and there is no evidence of recent hydrologic alteration, or when *a* or *b* do not apply and there is documented evidence that the area is periodically inundated or has saturated soils, wetland hydrology is present. Otherwise, wetland hydrology does not occur on the area. Complete the hydrology section of DATA FORM 1 and PROCEED TO STEP 4.

- *STEP 4 - Determine whether the soils parameter must be considered.* When either *a* or *b* of STEP 3 applies *and* there is either no evidence of recent hydrologic alteration of the project area or if wetland hydrology presently occurs on the area, hydric soils can be assumed to be present. If so, PROCEED TO STEP 6. Otherwise PROCEED TO STEP 5.

- *STEP 5 - Determine whether hydric soils are present.* Examine the soils data (Section B, STEP 7) and record the soil series or soil phase on DATA FORM 1 for each community type. Determine whether the soil is listed as a hydric soil ~~(Appendix D, Section 2)~~. If all community types have hydric soils, the entire project area has hydric soils. *(CAUTION: If the soil series description makes reference to inclusions of other soil types, data must be field verified).* Any portion of the area that lacks hydric soils is a nonwetland. Complete the soils section of each DATA FORM 1 and PROCEED TO STEP 6.

---

[1] There must be documented evidence of periodic inundation or saturated soils when the project area: (a) has plant communities dominated by one or more FAC species; (b) has vegetation dominated by FACW species but no adjacent community dominated by OBL species; (c) has a gradual, nondistinct boundary between wetlands and nonwetlands; and/or (d) is known to have or is suspected of having significantly altered hydrology.

- *STEP 6 - Wetland determination.* Examine the DATA FORM 1 for each community type. Any portion of the project area is a wetland that has:

    a. Hydrophytic vegetation that conforms to one of the conditions identified in STEP 3*a* or 3*b* and has either no evidence of altered hydrology or confirmed wetland hydrology.

    b. Hydrophytic vegetation that does not conform to STEP 3*a* or 3*b*, has hydric soils, and has confirmed wetland hydrology.

    If STEP 6*a* or 6*b* applies to the entire project area, the entire area is a wetland. Complete a DATA FORM 1 for all plant community types. Portions of the area not qualifying as a wetland based on an office determination might or might not be wetlands. If the data used for the determination are considered to be highly reliable, portions of the area not qualifying as wetlands may properly be considered nonwetlands. PROCEED TO STEP 7. If the available data are incomplete or questionable, an onsite inspection (Subsection 2) will be required.

- *STEP 7 - Determine wetland boundary.* Mark on the base map all community types determined to be wetlands with a W and those determined to be nonwetlands with an N. Combine all wetland community types into a single mapping unit. The boundary of these community types is the interface between wetlands and nonwetlands.

Subsection 2 - Onsite Inspection Necessary

63. This subsection describes procedures for routine determinations in which the available information (Section B) is insufficient for one or more parameters. If only one or two parameters must be characterized, apply the appropriate steps and return to Subsection 1 and complete the determination. A flowchart of steps required for using this method is presented in Figure 14, and each step is described below.

Equipment and materials

64. The following equipment and materials will be needed:

a. Base map (Section B, STEP 2).

b. Copies of DATA FORM 1 (one for each community type and additional copies for boundary determinations).

c. Appendices C and D.

d. Compass.

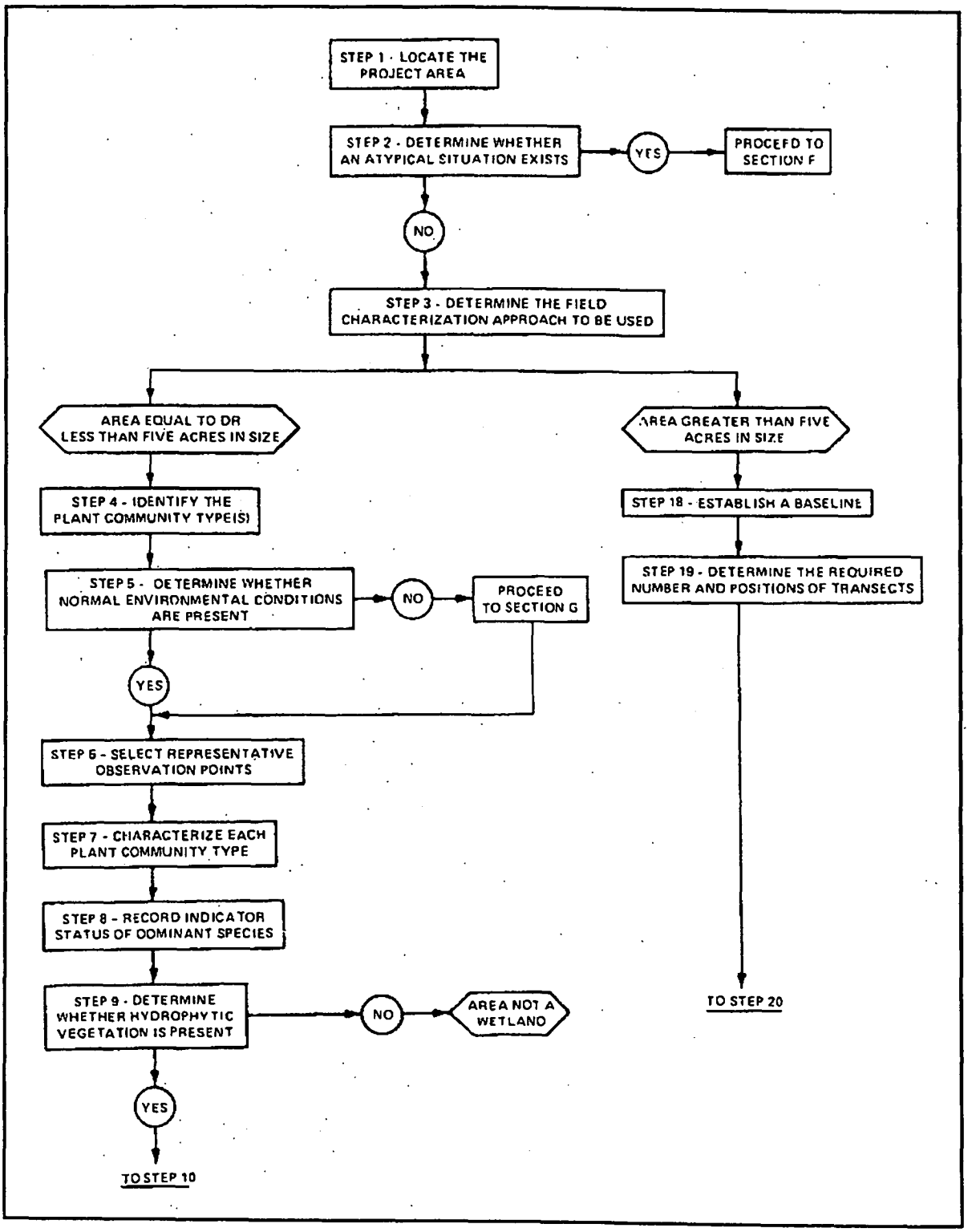


Figure 14. Flowchart of steps involved in making a routine wetland determination when an onsite visit is necessary (Continued)

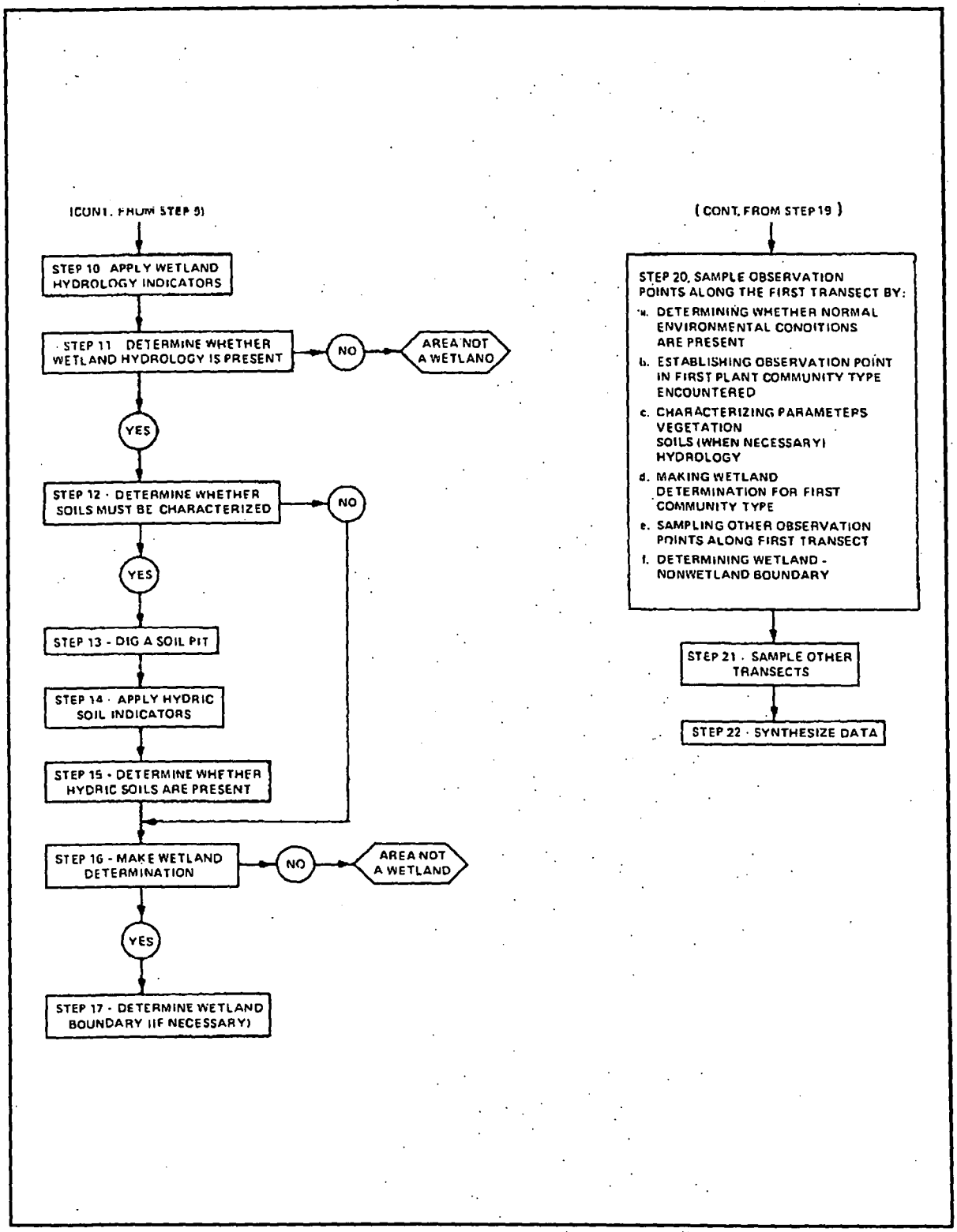


Figure 14. (Concluded)

e. Soil auger or spade (soils only).

f. Tape (300 ft).

g. Munsell Color Charts (Munsell Color 1975) (soils only).

Procedure

65. Complete the following steps, as necessary:

- *STEP 1 - Locate the project area.* Determine the spatial boundaries of the project area using information from a USGS quadrangle map or other appropriate map, aerial photography, and/or the project survey plan (when available). PROCEED TO STEP 2.

- *STEP 2 - Determine whether an atypical situation exists.* Examine the area and determine whether there is evidence of sufficient natural or human-induced alteration to significantly alter the area vegetation, soils, and/or hydrology. *NOTE: Include possible offsite modifications that may affect the area hydrology.* If not, PROCEED TO STEP 3.

  If one or more parameters have been significantly altered by an activity that would normally require a permit, PROCEED TO Section F and determine whether there is sufficient evidence that hydrophytic vegetation, hydric soils, and/or wetland hydrology were present prior to this alteration. Then, return to this subsection and characterize parameters not significantly influenced by human activities. PROCEED TO STEP 3.

- *STEP 3 - Determine the field characterization approach to be used.* Considering the size and complexity of the area, determine the field characterization approach to be used. When the area is equal to or less than 5 acres in size (Section B, STEP 3) and the area is thought to be relatively homogeneous with respect to vegetation, soils, and/or hydrologic regime, PROCEED TO STEP 4. When the area is greater than 5 acres in size (Section B, STEP 3) or appears to be highly diverse with respect to vegetation, PROCEED TO STEP 18.

Areas Equal To or Less Than 5 Acres in Size

- *STEP 4 - Identify the plant community type(s).* Traverse the area and determine the number and locations of plant community types. Sketch the location of each on the base map (Section B, STEP 2), and give each community type a name. PROCEED TO STEP 5.

- *STEP 5 - Determine whether normal environmental conditions are present.* Determine whether normal environmental conditions are present by considering the following:

    a. Is the area presently lacking hydrophytic vegetation or hydrologic indicators due to annual or seasonal fluctuations in precipitation or ground-water levels?

    b. Are hydrophytic vegetation indicators lacking due to seasonal fluctuations in temperature?

    If the answer to either of these questions is thought to be YES, PROCEED TO Section G. If the answer to both questions is NO, PROCEED TO STEP 6.

- *STEP 6 - Select representative observation points.* Select a representative observation point in each community type. A representative observation point is one in which the apparent characteristics (determine visually) best represent characteristics of the entire community. Mark on the base map the approximate location of the observation point. PROCEED TO STEP 7.

- *STEP 7 - Characterize each plant community type.* Visually determine the dominant plant species in each vegetation layer of each community type and record them on DATA FORM 1 (use a separate DATA FORM 1 for each community type). Dominant species are those having the greatest relative basal area (woody overstory),[1] greatest height (woody understory), greatest percentage of areal cover (herbaceous understory), and/or greatest number of stems (woody vines). PROCEED TO STEP 8.

- *STEP 8 - Record indicator status of dominant species.* Record on DATA FORM 1 the indicator status ~~(Appendix C, Section 1 or 2)~~ of each dominant species in each community type. PROCEED TO STEP 9.

- *STEP 9 - Determine whether hydrophytic vegetation is present.* Examine each DATA FORM 1. When more than 50 percent of the dominant species in a community type have an indicator status (STEP 8) of OBL, FACW, and/or FAC,[2] hydrophytic vegetation is present. Complete the vegetation section of each DATA FORM 1. Portions of the area failing this test are not wetlands. PROCEED TO STEP 10.

- *STEP 10 - Apply wetland hydrologic indicators.* Examine the portion of the area occupied by each plant community type for positive indicators

---

[1] This term is used because species having the largest individuals may not be dominant when only a few are present. To determine relative basal area, consider both the size and number of individuals of a species and subjectively compare with other species present.

[2] For the FAC-neutral option, see paragraph 35*a*.

of wetland hydrology (Part III, paragraph 49). Record findings on the appropriate DATA FORM 1. PROCEED TO STEP 11.

- *STEP 11 - Determine whether wetland hydrology is present.* Examine the hydrologic information on DATA FORM 1 for each plant community type. Any portion of the area having a positive wetland hydrology indicator has wetland hydrology. If positive wetland hydrology indicators are present in all community types, the entire area has wetland hydrology. If no plant community type has a wetland hydrology indicator, none of the area has wetland hydrology. Complete the hydrology portion of each DATA FORM 1. PROCEED TO STEP 12.

- *STEP 12 - Determine whether soils must be characterized.* Examine the vegetation section of each DATA FORM 1. Hydric soils are assumed to be present in any plant community type in which:

  a. All dominant species have an indicator status of OBL.

  b. All dominant species have an indicator status of OBL or FACW, and the wetland boundary (when present) is abrupt.[1]

  When either *a* or *b* occurs and wetland hydrology is present, check the hydric soils blank as positive on DATA FORM 1 and PROCEED TO STEP 16. If neither *a* nor *b* applies, PROCEED TO STEP 13.

- *STEP 13 - Dig a soil pit.* Using a soil auger or spade, dig a soil pit at the representative location in each community type. The procedure for digging a soil pit is described in Appendix D, Section 1. When completed, approximately 16 inches of the soil profile will be available for examination. PROCEED TO STEP 14.

- *STEP 14 - Apply hydric soil indicators.* Examine the soil at each location and compare its characteristics immediately below the A-horizon or 10 inches (whichever is shallower) with the hydric soil indicators described in Part III, paragraph 44 and/or 45. Record findings on the appropriate DATA FORM 1's. PROCEED TO STEP 15.

- *STEP 15 - Determine whether hydric soils are present.* Examine each DATA FORM 1 and determine whether a positive hydric soil indicator was found. If so, the area at that location has hydric soil. If soils at all sampling locations have positive hydric soil indicators, the entire area has hydric soils. If soils at all sampling locations lack positive hydric soil indicators, none of the area is a wetland. Complete the soil section of each DATA FORM 1. PROCEED TO STEP 16.

---

[1] The soils parameter must be considered in any plant community in which: (a) the community is dominated by one or more FAC species; (b) no community type dominated by OBL species is present; (c) the boundary between wetlands and nonwetlands is gradual or nondistinct; (d) the area is known to or is suspected of having significantly altered hydrology.

- *STEP 16 - Make wetland determination.* Examine DATA FORM 1. If the entire area presently or normally has wetland indicators of all three parameters (STEPS 9, 11, and 15), the entire area is a wetland. If the entire area presently or normally lacks wetland indicators of one or more parameters, the entire area is a nonwetland. If only a portion of the area presently or normally has wetland indicators for all three parameters, PROCEED TO STEP 17.

- *STEP 17 - Determine wetland-nonwetland boundary.* Mark each plant community type on the base map with a W if wetland or an N if nonwetland. Combine all wetland plant communities into one mapping unit and all nonwetland plant communities into another mapping unit. The wetland-nonwetland boundary will be represented by the interface of these two mapping units.

Areas Greater Than 5 Acres in Size

- *STEP 18 - Establish a baseline.* Select one project boundary as a baseline. The baseline should parallel the major watercourse through the area or should be perpendicular to the hydrologic gradient (Figure 15). Determine the approximate baseline length. PROCEED TO STEP 19.

- *STEP 19 - Determine the required number and position of transects.* Use the following to determine the required number and position of transects (specific site conditions may necessitate changes in intervals):

Baseline Length, Miles	Number of Required Transects
≤0.25	3
>0.25 - 0.50	3
>0.50 - 0.75	3
>0.75 - 1.00	3
>1.00 - 2.00	3-5
>2.00 - 4.00	5-8
>4.00	8 or more[1]

[1] Transect intervals should not exceed 0.5 mile.

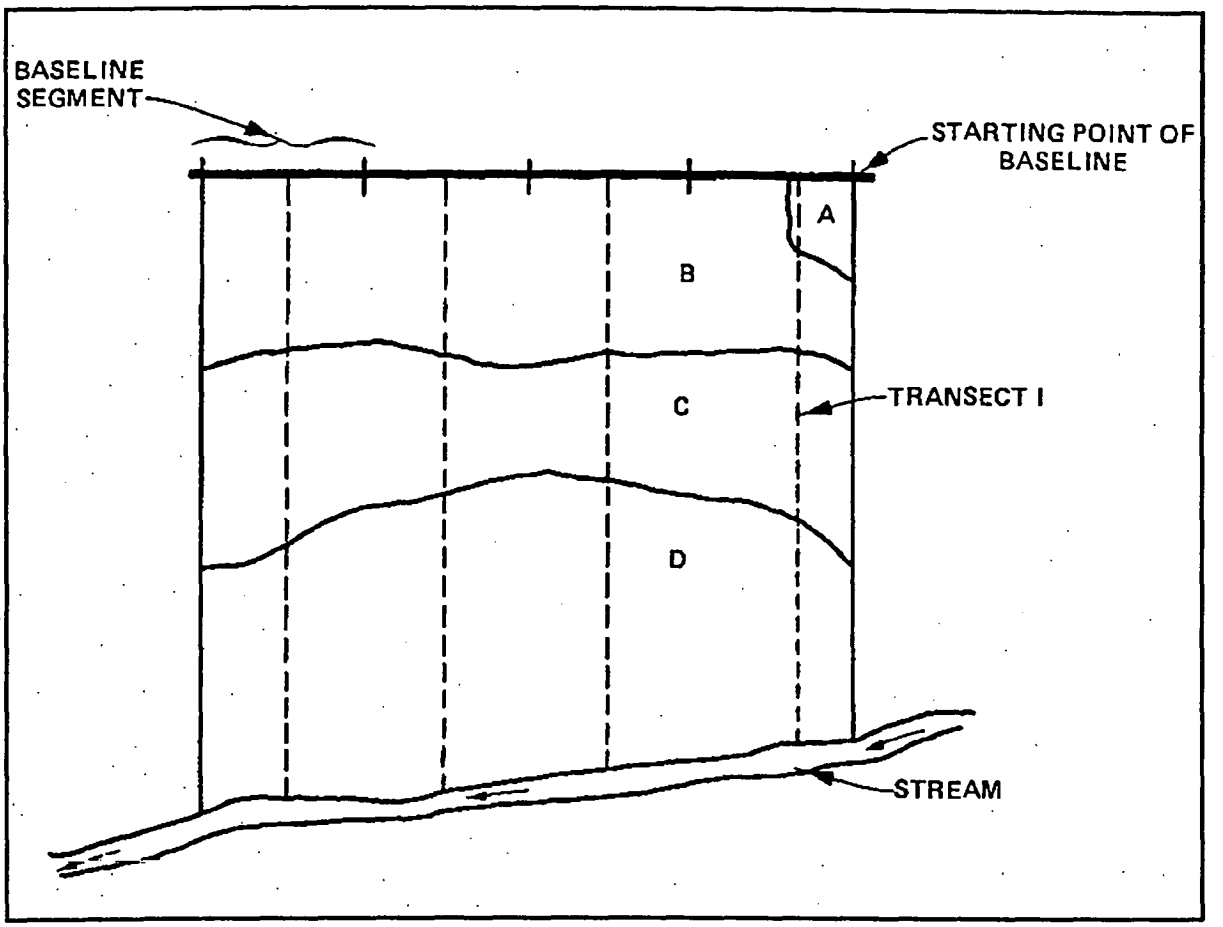


Figure 15. General orientation of baseline and transects (dotted lines) in a hypothetical project area. Alpha characters represent different plant communities. All transects start at the midpoint of a baseline segment except the first, which was repositioned to include community type A

Divide the baseline length by the number of required transects. Establish one transect in each resulting baseline increment. Use the midpoint of each baseline increment as a transect starting point. For example, if the baseline is 1,200 ft in length, three transects would be established—one at 200 ft, one at 600 ft, and one at 1,000 ft from the baseline starting point. *CAUTION: All plant community types must be included. This may necessitate relocation of one or more transect lines. PROCEED TO STEP 20.*

- *STEP 20 - Sample observation points along the first transect.* Beginning at the starting point of the first transect, extend the transect at a 90-deg angle to the baseline. Use the following procedure as appropriate to simultaneously characterize the parameters at each observation point. Combine field-collected data with information already available and make a wetland determination at each observation point. A DATA FORM 1 must be completed for each observation point.

a. *Determine whether normal environmental conditions are present.* Determine whether normal environmental conditions are present by considering the following:

(1) Is the area presently lacking hydrophytic vegetation and/or hydrologic indicators due to annual or seasonal fluctuations in precipitation or ground-water levels?

(2) Are hydrophytic vegetation indicators lacking due to seasonal fluctuations in temperature?

If the answer to either of these questions is thought to be YES, PROCEED TO Section G. If the answer to both questions is NO, PROCEED TO STEP 20*b*.

b. *Establish an observation point in the first plant community type encountered.* Select a representative location along the transect in the first plant community type encountered. When the first plant community type is large and covers a significant distance along the transect, select an area that is no closer than 300 ft to a perceptible change in plant community type. PROCEED TO STEP 20*c*.

c. *Characterize parameters.* Characterize the parameters at the observation point by completing (1), (2), and (3) below:

(1) *Vegetation.* Record on DATA FORM 1 the dominant plant species in each vegetation layer occurring in the immediate vicinity of the observation point. Use a 5-ft radius for herbs and saplings/shrubs, and a 30-ft radius for trees and woody vines (when present). Subjectively determine the dominant species by estimating those having the largest relative basal area[1] (woody overstory), greatest height (woody understory), greatest percentage of areal cover (herbaceous understory), and/or greatest number of stems (woody vines). *NOTE: Plot size may be estimated, and plot size may also be varied when site conditions warrant.* Record on DATA FORM 1 any dominant species observed to have morphological adaptations (Appendix C, Section 3) for occurrence in wetlands, and determine and record dominant species that have known physiological adaptations for occurrence in wetlands (Appendix C, Section 3). Record on DATA FORM 1 the indicator status ~~(Appendix C, Section 1 or 2)~~ of each dominant species. Hydrophytic

[1] This term is used because species having the largest individuals may not be dominant when only a few are present. To use relative basal area, consider both the size and number of individuals of a species and subjectively compare with other species present.

vegetation is present at the observation point when more than 50 percent of the dominant species have an indicator status of OBL, FACW, and/or FAC;[1] when two or more dominant species have observed morphological or known physiological adaptations for occurrence in wetlands; or when other indicators of hydrophytic vegetation (Part III, paragraph 35) are present. Complete the vegetation section of DATA FORM 1. PROCEED TO (2).

(2) *Soils.* In some cases, it is not necessary to characterize the soils. Examine the vegetation of DATA FORM 1. Hydric soils can be assumed to be present when:

(a) All dominant plant species have an indicator status of OBL.

(b) All dominant plant species have an indicator status of OBL and/or FACW (at least one dominant species must be OBL).[2]

When either (a) or (b) applies, check the hydric soils blank as positive and PROCEED TO (3). If neither (a) nor (b) applies but the vegetation qualifies as hydrophytic, dig a soil pit at the observation point using the procedure described in Appendix D, Section 1. Examine the soil immediately below the A-horizon or 10-inches (whichever is shallower) and compare its characteristics (Appendix D, Section 1) with the hydric soil indicators described in Part III, paragraph 44 and/or 45. Record findings on DATA FORM 1. If a positive hydric soil indicator is present, the soil at the observation point is a hydric soil. If no positive hydric soil indicator is found, the area at the observation point does not have hydric soils and the area at the observation point is not a wetland. Complete the soils section of DATA FORM 1 for the observation point. PROCEED TO (3) if hydrophytic vegetation (1) and hydric soils (2) are present. Otherwise, PROCEED TO STEP 20*d*.

(3) *Hydrology.* Examine the observation point for indicators of wetland hydrology (Part III, paragraph 49) and record observations on DATA FORM 1. Consider the indicators in the same sequence as presented in Part III, paragraph 49. If a positive wetland hydrology indicator

---

[1] For the FAC-neutral option, see paragraph 35*a*.
[2] Soils must be characterized when any dominant species has an indicator status of FAC.

is present, the area at the observation point has wetland hydrology. If no positive wetland hydrologic indicator is present, the area at the observation point is not a wetland. Complete the hydrology section of DATA FORM 1 for the observation point. PROCEED TO STEP 20*d*.

d. *Wetland determination.* Examine DATA FORM 1 for the observation point. Determine whether wetland indicators of all three parameters are or would normally be present during a significant portion of the growing season. If so, the area at the observation point is a wetland. If no evidence can be found that the area at the observation point normally has wetland indicators for all three parameters, the area is a nonwetland. PROCEED TO STEP 20*e*.

e. *Sample other observation points along the first transect.* Continue along the first transect until a different community type is encountered. Establish a representative observation point within this community type and repeat STEP 20*c* and 20*d*. If the areas at both observation points are either wetlands or nonwetlands, continue along the transect and repeat STEP 20*c* and 20*d* for the next community type encountered. Repeat for all other community types along the first transect. If the area at one observation point is wetlands and the next observation point is nonwetlands (or vice versa), PROCEED TO STEP 20*f*.

f. *Determine wetland-nonwetland boundary.* Proceed along the transect from the wetland observation point toward the nonwetland observation point. Look for subtle changes in the plant community (e.g., the first appearance of upland species, disappearance of apparent hydrology indicators, or slight changes in topography). When such features are noted, establish an observation point and repeat the procedures described in STEP 20*c* through 20*d*. *NOTE: A new DATA FORM 1 must be completed for this observation point, and all three parameters must be characterized by field observation.* If the area at this observation point is a wetland, proceed along the transect toward the nonwetland observation point until upland indicators are more apparent. Repeat the procedures described in STEP 20*c* through 20*d*. If the area at this observation point is a nonwetland, move halfway back along the transect toward the last documented wetland observation point and repeat the procedure described in STEP 20*c* through 20*d*. Continue this procedure until the wetland-nonwetland boundary is found. It is not necessary to complete a DATA FORM 1 for all intermediate points, but a DATA FORM 1 should be completed for the wetland-nonwetland boundary. Mark the position of the wetland boundary on the base map, and continue along the first transect until all community types have been sampled and

all wetland boundaries located. *CAUTION: In areas where wetlands are interspersed among nonwetlands (or vice versa), several boundary determinations will be required.* When all necessary wetland determinations have been completed for the first transect, PROCEED TO STEP 21.

- *STEP 21 - Sample other transects.* Repeat procedures described in STEP 21 for all other transects. When completed, a wetland determination will have been made for one observation point in each community type along each transect, and all wetland-nonwetland boundaries along each transect will have been determined. PROCEED TO STEP 22.

- *STEP 22 - Synthesize data.* Examine all completed copies of DATA FORM 1, and mark each plant community type on the base map. Identify each plant community type as either a wetland (W) or nonwetland (N). If all plant community types are identified as wetlands, the entire area is wetlands. If all plant community types are identified as nonwetlands, the entire area is nonwetlands. If both wetlands and nonwetlands are present, identify observation points that represent wetland boundaries on the base map. Connect these points on the map by generally following contour lines to separate wetlands from nonwetlands. Walk the contour line between transects to confirm the wetland boundary. Should anomalies be encountered, it will be necessary to establish short transects in these areas, apply the procedures described in STEP 20*f*, and make any necessary adjustments on the base map.

Subsection 3 - Combination of Levels I and 2

66. In some cases, especially for large projects, adequate information may already be available (Section B) to enable a wetland determination for a portion of the project area, while an onsite visit will be required for the remainder of the area. Since procedures for each situation have already been described in Subsections 1 and 2, they will not be repeated. Apply the following steps:

- *STEP 1 - Make wetland determination for portions of the project area that are already adequately characterized.* Apply procedures described in Subsection 1. When completed, a DATA FORM 1 will have been completed for each community type, and a map will have been prepared identifying each community type as wetland or nonwetland and showing any wetland boundary occurring in this portion of the project area. PROCEED TO STEP 2.

- *STEP 2 - Make wetland determination for portions of the project area that require an onsite visit.* Apply procedures described in Subsection 2. When completed, a DATA FORM 1 will have been completed for each plant community type or for a number of observation points (including

wetland boundary determinations). A map of the wetland (if present) will also be available. PROCEED TO STEP 3.

- *STEP 3 - Synthesize data.* Using the maps resulting from STEPS 1 and 2, prepare a summary map that shows the wetlands of the entire project area. *CAUTION: Wetland boundaries for the two maps will not always match exactly. When this occurs, an additional site visit will be required to refine the wetland boundaries. Since the degree of resolution of wetland boundaries will be greater when determined onsite, it may be necessary to employ procedures described in Subsection 2 in the vicinity of the boundaries determined from Subsection 1 to refine these boundaries.*

Section E. Comprehensive Determinations

67. This section describes procedures for making comprehensive wetland determinations. Unlike procedures for making routine determinations (Section D), application of procedures described in this section will result in maximum information for use in making determinations, and the information usually will be quantitatively expressed. Comprehensive determinations should only be used when the project area is very complex and/or when the determination requires rigorous documentation. This type of determination may be required in areas of any size, but will be especially useful in large areas. There may be instances in which only one parameter (vegetation, soil, or hydrology) is disputed. In such cases, only procedures described in this section that pertain to the disputed parameter need be completed. It is assumed that the user has already completed all applicable steps in Section B. *NOTE: Depending on site characteristics, it may be necessary to alter the sampling design and/or data collection procedures.*

68. This section is divided into five basic types of activities. The first consists of preliminary field activities that must be completed prior to making a determination (STEPS 1 through 5). The second outlines procedures for determining the number and locations of required determinations (STEPS 6 through 8). The third describes the basic procedure for making a comprehensive wetland determination at any given point (STEPS 9 through 17). The fourth describes a procedure for determining wetland boundaries (STEP 18). The fifth describes a procedure for synthesizing the collected data to determine the extent of wetlands in the area (STEPS 20 and 21). A flowchart showing the relationship of various steps required for making a comprehensive determination is presented in Figure 16.

Equipment and materials

69. Equipment and materials needed for making a comprehensive determination include:

a. Base map (Section B, STEP 2).

b. Copies of DATA FORMS 1 and 2.

c. Appendices C and D.

d. Compass.

e. Tape (300 ft).

f. Soil auger or spade.

g. Munsell Color Charts (Munsell Color 1975).

h. Quadrat (3.28 ft by 3.28 ft).

i. Diameter or basal area tape (for woody overstory).

Field procedures

70. Complete the following steps:

- *STEP 1 - Identify the project area.* Using information from the USGS quadrangle or other appropriate map (Section B), locate and measure the spatial boundaries of the project area. Determine the compass heading of each boundary and record on the base map (Section B, STEP 2). The applicant's survey plan may be helpful in locating the project boundaries. PROCEED TO STEP 2.

- *STEP 2 - Determine whether an atypical situation exists.* Examine the area and determine whether there is sufficient natural or human-induced alteration to significantly change the area vegetation, soils, and/or hydrology. If not, PROCEED TO STEP 3. If one or more parameters have been recently altered significantly, PROCEED TO Section F and determine whether there is sufficient evidence that hydrophytic vegetation, hydric soils, and/or wetland hydrology were present on the area prior to alteration. Then return to this section and characterize parameters not significantly influenced by human activities. PROCEED TO STEP 3.

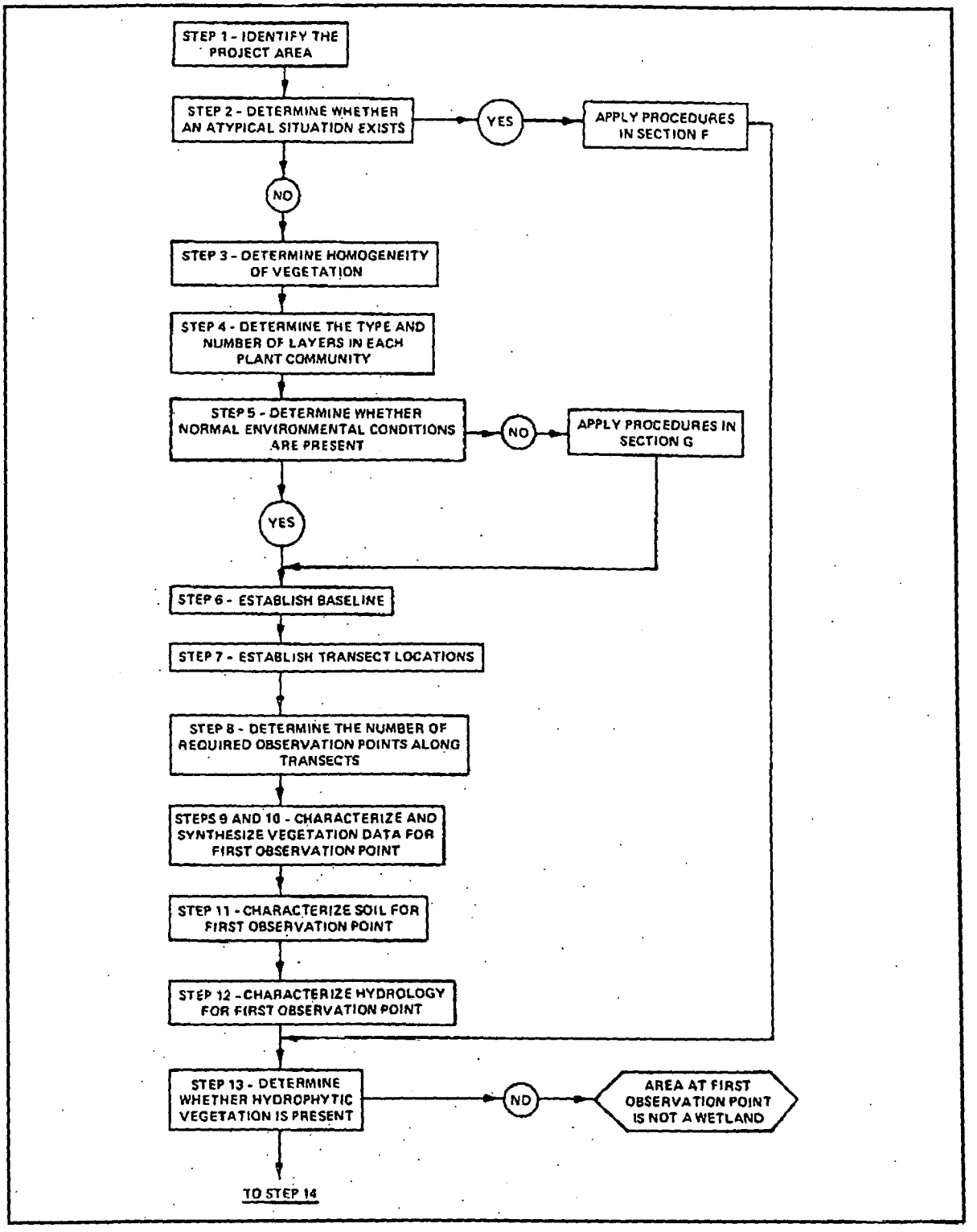


Figure 16. Flowchart of steps involved in making a comprehensive wetland determination (Section E) (Continued)

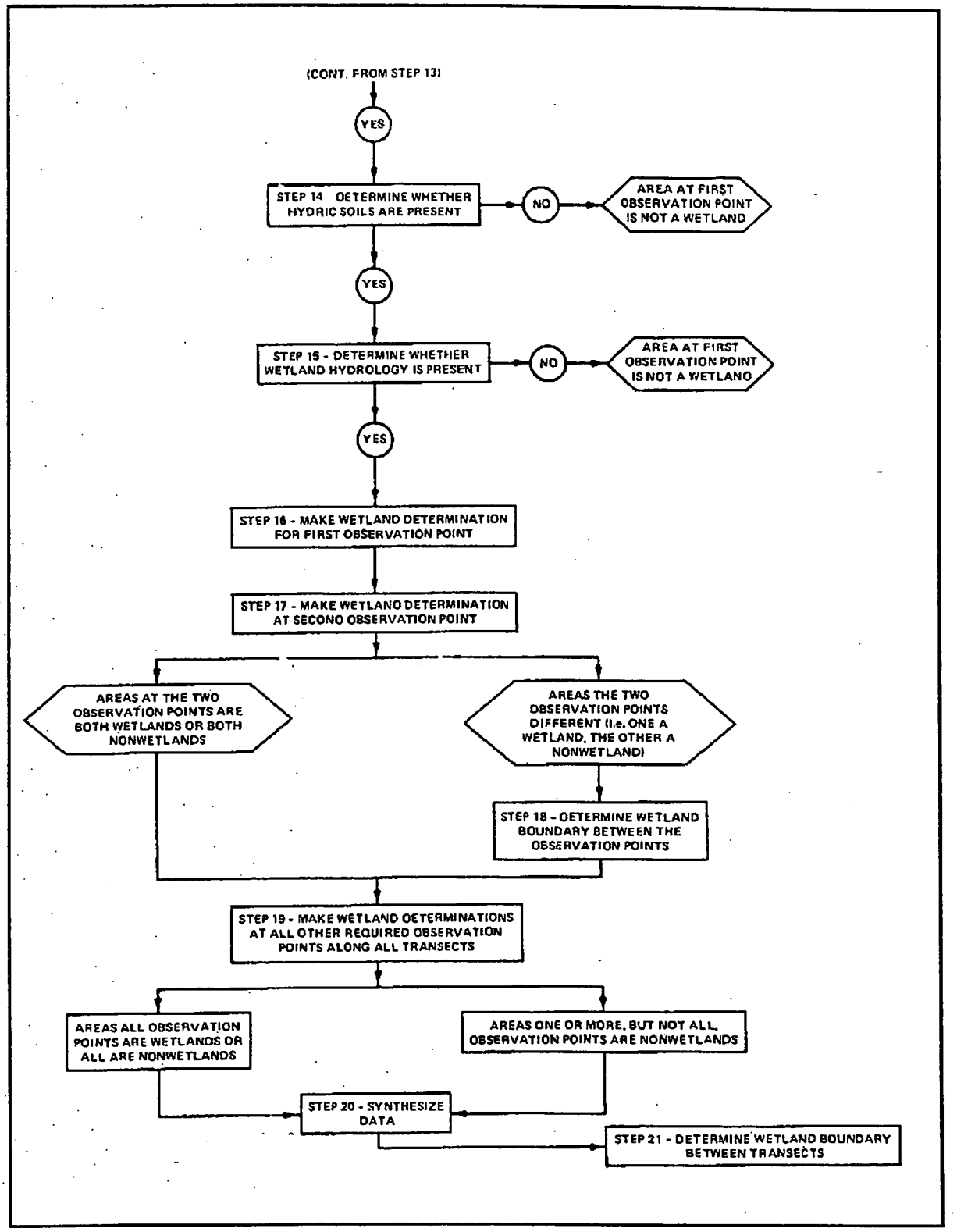


Figure 16. (Concluded)

- *STEP 3 - Determine homogeneity of vegetation.* While completing STEP 2, determine the number of plant community types present. Mark the approximate location of each community type on the base map. The number and locations of required wetland determinations will be strongly influenced by both the size of the area and the number and distribution of plant community types; the larger the area and greater the number of plant community types, the greater the number of required wetland determinations. It is imperative that all plant community types occurring in all portions of the area be included in the investigation. PROCEED TO STEP 4.

- *STEP 4 - Determine the type and number of layers in each plant community.* Examine each identified plant community type and determine the type(s) and number of layers in each community. Potential layers include trees (woody overstory), saplings/shrubs (woody understory), herbs (herbaceous understory), and/or woody vines. PROCEED TO STEP 5.

- *STEP 5 - Determine whether normal environmental conditions are present.* Determine whether normal environmental conditions are present at the observation point by considering the following:

    a. Is the area at the observation point presently lacking hydrophytic vegetation and/or hydrologic indicators due to annual or seasonal fluctuations in precipitation or groundwater levels?

    b. Are hydrophytic vegetation indicators lacking due to seasonal fluctuations in temperature?

  If the answer to either of these questions is thought to be YES, PROCEED TO Section G. If the answer to both questions is NO, PROCEED TO STEP 6.

- *STEP 6 - Establish a baseline.* Select one project boundary area as a baseline. The baseline should extend parallel to any major watercourse and/or perpendicular to a topographic gradient (see Figure 17). Determine the baseline length and record on the base map both the baseline length and its compass heading. PROCEED TO STEP 7.

- *STEP 7 - Establish transect locations.* Divide the baseline into a number of equal segments (Figure 17). Use the following as a guide to determine the appropriate number of baseline segments:

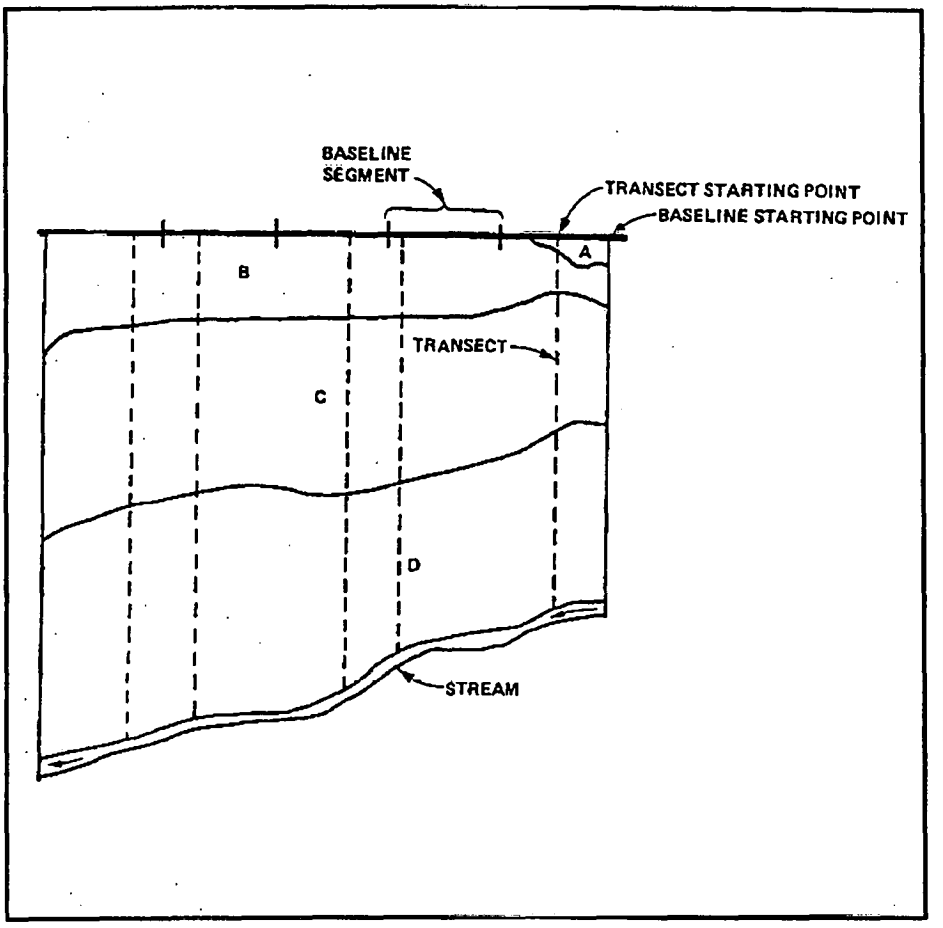


Figure 17. General orientation of baseline and transects in a hypothetical project area. Alpha characters represent different plant communities. Transect positions were determined using a random numbers table

Baseline Length, ft	Number of Segments	Length of Baseline Segment, ft
>50 - 500	3	18 - 167
>500 - 1,000	3	167 - 333
>1,000 - 5,000	5	200 - 1,000
>5,000 - 10,000	7	700 - 1,400
>10,000[1]	Variable	2,000

[1] If the baseline exceeds 5 miles, baseline segments should be 0.5 mile in length.

Use a random numbers table or a calculator with a random numbers generation feature to determine the position of a transect starting point within each baseline segment. For example, when the baseline is 4,000 ft, the number of baseline segments will be five, and the baseline segment length will be 4,000/5 = 800 ft. Locate the first transect within the first 800 ft of the baseline. If the random numbers table yields 264 as the

distance from the baseline starting point, measure 264 ft from the baseline starting point and establish the starting point of the first transect. If the second random number selected is 530, the starting point of the second transect will be located at a distance of 1,330 ft (800 + 530 ft) from the baseline starting point. *CAUTION: Make sure that each plant community type is included in at least one transect. If not, modify the sampling design accordingly.* When the starting point locations for all required transects have been determined, PROCEED TO STEP 8.

- *STEP 8 - Determine the number of required observation points along transects.* The number of required observation points along each transect will be largely dependent on transect length. Establish observation points along each transect using the following as a guide:

Transect Length, ft	Number of Observation Points	Interval Between Observation Points, ft
<1,000	2-10	100
1,000 - <5,000	10	100 - 500
5,000 - <10,000	10	500 - 1,000
≥ 10,000	>10	1,000

Establish the first observation point at a distance of 50 ft from the baseline (Figure 17). When obvious nonwetlands occupy a long portion of the transect from the baseline starting point, establish the first observation point in the obvious nonwetland at a distance of approximately 300 ft from the point that the obvious nonwetland begins to intergrade into a potential wetland community type. Additional observation points must also be established to determine the wetland boundary between successive regular observation points when one of the points is a wetland and the other is a nonwetland. *CAUTION: In large areas having a mosaic of plant community types, several wetland boundaries may occur along the same transect.* PROCEED TO STEP 9 and apply the comprehensive wetland determination procedure at each required observation point. Use the described procedure to simultaneously characterize the vegetation, soil, and hydrology at each required observation point along each transect, and use the resulting characterization to make a wetland determination at each point. *NOTE: ALL required wetland boundary determinations should be made while proceeding along a transect.*

- *STEP 9 - Characterize the vegetation at the first observation point along the first transect.*[1] Record on DATA FORM 2 the vegetation occurring

[1] There is no single best procedure for characterizing vegetation. Methods described in STEP 9 afford standardization of the procedure. However, plot size and descriptors for determining dominance may vary.

at the first observation point along the first transect by completing the following (as appropriate):

a. *Trees.* Identify each tree occurring within a 30-ft radius[1] of the observation point, measure its basal area (square inches) or diameter at breast height (DBH) using a basal area tape or diameter tape, respectively, and record. *NOTE: If DBH is measured, convert values to basal area by applying the formula* $A = \pi r^2$. *This must be done on an individual basis.* A tree is any nonclimbing, woody plant that has a DBH of ≥ 3.0 in., regardless of height.

b. *Saplings/shrubs.* Identify each sapling/shrub occurring within a 10-ft radius of the observation point, estimate its height, and record the midpoint of its class range using the following height classes (height is used as an indication of dominance; taller individuals exert a greater influence on the plant community):

Height Class	Height Class Range, ft	Midpoint of Range, ft
1	1-3	2
2	3-5	4
3	5-7	6
4	7-9	8
5	9-11	10
6	>11	12

A sapling/shrub is any woody plant having a height >3.2 ft but a stem diameter of <3.0 in., exclusive of woody vines.

c. *Herbs.* Place a 3.28- by 3.28-ft quadrat with one corner touching the observation point and one edge adjacent to the transect line. As an alternative, a 1.64-ft-radius plot with the center of the plot representing the observation point position may be used. Identify each plant species with foliage extending into the quadrat and estimate its percent cover by applying the following cover classes:

[1] A larger sampling plot may be necessary when trees are large and widely spaced.

Cover Class	Class Range, Percent	Midpoint of Class Range, Percent
1	0-5	2.5
2	>5-25	15.0
3	>25-50	37.5
4	>50-75	62.5
5	>75-95	85.0
6	>95-100	97.5

Include all nonwoody plants and woody plants <3.2 ft in height. *NOTE: Total percent cover for all species will often exceed 100 percent.*

d. *Woody vines (lianas).* Identify species of woody vines climbing each tree and sapling/shrub sampled in STEPS 9*a* and 9*b* above, and record the number of stems of each. Since many woody vines branch profusely, count or estimate the number of stems at the ground surface. Include only individuals rooted in the 10-ft radius plot. Do not include individuals <3.2 ft in height. PROCEED TO STEP 10.

- *STEP 10 - Analyze field vegetation data.* Examine the vegetation data (STEP 9) and determine the dominant species in each vegetation layer[1] by completing the following:

  a. *Trees.* Obtain the total basal area (square inches) for each tree species identified in STEP 9*a* by summing the basal area of all individuals of a species found in the sample plot. Rank the species in descending order of dominance based on total basal area. Complete DATA FORM 2 for the tree layer.

  b. *Saplings/shrubs.* Obtain the total height for each sapling/shrub species identified in STEP 9*b*. Total height, which is an estimate of dominance, is obtained by summing the midpoints of height classes for all individuals of a species found in the sample plot. Rank the species in descending order of dominance based on sums of midpoints of height class ranges. Complete DATA FORM 2 for the sapling/shrub layer.

  c. *Herbs.* Obtain the total cover for each herbaceous and woody seedling species identified in STEP 9*c*. Total cover is obtained by using the midpoints of the cover class range as-

[1] The same species may occur as a dominant in more than one vegetation layer.

signed to each species (only one estimate of cover is made for a species in a given plot). Rank herbs and woody seedlings in descending order of dominance based on percent cover. Complete DATA FORM 2 for the herbaceous layer.

d. *Woody vines (lianas).* Obtain the total number of individuals of each species of woody vine identified in STEP 9*d*. Rank the species in descending order of dominance based on number of stems. Complete DATA FORM 2 for the woody vine layer. PROCEED TO STEP 11.

- *STEP 11 - Characterize soil.* If a soil survey is available (Section B), the soil type may already be known. Have a soil scientist confirm that the soil type is correct, and determine whether the soil series is a hydric soil ~~(Appendix D, Section 2)~~. *CAUTION: Mapping units on soil surveys sometimes have inclusions of soil series or phases not shown on the soil survey map.* If a hydric soil type is confirmed, record on DATA FORM 1 and PROCEED TO STEP 12. If not, dig a soil pit using a soil auger or spade (See Appendix D, Section 1) and look for indicators of hydric soils immediately below the A-horizon or 10 inches (whichever is shallower) (Part III, paragraphs 44 and/or 45). Record findings on DATA FORM 1. PROCEED TO STEP 12.

- *STEP 12 - Characterize hydrology.* Examine the observation point for indicators of wetland hydrology (Part III, paragraph 49) and record observations on DATA FORM 1. Consider indicators in the same sequence as listed in paragraph 49. PROCEED TO STEP 13.

- *STEP 13 - Determine whether hydrophytic vegetation is present.* Record the three dominant species from each vegetation layer (five species if only one or two layers are present) on DATA FORM 1.[1] Determine whether these species occur in wetlands by considering the following:

  a. *More than 50 percent of the dominant plant species are OBL, FACW, and/or FAC[2] on lists of plant species that occur in wetlands.* Record the indicator status of all dominant species ~~(Appendix C, Section 1 or 2)~~ on DATA FORM 1. Hydrophytic vegetation is present when the majority of the dominant species have an indicator status of OBL, FACW, or FAC. *CAUTION: Not necessarily all plant communities composed of only FAC species are hydrophytic communities. They are hydrophytic communities only when positive indicators of hydric soils and wetland hydrology are also found.* If this indicator is satisfied, complete the vegetation portion of

---

[1] Record all dominant species when less than three are present in a vegetation layer.
[2] For the FAC-neutral option, see paragraph 35*a*.

DATA FORM 1 and PROCEED TO STEP 14. If not, consider other indicators of hydrophytic vegetation.

b. *Presence of adaptations for occurrence in wetlands.* Do any of the species listed on DATA FORM 1 have observed morphological or known physiological adaptations (Appendix C, Section 3) for occurrence in wetlands? If so, record species having such adaptations on DATA FORM 1. When two or more dominant species have observed morphological adaptations or known physiological adaptations for occurrence in wetlands, hydrophytic vegetation is present. If so, complete the vegetation portion of DATA FORM 1 and PROCEED TO STEP 14. If not, consider other indicators of hydrophytic vegetation.

c. *Other indicators of hydrophytic vegetation.* Consider other indicators (see Part III, paragraph 35) that the species listed on DATA FORM 1 are commonly found in wetlands. If so, complete the vegetation portion of DATA FORM 1 by recording sources of supporting information, and PROCEED TO STEP 14. If no indicator of hydrophytic vegetation is present, the area at the observation point is not a wetland. In such cases, it is unnecessary to consider soil and hydrology at that observation point. PROCEED TO STEP 17.

- *STEP 14 - Determine whether hydric soils are present.* Examine DATA FORM 1 and determine whether any indicator of hydric soils is present. If so, complete the soils portion of DATA FORM 1 and PROCEED TO STEP 15. If not, the area at the observation point is not a wetland. PROCEED TO STEP 17.

- *STEP 15 - Determine whether wetland hydrology is present.* Examine DATA FORM 1 and determine whether any indicator of wetland hydrology is present. Complete the hydrology portion of DATA FORM 1 and PROCEED TO STEP 16.

- *STEP 16 - Make wetland determination.* When the area at the observation point presently or normally has wetland indicators of all three parameters, it is a wetland. When the area at the observation point presently or normally lacks wetland indicators of one or more parameters, it is a nonwetland. PROCEED TO STEP 17.

- *STEP 17 - Make wetland determination at second observation point.* Locate the second observation point along the first transect and make a wetland determination by repeating procedures described in STEPS 9 through 16. When the area at the second observation point is the same as the area at the first observation point (i.e., both wetlands or both nonwetlands), PROCEED TO STEP 19. When the areas at the two ob-

servation points are different (i.e., one wetlands, the other nonwetlands), PROCEED TO STEP 18.

- *STEP 18 - Determine the wetland boundary between observation points.* Determine the position of the wetland boundary by applying the following procedure:

    a. Look for a change in vegetation or topography. *NOTE: The changes may sometimes be very subtle.* If a change is noted, establish an observation point and repeat STEPS 9 through 16. Complete a DATA FORM 1. If the area at this point is a wetland, proceed toward the nonwetland observation point until a more obvious change in vegetation or topography is noted and repeat the procedure. If there is no obvious change, establish the next observation point approximately halfway between the last observation point and the nonwetland observation point and repeat STEPS 9 through 16.

    b. Make as many additional wetland determinations as necessary to find the wetland boundary. *NOTE: The completed DATA FORM 1's for the original two observation points often will provide a clue as to the parameters that change between the two points.*

    c. When the wetland boundary is found, mark the boundary location on the base map and indicate on the DATA FORM 1 that this represents a wetland boundary. Record the distance of the boundary from one of the two regular observation points. Since the regular observation points represent known distances from the baseline, it will be possible to accurately pinpoint the boundary location on the base map. PROCEED TO STEP 19.

- *STEP 19 - Make wetland determinations at all other required observation points along all transects.* Continue to locate and sample all required observation points along all transects. *NOTE: The procedure described in STEP 18 must be applied at every position where a wetland boundary occurs between successive observation points.* Complete a DATA FORM 1 for each observation point and PROCEED TO STEP 20.

- *STEP 20 - Synthesize data to determine the portion of the area containing wetlands.* Examine all completed copies of DATA FORM 1 (STEP 19), and mark on a copy of the base map the locations of all observation points that are wetlands with a W and all observation points that are nonwetlands with an N. Also, mark all wetland boundaries occurring along transects with an X. If all the observation points are wetlands, the entire area is wetlands. If all observation points are nonwetlands, none of the area is wetlands. If some wetlands and some nonwetlands are present, connect the wetland boundaries (X) by following contour lines between transects. *CAUTION: If the determination is considered to be*

highly controversial, it may be necessary to be more precise in determining the wetland boundary between transects. This is also true for very large areas where the distance between transects is greater. If this is necessary, PROCEED TO STEP 21.

- *STEP 21 - Determine wetland boundary between transects.* Two procedures may be used to determine the wetland boundary between transects, both of which involve surveying:

    a. *Survey contour from wetland boundary along transects.* The first method involves surveying the elevation of the wetland boundaries along transects and then extending the survey to determine the same contour between transects. This procedure will be adequate in areas where there is no significant elevational change between transects. However, if a significant elevational change occurs between transects, either the surveyor must adjust elevational readings to accommodate such changes or the second method must be used. *NOTE: The surveyed wetland boundary must be examined to ensure that no anomalies exist. If these occur, additional wetland determinations will be required in the portion of the area where the anomalies occur, and the wetland boundary must be adjusted accordingly.*

    b. *Additional wetland determinations between transects.* This procedure consists of traversing the area between transects and making additional wetland determinations to locate the wetland boundary at sufficiently close intervals (not necessarily standard intervals) so that the area can be surveyed. Place surveyor flags at each wetland boundary location. Enlist a surveyor to survey the points between transects. From the resulting survey data, produce a map that separates wetlands from nonwetlands.

Section F. Atypical Situations

71. Methods described in this section should be used only when a determination has already been made in Section D or E that positive indicators of hydrophytic vegetation, hydric soils, and/or wetland hydrology could not be found due to effects of recent human activities or natural events. This section is applicable to delineations made in the following types of situations:

a. *Unauthorized activities.* Unauthorized discharges requiring enforcement actions may result in removal or covering of indicators of one or more wetland parameters. Examples include, but are not limited to: (1) alteration or removal of vegetation; (2) placement of dredged or fill material over hydric soils; and/or (3) construction of levees, drainage systems, or

dams that significantly alter the area hydrology. NOTE: This section should not be used for activities that have been previously authorized or those that are exempted from CE regulation. For example, this section is not applicable to areas that have been drained under CE authorization or that did not require CE authorization. Some of these areas may still be wetlands, but procedures described in Section D or E must be used in these cases.

b. *Natural events.* Naturally occurring events may result in either creation or alteration of wetlands. For example, recent beaver dams may impound water, thereby resulting in a shift of hydrology and vegetation to wetlands. However, hydric soil indicators may not have developed due to insufficient time having passed to allow their development. Fire, avalanches, volcanic activity, and changing river courses are other examples. *NOTE: It is necessary to determine whether alterations to an area have resulted in changes that are now the "normal circumstances."* The relative permanence of the change and whether the area is now functioning as a wetland must be considered.

c. *Man-induced wetlands.* Procedures described in Subsection 4 are for use in delineating wetlands that have been purposely or incidentally created by human activities, but in which wetland indicators of one or more parameters are absent. For example, road construction may have resulted in impoundment of water in an area that previously was nonwetland, thereby effecting hydrophytic vegetation and wetland hydrology in the area. However, the area may lack hydric soil indicators. *NOTE: Subsection D is not intended to bring into CE jurisdiction those manmade wetlands that are exempted under CE regulations or policy.* It is also important to consider whether the man-induced changes are now the "normal circumstances" for the area. Both the relative permanence of the change and the functioning of the area as a wetland are implied.

72. When any of the three types of situations described in paragraph 71 occurs, application of methods described in Sections D and/or E will lead to the conclusion that the area is not a wetland because positive wetland indicators for at least one of the three parameters will be absent. Therefore, apply procedures described in one of the following subsections (as appropriate) to determine whether positive indicators of hydrophytic vegetation, hydric soils, and/or wetland hydrology existed prior to alteration of the area. Once these procedures have been employed, RETURN TO Section D or E to make a wetland determination. PROCEED TO the appropriate subsection.

Subsection 1 - Vegetation

73. Employ the following steps to determine whether hydrophytic vegetation previously occurred:

- *STEP 1 - Describe the type of alteration.* Examine the area and describe the type of alteration that occurred. Look for evidence of selective harvesting, clear cutting, bulldozing, recent conversion to agriculture, or other activities (e.g., burning, discing, or presence of buildings, dams, levees, roads, parking lots, etc.). Determine the approximate date[1] when the alteration occurred. Record observations on DATA FORM 3, and PROCEED TO STEP 2.

- *STEP 2 - Describe effects on vegetation.* Record on DATA FORM 3 a general description of how the activities (STEP 1) have affected the plant communities. Consider the following:

    a. Has all or a portion of the area been cleared of vegetation?

    b. Has only one layer of the plant community (e.g., trees) been removed?

    c. Has selective harvesting resulted in removal of some species?

    d. Has all vegetation been covered by fill, dredged material, or structures?

    e. Have increased water levels resulted in the death of some individuals?

    PROCEED TO STEP 3.

- *STEP 3 - Determine the type of vegetation that previously occurred.* Obtain all possible evidence of the type of plant communities that occurred in the area prior to alteration. Potential sources of such evidence include:

    a. *Aerial photography.* Recent (within 5 years) aerial photography can often be used to document the type of previous vegetation. The general type of plant communities formerly present can usually be determined, and species identification is sometimes possible.

    b. *Onsite inspection.* Many types of activities result in only partial removal of the previous plant communities, and remaining species may be indicative of hydrophytic vegetation. In other cases, plant fragments (e.g., stumps, roots) may be used to reconstruct the plant community types that occurred prior to site alteration. Sometimes, this can be determined by examining piles of debris resulting from land-clearing opera-

[1] It is especially important to determine whether the alteration occurred prior to implementation of Section 404.

tions or excavation to uncover identifiable remains of the previous plant community.

c. *Previous site inspections.* Documented evidence from previous inspections of the area may describe the previous plant communities, particularly in cases where the area was altered after a permit application was denied.

d. *Adjacent vegetation.* Circumstantial evidence of the type of plant communities that previously occurred may sometimes be obtained by examining the vegetation in adjacent areas. If adjacent areas have the same topographic position, soils, and hydrology as the altered area, the plant community types on the altered area were probably similar to those of the adjacent areas.

e. *SCS records.* Most SCS soil surveys include a description of the plant community types associated with each soil type. If the soil type on the altered area can be determined, it may be possible to generally determine the type of plant communities that previously occurred.

f. *Permit applicant.* In some cases, the permit applicant may provide important information about the type of plant communities that occurred prior to alteration.

g. *Public.* Individuals familiar with the area may provide a good general description of the previously occurring plant communities.

h. *NWI wetland maps.* The NWI has developed wetland type maps for many areas. These may be useful in determining the type of plant communities that occurred prior to alteration.

To develop the strongest possible record, all of the above sources should be considered. If the plant community types that occurred prior to alteration can be determined, record them on DATA FORM 3 and also record the basis used for the determination. PROCEED TO STEP 4. If it is impossible to determine the plant community types that occurred on the area prior to alteration, a determination cannot be made using all three parameters. In such cases, the determination must be based on the other two parameters. PROCEED TO Subsection 2 or 3 if one of the other parameters has been altered, or return to the appropriate Subsection of Section D or to Section E, as appropriate.

- *STEP 4 - Determine whether plant community types constitute hydrophytic vegetation.* Develop a list of species that previously occurred on the site (DATA FORM 3). Subject the species list to applicable indicators of hydrophytic vegetation (Part III, paragraph 35). If none of the

indicators are met, the plant communities that previously occurred did not constitute hydrophytic vegetation. If hydrophytic vegetation was present and no other parameter was in question, record appropriate data on the vegetation portion of DATA FORM 3, and return to either the appropriate subsection of Section D or to Section E. If either of the other parameters was also in question, PROCEED TO Subsection 2 or 3.

Subsection 2 - Soils

74. Employ the following steps to determine whether hydric soils previously occurred:

- *STEP 1 - Describe the type of alteration.* Examine the area and describe the type of alteration that occurred. Look for evidence of:

    a. *Deposition of dredged or fill material or natural sedimentation.* In many cases the presence of fill material will be obvious. If so, it will be necessary to dig a hole to reach the original soil (sometimes several feet deep). Fill material will usually be a different color or texture than the original soil (except when fill material has been obtained from like areas onsite). Look for decomposing vegetation between soil layers and the presence of buried organic or hydric soil layers. In accreting or recently formed sandbars in riverine situations, the soils may support hydrophytic vegetation but lack hydric soil characteristics.

    b. *Presence of nonwoody debris at the surface.* This can only be applied in areas where the original soils do not contain rocks. Nonwoody debris includes items such as rocks, bricks, and concrete fragments.

    c. *Subsurface plowing.* Has the area recently been plowed below the A-horizon or to depths of greater than 10 in.?

    d. *Removal of surface layers.* Has the surface soil layer been removed by scraping or natural landslides? Look for bare soil surfaces with exposed plant roots or scrape scars on the surface.

    e. *Presence of man-made structures.* Are buildings, dams, levees, roads, or parking lots present?

Determine the approximate date[1] when the alteration occurred. This may require checking aerial photography, examining building permits, etc. Record on DATA FORM 3, and PROCEED TO STEP 2.

- *STEP 2 - Describe effects on soils.* Record on DATA FORM 3 a general description of how identified activities in STEP 1 have affected the soils. Consider the following:

    a. Has the soil been buried? If so, record the depth of fill and determine whether the original soil is intact.

    b. Has the soil been mixed at a depth below the A-horizon or 10 inches? If so, it will be necessary to examine soil at a depth immediately below the plowed zone. Record supporting evidence.

    c. Has the soil been sufficiently altered to change the soil phase? Describe these changes.

PROCEED TO STEP 3.

- *STEP 3 - Characterize soils that previously occurred.* Obtain all possible evidence that may be used to characterize soils that previously occurred on the area. Consider the following potential sources of information:

    a. *Soil surveys.* In many cases, recent soil surveys will be available. If so, determine the soil series that were mapped for the area, and compare these soil series with the list of hydric soils ~~(Appendix D, Section 2)~~. If all soil series are listed as hydric soils, the entire area had hydric soils prior to alteration.

    b. *Characterization of buried soils.* When fill material has been placed over the original soil without physically disturbing the soil, examine and characterize the buried soils. To accomplish this, dig a hole through the fill material until the original soil is encountered. Determine the point at which the original soil material begins. Remove 12 inches of the original soil from the hole and look for indicators of hydric soils (Part III, paragraphs 44 and/or 45) immediately below the A-horizon or 10 inches (whichever is shallower). Record on DATA FORM 3 the color of the soil matrix, presence of an organic layer, presence of mottles or gleying, and/or presence of iron and manganese concretions. If the original soil is mottled and the

[1] It is especially important to determine whether the alteration occurred prior to implementation of Section 404.

chroma of the soil matrix is 2 or less,[1] a hydric soil was formerly present on the site. If any of these indicators are found, the original soil was a hydric soil. *(NOTE: When the fill material is a thick layer, it might be necessary to use a backhoe or posthole digger to excavate the soil pit.)* If USGS quadrangle maps indicate distinct variation in area topography, this procedure must be applied in each portion of the area that originally had a different surface elevation. Record findings on DATA FORM 3.

c. *Characterization of plowed soils.* Determine the depth to which the soil has been disturbed by plowing. Look for hydric soil characteristics (Part III, paragraphs 44 and/or 45) immediately below this depth. Record findings on DATA FORM 3.

d. *Removal of surface layers.* Dig a hole (Appendix D, Section 1) and determine whether the entire surface layer (A-horizon) has been removed. If so, examine the soil immediately below the top of the subsurface layer (B-horizon) for hydric soil characteristics. As an alternative, examine an undisturbed soil of the same soil series occurring in the same topographic position in an immediately adjacent area that has not been altered. Look for hydric soil indicators immediately below the A-horizon or 10 inches (whichever is shallower), and record findings on DATA FORM 3.

If sufficient data on soils that existed prior to alteration can be obtained to determine whether a hydric soil was present, PROCEED TO STEP 4. If not, a determination cannot be made using soils. Use the other parameters (Subsections 1 and 3) for the determination.

- *STEP 4 - Determine whether hydric soils were formerly present.* Examine the available data and determine whether indicators of hydric soils (Part III, paragraphs 44 and/or 45) were formerly present. If no indicators of hydric soils were found, the original soils were not hydric soils. If indicators of hydric soils were found, record the appropriate indicators on DATA FORM 3 and PROCEED TO Subsection 3 if the hydrology of the area has been significantly altered or return either to the appropriate subsection of Section D or to Section E and characterize the area hydrology.

---

[1] The matrix chroma must be 1 or less if no mottles are present. The soil must be moist when colors are determined.

Subsection 3 - Hydrology

75. Apply the following steps to determine whether wetland hydrology previously occurred:

- *STEP 1 - Describe the type of alteration.* Examine the area and describe the type of alteration that occurred. Look for evidence of:

    a. *Dams.* Has recent construction of a dam or some natural event (e.g., beaver activity or landslide) caused the area to become increasingly wetter or drier? *NOTE: This activity could have occurred a considerable distance away from the site in question.*

    b. *Levees, dikes, and similar structures.* Have levees or dikes recently been constructed that prevent the area from becoming periodically inundated by overbank flooding?

    c. *Ditching.* Have ditches been constructed recently that cause the area to drain more rapidly following inundation?

    d. *Filling of channels or depressions (land-leveling).* Have natural channels or depressions been recently filled?

    e. *Diversion of water.* Has an upstream drainage pattern been altered that results in water being diverted from the area?

    f. *Ground-water extraction.* Has prolonged and intensive pumping of ground water for irrigation or other purposes significantly lowered the water table and/or altered drainage patterns?

    g. *Channelization.* Have feeder streams recently been channelized sufficiently to alter the frequency and/or duration of inundation?

  Determine the approximate date[1] when the alteration occurred. Record observations on DATA FORM 3 and PROCEED TO STEP 2.

- *STEP 2 - Describe effects of alteration on area hydrology.* Record on DATA FORM 3 a general description of how the observed alteration (STEP 1) has affected the area. Consider the following:

    a. Is the area more frequently or less frequently inundated than prior to alteration? To what degree and why?

---

[1] It is especially important to determine whether the alteration occurred prior to implementation of Section 404.

b. Is the duration of inundation and soil saturation different than prior to alteration? How much different and why?

PROCEED TO STEP 3.

- *STEP 3 - Characterize the hydrology that previously existed in the area.* Obtain all possible evidence that may be used to characterize the hydrology that previously occurred. Potential sources of information include:

  a. Stream or tidal gage data. If a stream or tidal gaging station is located near the area, it may be possible to calculate elevations representing the upper limit of wetlands hydrology based on duration of inundation. Consult hydrologists from the local CE District Office for assistance. The resulting mean sea level elevation will represent the upper limit of inundation for the area in the absence of any alteration. If fill material has not been placed on the area, survey this elevation from the nearest USGS benchmark. Record elevations representing zone boundaries on DATA FORM 3. If fill material has been placed on the area, compare the calculated elevation with elevations shown on a USGS quadrangle or any other survey map that predated site alteration.

  b. Field hydrologic indicators. Certain field indicators of wetland hydrology (Part III, paragraph 49) may still be present. Look for watermarks on trees or other structures, drift lines, and debris deposits. Record these on DATA FORM 3. If adjacent undisturbed areas are in the same topographic position and are similarly influenced by the same sources of inundation, look for wetland indicators in these areas.

  c. Aerial photography. Examine any available aerial photography and determine whether the area was inundated at the time of the photographic mission. Consider the time of the year that the aerial photography was taken and use only photography taken during the growing season and prior to site alteration.

  d. Historical records. Examine any available historical records for evidence that the area has been periodically inundated. Obtain copies of any such information and record findings on DATA FORM 3.

  e. Floodplain management maps. Determine the previous frequency of inundation of the area from Floodplain Management Maps (if available). Record flood frequency on DATA FORM 3.

f. *Public or local government officials.* Contact individuals who might have knowledge that the area was periodically inundated.

If sufficient data on hydrology that existed prior to site alteration can be obtained to determine whether wetland hydrology was previously present, PROCEED TO STEP 4. If not, a determination involving hydrology cannot be made. Use other parameters (Subsections 1 and 2) for the wetland determination. Return to either the appropriate subsection of Section D or to Section E and complete the necessary data forms. PROCEED TO STEP 4 if the previous hydrology can be characterized.

- *STEP 4 - Determine whether wetland hydrology previously occurred.* Examine the available data and determine whether indicators of wetland hydrology (Part III, paragraph 49) were present prior to site alteration. If no indicators of wetland hydrology were found, the original hydrology of the area was not wetland hydrology. If indicators of wetland hydrology were found, record the appropriate indicators on DATA FORM 3 and return either to the appropriate subsection of Section D or to Section E and complete the wetland determination.

Subsection 4 - Man-Induced Wetlands

76. A man-induced wetland is an area that has developed at least some characteristics of naturally occurring wetlands due to either intentional or incidental human activities. Examples of man-induced wetlands include irrigated wetlands, wetlands resulting from impoundment (e.g., reservoir shorelines), wetlands resulting from filling of formerly deepwater habitats, dredged material disposal areas, and wetlands resulting from stream channel realignment. Some man-induced wetlands may be subject to Section 404. In virtually all cases, man-induced wetlands involve a significant change in the hydrologic regime, which may either increase or decrease the wetness of the area. Although wetland indicators of all three parameters (i.e., vegetation, soils, and hydrology) may be found in some man-induced wetlands, indicators of hydric soils are usually absent. Hydric soils require long periods (hundreds of years) for development of wetness characteristics, and most man-induced wetlands have not been in existence for a sufficient period to allow development of hydric soil characteristics. Therefore, application of the multiparameter approach in making wetland determinations in man-induced wetlands must be based on the presence of hydrophytic vegetation and wetland hydrology.[1] There must also be documented evidence that the wetland resulted from human activities. Employ the following steps to determine whether an area consists of wetlands resulting from human activities:

[1] Uplands that support hydrophytic vegetation due to agricultural irrigation and that have an obvious hydrologic connection to other "waters of the United States" should not be delineated as wetlands under this subsection.

- *STEP 1 - Determine whether the area represents a potential man-induced wetland.* Consider the following questions:

    a. Has a recent man-induced change in hydrology occurred that caused the area to become significantly wetter?

    b. Has a major man-induced change in hydrology that occurred in the past caused a former deepwater aquatic habitat to become significantly drier?

    c. Has man-induced stream channel realignment significantly altered the area hydrology?

    d. Has the area been subjected to long-term irrigation practices?

    If the answer to any of the above questions is YES, document the approximate time during which the change in hydrology occurred, and PROCEED TO STEP 2. If the answer to all of the questions is NO, procedures described in Section D or E must be used.

- *STEP 2 - Determine whether a permit will be needed if the area is found to be a wetland.* Consider the current CE regulations and policy regarding man-induced wetlands. If the type of activity resulting in the area being a potential man-induced wetland is exempted by regulation or policy, no further action is needed. If not exempt, PROCEED TO STEP 3.

- *STEP 3 - Characterize the area vegetation, soils, and hydrology.* Apply procedures described in Section D (routine determinations) or Section E (comprehensive determinations) to the area. Complete the appropriate data forms and PROCEED TO STEP 4.

- *STEP 4 - Wetland determination.* Based on information resulting from STEP 3, determine whether the area is a wetland. When wetland indicators of all three parameters are found, the area is a wetland. When indicators of hydrophytic vegetation and wetland hydrology are found *and* there is documented evidence that the change in hydrology occurred so recently that soils could not have developed hydric characteristics, the area is a wetland. In such cases, it is assumed that the soils are functioning as hydric soils. *CAUTION: If hydrophytic vegetation is being maintained only because of man-induced wetland hydrology that would no longer exist if the activity (e.g., irrigation) were to be terminated, the area should not be considered a wetland.*

Section G - Problem Areas

77. There are certain wetland types and/or conditions that may make application of indicators of one or more parameters difficult, at least at certain times of the year. These are not considered to be atypical situations. Instead, they are wetland types in which wetland indicators of one or more parameters may be periodically lacking due to *normal* seasonal or annual variations in environmental conditions that result from causes other than human activities or catastrophic natural events.

Types of problem areas

78. Representative examples of potential problem areas, types of variations that occur, and their effects on wetland indicators are presented in the following subparagraphs. Similar situations may sometimes occur in other wetland types. *NOTE: This section is not intended to bring nonwetland areas having wetland indicators of two, but not all three, parameters into Section 404 jurisdiction.*

a. *Wetlands on drumlins.* Slope wetlands occur in glaciated areas in which thin soils cover relatively impermeable glacial till or in which layers of glacial till have different hydraulic conditions that produce a broad zone of ground-water seepage. Such areas are seldom, if ever, flooded, but downslope groundwater movement keeps the soils saturated for a sufficient portion of the growing season to produce anaerobic and reducing soil conditions. This fosters development of hydric soil characteristics and selects for hydrophytic vegetation. Indicators of wetland hydrology may be lacking during the drier portion of the growing season.

b. *Seasonal wetlands.* In many regions (especially in western states), depressional areas occur that have wetland indicators of all three parameters during the wetter portion of the growing season, but normally lack wetland indicators of hydrology and/or vegetation during the drier portion of the growing season. Obligate hydrophytes and facultative wetland plant species ~~(Appendix C, Section 1 or 2)~~ normally are dominant during the wetter portion of the growing season, while upland species (annuals) may be dominant during the drier portion of the growing season. These areas may be inundated during the wetter portion of the growing season, but wetland hydrology indicators may be totally lacking during the drier portion of the growing season. It is important to establish that an area truly is a water body. Water in a depression normally must be sufficiently persistent to exhibit an ordinary high-water mark or the presence of wetland characteristics before it can be considered as a water body potentially subject to Clean Water Act jurisdiction. The determination that an area exhibits wetland characteristics for a sufficient portion of the growing season to qualify as a wetland under the Clean Water Act must be made on a case-by-case basis. Such determinations should consider the respective length of time that the area exhibits upland and wetland characteristics, and the manner in which the area fits

into the overall ecological system as a wetland. Evidence concerning the persistence of an area's wetness can be obtained from its history, vegetation, soil, drainage characteristics, uses to which it has been subjected, and weather or hydrologic records.

c. *Prairie potholes.* Prairie potholes normally occur as shallow depressions in glaciated portions of the north-central United States. Many are landlocked, while others have a drainage outlet to streams or other potholes. Most have standing water for much of the growing season in years of normal or above normal precipitation, but are neither inundated nor have saturated soils during most of the growing season in years of below normal precipitation. During dry years, potholes often become incorporated into farming plans, and are either planted to row crops (e.g., soybeans) or are mowed as part of a haying operation. When this occurs, wetland indicators of one or more parameters may be lacking. For example, tillage would eliminate any onsite hydrologic indicator, and would make detection of soil and vegetation indicators much more difficult.

d. *Vegetated flats.* In both coastal and interior areas throughout the Nation, vegetated flats are often dominated by annual species that are categorized as OBL. Application of procedures described in Sections D and E during the growing season will clearly result in a positive wetland determination. However, these areas will appear to be unvegetated mudflats when examined during the nongrowing season, and the area would not qualify at that time as a wetland due to an apparent lack of vegetation.

Wetland determinations in problem areas

79. Procedures for making wetland determinations in problem areas are presented below. Application of these procedures is appropriate only when a decision has been made in Section D or E that wetland indicators of one or more parameters were lacking, probably due to normal seasonal or annual variations in environmental conditions. Specific procedures to be used will vary according to the nature of the area, site conditions, and parameter(s) affected by the variations in environmental conditions. A determination must be based on the best evidence available to the field inspector, including:

a. Available information (Section B).

b. Field data resulting from an onsite inspection.

c. Basic knowledge of the ecology of the particular community type(s) and environmental conditions associated with the community type.

NOTE: The procedures described below should only be applied to parameters not adequately characterized in Section D or E. Complete the following steps:

- *STEP 1 - Identify the parameter(s) to be considered.* Examine the DATA FORM 1 (Section D or E) and identify the parameter(s) that must be given additional consideration. PROCEED TO STEP 2.

- *STEP 2 - Determine the reason for further consideration.* Determine the reason why the parameter(s) identified in STEP 1 should be given further consideration. This will require a consideration and documentation of:

    a. Environmental condition(s) that have impacted the parameter(s).

    b. Impacts of the identified environmental condition(s) on the parameter(s) in question.

  Record findings in the comments section of DATA FORM 1. PROCEED TO STEP 3.

- *STEP 3 - Document available information for parameter(s) in question.* Examine the available information and consider personal ecological knowledge of the range of normal environmental conditions of the area. Local experts (e.g., university personnel) may provide additional information. Record information on DATA FORM 1. PROCEED TO STEP 4.

- *STEP 4 - Determine whether wetland indicators are normally present during a portion of the growing season.* Examine the information resulting from STEP 3 and determine whether wetland indicators are *normally* present during part of the growing season. If so, record on DATA FORM 1 the indicators normally present and return to Section D or Section E and make a wetland determination. If no information can be found that wetland indicators of all three parameters are normally present during part of the growing season, the determination must be made using procedures described in Section D or Section E.

References

Clark, J. R., and Benforado, J., eds. (1981). *Wetlands of Bottomland Hardwood Forests, Proceedings of a Workshop on Bottomland Hardwood Forest Wetlands of the Southeastern United States*, Elsevier Scientific Publishing Company, New York.

Correll, D. S., and Correll, H. B. (1972). *Aquatic and Wetland Plants of the Southwestern United States*, Publ. No. 16030 DNL 01/72, Environmental Protection Agency, Washington, DC.

Cowardin, L. M., Carter, V., Golet, F. C., and LaRoe, E. T. (1979). "Classification of Wetlands and Deepwater Habitats of the United States," FWS/OBS-79/31, U.S. Fish and Wildlife Service, Office of Biological Services, Washington, DC.

Cronquist, A., Holmgren, A. H., Holmgren, N. H., and Reveal, J. L. (1972). *Intermountain Flora - Vascular Plants of the Intermountain West, USA*, Vol. I and II, Hefner Publishing Company, New York.

Davis, R. J. (1952). *Flora of Idaho*, William C. Brown Company, Dubuque, IA.

Federal Register. (1980). "40 CFR Part 230: Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material," U.S. Government Printing Office, Washington, DC, 45(249), 85,352-85,353.

_____. (1982). "Title 33: Navigation and Navigable Waters; Chapter 2. Regulatory Programs of the Corps of Engineers," U.S. Government Printing Office, Washington, DC, 47(138), 31,810.

Fernald, M. L. (1950). *Gray's Manual of Botany*, 8th ed., American Book Company, New York.

Gleason, H. A., and Cronquist, A. (1963). *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, Van Nostrand, Princeton, NJ.

Godfrey, R. K., and Wooten, J. W. (1979). *Aquatic and Wetland Plants of the Southeastern United States*, Vol. I and II, University of Georgia Press, Athens, GA.

Harrington, H. D. (1979). *Manual of the Plants of Colorado*, 2nd ed., Sage Books, Denver, CO.

Hitchcock, A. S. (1950). *Manual of Grasses of the United States*, U.S. Department of Agriculture Miscellaneous Publication No. 200, U.S. Government Printing Office, Washington, DC.

Hitchcock, C. L., and Cronquist, A. (1973). *Flora of the Pacific Northwest*, University of Washington Press, Seattle, WA.

Kearney, T. H., and Peebles, R. H. (1960). *Arizona Flora*, 2nd ed., University of California Press, Berkeley, CA.

Long, R. W., and Lakela, O. (1976). *A Flora of Tropical Florida*, Banyan Books, Miami, FL.

Munsell Color. (1975). *Munsell Soil Color Charts*, Kollmorgen Corporation, Baltimore, MD.

Munz, P. A., and Keck, D. D. (1959). *A California Flora*, University of California Press, Berkeley, CA.

Radford, A. E., Ahles, H. E., and Bell, C. R. (1968). *Manual of the Vascular Flora of the Carolinas*, The University of North Carolina Press, Chapel Hill, NC.

Small, J. K. (1933). *Manual of the Southeastern Flora*, The University of North Carolina Press, Chapel Hill, NC.

Steyermark, J. A. (1963). *Flora of Missouri*, The Iowa State University Press, Ames, IA.

Theriot, R. F. (In Review). "Flood Tolerance Indices of Plant Species of Southeastern Bottomland Forests," Technical Report, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

U.S. Department of Agriculture - Soil Conservation Service. (1975). *Soil Taxonomy*, Agriculture Handbook No. 436, U.S. Government Printing Office, Washington, DC.

_____. (1983). "List of Soils with Actual or High Potential for Hydric Conditions," USDA-SCS National Bulletin No. 430-3-10, Washington, DC.

U.S. Department of Agriculture - Soil Conservation Service. (1985). "Hydric Soils of the United States," USDA-SCS National Bulletin No. 430-5-9, Washington, DC.

U.S. Department of the Interior. (1970). *National Atlas of the United States*, U.S. Geological Survey, US Government Printing Office, Washington, DC, 110-111.

Bibliography

Copeland, B. J., Hodson, R. G., and Riggs, S. R. (1984). "The Ecology of the Pamlico River, North Carolina: An Estuarine Profile," FWS/OBS-82/06, U.S. Fish and Wildlife Service, Washington, DC.

Foster, M. S., and Schiel, D. R. (1985). "The Ecology of Giant Kelp Forests in California: A Community Profile," FWS/OBS-85(7.2), U.S. Fish and Wildlife Service, Washington, DC.

Gosselink, J. G. (1984). "The Ecology of Delta Marshes of Coastal Louisiana: A Community Profile," FWS/OBS-84/09, U.S. Fish and Wildlife Service, Washington, DC.

Hobbie, J. E. (1984). "The Ecology of Tundra Ponds of the Arctic Coastal Plain: A Community Profile," FWS/OBS-83/25, U.S. Fish and Wildlife Service, Washington, DC.

Huffman, R. T., and Tucker, G. E. (1984). "Preliminary Guide to the Onsite Identification and Delineation of the Wetlands of Alaska," Technical Report Y-78-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Huffman, R. T., Tucker, G. E, Wooten, J. W., Limas, C. V., Feel, M. W., Forsythe, S. W., and Wilson, J. S. (1982). "Preliminary Guide to the Onsite Identification and Delineation of the Wetlands of the South Atlantic United States," Technical Report Y-78-7, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

_____. (1982). "Preliminary Guide to the Onsite Identification and Delineation of the Wetlands of the North Atlantic United States," Technical Report Y-78-8, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Japp, W. C. (1984). "The Ecology of the South Florida Coral Reefs: A Community Profile," FWS/OBS-82/08, U.S. Fish and Wildlife Service, Washington, DC.

Gasolene, M. (1983). "The Ecology of San Francisco Bay Tidal Marshes: A Community Profile," FWS/OBS-83/23, U.S. Fish and Wildlife Service, Washington, DC.

Livingston, R. J. (1984). "The Ecology of the Apalachicola Bay System: An Estuarine Profile," FWS/OBS-82/05, U.S. Fish and Wildlife Service, Washington, DC.

Nixon, S. W. (1982). "The Ecology of New England High Salt Marshes: A Community Profile," FWS/OBS-81/55, U.S. Fish and Wildlife Service, Washington, DC.

Odum, W. E., McIvor, C. C., and Smith, T. J., III. (1982). "The Ecology of the Mangroves of South Florida: A Community Profile," FWS/OBS-81/24, U.S. Fish and Wildlife Service, Washington, DC.

Odum, W. E., Smith, T. J., III, Hoover, J. K., and McIvor, C. C. (1984). "The Ecology of Tidal Freshwater Marshes of the United States East Coast: A Community Profile," FWS/OBS-83/17, U.S. Fish and Wildlife Service, Washington, DC.

Peterson, C. H., and Peterson, N. M. (1979). "The Ecology of Intertidal Flats of North Carolina: A Community Profile," FWS/OBS-79/39, U.S. Fish and Wildlife Service, Washington, DC.

Phillips, R. C. (1984). "The Ecology of Eelgrass Meadows in the Pacific Northwest: A Community Profile," FWS/OBS-84/24, U.S. Fish and Wildlife Service, Washington, DC.

Seliskar, D. M., and Gallagher, J. L. (1983). "The Ecology of Tidal Marshes of the Pacific Northwest Coast: A Community Profile," FWS/OBS-82/32, U.S. Fish and Wildlife Service, Washington, DC.

Sharitz, R. R., and Gibbons, J. W. (1982). "The Ecology of Southeastern Shrub Bogs (Pocosins) and Carolina Bays: A Community Profile," FWS/OBS-82/04, U.S. Fish and Wildlife Service, Washington, DC.

Thayer, G. W., Kenworthy, W. J., and Fonseca, M. S. (1984). "The Ecology of Eelgrass Meadows of the Atlantic Coast: A Community Profile," FWS/OBS-84/02, U.S. Fish and Wildlife Service, Washington, DC.

U.S. Army Corps of Engineers. (1978). "Preliminary Guide to Wetlands of Peninsular Florida," Technical Report Y-78-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

_____. (1978). "Preliminary Guide to Wetlands of Puerto Rico," Technical Report Y-78-3, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

U.S. Army Corps of Engineers. (1978). "Preliminary Guide to Wetlands of the West Coast States," Technical Report Y-78-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

_____. (1978). "Preliminary Guide to Wetlands of the Gulf Coastal Plain," Technical Report Y-78-5, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

_____. (1982). "Preliminary Guide to the Onsite Identification and Delineation of the Wetlands of the Interior United States," Technical Report Y-78-6, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Witlatch, R. B. (1982). "The Ecology of New England Tidal Flats: A Community Profile," FWS/OBS-81/01, U.S. Fish and Wildlife Service, Washington, DC.

Wharton, C. H., Kitchens, W. M., and Sipe, T. W. (1982). "The Ecology of Bottomland Hardwood Swamps of the Southeast: A Community Profile," FWS/OBS-81/37, U.S. Fish and Wildlife Service, Washington, DC.

Zedler, J. B. (1984). "The Ecology of Southern California Coastal Salt Marshes: A Community Profile," FWS/OBS-81/54, U.S. Fish and Wildlife Service, Washington, DC.

Zieman, J. C. (1982). "The Ecology of the Seagrasses of South Florida: A Community Profile," FWS/OBS-82/25, U.S. Fish and Wildlife Service, Washington, DC.

Appendix A
Glossary

Active water table. A condition in which the zone of soil saturation fluctuates, resulting in periodic anaerobic soil conditions. Soils with an active water table often contain bright mottles and matrix chromas of 2 or less.

Adaptation. A modification of a species that makes it more fit for existence under the conditions of its environment. These modifications are the result of genetic selection processes.

Adventitious roots. Roots found on plant stems in positions where they normally do not occur.

Aerenchymous tissue. A type of plant tissue in which cells are unusually large and arranged in a manner that results in air spaces in the plant organ. Such tissues are often referred to as spongy and usually provide increased buoyancy.

Aerobic. A situation in which molecular oxygen is a part of the environment.

Anaerobic. A situation in which molecular oxygen is absent (or effectively so) from the environment.

Aquatic roots. Roots that develop on stems above the normal position occupied by roots in response to prolonged inundation.

Aquic moisture regime. A mostly reducing soil moisture regime nearly free of dissolved oxygen due to saturation by ground water or its capillary fringe and occurring at periods when the soil temperature at 19.7 in. is greater than 5 °C.

Arched roots. Roots produced on plant stems in a position above the normal position of roots, which serve to brace the plant during and following periods of prolonged inundation.

Areal cover. A measure of dominance that defines the degree to which above-ground portions of plants (not limited to those rooted in a sample plot) cover the ground surface. It is possible for the total areal cover in a community to exceed 100 percent because (a) most plant communities consist of two or more vegetative strata; (b) areal cover is estimated by vegetative layer; and (c) foliage within a single layer may overlap.

Atypical situation. As used herein, this term refers to areas in which one or more parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter.

Backwater flooding. Situations in which the source of inundation is overbank flooding from a nearby stream.

Basal area. The cross-sectional area of a tree trunk measured in square inches, square centimeters, etc. Basal area is normally measured at 4.5 ft above the ground level and is used as a measure of dominance. The most easily used tool for measuring basal area is a tape marked in square inches. When plotless methods are used, an angle gauge or prism will provide a means for rapidly determining basal area. This term is also applicable to the cross-sectional area of a clumped herbaceous plant, measured at 1.0 in. above the soil surface.

Bench mark. A fixed, more or less permanent reference point or object, the elevation of which is known. The U.S. Geological Survey (USGS) installs brass caps in bridge abutments or otherwise permanently sets bench marks at convenient locations nationwide. The elevations on these marks are referenced to the National Geodetic Vertical Datum (NGVD), also commonly known as mean sea level (MSL). Locations of these bench marks on USGS quadrangle maps are shown as small triangles. However, the marks are sometimes destroyed by construction or vandalism. The existence of any bench mark should be field verified before planning work that relies on a particular reference point. The USGS and/or local state surveyor's office can provide information on the existence, exact location, and exact elevation of bench marks.

Biennial. An event that occurs at 2-year intervals.

Buried soil. A once-exposed soil now covered by an alluvial, loessal, or other deposit (including man-made).

Canopy layer. The uppermost layer of vegetation in a plant community. In forested areas, mature trees comprise the canopy layer, while the tallest herbaceous species constitute the canopy layer in a marsh.

Capillary fringe. A zone immediately above the water table (zero gauge pressure) in which water is drawn upward from the water table by capillary action.

Chemical reduction. Any process by which one compound or ion acts as an electron donor. In such cases, the valence state of the electron donor is decreased.

Chroma. The relative purity or saturation of a color; intensity of distinctive hue as related to grayness; one of the three variables of color.

Comprehensive wetland determination. A type of wetland determination that is based on the strongest possible evidence, requiring the collection of quantitative data.

Concretion. A local concentration of chemical compounds (e.g., calcium carbonate, iron oxide) in the form of a grain or nodule of varying size, shape, hardness, and color. Concretions of significance in hydric soils are usually iron and/or manganese oxides occurring at or near the soil surface, which develop under conditions of prolonged soil saturation.

Contour. An imaginary line of constant elevation on the ground surface. The corresponding line on a map is called a "contour line."

Criteria. Standards, rules, or tests on which a judgment or decision may be based.

Deepwater aquatic habitat. Any open water area that has a mean annual water depth >6.6 ft, lacks soil, and/or is either unvegetated or supports only floating or submersed macrophytes.

Density. The number of individuals of a species per unit area.

Detritus. Minute fragments of plant parts found on the soil surface. When fused together by algae or soil particles, this is an indicator that surface water was recently present.

Diameter at breast height (DBH). The width of a plant stem as measured at 4.5 ft above the ground surface.

Dike. A bank (usually earthen) constructed to control or confine water.

Dominance. As used herein, a descriptor of vegetation that is related to the standing crop of a species in an area, usually measured by height, areal cover, or basal area (for trees).

Dominant species. As used herein, a plant species that exerts a controlling influence on or defines the character of a community.

Drained. A condition in which ground or surface water has been reduced or eliminated from an area by artificial means.

Drift line. An accumulation of debris along a contour (parallel to the water flow) that represents the height of an inundation event.

Duration (inundation/soil saturation). The length of time during which water stands at or above the soil surface (inundation), or during which the soil is saturated. As used herein, duration refers to a period during the growing season.

Ecological tolerance. The range of environmental conditions in which a plant species can grow.

Emergent plant. A rooted herbaceous plant species that has parts extending above a water surface.

Field capacity. The percentage of water remaining in a soil after it has been saturated and after free drainage is negligible.

Fill material. Any material placed in an area to increase surface elevation.

Flooded. A condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from high tides, or any combination of sources.

Flora. A list of all plant species that occur in an area.

Frequency (inundation or soil saturation). The periodicity of coverage of an area by surface water or soil saturation. It is usually expressed as the number of years (e.g., 50 years) the soil is inundated or saturated at least once each year during part of the growing season per 100 years or as a 1-, 2-, 5-year, etc., inundation frequency.

Frequency (vegetation). The distribution of individuals of a species in an area. It is quantitatively expressed as

$$\frac{\text{Number of samples containing species A}}{\text{Total number of samples}} \times 100$$

More than one species may have a frequency of 100 percent within the same area.

Frequently flooded. A flooding class in which flooding is likely to occur often under normal weather conditions (more than 50-percent chance of flooding in any year or more than 50 times in 100 years).

Gleyed. A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under re-

ducing soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state.

Ground water. That portion of the water below the ground surface that is under greater pressure than atmospheric pressure.

Growing season. The portion of the year when soil temperatures at 19.7 in. below the soil surface are higher than biologic zero (5 °C) (U.S. Department of Agriculture—Soil Conservation Service 1985). For ease of determination this period can be approximated by the number of frost-free days (U.S Department of the Interior 1970).

Habitat. The environment occupied by individuals of a particular species, population, or community.

Headwater flooding. A situation in which an area becomes inundated directly by surface runoff from upland areas.

Herb. A nonwoody individual of a macrophytic species. In this manual, seedlings of woody plants (including vines) that are less than 3.2 ft in height are considered to be herbs.

Herbaceous layer. Any vegetative stratum of a plant community that is composed predominantly of herbs.

Histic epipedon. An 8- to 16-in. soil layer at or near the surface that is saturated for 30 consecutive days or more during the growing season in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent organic matter when 60 percent or greater clay is present.

Histosols. An order in soil taxonomy composed of organic soils that have organic soil materials in more than half of the upper 80 cm or that are of any thickness if directly overlying bedrock.

Homogeneous vegetation. A situation in which the same plant species association occurs throughout an area.

Hue. A characteristic of color that denotes a color in relation to red, yellow, blue, etc; one of the three variables of color. Each color chart in the Munsell Color Book (Munsell Color 1975) consists of a specific hue.

Hydric soil. A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (U.S. Department of Agriculture—Soil Conservation Service 1985). Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.

Hydric soil condition. A situation in which characteristics exist that are associated with soil development under reducing conditions.

Hydrologic regime. The sum total of water that occurs in an area on average during a given period.

Hydrologic zone. An area that is inundated or has saturated soils within a specified range of frequency and duration of inundation and soil saturation.

Hydrology. The science dealing with the properties, distribution, and circulation of water.

Hydrophyte. Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats.

Hydrophytic vegetation. The sum total of macrophytic plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. When hydrophytic vegetation comprises a community where indicators of hydric soils and wetland hydrology also occur, the area has wetland vegetation.

Hypertrophied lenticels. An exaggerated (oversized) pore on the surface of stems of woody plants through which gases are exchanged between the plant and the atmosphere. The enlarged lenticels serve as a mechanism for increasing oxygen to plant roots during periods of inundation and/or saturated soils.

Importance value. A quantitative term describing the relative influence of a plant species in a plant community, obtained by summing any combination of relative frequency, relative density, and relative dominance.

Indicator. As used in this manual, an event, entity, or condition that typically characterizes a prescribed environment or situation; indicators determine or aid in determining whether or not certain stated circumstances exist.

Indicator status. One of the categories (e.g., OBL) that describes the estimated probability of a plant species occurring in wetlands.

Intercellular air space. A cavity between cells in plant tissues, resulting from variations in cell shape and configuration. Aerenchymous tissue (a morphological adaptation found in many hydrophytes) often has large intercellular air spaces.

Inundation. A condition in which water from any source temporarily or permanently covers a land surface.

Levee. A natural or man-made feature of the landscape that restricts movement of water into or through an area.

Liana. As used in this manual, a layer of vegetation in forested plant communities that consists of woody vines. The term may also be applied to a given species.

Limit of biological activity. With reference to soils, the zone below which conditions preclude normal growth of soil organisms. This term often is used to refer to the temperature (5 °C) in a soil below which metabolic processes of soil microorganisms, plant roots, and animals are negligible.

Long duration (flooding). A flooding class in which the period of inundation for a single event ranges from 7 days to 1 month.

Macrophyte. Any plant species that can be readily observed without the aid of optical magnification. This includes all vascular plant species and mosses (e.g., *Sphagnum* spp.), as well as large algae (e.g., *Cara* spp., kelp).

Macrophytic. A term referring to a plant species that is a macrophyte.

Major portion of the root zone. The portion of the soil profile in which more than 50 percent of plant roots occur. In wetlands, this usually constitutes the upper 12 in. of the profile.

Man-induced wetland. Any area that develops wetland characteristics due to some activity (e.g., irrigation) of man.

Mapping unit. As used in this manual, some common characteristic of soil, vegetation, and/or hydrology that can be shown at the scale of mapping for the defined purpose and objectives of a survey.

Mean sea level. A datum, or "plane of zero elevation," established by averaging all stages of oceanic tides over a 19-year tidal cycle or "epoch." This plane is corrected for curvature of the earth and is the standard reference for elevations on the earth's surface. The correct term for mean sea level is the National Geodetic Vertical Datum (NGVD).

Mesophytic. Any plant species growing where soil moisture and aeration conditions lie between extremes. These species are typically found in habitats with average moisture conditions, neither very dry nor very wet.

Metabolic processes. The complex of internal chemical reactions associated with life-sustaining functions of an organism.

Method. A particular procedure or set of procedures to be followed.

Mineral soil. A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter usually containing less than 20 percent organic matter.

Morphological adaptation. A feature of structure and form that aids in fitting a species to its particular environment (e.g., buttressed base, adventitious roots, aerenchymous tissue).

Mottles. Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic reducing soil conditions.

Muck. Highly decomposed organic material in which the original plant parts are not recognizable.

Multitrunk. A situation in which a single individual of a woody plant species has several stems.

Nonhydric soil. A soil that has developed under predominantly aerobic soil conditions. These soils normally support mesophytic or xerophytic species.

Nonwetland. Any area that has sufficiently dry conditions that indicators of hydrophytic vegetation, hydric soils, and/or wetland hydrology are lacking. As used in this manual, any area that is neither a wetland, a deepwater aquatic habitat, nor other special aquatic site.

Organic pan. A layer usually occurring at 12 to 30 in. below the soil surface in coarse-textured soils, in which organic matter and aluminum (with or without iron) accumulate at the point where the top of the water table most often occurs. Cementing of the organic matter slightly reduces permeability of this layer.

Organic soil. A soil is classified as an organic soil when it is: (1) saturated for prolonged periods (unless artificially drained) and has more than 30 percent organic matter if the mineral fraction is more than 50 percent clay, or more than 20 percent organic matter if the mineral fraction has no clay; or (2) never saturated with water for more than a few days and having more than 34 percent organic matter.

Overbank flooding. Any situation in which inundation occurs as a result of the water level of a stream rising above bank level.

Oxidation-reduction process. A complex of biochemical reactions in soil that influences the valence state of component elements and their ions. Prolonged soil saturation during the growing season elicits anaerobic conditions that shift the overall process to a reducing condition.

Oxygen pathway. The sequence of cells, intercellular spaces, tissues, and organs, through which molecular oxygen is transported in plants. Plant species having pathways for oxygen transport to the root system are often adapted for life in saturated soils.

Parameter. A characteristic component of a unit that can be defined. Vegetation. soil, and hydrology are three parameters that may be used to define wetlands.

Parent material. The unconsolidated and more or less weathered mineral or organic matter from which a soil profile develops.

Ped. A unit of soil structure (e.g., aggregate, crumb, prism, block, or granule) formed by natural processes.

Peraquic moisture regime. A soil condition in which a reducing environment always occurs due to the presence of ground water at or near the soil surface.

Periodically. Used herein to define detectable regular or irregular saturated soil conditions or inundation, resulting from ponding of ground water, precipitation, overland flow, stream flooding, or tidal influences that occur(s) with hours, days, weeks, months, or even years between events.

Permeability. A soil characteristic that enables water or air to move through the profile, measured as the number of inches per hour that water moves downward through the saturated soil. The rate at which water moves through the least permeable layer governs soil permeability.

Physiognomy. A term used to describe a plant community based on the growth habit (e.g., trees, herbs, lianas) of the dominant species.

Physiological adaptation. A feature of the basic physical and chemical activities that occurs in cells and tissues of a species, which results in it being better fitted to its environment (e.g., ability to absorb nutrients under low oxygen tensions).

Plant community. All of the plant populations occurring in a shared habitat or environment.

Plant cover. See areal cover.

Pneumatophore. Modified roots that may function as a respiratory organ in species subjected to frequent inundation or soil saturation (e.g., cypress knees).

Ponded. A condition in which water stands in a closed depression. Water may be removed only by percolation, evaporation, and/or transpiration.

Poorly drained. Soils that commonly are wet at or near the surface during a sufficient part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these conditions.

Population. A group of individuals of the same species that occurs in a given area.

Positive wetland indicator. Any evidence of the presence of hydrophytic vegetation, hydric soil, and/or wetland hydrology in an area.

Prevalent vegetation. The plant community or communities that occur in an area during a given period. The prevalent vegetation is characterized by the dominant macrophytic species that comprise the plant community.

Quantitative. A precise measurement or determination expressed numerically.

Range. As used herein, the geographical area in which a plant species is known to occur.

Redox potential. A measure of the tendency of a system to donate or accept electrons, which is governed by the nature and proportions of the oxidizing and reducing substances contained in the system.

Reducing environment. An environment conducive to the removal of oxygen and chemical reduction of ions in the soils.

Relative density. A quantitative descriptor, expressed as a percent, of the relative number of individuals of a species in an area; it is calculated by

$$\frac{\text{Number of individuals of species A}}{\text{Total number of individuals of all species}} \times 100$$

Relative dominance. A quantitative descriptor, expressed as a percent, of the relative size or cover of individuals of a species in an area; it is calculated by

$$\frac{\text{Amount}^{1} \text{ of species A}}{\text{Total amount of all species}} \times 100$$

Relative frequency. A quantitative descriptor, expressed as a percent, of the relative distribution of individuals of a species in an area; it is calculated by

$$\frac{\text{Frequency of species A}}{\text{Total frequency of all species}} \times 100$$

Relief. The change in elevation of a land surface between two points; collectively, the configuration of the earth's surface, including such features as hills and valleys.

[1] The "amount" of a species may be based on percent areal cover, basal area, or height.

Reproductive adaptation. A feature of the reproductive mechanism of a species that results in it being better fitted to its environment (e.g., ability for seed germination under water).

Respiration. The sum total of metabolic processes associated with conversion of stored (chemical) energy into kinetic (physical) energy for use by an organism.

Rhizosphere. The zone of soil in which interactions between living plant roots and microorganisms occur.

Root zone. The portion of a soil profile in which plant roots occur.

Routine wetland determination. A type of wetland determination in which office data and/or relatively simple, rapidly applied onsite methods are employed to determine whether or not an area is a wetland. Most wetland determinations are of this type, which usually does not require collection of quantitative data.

Sample plot. An area of land used for measuring or observing existing conditions.

Sapling/shrub. A layer of vegetation composed of woody plants <3.0 in. in diameter at breast height but greater than 3.2 ft in height, exclusive of woody vines.

Saturated soil conditions. A condition in which all easily drained voids (pores) between soil particles in the root zone are temporarily or permanently filled with water to the soil surface at pressures greater than atmospheric.

Soil. Unconsolidated mineral and organic material that supports, or is capable of supporting, plants, and which has recognizable properties due to the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over time.

Soil horizon. A layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics (e.g., color, structure, texture, etc.).

Soil matrix. The portion of a given soil having the dominant color. In most cases, the matrix will be the portion of the soil having more than 50 percent of the same color.

Soil permeability. The ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil.

Soil phase. A subdivision of a soil series having features (e.g., slope, surface texture, and stoniness) that affect the use and management of the soil, but

which do not vary sufficiently to differentiate it as a separate series. These are usually the basic mapping units on detailed soil maps produced by the Soil Conservation Service.

Soil pore. An area within soil occupied by either air or water, resulting from the arrangement of individual soil particles or peds.

Soil profile. A vertical section of a soil through all its horizons and extending into the parent material.

Soil series. A group of soils having horizons similar in differentiating characteristics and arrangement in the soil profile, except for texture of the surface horizon.

Soil structure. The combination or arrangement of primary soil particles into secondary particles, units, or peds.

Soil surface. The upper limits of the soil profile. For mineral soils, this is the upper limit of the highest (A1) mineral horizon. For organic soils, it is the upper limit of undecomposed, dead organic matter.

Soil texture. The relative proportions of the various sizes of particles in a soil.

Somewhat poorly drained. Soils that are wet near enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, wet conditions high in the profile, additions of water through seepage, or a combination of these conditions.

Stilted roots. Aerial roots arising from stems (e.g., trunk and branches), presumably providing plant support (e.g., *Rhizophora mangle).*

Stooling. A form of asexual reproduction in which new shoots are produced at the base of senescing stems, often resulting in a multitrunk growth habit.

Stratigraphy. Features of geology dealing with the origin, composition, distribution, and succession of geologic strata (layers).

Substrate. The base or substance on which an attached species is growing.

Surface water. Water present above the substrate or soil surface.

Tidal. A situation in which the water level periodically fluctuates due to the action of lunar and solar forces upon the rotating earth.

Topography. The configuration of a surface, including its relief and the position of its natural and man-made features.

Transect. As used herein, a line on the ground along which observations are made at some interval.

Transition zone. The area in which a change from wetlands to nonwetlands occurs. The transition zone may be narrow or broad.

Transpiration. The process in plants by which water vapor is released into the gaseous environment, primarily through stomata.

Tree. A woody plant >3.0 in. in diameter at breast height, regardless of height (exclusive of woody vines).

Typical. That which normally, usually, or commonly occurs.

Typically adapted. A term that refers to a species being normally or commonly suited to a given set of environmental conditions, due to some feature of its morphology, physiology, or reproduction.

Unconsolidated parent material. Material from which a soil develops, usually formed by weathering of rock or placement in an area by natural forces (e.g., water, wind, or gravity).

Under normal circumstances. As used in the definition of wetlands, this term refers to situations in which the vegetation has not been substantially altered by man's activities.

Uniform vegetation. As used herein, a situation in which the same group of dominant species generally occurs throughout a given area.

Upland. As used herein, any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands. Such areas occurring within floodplains are more appropriately termed nonwetlands.

Value (soil color). The relative lightness or intensity of color, approximately a function of the square root of the total amount of light reflected from a surface; one of the three variables of color.

Vegetation. The sum total of macrophytes that occupy a given area.

Vegetation layer. A subunit of a plant community in which all component species exhibit the same growth form (e.g., trees, saplings/shrubs, herbs).

Very long duration (flooding). A duration class in which the length of a single inundation event is greater than 1 month.

Very poorly drained. Soils that are wet to the surface most of the time. These soils are wet enough to prevent the growth of important crops (except rice) unless artificially drained.

Watermark. A line on a tree or other upright structure that represents the maximum static water level reached during an inundation event.

Water table. The upper surface of ground water or that level below which the soil is saturated with water. It is at least 6 in. thick and persists in the soil for more than a few weeks.

Wetlands. Those areas that are inundated or saturated by surface or ground water 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.

Wetland boundary. The point on the ground at which a shift from wetlands to nonwetlands or aquatic habitats occurs. These boundaries usually follow contours.

Wetland determination. The process or procedure by which an area is adjudged a wetland or nonwetland.

Wetland hydrology. The sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.

Wetland plant association. Any grouping of plant species that recurs wherever certain wetland conditions occur.

Wetland soil. A soil that has characteristics developed in a reducing atmosphere, which exists when periods of prolonged soil saturation result in anaerobic conditions. Hydric soils that are sufficiently wet to support hydrophytic vegetation are wetland soils.

Wetland vegetation. The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. As used herein, hydrophytic vegetation occurring in areas that also have hydric soils and wetland hydrology may be properly referred to as wetland vegetation.

Woody vine. See liana.

Xerophytic. A plant species that is typically adapted for life in conditions where a lack of water is a limiting factor for growth and/or reproduction. These species are capable of growth in extremely dry conditions as a result of morphological, physiological, and/or reproductive adaptations.

Appendix B
Blank and Example Data Forms

USER NOTES: The following field data form ("Data Form, Routine Wetland Determination, 1987 COE Wetlands Delineation Manual") dated 3/92 is the HQUSACE-approved replacement for Data Form 1 given in the 1987 Manual. (HQUSACE, 6 Mar 92)

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: _____ Applicant/Owner: _____ Investigator: _____	Date: _____ County: _____ State: _____
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-).

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes No (Circle)
Wetland Hydrology Present? Yes No
Hydric Soils Present? Yes No

(Circle)
Is this Sampling Point Within a Wetland? Yes No

Remarks:

Approved by HQUSACE 3/92

DATA FORM 1

WETLAND DETERMINATION

Applicant Name:_____ Application Number:_____ Project Name:_____

State:_____ County:_____ Legal Description: Township:_____ Range:_____

Date:_____ Plot No.:_____ Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7.	
2.		8.	
3.		9.	
Saplings/shrubs		Woody vines	
4.		10.	
5.		11.	
6.		12.	

% of species that are OBL, FACW, and/or FAC:____. Other indicators:_____.

Hydrophytic vegetation: Yes ____ No ____. Basis:_____.

Soil

Series and phase:_____ On hydric soils list? Yes_____; No____.

Mottled: Yes_____; No_____. Mottle color:_____; Matrix color:_____.

Gleyed: Yes_____ No_____ Other indicators:_____.

Hydric soils: Yes_____ No_____; Basis:_____.

Hydrology

Inundated: Yes_____; No_____. Depth of standing water:_____.

Saturated soils: Yes_____; No_____. Depth to saturated soil:_____.

Other indicators:_____.

Wetland hydrology: Yes_____; No_____. Basis:_____.

Atypical situation: Yes____; No_____.

Normal Circumstances? Yes_____ No_____.

Wetland Determination: Wetland_____; Nonwetland_____.

Comments:

Determined by:_____

DATA FORM 2

VEGETATION-COMPREHENSIVE DETERMINATION

Applicant Name:_____ Application No.:_____ Project Name:_____

Location:_____ Plot #:_____ Date:_____ Determined By:_____

VEGETATION LAYER

TREES	BASAL AREA	TOTAL BASAL AREA	RANK	HERBS	MIDPOINT OF % COVER CLASS	RANK
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	RANK	WOODY VINES	NUMBER OF STEMS	RANK
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

DATA FORM 3

ATYPICAL SITUATIONS

Applicant Name:_____ Application Number:_____ Project Name:_____

Location:_____ Plot Number:_____ Date:_____

A. VEGETATION:

1. Type of Alteration:_____

_____

_____.

2. Effect on Vegetation:_____

_____

_____.

3. Previous Vegetation:_____

(Attach documentation) _____

_____.

4. Hydrophytic Vegetation? Yes_____No_____.

B. SOILS:

1. Type of Alteration:_____

_____

_____.

2. Effect on Soils:_____

_____

_____.

3. Previous Soils:_____

(Attach documentation) _____

_____.

4. Hydric Soils? Yes_____No_____.

C. HYDROLOGY:

1. Type of Alteration:_____

_____

_____.

2. Effect on Hydrology:_____

_____

_____.

3. Previous Hydrology:_____

(Attach documentation) _____

_____.

4. Wetland Hydrology? Yes_____No_____.

Characterized By:_____

DATA FORM 1

WETLAND DETERMINATION

Applicant Name: John Doe Application Number: R-85-1421 Project Name: Zene Acricultural Land

State: LA County: Choctaw Legal Description: Township: 7N Range: 2E

Date: 10/08/85 Plot No.: 1-1 Section: 32

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		**Herbs**	
1. *Quercus lyrata*	OBL	7. *Polygonum hydropiperoides*	OBL
2. *Carya aquatica*	OBL	8. *Boehmeria cylindrica*	FACW+
3. *Gleditsia aquatica*	OBL	9. *Brunnichia cirrhosa*	--
Saplings/shurbs		**Woody vines**	
4. *Forestiera acuminata*	OBL	10. *Toxicodendron radicans*	FAC
5. *Planera aquatica*	OBL	11. —	--
6. --	--	12. --	--

% of species that are OBL, FACW, and/or FAC: 100%. Other indicators: --.

Hydrophytic vegetation: Yes X No ____. Basis: 50% of dominants are OBL, FACW, and/or FAC on plant list.

Soil

Series and phase: Sharkey, frequently flooded On hydric soils list? Yes X; No ___.

Mottled: Yes X; No ____. Mottle color: 5YR4/6; Matrix color: 10YR4/1.

Gleyed: Yes ____ No X. Other indicators: ____.

Hydric soils: Yes X No ____; Basis: On hydric soil list and matrix color.

Hydrology

Inundated: Yes ____; No X. Depth of standing water: —.

Saturated soils: Yes X; No ____. Depth to saturated soil: 6".

Other indicators: Drift lines and sediment deposits present on trees.

Wetland hydrology: Yes X; No ____. Basis: Saturated soils.

Atypical situation: Yes ____; No X.

Normal Circumstances?: Yes X No ____.

Wetland Determination: Wetland X; Nonwetland ____.

Comments: No rain reported from area in previous two weeks.

Determined by: Zelda Schmell (Signed)

DATA FORM 2

VEGETATION-COMPREHENSIVE DETERMINATION

Applicant Name: John Doe Application No.: R-85-1421 Project Name: Zena Agricultural Land

Location: LA (Choctaw Parish) Plot #: 1-1 Date: 10/08/85 Determined By: Zelda Schmell

VEGETATION LAYER

	TREES	BASAL AREA (in^2)	TOTAL BASAL AREA	RANK
1	*Quercus lyrata*	465	1,145	1
2	*Quercus lyrata*	680		
3	*Carya aquatica*	85	243	3
4	*Carya aquatica*	120		
5	*Carya aquatica*	38		
6	*Cleditsia aquatica*	235	253	2
7	*Cleditsia aquatica*	18		
8	*Dionpyron virginiana*	46	46	
9				
10				

	HERBS	MIDPOINT OF % COVER CLASS	RANK
1	*Boehmeria cylindrica*	37.5	2
2	*Polygonum hydropiperoides*	62.5	1
3	*Brunnichia ovata*	37.5	3
4	*Gleditsia aquatica* (seedling)	2.5	
5	*Eclipta alba*	2.5	
6			
7			
8			
9			
10			

	SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	RANK
1	*Forestiera acuminata*	4.5	13.0	1
2	*Forestiera acuminata*	4.5		
3	*Forestiera acuminata*	1.5		
4	*Forestiera acuminata*	2.5		
5	*Planera aquatica*	4.5	8.0	2
6	*Planera aquatica*	3.5		
7	*Carya aquatica*	1.5	1.5	
8				
9				
10				

	WOODY VINES	NUMBER OF STEMS	RANK
1	*Toxicodendron radicans*	35	1
2	(only woody vine present)		
3			
4			
5			
6			
7			
8			
9			
10			

DATA FORM 3

ATYPICAL SITUATIONS

Applicant Name: Wetland Developers, Inc. Application Number: R-85-12 Project Name: Big Canal

Location: Joshua Co., MT Plot Number: 2 Date: 10/08/85

A. VEGETATION:

1. Type of Alteration: Vegetation totally removed or covered by placement of fill from canal (1984).

2. Effect on Vegetation: None remaining.

3. Previous Vegetation: *Carex nebrascensis - Juncus effusus* freshwater marsh (based on contiguous plant communities and aerial photography predating fill).

(Attach documentation)

4. Hydrophytic Vegetation? Yes X No .

B. SOILS:

1. Type of Alteration: Original soil covered by 4 feet of fill material excavated from canal.

2. Effect on Soils: Original soil buried in 1984.

3. Previous Soils: Original soil examined at 10 inches below original soil surface. Soil gleyed (color notation 5Y2/0).

(Attach documentation)

4. Hydric Soils? Yes X No .

C. HYDROLOGY:

1. Type of Alteration: 4 feet of fill material placed on original surface.

2. Effect on Hydrology: Area no longer is inundated.

3. Previous Hydrology: Examination of color IR photography taken on 6/5/84 showed the area to be inundated. Gaging station data from gage 2 miles upstream indicated the area has been inundated for as much as 3 months of the growing season during 8 of the past 12 years.

(Attach documentation)

4. Wetland Hydrology? Yes X No .

Characterized By: Joe Zook

Appendix C
Vegetation

1. This appendix contains three sections. ~~Section 1 is a subset of the regional list of plants that occur in wetlands, but includes only those species having an indicator status of OBL, FACW, or FAC. Section 2 is a list of plants that commonly occur in wetlands of a given region. Since many geographic areas of Section 404 responsibility include portions of two or more plant list regions, users will often need more than one regional list; thus, Sections 1 and 2 will be published separately from the remainder of the manual. Users will be furnished all appropriate regional lists.~~

USER NOTES: CE-supplied plant lists are obsolete and have been superseded by the May 1988 version of the "National List of Plant Species that Occur in Wetlands" published by the U.S. Fish and Wildlife Service and available on the World Wide Web. (HQUSACE, 27 Aug 91)

2. Section 3, which is presented herein, describes morphological, physiological, and reproductive adaptations that can be observed or are known to occur in plant species that are typically adapted for life in anaerobic soil conditions.

Section 3 - Morphological, Physiological, and Reproductive Adaptations of Plant Species for Occurrence in Areas Having Anaerobic Soil Conditions

Morphological adaptations

3. Many plant species have morphological adaptations for occurrence in wetlands. These structural modifications most often provide the plant with increased buoyancy or support. In some cases (e.g., adventitious roots), the adaptation may facilitate the uptake of nutrients and/or gases (particularly oxygen). However, not all species occurring in areas having anaerobic soil condi-

tions exhibit morphological adaptations for such conditions. The following is a list of morphological adaptations that a species occurring in areas having anaerobic soil conditions may possess (a partial list of species with such adaptations is presented in Table C1):

Table C1
Partial List of Species with Known Morphological Adaptations for Occurrence in Wetlands[1]

Species	Common Name	Adaptation
Acer negundo	Box elder	Adventitious roots
Acer rubrum	Red maple	Hypertrophied lenticels
Acer saccharinum	Silver maple	Hypertrophied lenticels; adventitious roots (juvenile plants)
Alisma spp.	Water plantain	Polymorphic leaves
Alternanthera philoxeroides	Alligatorweed	Adventitious roots; inflated, floating stems
Avicennia nitida	Black mangrove	Pneumatophores; hypertrophied lenticels
Brasenia schreberi	Watershield	Inflated, floating leaves
Caladium mariscoides	Twig rush	Inflated stems
Cyperus spp. (most species)	Flat sedge	Inflated stems and leaves
Eleocharis spp. (most species)	Spikerush	Inflated stems and leaves
Forestiera accuminata	Swamp privet	Multi-trunk, stooling
Fraxinus pennsylvanica	Green ash	Buttressed trunks; adventitious roots
Gleditsia aquatica	Water locust	Hypertrophied lenticels
Juncus spp.	Rush	Inflated stems and leaves
Limnobium spongia	Frogbit	Inflated, floating leaves
Ludwigia spp.	Waterprimrose	Adventitious roots; inflated floating stems
Menyanthes trifoliata	Buckbean	Inflated stems (rhizome)
Myrica gale	Sweetgale	Hypertrophied lenticels
Nelumbo spp.	Lotus	Floating leaves
Nuphar spp.	Cowlily	Floating leaves
Nymphaea spp.	Waterlily	Floating leaves
Nyssa aquatica	Water tupelo	Buttressed trunks; pneumatophores; adventitious roots
Nyssa ogechee	Ogechee tupelo	Buttressed trunks; multi-trunk; stooling
Nyssa sylvatica var. *biflora*	Swamp blackgum	Buttressed trunks
Platanus occidentalis	Sycamore	Adventitious roots
Populus deltoides	Cottonwood	Adventitious roots
Quercus laurifolia	Laurel oak	Shallow root system
Quercus palustris	Pin oak	Adventitious roots
Rhizophora mangle	Red mangrove	Pneumatophores
Sagittaria spp.	Arrowhead	Polymorphic leaves
Salix spp.	Willow	Hypertrophied lenticels; adventitious roots; oxygen pathway to roots
Scirpus spp.	Bulrush	Inflated stems and leaves
Spartina alterniflora	Smooth cordgrass	Oxygen pathway to roots
Taxodium distichum	Bald cypress	Buttressed trunks; pneumatophores

[1] Many other species exhibit one or more morphological adaptations for occurrence in wetlands. However, not all individuals of a species will exhibit these adaptations under field conditions, and individuals occurring in uplands characteristically may not exhibit them.

a. *Buttressed tree trunks.* Tree species (e.g., *Taxodium distichum)* may develop enlarged trunks (Figure C1) in response to frequent inundation. This adaptation is a strong indicator of hydrophytic vegetation in non-tropical forested areas.

b. *Pneumatophores.* These modified roots may serve as respiratory organs in species subjected to frequent inundation or soil saturation. Cypress knees (Figure C2) are a classic example, but other species (e.g., *Nyssa aquatica, Rhizophora mangle)* may also develop pneumatophores.

Figure C1. Buttressed tree truck (bald cypress)

Figure C2. Pneumatophores (bald cypress)

c. *Adventitious roots.* Sometimes referred to as "water roots," adventitious roots occur on plant stems in positions where roots normally are not found. Small fibrous roots protruding from the base of trees (e.g., *Salix nigra)* or roots on stems of herbaceous plants and tree seedlings in positions immediately above the soil surface (e.g., *Ludwigia* spp.) occur in response to inundation or soil saturation (Figure C3). These usually develop during periods of sufficiently prolonged soil saturation to destroy most of the root system. *CAUTION: Not all adventitious roots develop as a result of inundation or soil saturation. For example, aerial roots on woody vines are not normally produced as a response to inundation or soil saturation.*

Figure C3. Adventitious roots

d. *Shallow root systems.* When soils are inundated or saturated for long periods during the growing season, anaerobic conditions develop in the zone of root growth. Most species with deep root systems cannot survive in such conditions. Most species capable of growth during periods when soils are oxygenated only near the surface have shallow root systems. In forested wetlands,

windthrown trees (Figure C4) are often indicative of shallow root systems.

e. *Inflated leaves, stems, or roots.* Many hydrophytic species, particularly herbs (e.g., *Limnobium spongia, Ludwigia* spp.) have or develop spongy (aerenchymous) tissues in leaves, stems, and/or roots that provide buoyancy or support and serve as a reservoir or passageway for oxygen needed for metabolic processes. An example of inflated leaves is shown in Figure C5.

f. *Polymorphic leaves.* Some herbaceous species produce different types of leaves, depending on the water level at the time of leaf formation. For example, *Alisma* spp. produce strap-shaped leaves when totally submerged, but produce broader, floating leaves when plants are emergent. *CAUTION: Many upland species also produce polymorphic leaves.*

g. *Floating leaves.* Some species (e.g., *Nymphaea* spp.) produce leaves that are uniquely adapted for floating on a water surface (Figure C6). These leaves have stomata primarily on the upper surface and a thick waxy cuticle that restricts water penetration. The presence of species with floating leaves is strongly indicative of hydrophytic vegetation.

h. *Floating stems.* A number of species (e.g., *Alternanthera philoxeroides*) produce matted stems that have large internal air spaces when occurring in inun-

Figure C4. Wind-thrown tree with shallow root system

Figure C5. Inflated leaves

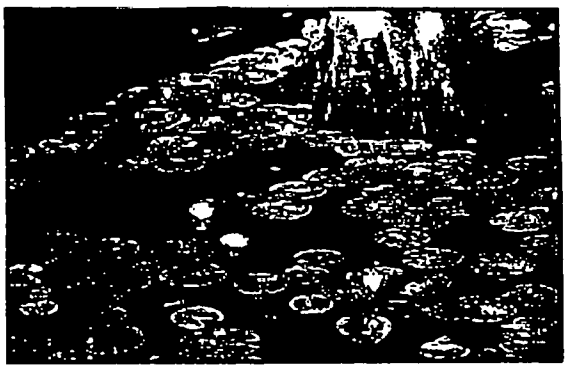


Figure C6. Floating leaves

dated areas. Such species root in shallow water and grow across the water surface into deeper areas. Species with floating stems often produce adventitious roots at leaf nodes.

i. *Hypertrophied lenticels.* Some plant species (e.g., *Gleditsia aquatica*) produce enlarged lenticels on the stem in response to prolonged inundation or soil saturation. These are thought to increase oxygen uptake through the stem during such periods.

Figure C7. Multitrunk plant

k. *Multitrunks or stooling.* Some woody hydrophytes characteristically produce several trunks of different ages (Figure C7) or produce new stems arising from the base of a senescing individual (e.g., *Forestiera acuminata, Nyssa ogechee)* in response to inundation.

l. *Oxygen pathway to roots.* Some species (e.g., *Spartina alterniflora*) have a specialized cellular arrangement that facilitates diffusion of gaseous oxygen from leaves and stems to the root system.

Physiological adaptations

4. Most, if not all, hydrophytic species are thought to possess physiological adaptations for occurrence in areas that have prolonged periods of anaerobic soil conditions. However, relatively few species have actually been proven to possess such adaptations, primarily due to the limited research that has been conducted. Nevertheless, several types of physiological adaptations known to occur in hydrophytic species are discussed below, and a list of species having one or more of these adaptations is presented in Table C2. *NOTE: Since it is impossible to detect these adaptations in the field, use of this indicator will be limited to observing the species in the field and checking the list in Table C2 to determine whether the species is known to have a physiological adaptation for occurrence in areas having anaerobic soil conditions.*

Reproductive adaptations

5. Some plant species have reproductive features that enable them to become established and grow in saturated soil conditions. The following have been identified in the technical literature as reproductive adaptations that occur in hydrophytic species:

a. *Prolonged seed viability.* Some plant species produce seeds that may remain viable for 20 years or more. Exposure of these seeds to atmospheric oxygen usually triggers germination. Thus, species (e.g., *Taxodium distichum)* that grow in very wet areas may produce seeds that germinate only during infrequent periods when the soil is dewatered. *NOTE: Many upland species also have prolonged seed viability, but the trigger mechanism for germination is not exposure to atmospheric oxygen.*

b. *Seed germination under low oxygen concentrations.* Seeds of some hydrophytic species germinate when submerged. This enables germination during periods of early-spring inundation, which may provide resulting seedlings a competitive advantage over species whose seeds germinate only when exposed to atmospheric oxygen.

c. *Flood-tolerant seedlings.* Seedlings of some hydrophytic species (e.g., *Fraxinus pennsylvanica)* can survive moderate periods of total or partial inundation. Seedlings of these species have a competitive advantage over seedlings of flood-intolerant species.

Table C2
Species Exhibiting Physiological Adaptations for Occurrence in Wetlands

Species	Physiological Adaptation
Alnus incana	Increased levels of nitrate reductase; malate accumulation
Alnus rubra	Increased levels of nitrate reductase
Baccharis viminea	Ability for root growth in low oxygen tensions
Betula pubescens	Oxidizes the rhizosphere; malate accumulation
Carex arenaria	Malate accumulation
Carex flacca	Absence of ADH activity
Carex lasiocarpa	Malate accumulation
Deschampsia cespitosa	Absence of ADH activity
Filipendula ulmaria	Absence of ADH activity
Fraxinus pennsylvanica	Oxidizes the rhizosphere
Glyceria maxima	Malate accumulation; absence of ADH activity
Juncus effusus	Ability for root growth in low oxygen tensions; absence of ADH activity
Larix laricina	Slight increases in metabolic rates; increased levels of nitrate reductase
Lobelia dortmanna	Oxidizes the rhizosphere
Lythrum salicaria	Absence of ADH activity
Molinia caerulea	Oxidizes the rhizosphere
Myrica gale	Oxidizes the rhizosphere
Nuphar lutea	Organic acid production
Nyssa aquatica	Oxidizes the rhizosphere
Nyssa sylvatica var. *biflora*	Oxidizes the rhizosphere; malate accumulation
Phalaris arundinacea	Absence of ADH activity; ability for root growth in low oxygen tensions
Phragmites australis	Malate accumulation
Pinus contorta	Slight increases in metabolic rates; increased levels of nitrate reductase
Polygonum amphibium	Absence of ADH activity
Potentilla anserina	Absence of ADH activity; ability for root growth in low oxygen tensions
Ranunculus flammula	Malate accumulation; absence of ADH activity
Salix cinerea	Malate accumulation
Salix fragilis	Oxidizes the rhizosphere
Salix lasiolepis	Ability for root growth in low oxygen tensions
Scirpus maritimus	Ability for root growth in low oxygen tensions
Senecio vulgaris	Slight increases in metabolic rates
Spartina alterniflora	Oxidizes the rhizosphere
Trifolia subterraneum	Low ADH activity
Typha angustifolia	Ability for root growth in low oxygen tensions

a. *Accumulation of malate.* Malate, a nontoxic metabolite, accumulates in roots of many hydrophytic species (e.g., *Glyceria maxima*, *Nyssa sylvatica* var. *biflora*). Nonwetland species concentrate ethanol, a toxic by-product of anaerobic respiration, when growing in anaerobic soil conditions. Under such conditions, many hydrophytic species produce high concentrations of malate and unchanged concentrations of ethanol, thereby avoiding accumulation of toxic materials. Thus, species having the ability to concentrate malate instead of ethanol in the root system under anaerobic soil conditions are adapted for life in such conditions, while species that concentrate ethanol are poorly adapted for life in anaerobic soil conditions.

b. *Increased levels of nitrate reductase.* Nitrate reductase is an enzyme involved in conversion of nitrate nitrogen to nitrite nitrogen, an intermediate step in ammonium production. Ammonium ions can accept electrons as a replacement for gaseous oxygen in some species, thereby allowing continued functioning of metabolic processes under low soil oxygen conditions. Species that produce high levels of nitrate reductase (e.g., *Larix laricina*) are adapted for life in anaerobic soil conditions.

c. *Slight increases in metabolic rates.* Anaerobic soil conditions effect short-term increases in metabolic rates in most species. However, the rate of metabolism often increases only slightly in wetland species, while metabolic rates increase significantly in nonwetland species. Species exhibiting only slight increases in metabolic rates (e.g., *Larix laricina, Senecio vulgaris)* are adapted for life in anaerobic soil conditions.

d. *Rhizosphere oxidation.* Some hydrophytic species (e.g., *Nyssa sylvatica*, *Myrica gale*) are capable of transferring gaseous oxygen from the root system into soil pores immediately surrounding the roots. This adaptation prevents root deterioration and maintains the rates of water and nutrient absorption under anaerobic soil conditions.

e. *Ability for root growth in low oxygen tensions.* Some species (e.g., *Typha angustifolia, Juncus effusus*) have the ability to maintain root growth under soil oxygen concentrations as low as 0.5 percent. Although prolonged (>1 year) exposure to soil oxygen concentrations lower than 0.5 percent generally results in the death of most individuals, this adaptation enables some species to survive extended periods of anaerobic soil conditions.

f. *Absence of alcohol dehydrogenase (ADH) activity.* ADH is an enzyme associated with increased ethanol production. When the enzyme is not functioning, ethanol production does not increase significantly. Some hydrophytic species (e.g., *Potentilla anserina, Polygonum amphibium*) show only slight increases in ADH activity under anaerobic soil conditions. Therefore, ethanol production occurs at a slower rate in species that have low concentrations of ADH.

Appendix D
Hydric Soils

1. This appendix consists of two sections. Section 1 describes the basic procedure for digging a soil pit and examining for hydric soil indicators. ~~Section 2 is a list of hydric soils of the United States.~~

Section I - Procedures for Digging a Soil Pit and Examining for Hydric Soil Indicators

Digging a soil pit

2. Apply the following procedure: Circumscribe a 1-ft-diam area, preferably with a tile spade (sharpshooter). Extend the blade vertically downward, cut all roots to the depth of the blade, and lift the soil from the hole. This should provide approximately 16 inches of the soil profile for examination. *NOTE: Observations are usually made immediately below the A-horizon or 10 in. (whichever is shallower).* In many cases, a soil auger or probe can be used instead of a spade. If so, remove successive cores until 16 inches of the soil profile have been removed. Place successive cores in the same sequence as removed from the hole. *NOTE: An auger or probe cannot be effectively used when the soil profile is loose, rocky, or contains a large volume of water (e.g., peraquic moisture regime).*

Examining the soil

3. Examine the soil for hydric soils indicators (paragraphs 44 and/or 45 of main text (for sandy soils)). *NOTE: It may not be necessary to conduct a classical characterization (e.g., texture, structure, etc.) of the soil.* Consider the hydric soil indicators in the following sequence *(NOTE: The soil examination can be terminated when a positive hydric soil indicator is found):*

Nonsandy soils.

a. Determine whether an organic soil is present (see paragraph 44 of the main text). If so, the soil is hydric.

b. Determine whether the soil has a histic epipedon (see paragraph 44 of the main text). Record the thickness of the histic epipedon on Data Form 1.

c. Determine whether sulfidic materials are present by smelling the soil. The presence of a "rotten egg" odor is indicative of hydrogen sulfide, which forms only under extreme reducing conditions associated with prolonged inundation/soil saturation.

d. Determine whether the soil has an aquic or peraquic moisture regime (see paragraph 44 of the main text). If so, the soil is hydric.

e. Conduct a ferrous iron test. A colorimetric field test kit has been developed for this purpose. A reducing soil environment is present when the soil extract turns pink upon addition of α,α'-dipyridyl.

f. Determine the color(s) of the matrix and any mottles that may be present. Soil color is characterized by three features: hue, value, and chroma. Hue refers to the soil color in relation to red, yellow, blue, etc. Value refers to the lightness of the hue. Chroma refers to the strength of the color (or departure from a neutral of the same lightness). Soil colors are determined by use of a Munsell Color Book (Munsell Color 1975).[1] Each Munsell Color Book has color charts of different hues, ranging from 10R to 5Y. Each page of hue has color chips that show values and chromas. Values are shown in columns down the page from as low as 0 to as much as 8, and chromas are shown in rows across the page from as low as 0 to as much as 8. In writing Munsell color notations, the sequence is always hue, value, and chroma (e.g., 10YR 5/2). To determine soil color, place a small portion of soil[2] in the openings behind the color page and match the soil color to the appropriate color chip. *NOTE: Match the soil to the nearest color chip.* Record on DATA FORM 1 the hue, value, and chroma of the best matching color chip. *CAUTION: Never place soil on the face or front of the color page because this might smear the color chips.* Mineral hydric soils usually have one of the following color features immediately below the A-horizon or 10 inches (whichever is shallower):

(1) Gleyed soil.

---

[1] See references at the end of the main text.
[2] The soil must be moistened if dry at the time of examination.

Determine whether the soil is gleyed. If the matrix color best fits a color chip found on the gley page of the Munsell soil color charts, the soil is gleyed. This indicates prolonged soil saturation, and the soil is highly reduced.

(2) Nongleyed soil.

(a) Matrix chroma of 2 or less in mottled soils.[1]

(b) Matrix chroma of 1 or less in unmottled soils.[1]

(c) Gray mottles within 10 in. of the soil surface in dark (black) mineral soils (e.g., Mollisols) that do not have characteristics of (a) or (b) above.

Soils having the above color characteristics are normally saturated for significant duration during the growing season. However, hydric soils with significant coloration due to the nature of the parent material (e.g., red soils of the Red River Valley) may not exhibit chromas within the range indicated above. In such cases, this indicator cannot be used.

g. Determine whether the mapped soil series or phase is on the national list of hydric soils (Section 2). *CAUTION: It will often be necessary to compare the profile description of the soil with that of the soil series or phase indicated on the soil map to verify that the soil was correctly mapped. This is especially true when the soil survey indicates the presence of inclusions or when the soil is mapped as an association of two or more soil series.*

h. Look for iron and manganese concretions. Look for small (>0.08-in.) aggregates within 3 in. of the soil surface. These are usually black or dark brown and reflect prolonged saturation near the soil surface.

Sandy soils.

Look for one of the following indicators in sandy soils:

a. A layer of organic material above the mineral surface or high organic matter content in the surface horizon (see paragraph 45*a* of the main text). This is evidenced by a darker color of the surface layer due to organic matter interspersed among or adhering to the sand particles. This is not observed in upland soils due to associated aerobic conditions.

b. Streaking of subsurface horizons (see paragraph 45*b* of the main text). Look for dark vertical streaks in subsurface horizons. These streaks

---

[1] The soil must be moistened if dry at the time of examination.

represent organic matter being moved downward in the profile. When soil is rubbed between the fingers, the organic matter will leave a dark stain on the fingers.

c. Organic pans (see paragraph 45*c* of the main text). This is evidenced by a thin layer of hardened soil at a depth of 12 to 30 inches below the mineral surface.

Section 2 - Hydric Soils of the United States

4. The list of hydric soils of the United States ~~(Table D1)~~ was developed by the National Technical Committee for Hydric Soils (NTCHS), a panel consisting of representatives of the Soil Conservation Service (SCS), Fish and Wildlife Service, Environmental Protection Agency, Corps of Engineers, Auburn University, University of Maryland, and Louisiana State University. Keith Young of SCS was committee chairman.

5. The NTCHS developed the following definition of hydric soils:

~~A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (U.S. Department of Agriculture (USDA) Soil Conservation Service 1985, as amended by the NTCHS in December 1986).~~

USER NOTES: The hydric soil definition, criteria, and hydric soil list (Table D1) published in the 1987 Corps Manual are obsolete. Current hydric soil definition, criteria, and lists are available over the World Wide Web from the U.S.D.A. Natural Resources Conservation Service (NRCS). (HQUSACE, 27 Aug 91, 6 Mar 92)

Criteria for hydric soils

6. Based on the above definition, the NTCHS developed the following criteria for hydric soils, and all soils appearing on the list will meet at least one criterion:

a. ~~All Histosols[1] except Folists;~~

b. ~~Soils in Aquic suborders, Aquic subgroups, Albolls suborder, Salorthids great group, or Pell great groups of Vertisols that are:~~

[1] Soil taxa conform to USDA-SCS (1975).

(1) Somewhat poorly drained and have water table less than 0.5 ft from the surface for a significant period (usually a week or more) during the growing season, or

(2) Poorly drained or very poorly drained and have either:

(a) A water table at less than 1.0 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches; or

(b) A water table at less than 1.5 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is less than 6.0 in/hr in any layer within 20 inches; or

c. Soils that are ponded for long duration or very long duration during part of the growing season; or

d. Soils that are frequently flooded for long duration or very long duration during the growing season.

7. The hydric soils list was formulated by applying the above criteria to soil properties documented in USDA-SCS (1975) and the SCS Soil Interpretation Records (SOI-5).

Use of the list

8. The list of hydric soils of the United States (Table D1) is arranged alphabetically by soil series. Unless otherwise specified, all phases of a listed soil series are hydric. In some cases, only those phases of a soil series that are ponded, frequently flooded, or otherwise designated as wet are hydric. Such phases are denoted in Table D1 by the following symbols in parentheses after the series name:

F - flooded

FF - frequently flooded

P - ponded

W - wet

D - depressional

9. Drained phases of some soil series retain their hydric properties even after drainage. Such phases are identified in Table D1 by the symbol "DR" in parentheses following the soil series name. In such cases, both the drained and un-

~~drained phases of the soil series are hydric.~~ *CAUTION: Be sure that the profile description of the mapping unit conforms to that of the sampled soil. Also, designation of a soil series or phase as hydric does not necessarily mean that the area is a wetland. An area having a hydric soil is a wetland only if positive indicators of hydrophytic vegetation and wetland hydrology are also present.*

Four appendices provide supporting information. Appendix A is a glossary of technical terms used in the manual. Appendix B contains data forms for use with the various methods. Appendix C, developed by a Federal interagency panel, contains a list of all plant species known to occur in wetlands of the region. Each species has been assigned an indicator status that describes its estimated probability of occurring in wetlands of the region. Morphological, physiological, and reproductive adaptations that enable a plant species to occur in wetlands are also described, along with a listing of some species having such adaptations. Appendix D describes the procedure for examining the soil for indicators of hydric soil conditions, and includes a national list of hydric soils developed by the National Technical Committee for Hydric Soils.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	January 1987	Final report

4. TITLE AND SUBTITLE
Corps of Engineers Wetlands Delineation Manual

5. FUNDING NUMBERS

6. AUTHOR(S)
Environmental Laboratory

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Engineer Waterways Experiment Station
3909 Halls Ferry Road, Vicksburg, MS 39180-6199

8. PERFORMING ORGANIZATION REPORT NUMBER
Technical Report Y-87-1

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Corps of Engineers
Washington, DC 20314-1000

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This document presents approaches and methods for identifying and delineating wetlands for purposes of Section 404 of the Clean Water Act. It is designed to assist users in making wetland determinations using a multiparameter approach. Except where noted in the manual, this approach requires positive evidence of hydrophytic vegetation, hydric soils, and wetland hydrology for a determination that an area is a wetland. The multiparameter approach provides a logical, easily defensible, and technical basis for wetland determinations. Technical guidelines are presented for wetlands, deepwater aquatic habitats, and nonwetlands (uplands).

Hydrophytic vegetation, hydric soils, and wetland hydrology are also characterized, and wetland indicators of each parameter are listed.

Methods for applying the multiparameter approach are described. Separate sections are devoted to preliminary data gathering and analysis, method selection, routine determinations, comprehensive determinations, atypical situations, and problem areas. Three levels of routine determinations are described, thereby affording significant flexibility in method selection.

(Continued)

14. SUBJECT TERMS
Delineation, Hydrology, Manual, Methods, Plant communities, Soil, Vegetation, Wetlands

15. NUMBER OF PAGES
169

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED		

Scientific Name	Common Name	Region 1	Habit
Abies balsamea	FIR,BALSAM	FAC	NT
Abies fraseri	FIR,FRASER'S	FACU	NT
Abutilon theophrasti	VELVET-LEAF	UPL	AIF
Acalypha rhomboidea	COPPER-LEAF,COMMON	FACU-	ANF
Acalypha virginica	MERCURY,THREE-SEEDED	FACU-	ANF
Acer negundo	BOX-ELDER	FAC+	NT
Acer pensylvanicum	MAPLE,STRIPED	FACU	NT
Acer rubrum	MAPLE,DRUMMOND RED	FACW+	NT
Acer rubrum	MAPLE,TRIDENT RED	FACW+	NT
Acer rubrum	MAPLE,RED	FAC	NT
Acer saccharinum	MAPLE,SILVER	FACW	NT
Acer saccharum	MAPLE,SUGAR	FACU-	NT
Acer spicatum	MAPLE,MOUNTAIN	FACU-	NST
Achillea millefolium	YARROW,COMMON	FACU	PNF
Acorus calamus	SWEETFLAG	OBL	PIEF
Adiantum capillus-veneris	FERN,SOUTHERN MAIDEN-HAIR	FACU	PNF3
Adiantum pedatum	FERN,NORTHERN MAIDEN-HAIR	FAC-	PNF3
Adoxa moschatellina	MUSK-ROOT	FAC*	PNF
Aegopodium podagraria	GOUTWEED,BISHOPS	FACU	PIF
Aeschynomene virginica	JOINT-VETCH,VIRGINIA	OBL	NF
Aesculus glabra	BUCKEYE,OHIO	FACU+	NT
Aesculus pavia	BUCKEYE,RED	FAC	NST
Aesculus sylvatica	BUCKEYE,PAINTED	FAC	NT
Agalinis fasciculata	FALSE-FOXGLOVE,BEACH	FAC	ANF
Agalinis linifolia	FALSE-FOXGLOVE,FLAX-LEAF	FACW	PNF
Agalinis maritima	FALSE-FOXGLOVE,SALTMARSH	FACW+	ANF
Agalinis obtusifolia	FALSE-FOXGLOVE,TEN-LOBE	FACU	AN+F
Agalinis paupercula	FALSE-FOXGLOVE,SMALL-FLOWER	FACW+	ANF
Agalinis purpurea	FALSE-FOXGLOVE,LARGE PURPLE	FACW-	ANF
Agalinis tenuifolia	FALSE-FOXGLOVE,SLENDER	FAC	AF
Agalinis virgata	FALSE-FOXGLOVE,PINE BARREN	FAC	ANF
Agastache nepetoides	GIANT-HYSSOP,YELLOW	FACU	PNF
Ageratina altissima	SNAKEROOT,WHITE	FACU-	N
Agrimonia gryposepala	GROOVEBUR,TALL HAIRY	FACU	PNF
Agrimonia parviflora	GROOVEBUR,SMALL-FLOWER	FAC	PNF
Agrimonia rostellata	GROOVEBUR,BEAKED	FACU	PNF
Agrimonia striata	GROOVEBUR,WOODLAND	FACU-	PNF
Agropyron caninum	WHEATGRASS,CUTTING	FACU	PIG
Agropyron pungens	QUACKGRASS,STIFF-LEAF	FACW	PIG
Agropyron repens	QUACKGRASS	FACU-	PIG
Agropyron smithii	WHEATGRASS,WESTERN	UPL	PNG
Agropyron trachycaulum	WHEATGRASS,SLENDER	FACU	PNG
Agrostis alba	REDTOP	FACW	PIG
Agrostis avenacea	BENTGRASS,HAIRY-FLOWER	NI	PIG
Agrostis borealis	BENTGRASS,NORTHERN	FACU	PNG
Agrostis canina	BENTGRASS,BROWN	FACU	PNG
Agrostis gigantea	BENTGRASS,BLACK	NI	PNG
Agrostis hyemalis	BENTGRASS,WINTER	FAC	PNG
Agrostis perennans	BENTGRASS,PERENNIAL	FACU	PNG
Agrostis scabra	BENTGRASS,ROUGH	FAC	PNG
Agrostis semiverticillata	BENTGRASS,WATER	FACW	PIG
Agrostis stolonifera	BENTGRASS,SPREADING	FACW	PNG
Ailanthus altissima	TREE-OF-HEAVEN	NI	IT
Aletris aurea	COLIC-ROOT,GOLDEN	FACW	PNF
Aletris farinosa	COLIC-ROOT,WHITE	FAC	PNF
Aletris lutea	COLIC-ROOT,YELLOW	FACW	PNF
Alisma gramineum	WATER-PLANTAIN,NARROW-LEAF	OBL	PNEF
Alisma plantago-aquatica	WATER-PLANTAIN,BROAD-LEAF	OBL	PNEF
Alisma subcordatum	WATER-PLANTAIN,SUBCORDATE	OBL	PNEF
Alliaria petiolata	MUSTARD,GARLIC	FACU-	BIF
Allium bivalve	GARLIC,FALSE	FACU	PNF
	ONION,MEADOW	FACU	PNF
		FACU	PNF

Scientific Name	Common Name	Region 1	Habit
Allium vineale	GARLIC,FIELD	FACU-	PIF
Alnus crispa	ALDER,GREEN	FAC	NS
Alnus glutinosa	ALDER,EUROPEAN	FACW-	IT
Alnus incana	ALDER,SPECKLED	NI	NS
Alnus maritima	ALDER,SEASIDE	OBL	NT
Alnus rugosa	ALDER,SPECKLED	FACW+	NT
Alnus serrulata	ALDER,BROOK-SIDE	OBL	NT
Alopecurus aequalis	FOXTAIL,SHORT-AWN	OBL	PNG
Alopecurus carolinianus	FOXTAIL,TUFTED	FACW	ANG
Alopecurus geniculatus	FOXTAIL,MEADOW	OBL	PNG
Alopecurus myosuroides	FOXTAIL,MOUSE	FACW	AIG
Alopecurus pratensis	FOXTAIL,MEADOW	FACW	PIG
Alternanthera philoxeroides	WEED,ALLIGATOR	OBL	PIEF
Althaea officinalis	MARSH-MALLOW,COMMON	FACW+	PIF
Amaranthus albus	AMARANTH,WHITE	FACU	ANF
Amaranthus arenicola	AMARANTH,SANDHILLS	UPL*	ANF
Amaranthus blitoides	AMARANTH,PROSTRATE	NI	AIF
Amaranthus cannabinus	AMARANTH,TIDEMARSH	OBL	PNEF
Amaranthus palmeri	AMARANTH,PALMER'S	FACU	ANF
Amaranthus pumilus	AMARANTH,SEABEACH	FACW*	ANF
Amaranthus retroflexus	AMARANTH,RED-ROOT	FACU	ANF
Amaranthus rudis	AMARANTH,TALL	FACW-	ANF
Amaranthus spinosus	AMARANTH,SPINY	FACU	ANF
Amaranthus tuberculatus	AMARANTH,ROUGH-FRUIT	FACW	ANF
Ambrosia artemisiifolia	RAGWEED,ANNUAL	FACU	ANF
Ambrosia psilostachya	RAGWEED,NAKED-SPIKE	FACU-	PNF
Ambrosia trifida	RAGWEED,GREAT	FAC	ANF
Amelanchier arborea	SERVICE-BERRY,DOWNY	FAC-	NT
Amelanchier bartramiana	SERVICE-BERRY,BARTRAM'S	FAC	NS
Amelanchier canadensis	SERVICE-BERRY,OBLONG-LEAF	FAC	NS
Amelanchier obovalis	SERVICE-BERRY,OBOVATE COASTAL	FACU	NS
Amelanchier spicata	JUNE-BERRY,LOW	FACU	NS
Amelanchier x intermedia	SHADBUSH,SWAMP	FACW	NS
Amerorchis rotundifolia	ORCHID,ROUND-LEAF	OBL	PNF
Amianthium muscaetoxicum	FLYPOISON	FAC	PNF
Ammannia coccinea	AMMANNIA,PURPLE	OBL	ANF
Ammannia latifolia	AMMANNIA,PINK	NI	ANF
Ammophila arenaria	BEACHGRASS,EUROPEAN	FACU-	PIG
Ammophila breviligulata	BEACHGRASS,AMERICAN	FACU-	PNG
Amorpha fruticosa	INDIGO-BUSH,FALSE	FACW	NS
Amorpha georgiana	INDIGO-BUSH,GEORGIA	NI	NS
Amorpha nitens	INDIGO-BUSH,SHINING	NI	NS
Ampelamus albidus	SANDVINE	FAC	PNF
Ampelopsis arborea	PEPPER-VINE	FACW	NWV
Ampelopsis cordata	PEPPER-VINE,HEART-LEAF	FAC+	NWVS
Amphicarpaea bracteata	HOG-PEANUT,AMERICAN	FAC	APNFV
Amphicarpum purshii	GOOBERGRASS,ANNUAL	FACW	ANG
Amsonia illustris	SLIMPOD,GREAT PLAINS	NI	PNF
Amsonia tabernaemontana	SLIMPOD,EASTERN	FACW	PNF
Anagallis arvensis	PIMPERNEL,SCARLET	UPL*	AIF
Andromeda glaucophylla	ROSEMARY,DOWNY BOG	OBL	NS
Andromeda polifolia	ROSEMARY,BOG	OBL	NS
Andropogon gerardii	BLUESTEM,BIG	FAC	PNG
Andropogon glomeratus	BLUESTEM,BUSHY	FACW+	PNG
Andropogon mohrii	BLUESTEM,MOHR'S	FACW	PNG
Andropogon temarius	BLUESTEM,SILVER	FACU	PNG
Andropogon virginicus	BROOM-SEDGE	FACU	PNG
Anemone canadensis	THIMBLE-WEED,CANADA	FACW	PNF
Anemone quinquefolia	THIMBLE-WEED,AMERICAN WOODLAND	FACU	PNF
Anemone riparia	THIMBLE-WEED,RIVER	NI	PNF
Anemone virginiana	THIMBLE-WEED,TALL	NI	PNF
Angelica atropurpurea	ANGELICA,PURPLE-STEM	OBL	PNF
Angelica lucida	ANGELICA,SEAWATCH	FAC*	PNF
Angelica triquinata	ANGELICA,FILMY	UPL*	PNF

Scientific Name	Common Name	Region 1	Habit
Anoda cristata	ANODA,CRESTED	UPL*	ANF
Anthemis cotula	MAYWEED	FACU-	AIF
Anthoxanthum odoratum	GRASS,SWEET VERNAL	FACU	PIG
Apios americana	POTATO-BEAN,AMERICAN	FACW	PNF
Apium graveolens	CELERY	FAC	PIF
Aplectrum hyemale	PUTTYROOT	FAC	PNF
Apocynum cannabinum	DOGBANE,CLASPING-LEAF	FACU	PNF
Apocynum sibiricum	DOGBANE,PRAIRIE	FAC	PNF
Aquilegia canadensis	COLUMBINE,WILD	FAC	PNF
Arabis alpina	ROCKCRESS,ALPINE	FAC+	PIF
Arabis divaricarpa	ROCKCRESS,LIMESTONE	FACU	BNF
Arabis drummondii	ROCKCRESS,DRUMMOND'S	FACU	BNF
Arabis hirsuta	ROCKCRESS,HAIRY	FACU	PNF
Arabis lyrata	ROCKCRESS,LYRE-LEAF	FACU	BNF
Aralia nudicaulis	SARSAPARILLA,WILD	FACU	PNF
Aralia spinosa	CLUB,HERCULES	FAC	NT
Arctostaphylos alpina	MANZANITA,ALPINE	FAC	NS
Arctostaphylos uva-ursi	BEARBERRY	NI	NS
Arenaria lanuginosa	SANDWORT,SPREADING	FAC	PNF
Arenaria serpyllifolia	SANDWORT,THYME-LEAF	FAC	AIF
Arethusa bulbosa	SWAMP-PINK	OBL	PNF
Arisaema dracontium	DRAGON,GREEN	FACW	PNF
Arisaema quinatum	JACK-IN-THE-PULPIT,FIVE-LEAF	NI	PNF
Arisaema triphyllum	JACK-IN-THE-PULPIT,SWAMP	FACW-	PNF
Aristida affinis	GRASS,LONG-LEAF THREE-AWN	FACW+	PNG
Aristida dichotoma	GRASS,SHINNERS' THREE-AWN	UPL	ANG
Aristida longespica	GRASS,SLIM-SPIKE THREE-AWN	UPL	ANG
Aristida virgata	GRASS,WAND-LIKE THREE-AWN	FAC	PNG
Aristolochia serpentaria	SNAKEROOT,VIRGINIA	UPL*	PNF
Aristolochia tomentosa	DUTCHMAN'S-PINE,WOOLLY	FAC	PNF
Armeria maritima	THRIFT,WESTERN	NI	PNF
Armoracia aquatica	LAKECRESS	OBL	PNZF
Armoracia rusticana	HORSERADISH	NI	PIEF
Arnica acaulis	LEOPARD'S-BANE	FACU	PNF
Arnica mollis	ARNICA,HAIRY	FAC	PNF
Arnoglossum plantagineum	INDIAN-PLANTAIN,GROOVE-STEM	FACW	PNF
Aronia arbutifolia	CHOKEBERRY,RED	FACW	NS
Aronia melanocarpa	CHOKEBERRY,BLACK	FAC	NS
Aronia prunifolia	CHOKEBERRY,PURPLE	FACW	NS
Arrhenatherum elatius	OATGRASS,TALL	FACU	PIG
Artemisia annua	WORMWOOD,ANNUAL	FACU	AIF
Artemisia biennis	WORMWOOD,BIENNIAL	FACU-	AIF
Artemisia cana	SAGEBRUSH,SILVER	NI	NS
Artemisia ludoviciana	SAGEBRUSH,WHITE	UPL	PNFH
Artemisia stellerana	SAGEBRUSH,HOARY	FACU	PIF
Arthraxon hispidus	ARTHRAXON,JOINT-HEAD	NI	AIG
Aruncus dioicus	GOATSBEARD,HAIRY	FACU	PNF
Arundinaria gigantea	CANE,GIANT	FACW	PNG
Arundo donax	REED,GIANT	FACU-	PIG
Asarum arifolium	LITTLE-BROWN-JUG	FACU	PNF
Asarum shuttleworthii	WILDGINGER	NI	PNF
Asarum virginicum	HEARTLEAF,VIRGINIA	FACU*	PNF
Asclepias exaltata	MILKWEED,POKE	FACU*	PNF
Asclepias hirtella	MILKWEED,GREEN	UPL	PNF
Asclepias incarnata	MILKWEED,SWAMP	OBL	PNF
Asclepias lanceolata	MILKWEED,FEN-FLOWER	OBL	PNF
Asclepias longifolia	MILKWEED,LONG-LEAF	OBL	PNF
Asclepias perennis	MILKWEED,AQUATIC	NI	PNF
Asclepias purpurascens	MILKWEED,PURPLE	FACU	PNF
Asclepias rubra	MILKWEED,RED	OBL	PNF
Asclepias variegata	MILKWEED,WHITE	FACU	PNF
Ascyrum hypericoi	CROSS,ST. ANDREW'S	FACU	NS
Ascyrum stans	ST. PETERSWORT	FACU	NS
Asimina parviflor	PAWPAW,DWARF	UPL*	NST
Asimina triloba	PAWPAW,COMMON	FACU+	NT
Asparagus officinalis	ASPARAGUS-FERN,GARDEN	FACU	PIF
Asplenium platyneuron	SPLEENWORT,EBONY	FACU	PNF3
Asplenium trichomanes-ramosum	SPLEENWORT,GREEN	UPL	PNF3
Aster brachyactis	ASTER,RAYLESS ALKALI	NI	ANF
Aster dumosus	ASTER,BUSH	FAC	PNF
Aster elliotii	ASTER,ELLIOTT'S	OBL	PNF
Aster ericoides	ASTER,WHITE HEATH	FACU	PNF
Aster foliaceus	ASTER,LEAFY-BRACTED	FAC	PNF
Aster frondosus	ASTER,LEAFY	NI	ANF
Aster gracilis	ASTER,SLENDER	FACU	PNF
Aster hemisphericus	ASTER,TENNESSEE	NI	PNF
Aster junciformis	ASTER,RUSH	OBL	PNF
Aster lateriflorus	ASTER,CALICO	FACW-	PNF
Aster lucidulus	ASTER,SHINING	FACW	PNF
Aster nemoralis	ASTER,BOG	FACW+	PNF
Aster novae-angliae	ASTER,NEW ENGLAND	FACW-	PNF
Aster novi-belgii	ASTER,NEW YORK	FACW+	PNF
Aster ontarionis	ASTER,ONTARIO	FAC	PNF
Aster pilosus	ASTER,WHITE HEATH	UPL	PNF
Aster praealtus	ASTER,WILLOW-LEAF	FACW	PNF
Aster prenanthoides	ASTER,CROOKED-STEM	FAC	PNF
Aster puniceus	ASTER,SWAMP	OBL	PNF
Aster racemosus	ASTER,COASTAL-PLAIN	FACW	PNF
Aster radula	ASTER,LOW ROUGH	OBL	PNF
Aster simplex	ASTER,PANICLED	FACW	PNF
Aster subulatus	ASTER,ANNUAL SALTMARSH	OBL	ANF
Aster tenuifolius	ASTER,PERENNIAL SALTMARSH	OBL	PNF
Aster tradescanti	ASTER,TRADESCANT	FACW	PNF
Aster umbellatus	ASTER,FLAT-TOP WHITE	FACW	PNF
Aster vimineus	ASTER,SMALL WHITE	FAC	PNF
Aster x blakei	ASTER,BLAKE'S	FACW+	PNF
Aster x lanceolatus	ASTER,WHITE PANICLE	NI	F
Astilbe biternata	GOAT'S-BEARD,FALSE	FACU	PNF
Astragalus alpinus	MILKVETCH,ALPINE	FACU	PNF
Astragalus canadensis	MILKVETCH,CANADA	FAC	PNF
Astragalus eucosmus	MILKVETCH,ELEGANT	FACU	PNF
Astragalus neglectus	MILKVETCH,COOPER'S	FACU	PNF
Astragalus robbinsii	MILKVETCH,ROBBINS	UPL	PNF
Athyrium distentifolium	FERN,ALPINE LADY	NI	PNF3
Athyrium filix-femina	FERN,SUBARCTIC LADY	FAC	PNF3
Athyrium pycnocarpon	FERN,NARROW-LEAF LADY	FAC	PNF3
Athyrium thelypteroides	FERN,SILVERY LADY	FAC	PNF3
Atriplex arenaria	ORACHE,SEABEACH	FAC-	ANF
Atriplex argentea	SALTBUSH,SILVER-SCALE	NI	ANF
Atriplex glabriuscula	SALTBUSH,NORTHEASTERN	NI	ANF
Atriplex hortensis	ORACHE,GARDEN	UPL	AIF
Atriplex patula	SALTBUSH,HALBERD-LEAF	FACW	ANF
Atriplex rosea	ORACHE,TUMBLING	FACU	AIF
Axonopus affinis	GRASS,SOUTHERN CARPET	FACW-	PNG
Axonopus furcatus	GRASS,BIG CARPET	FACW	PNG
Azolla caroliniana	FERN,CAROLINA MOSQUITO	OBL	AN/W
Azolla filiculoides	FERN,FERN-LIKE MOSQUITO	OBL	PN/W
Baccharis halimifolia	FALSE-WILLOW,EASTERN	FACW	NS
Bacopa caroliniana	WATER-HYSSOP,CAROLINA	OBL	PNF
Bacopa cyclophylla	WATER-HYSSOP,COASTAL-PLAIN	OBL	PNF
Bacopa monnieri	WATER-HYSSOP,COASTAL	OBL	PNF
Bacopa repens	WATER-HYSSOP,CREEPING	NI	EF
Bacopa rotundifolia	WATER-HYSSOP,DISK	NI	PNF
Bacopa simulans	WATER-HYSSOP,CHICKAHOMINY	OBL	PN$F
Bacopa stragula	WATER-HYSSOP,MAT-FORMING		PN$F
Baptisia lactea	WILD-INDIGO,WHITE		PNF
Barbarea orthoceras	WINTER-CRESS,AMERICAN		BNEF
Barbarea vulgaris	ROCKET,YELLOW	FACU	BIF

Scientific Name	Common Name	Region 1	Habit
Bartonia paniculata	SCREWSTEM,TWINING	OBL	ANF
Bartonia verna	SCREWSTEM,WHITE	FACW	ANF
Bartonia virginica	SCREWSTEM,YELLOW	FACW	ANF
Bassia hirsuta	SMOTHER-WEED,HAIRY	OBL	AIF
Bassia hyssopifolia	SMOTHER-WEED,FIVE-HORN	NI	AIF
Beckmannia eruciformis	GRASS,BECKMANN'S	OBL	G
Beckmannia syzigachne	SLOUGHGRASS,AMERICAN	OBL	ANG
Berberis thunbergii	BARBERRY,JAPANESE	FACU	IS
Berberis vulgaris	BARBERRY,EUROPEAN	FACU	IS
Berchemia scandens	SUPPLE-JACK,ALABAMA	FACW	NWV
Berula erecta	PARSNIP,CUT-LEAF WATER	NI	PIF
Beta vulgaris	BEET,CULTIVATED	NI	AIF
Betula alba	BIRCH,WHITE	FAC+	NTS
Betula alleghaniensis	BIRCH,YELLOW	FAC	NT
Betula glandulosa	BIRCH,TUNDRA DWARF	OBL	NS
Betula lenta	BIRCH,SWEET	FACU	NT
Betula nigra	BIRCH,RIVER	FACW	NT
Betula papyrifera	BIRCH,PAPER	FACU	NT
Betula populifolia	BIRCH,GRAY	FAC	NT
Betula pumila	BIRCH,BOG	OBL	NS
Betula x purpusii	BIRCH,PURPUS'	NI	NT
Bidens aristosa	BEGGAR-TICKS,BEARDED	FACW-	ANF
Bidens bidentoides	BEGGAR-TICKS,SWAMP	FACW	ANF
Bidens cernua	BEGGAR-TICKS,NODDING	OBL	AIF
Bidens comosa	BEGGAR-TICKS,LEAFY-BRACT	FACW	ANF
Bidens connata	BEGGAR-TICKS,PURPLE-STEM	FACW+	ANF
Bidens coronata	BEGGAR-TICKS,LARGE-FRUIT	OBL	ANF
Bidens discoidea	BEGGAR-TICKS,SWAMP	FACW	ANF
Bidens eatoni	BEGGAR-TICKS,EATON'S	OBL	ANF
Bidens frondosa	BEGGAR-TICKS,DEVIL'S	FACW	ANF
Bidens heterodoxa	BEGGAR-TICKS,CONNECTICUT	FACW+	ANF
Bidens hyperborea	BEGGAR-TICKS,ESTUARY	OBL	ANF
Bidens laevis	BEGGAR-TICKS,SMOOTH	OBL	PNF
Bidens mariana	OBL	ANF	
Bidens mitis	BEGGAR-TICKS,SMALL-FRUIT	OBL	ANF
Bidens pilosa	BEGGAR-TICKS,HAIRY	NI	ANF
Bidens polylepis	BEGGAR-TICKS,AWNLESS	FACW	ANF
Bidens tenuisecta	BEGGAR-TICKS,SLIM-LOBE	NI	ANF
Bidens tripartita	BEGGAR-TICKS,THREE-LOBE	OBL	AIF
Bignonia capreolata	CROSSVINE	FAC+	NWV
Blephilia hirsuta	WOODMINT,HAIRY	FACU-	PNF
Boehmeria cylindrica	FALSE-NETTLE,SMALL-SPIKE	FACW+	PNF
Boltonia asteroides	BOLTONIA,WHITE	FACW	PNF
Boltonia caroliniana	BOLTONIA,CAROLINA	FACW	PNF
Boltonia diffusa	BOLTONIA,SMALL-HEAD	FAC	PNF
Borrichia frutescens	OXEYE,SEA	OBL	NS
Botrychium biternatum	GRAPEFERN,SPARSE-LOBE	FAC	PNF3
Botrychium dissectum	GRAPEFERN,CUTLEAF	FAC	PNF3
Botrychium lanceolatum	MOONWORT,TRIANGLE	FACW	PNF3
Botrychium lunaria	MOONWORT	FACW	PNF3
Botrychium matricariifolium	MOONWORT,DAISY-LEAF	FACU	PNF3
Botrychium multifidum	GRAPEFERN,LEATHERY	FACU	PNF3
Botrychium simplex	GRAPEFERN,LEAST	FACU	PNF3
Botrychium virginianum	FERN,RATTLESNAKE	FACU	PNF3
Boykinia aconitifolia	BROOKFOAM,ALLEGHANY	FACW	PNF
Brachiaria plantaginea	GRASS,PLANTAIN SIGNAL	NI	ANG
Brachiaria platyphylla	GRASS,BROAD-LEAF SIGNAL	NI	ANG
Brasenia schreberi	WATERSHIELD	OBL	PNZF
Braya humilis	BRAYA,LOW	UPL	PNF
Briza media	GRASS,PERENNIAL QUAKING	FAC	PIG
Briza minor	GRASS,LITTLE QUAKING	FACW	AIG
Bromus ciliatus	BROME,FRINGED	FACW	PNG
Bromus dudleyi	BROME,DUDLEY'S	FAC+	G
Bromus hordeaceus	BROME,SOFT	FACU	AIG
Bromus kalmii	BROME,KALM'S	FAC-	PNG
Bromus latiglumis	BROME,EARLEAF	FACW	PNG
Bromus mollis	BROME,SOFT	UPL	AIG
Bromus purgans	BROME,CANADA	FACU	PNG
Bromus rubens	BROME,RIPGUT	NI	AIG
Brunnichia cirrhosa	REDVINE	FACW	PNF
Buchnera americana	BLUEHEARTS,AMERICAN	FACU	PNF
Bulbostylis capillaris	HAIRSEDGE,OENSE-TUFT	FACU	APNGL
Bulbostylis ciliatifolia	HAIRSEDGE,CAPILLARY	FACU	ANGL
Bumelia lycioides	BUMELIA,BUCKTHORN	FACW	NT
Burmannia biflora	BURMANNIA,NORTHERN	OBL	AN-F
Butomus umbellatus	FLOWERING-RUSH	OBL	PIEF
Cabomba caroliniana	FANWORT,CAROLINA	OBL	PNZ/F
Cakile edentula	SEAROCKET,AMERICAN	FACU	AN$F
Cakile maritima	SEAROCKET,EUROPEAN	NI	AI$F
Calamagrostis canadensis	REEDGRASS,BLUE-JOINT	FACW+	PNG
Calamagrostis cinnoides	SMALL-REEDGRASS,NUTTALL'S	OBL	PNG
Calamagrostis epigeios	REEDGRASS,CHEE	FAC	PIG
Calamagrostis femaldii	SMALL-REEDGRASS,FERNALD'S	OBL	PNG
Calamagrostis inexpansa	SMALL-REEDGRASS,NARROW-SPIKE	FACW	PNG
Calamagrostis neglecta	REEDGRASS,SLIMSTEM	FACW	PNG
Calamagrostis perplexa	REEDGRASS,POND	FAC+	PNG
Calamagrostis pickeringii	BENTGRASS,REED	FACW	PNG
Calamovilfa brevipilis	SAND-REEDGRASS,PINEBARREN	OBL	PNG
Calla palustris	CALLA,WILD	OBL	PNEF
Callicarpa americana	BEAUTY-BERRY,AMERICAN	FACU+	NS
Callicarpa dichotoma	BEAUTY-BERRY,PURPLE	OBL*	IS
Callitriche anceps	WATER-STARWORT,TWO-EDGE	OBL	ANZF
Callitriche deflexa	WATER-STARWORT,TERRESTRIAL	FACW+	ANF
Callitriche hermaphroditica	WATER-STARWORT,AUTUMNAL	OBL	PNZF
Callitriche heterophylla	WATER-STARWORT,LARGER	OBL	PIZ/F
Callitriche stagnalis	WATER-STARWORT,POND	OBL	PNZF
Callitriche verna	WATER-STARWORT,SPINY	OBL	PNZ/F
Calluna vulgaris	HEATHER	FAC*	IS
Calopogon pallidus	GRASS-PINK,PALE	OBL	PNF
Calopogon tuberosus	GRASS-PINK,TUBEROUS	FACW+	PNF
Caltha palustris	MARSH-MARIGOLD,COMMON	OBL	PNF
Calycanthus fertilis	SWEETSHRUB	FACU	NS
Calycanthus floridus	SWEETSHRUB,EASTERN	NI	NS
Calycocarpum lyonii	CUPSEED	FACW	NWV
Calypso bulbosa	SLIPPER,FAIRY	FACW	PNF
Calystegia sepium	BINDWEED,HEDGE	FAC-	PIF
Camassia scilloides	CAMASSIA,ATLANTIC	FAC	PNF
Camelina sativa	FALSE-FLAX,LARGE-SEED	UPL*	AIF
Campanula americana	BELLFLOWER,AMERICAN	FAC	ANF
Campanula aparinoides	BELLFLOWER,MARSH	OBL	PNF
Campanula rotundifolia	BELLFLOWER,SCOTCH	FACU	PNF
Campsis radicans	TRUMPET-CREEPER	FAC	NWV
Canna x generalis	CANNA,COMMON GARDEN	NI	PIF
Cannabis sativa	MARIJUANA	FACU	AIF
Capsella bursa-pastoris	PURSE,COMMON SHEPHERD'S	FACU	AIF
Cardamine angustata	TOOTHWORT,SLENDER	FACU	PNF
Cardamine bellidifolia	BITTER-CRESS,ALPINE	FACW	PNF
Cardamine bulbosa	BITTER-CRESS,BULBOUS	OBL	PNF
Cardamine clematitis	BITTER-CRESS,MOUNTAIN	OBL	PNF
Cardamine concatenata	TOOTHWORT,CUT-LEAF	FACU	PNF
Cardamine diphylla	TOOTHWORT,TWO-LEAF	FACU*	PNF
Cardamine douglassii	BITTER-CRESS,PURPLE	FACW+	PNEF
Cardamine flexuosa	BITTER-CRESS,FLEXUOUS	OBL*	AIF
Cardamine hirsuta	BITTER-CRESS,HAIRY	FACU	AIF
Cardamine longii	BITTER-CRESS,LONG'S	OBL	PNF
Cardamine oligosperma	BITTER-CRESS,FEW-SEED	NI	ANF
Cardamine parviflora	BITTER-CRESS,SMALL-FLOWER	FACU	AIF
Cardamine pensylvanica	BITTER-CRESS,PENNSYLVANIA	OBL	ANF

Scientific Name	Common Name	Region 1	Habit
Cardamine pratensis	BITTER-CRESS,MEADOW	OBL	PNF
Cardamine rotundifolia	BITTER-CRESS,ROUND-LEAF	OBL	PNF
Cardamine x anomala	BITTER-CRESS	FACU*	F
Cardamine x incisa	BITTER-CRESS	FACU*	F
Cardiospermum halicacabum	BALLOONVINE	FACU*	AIF
Carex abscondita	SEDGE,THICKET	FAC	PNGL
Carex acutiformis	SEDGE,SWAMP	OBL	PIGL
Carex aeriae	SEDGE,BRONZE	NI	PNGL
Carex albolutescens	SEDGE,GREENISH-WHITE	FACW	PNGL
Carex alopecoidea	SEDGE,FOXTAIL	FACW	PNGL
Carex amphibola	SEDGE,NARROW-LEAF	FAC	PNGL
Carex annectens	SEDGE,YELLOW-FRUIT	FACW	PNGL
Carex aquatilis	SEDGE,WATER	OBL	PNEGL
Carex arcta	SEDGE,NORTHERN CLUSTERED	OBL	PNGL
Carex atherodes	SEDGE,SLOUGH	OBL	PNEGL
Carex atlantica	SEDGE,PRICKLY BOG	FACW+	PNEGL
Carex atrata	SEDGE,BLACK-SCALE	NI	PNGL
Carex atratiformis	SEDGE,BLACK	FACW-	PNGL
Carex aurea	SEDGE,GOLDEN-FRUIT	FACW	PNGL
Carex baileyi	SEDGE,BAILEY'S	OBL	PNGL
Carex barrattii	SEDGE,BARRATT'S	OBL	PNGL
Carex bebbii	SEDGE,BEBB'S	OBL	PNGL
Carex bicknellii	SEDGE,BICKNELL'S	FACU	PNGL
Carex bigelowii	SEDGE,BIGELOW'S	FACW-	PNGL
Carex blanda	SEDGE,WOODLAND	FAC	PNGL
Carex brevior	SEDGE,SHORT-BEAK	UPL	PNEGL
Carex bromoides	SEDGE,BROME-LIKE	FACW	PNGL
Carex brunnescens	SEDGE,BROWNISH	FACW	PNGL
Carex bullata	SEDGE,BUTTON	OBL	PNGL
Carex bushii	SEDGE,BUSH'S	FACW	PNGL
Carex buxbaumii	SEDGE,BROWN BOG	OBL	PNEGL
Carex canescens	SEDGE,HOARY	OBL	PNGL
Carex capillaris	SEDGE,HAIR-LIKE	FACW	PNGL
Carex capitata	SEDGE,CAPITATE	FAC	PNGL
Carex caroliniana	SEDGE,HIRSUTE	FACU	PNGL
Carex castanea	SEDGE,CHESTNUT-COLOR	OBL	PNEGL
Carex cephaloidea	SEDGE,THIN-LEAF	FAC+	GL
Carex cephalophora	SEDGE,OVAL-LEAF	FACU	PNGL
Carex chapmanii	SEDGE,CHAPMAN'S	FACW	PNGL
Carex cherokeensis	SEDGE,CHEROKEE	FACW	PNGL
Carex chordorrhiza	SEDGE,CREEPING	OBL	PNGL
Carex collinsii	SEDGE,COLLINS'	OBL	PNGL
Carex comosa	SEDGE,BEARDED	OBL	PNEGL
Carex complanata	SEDGE,HIRSUTE	FACU	PNGL
Carex conjuncta	SEDGE,SOFT FOX	FACW	PNGL
Carex conoidea	SEDGE,FIELD	FACU	PNGL
Carex crawei	SEDGE,CRAWE'S	FACW	PNGL
Carex crawfordii	SEDGE,CRAWFORD'S	FAC	PNGL
Carex crinita	SEDGE,FRINGED	OBL	PNEGL
Carex cristatella	SEDGE,CRESTED	FACW	PNGL
Carex crus-corvi	SEDGE,RAVEN-FOOT	OBL	PNGL
Carex cryptolepis	SEDGE,NORTHEASTERN	OBL	PNGL
Carex cumulata	SEDGE,CLUSTERED	FACU	PNGL
Carex davisii	SEDGE,DAVIS'	FAC-	PNGL
Carex debilis	SEDGE,WHITE-EDGE	FAC	PNGL
Carex decomposita	SEDGE,CYPRESS-KNEE	OBL	PNGL
Carex deweyana	SEDGE,SHORT-SCALE	FACU	PNGL
Carex diandra	SEDGE,LESSER PANICLED	OBL	PNGL
Carex digitalis	SEDGE,SLENDER WOOD	UPL	PNGL
Carex disperma	SEDGE,SOFT-LEAF	FACW+	PNGL
Carex divisa	SEDGE,SEPARATED	FACW+	PIGL
Carex eburnea	SEDGE,BRISTLE-LEAF	FACU	PNGL
Carex echinata	SEDGE,LITTLE PRICKLY	OBL*	PNGL
Carex emoryi	SEDGE,EMORY'S	OBL	PNGL

Scientific Name	Common Name	Region 1	Habit
Carex exilis	SEDGE,COAST	OBL	PNGL
Carex extensa	SEDGE,LONG-BRACT	OBL	PIGL
Carex festucacea	SEDGE,FESCUE	FAC	PNGL
Carex flaccosperma	SEDGE,THIN-FRUIT	FAC	PNGL
Carex flava	SEDGE,YELLOW	OBL	PNGL
Carex foenea	SEDGE,DRY-SPIKE	NI	PNGL
Carex formosa	SEDGE,HANDSOME	FAC	PNGL
Carex frankii	SEDGE,FRANK'S	OBL	PNEGL
Carex garberi	SEDGE,ELK	FACW	PNGL
Carex gigantea	SEDGE,LARGE	OBL	PNEGL
Carex glaucescens	SEDGE,SOUTHERN WAXY	OBL	PNEGL
Carex gracillima	SEDGE,GRACEFUL	FACU*	PNGL
Carex granularis	SEDGE,MEADOW	FACW+	PNGL
Carex grayi	SEDGE,ASA GRAY'S	FACW+	PNGL
Carex gynocrates	SEDGE,NORTHERN BOG	OBL	PNGL
Carex hassei	SEDGE,HASSE'S	FACW	PNGL
Carex haydenii	SEDGE,CLOUD	OBL	PNEGL
Carex hormathodes	SEDGE,MARSH-STRAW	OBL	PNGL
Carex howei	SEDGE,HOWE	OBL	PNGL
Carex hyalinolepis	SEDGE,SHORELINE	OBL	PNEGL
Carex hystericina	SEDGE,PORCUPINE	OBL	PNEGL
Carex interior	SEDGE,INLAND	OBL	PNGL
Carex intumescens	SEDGE,BLADDER	FACW+	PNGL
Carex joorii	SEDGE,CYPRESS-SWAMP	OBL	PNEGL
Carex lacustris	SEDGE,LAKEBANK	OBL	PNEGL
Carex laevivaginata	SEDGE,SMOOTH-SHEATH	OBL	PNGL
Carex lanuginosa	SEDGE,WOOLY	OBL	PNGL
Carex lapponica	SEDGE,LAPLAND	NI	PNGL
Carex lasiocarpa	SEDGE,WOOLLY-FRUIT	OBL	PNEGL
Carex laxiflora	SEDGE,LOOSE-FLOWERED	FACU*	PNGL
Carex lenticularis	SEDGE,SHORE	OBL	PNGL
Carex lepidocarpa	SEDGE,SMALL YELLOW	OBL	PNGL
Carex leporina	SEDGE,HARE'S-FOOT	FAC	PIGL
Carex leptalea	SEDGE,BRISTLY-STALK	OBL	PNGL
Carex leptonervia	SEDGE,NERVELESS WOOD	FACW	PNGL
Carex limosa	SEDGE,MUD	OBL	PNGL
Carex livida	SEDGE,LIVID	OBL	PNGL
Carex longii	SEDGE,GREENISH-WHITE	OBL	PNEGL
Carex louisianica	SEDGE,LOUISIANA	OBL	PNEGL
Carex lupuliformis	SEDGE,FALSE HOP	FACW+	PNGL
Carex lupulina	SEDGE,HOP	OBL	PNEGL
Carex lurida	SEDGE,SHALLOW	OBL	PNEGL
Carex meadii	SEDGE,MEAD'S	FAC	PNGL
Carex media	SEDGE,INTERMEDIATE	NI	PNGL
Carex michauxiana	SEDGE,MICHAUX'S	OBL	PNGL
Carex muskingumensis	SEDGE,MUSKINGUM	OBL	PNGL
Carex nigra	SEDGE,BLACK	FACW+	PNGL
Carex nigromarginata	SEDGE,BLACK-EDGE	UPL	PNGL
Carex normalis	SEDGE,LARGER STRAW	FACU	PNGL
Carex norvegica	SEDGE,SCANDINAVIAN	NI	PNGL
Carex novae-angliae	SEDGE,NEW ENGLAND	FACU*	PNGL
Carex oligosperma	SEDGE,FEW-SEED	OBL	PNGL
Carex oxylepis	SEDGE,SHARP-SCALE	FACW	PNGL
Carex paleacea	SEDGE,CHAFFY	OBL	PGL
Carex pauciflora	SEDGE,FEW-FLOWER	OBL	PNGL
Carex paupercula	SEDGE,POOR	OBL	PNEGL
Carex physorhyncha	SEDGE,BELLOWS-BEAK	UPL	PNGL
Carex polymorpha	SEDGE,VARIABLE	FACU	PNGL
Carex praegracilis	SEDGE,CLUSTERED FIELD	NI	PNGL
Carex prairea	SEDGE,PRAIRIE	FACW	PNGL
Carex prasina	SEDGE,DRODPING		PNGL
Carex praticola	SEDGE,NORTHERN MEADOW		PNGL
Carex projecta	SEDGE,NECKLACE		PNGL
Carex [illegible]udocy[illegible]	SEDGE,CYPRESS-LIKE	OBL	PNEGL

Scientific Name	Common Name	Region 1	Habit
Carex rariflora	SEDGE,LOOSE FLOWERED	OBL	PNGL
Carex recta	SEDGE,CUSPIDATE	OBL	PNGL
Carex reniformis	SEDGE,KIDNEY-SHAPE	FACW	PNGL
Carex retrorsa	SEDGE,RETRORSE	FACW+	PNGL
Carex richardsonii	SEDGE,RICHARDSON'S	UPL	PNGL
Carex rostrata	SEDGE,BEAKED	OBL	PNEGL
Carex salina	SEDGE,SALTMARSH	OBL	PNGL
Carex sartwellii	SEDGE,SARTWELL'S	OBL	PNGL
Carex saxatilis	SEDGE,RUSSET	FACW+	PNGL
Carex scabrata	SEDGE,ROUGH	OBL	PNGL
Carex schweinitzii	SEDGE,SCHWEINITZ'S	OBL	PNEGL
Carex scirpoidea	SEDGE,CANADIAN SINGLE-SPIKE	FACU	PNGL
Carex scoparia	SEDGE,POINTED BROOM	FACW	PNGL
Carex seorsa	SEDGE,WEAK STELLATE	FACW	PNGL
Carex shortiana	SEDGE,SHORT'S	FAC	PNGL
Carex sparganioides	SEDGE,BUR-REED	FACU	PNGL
Carex sprengelii	SEDGE,LONG-BEAK	FACU	PNGL
Carex squarrosa	SEDGE,SQUARROSE	FACW	PNGL
Carex sterilis	SEDGE,DIOECIOUS	OBL	PNGL
Carex straminea	SEDGE,STRAW	OBL	PNGL
Carex stricta	SEDGE,UPTIGHT	OBL	PNEGL
Carex styloflexa	SEDGE,BENT	FACW-	PNGL
Carex suberecta	SEDGE,PRAIRIE STRAW	OBL	PNGL
Carex swanii	SEDGE,SWAN'S	FACU	PNGL
Carex sychnocephala	SEDGE,MANY-HEAD	FACW	PNGL
Carex tenera	SEDGE,SLENDER	FAC	PNGL
Carex tenuiflora	SEDGE,SPARSE-FLOWER	OBL	PNGL
Carex tetanica	SEDGE,RIGID	FACW	PNGL
Carex torta	SEDGE,TWISTED	FACW	PNGL
Carex triangularis	SEDGE,FOX	NI	PNGL
Carex tribuloides	SEDGE,BLUNT BROOM	FACW+	PNGL
Carex trichocarpa	SEDGE,HAIRY-FRUIT	OBL	PNEGL
Carex trisperma	SEDGE,THREE-SEED	OBL	PNGL
Carex tuckermanii	SEDGE,TUCKERMAN'S	OBL	PNGL
Carex typhina	SEDGE,CAT-TAIL	FACW+	PNEGL
Carex vaginata	SEDGE,SHEATHED	OBL	PNGL
Carex venusta	SEDGE,DARK GREEN	OBL	PNGL
Carex verrucosa	SEDGE,WARTY	OBL	PNGL
Carex vesicaria	SEDGE,INFLATED	OBL	PNEGL
Carex viridula	SEDGE,LITTLE GREEN	OBL	PNGL
Carex vulpinoidea	SEDGE,FOX	OBL	PNEGL
Carex walterana	SEDGE,WALTER'S	OBL	PNGL
Carex wiegandii	SEDGE,WIEGAND'S	OBL	PNGL
Carex willdenowii	SEDGE,WILLDENOW'S	UPL	PNGL
Carex woodii	SEDGE,PRETTY	UPL	GL
Carex x aestivaliformis	SEDGE,FALSE SUMMER	FAC*	PNGL
Carex x alata	SEDGE,BROADWING	OBL	PNGL
Carex x crebriflora	SEDGE,COASTAL-PLAIN	FACW	PNGL
Carex x mainensis	SEDGE,MAINE	FAC	PGL
Carex x molesta	SEDGE,TROUBLESOME	FACU	PNGL
Carex x stipata	SEDGE,STALK-GRAIN	OBL	PNGL
Carex x subimpressa	SEDGE,IMPRESSED	NI	PNGL
Carex x tincta	SEDGE,TINGED	UPL	PNGL
Carphephorus tomentosus	CHAFFHEAD,WOOLLY	FACW	PNF
Carpinus caroliniana	HORNBEAM,AMERICAN	FAC	NT
Carya aquatica	HICKORY,WATER	OBL	NT
Carya cordiformis	HICKORY,BITTER-NUT	FACU+	NT
Carya glabra	HICKORY,SWEET PIGNUT	FACU-	NT
Carya illinoensis	HICKORY,PECAN	FACU	NT
Carya laciniosa	HICKORY,BIG SHELLBARK	FAC	NT
Carya ovalis	HICKORY,RED	NI	NT
Carya ovata	HICKORY,SHAG-BARK	FACU-	NT
Carya x lecontei	PECAN,BITTER	NI	NT
Cassia fasciculata	PEA,PARTRIDGE	FACU	ANF
Cassia hebecarpa	SENNA,WILD	FAC	PNF
Cassia marilandica	SENNA,MARYLAND	FAC+	PNF
Cassia nictitans	PEA,SENSITIVE PARTRIDGE	FACU-	ANF
Castilleja coccinea	INDIAN-PAINTBRUSH,SCARLET	FAC	ANF
Catalpa bignonioides	CATALPA,SOUTHERN	UPL	NT
Catalpa speciosa	CATALPA,NORTHERN	FAC	NT
Cayaponia grandifolia	CAYAPONIA,SOUTHERN	NI	ANF
Celastrus orbiculata	BITTER-SWEET,ORIENTAL	UPL*	IWV
Celastrus scandens	BITTER-SWEET,AMERICAN	FACU-	NSWV
Celtis laevigata	SUGAR-BERRY	FACW	NT
Celtis occidentalis	HACKBERRY,COMMON	FACU	NTS
Celtis reticulata	HACKBERRY,NETLEAF	NI	NTS
Cenchrus tribuloides	SANDBUR,DUNE	UPL	ANG
Centaurium pulchellum	CENTAURY,BRANCHING	FAC	ANF
Centaurium spicatum	CENTAURY,SPIKED	FACW+	AIF
Centaurium umbellatum	CENTAURY	FAC-	AIF
Centella asiatica	COINLEAF,ASIAN	FACW	PNF
Centella erecta	COINLEAF,ERECT	FACW	PNF
Centunculus minimus	CHAFFWEED	FACW	ANF
Cephalanthus occidentalis	BUTTONBUSH,COMMON	OBL	NT
Cerastium arvense	CHICKWEED,MOUSE-EAR	UPL	PNF
Cerastium brachypodum	CHICKWEED,SHORT-STALK	FACU-	AIF
Cerastium nutans	CHICKWEED,NODDING	FAC	ANF
Cerastium viscosum	CHICKWEED	UPL	AIF
Cerastium vulgatum	CHICKWEED,COMMON MOUSE-EAR	FACU-	PIF
Ceratophyllum demersum	HORNWORT,COMMON	OBL	PN/F
Ceratophyllum muricatum	HORNWORT,PRICKLY	OBL	PNZF
Cercis canadensis	REDBUD,EASTERN	FACU-	NTS
Chaerophyllum procumbens	CHERVIL,SPREADING	FACW	ANF
Chaerophyllum tainturieri	CHERVIL,HAIRY-FRUIT	FACW	ANF
Chamaecyparis thyoides	CEDAR,ATLANTIC WHITE	OBL	NT
Chamaedaphne calyculata	LEATHERLEAF	OBL	NS
Chamaelirium luteum	FAIRY-WAND	FAC	PNF
Chamaesyce serpens	BROOM-SPURGE,MATTED	FACW	ANF
Chasmanthium latifolium	SEA-OATS,INDIAN	FACU	PNG
Chasmanthium laxum	SPIKEGRASS,SLENDER	FAC	PNG
Chasmanthium sessiliflorum	SPIKEGRASS,LONG-LEAF	FAC	PNG
Chelone cuthbertii	TURTLEHEAD,CUTHBERT'S	OBL	PNF
Chelone glabra	TURTLEHEAD,WHITE	OBL	PNF
Chelone lyonii	TURTLEHEAD,PINK	FACW+	PNF
Chelone obliqua	TURTLEHEAD,RED	OBL	PNF
Chenopodium album	GOOSEFOOT,WHITE	FACU+	AIF
Chenopodium ambrosioides	WORMSEED,AMERICAN	FACU	AIF
Chenopodium botrys	JERUSALEM-OAK	UPL	AIF
Chenopodium chenopodioides	GOOSEFOOT,RED	NI	AIF
Chenopodium fremontii	GOOSEFOOT,FREMONT'S	NI	ANF
Chenopodium glaucum	GOOSEFOOT,OAKLEAF	FACW-	AIF
Chenopodium humile	PIGWEED,MARSHLAND	NI	ANF
Chenopodium leptophyllum	GOOSEFOOT,NARROW-LEAF	FAC	ANF
Chenopodium rubrum	GOOSEFOOT,COAST-BLITE	FACW	ANF
Chenopodium salinum	PIGWEED,ROCKY MOUNTAIN	NI	ANF
Chionanthus virginicus	TREE,WHITE FRINGE	FAC+	NT
Chloris ciliata	GRASS,FRINGED WINDMILL	NI	PNG
Chloris crinita	FALSE-RHODESGRASS	NI	G
Chrysosplenium americanum	GOLDEN-SAXIFRAGE,AMERICAN	OBL	PNF
Ciclospermum leptophyllum	PARSLEY,MARSH	NI	ANF
Cicuta bulbifera	WATER-HEMLOCK,BULBLET-BEARING	OBL	PNF
Cicuta maculata	WATER-HEMLOCK,SPOTTED	OBL	PNF
Cicuta mexicana	WATER-HEMLOCK,MEXICAN	OBL	PNF
Cinna arundinacea	WOOD-REEDGRASS,STOUT	FACW+	PNG
Cinna latifolia	WOOD-REEDGRASS,SLENDER	FACW	PNG
Circaea alpina	NIGHTSHADE,SMALL ENCHANTER'S	FACW	PNF
Circaea lutetiana	NIGHTSHADE,SOUTHERN BROAD-LEAF ENCH		FACU
	PNF		

Scientific Name	Common Name	Region 1	Habit
Cirsium arvense	THISTLE,CREEPING	FACU	PIF
Cirsium flodmanii	THISTLE,FLODMAN'S	NI	PNF
Cirsium horridulum	THISTLE,YELLOW	FACU-	ABNF
Cirsium muticum	THISTLE,SWAMP	OBL	BNF
Cirsium nuttallii	THISTLE,NUTTALL'S	FAC	PNF
Cirsium virginianum	THISTLE,VIRGINIA	FACW	BNF
Cirsium vulgare	THISTLE,BULL	FACU-	BIF
Cladium jamaicense	SAWGRASS,JAMAICA	OBL	PNEGL
Cladium mariscoides	SAWGRASS,SMOOTH	OBL	PNEGL
Claytonia caroliniana	SPRINGBEAUTY,BROAD-LEAF	FACU	PNF
Claytonia virginica	SPRINGBEAUTY,NARROW-LEAF	FACU	PNF
Cleistes divaricata	POGONIA,SPREADING	FAC	PNF
Clematis addisonii	VIRGIN'S-BOWER,ADDISON'S	FACU	NH
Clematis catesbyana	SATIN-CURLS	NI	NWV
Clematis crispa	VIRGIN'S-BOWER,SWAMP	FACW	NWV
Clematis glaucophylla	VIRGIN'S-BOWER,WHITE-LEAF	FACW	NWV
Clematis ligusticifolia	VIRGIN'S-BOWER,WESTERN	NI	NWV
Clematis pitcheri	VIRGIN'S-BOWER,PITCHER'S	NI	NWV
Clematis terniflora	VIRGIN'S-BOWER,JAPANESE	FACU-	IWV
Clematis virginiana	VIRGIN'S-BOWER,VIRGINIA	FAC	PNV
Cleome serrulata	SPIDER-FLOWER,BEE	NI	ANF
Cleome spinosa	SPIDER-FLOWER,SPINY	FACU-	AIF
Clethra alnifolia	PEPPER-BUSH,COAST	FAC+	NS
Clintonia borealis	BEADLILY,BLUE	FAC	PNF
Cocculus carolinus	CORAL-BEADS,CAROLINA	FAC	NWV
Coeloglossum viride	ORCHID,LONG-BRACT GREEN	FACU	PNF
Coelorachis rugosa	JOINTGRASS,WRINKLED	OBL	PNG
Coix lacryma-jobi	TEARS,JOB'S	FACW	AIG
Collinsia verna	MARY,SPRING BLUE-EYE	FAC-	ANF
Collinsonia canadensis	HORSE-BALM,CANADA	FAC+	PNF
Collomia linearis	COLLOMIA,NARROW-LEAF	UPL	ANF
Comandra umbellata	TOAD-FLAX,UMBELLATE BASTARD	FACU-	PN+F
Commelina caroliniana	DAYFLOWER,CREEPING	NI	ANF
Commelina communis	DAYFLOWER,ASIATIC	FAC-	AIF
Commelina diffusa	DAYFLOWER,SPREADING	FACW	AIF
Commelina virginica	DAYFLOWER,VIRGINIA	FACW	PIF
Conioselinum chinense	HEMLOCK-PARSLEY	FACW	PNF
Conium maculatum	POISON-HEMLOCK	FACW	BIF
Conoclinium coelestinum	MISTFLOWER	FAC	PNF
Conradina verticillata	ROSEMARY,CUMBERLAND	FACW+	NS
Conyza canadensis	HORSEWEED,CANADA	UPL	ANF
Coptis trifolia	GOLDTHREAD,ALASKA	FACW	PNF
Corallorrhiza maculata	CORALROOT,SPOTTED	FACU	PN-F
Corallorrhiza striata	CORALROOT,STRIPED	FACU+	PN-F
Corallorrhiza trifida	CORALROOT,EARLY	FACW	PN-F
Corallorrhiza wisterana	CORALROOT,SPRING	FAC	PN-F
Coreopsis gladiata	TICKSEED,SOUTHEASTERN	FACW	PNF
Coreopsis lanceolata	TICKSEED,LANCE-LEAF	FACU	PNF
Coreopsis linifolia	TICKSEED,TEXAS	FACW	PNF
Coreopsis pubescens	TICKSEED,STAR	UPL	PNF
Coreopsis rosea	TICKSEED,PINK	FACW	PNF
Coreopsis tinctoria	TICKSEED,GOLDEN	FAC-	ANF
Coreopsis tripteris	TICKSEED,TALL	FAC	PNF
Corispermum hyssopifolium	TICK-SEED,COMMON	FACU	AIF
Cornus amomum	DOGWOOD,SILKY	FACW	NS
Cornus asperifolia	DOGWOOD,ROUGH-LEAF	FAC*	NS
Cornus canadensis	BUNCHBERRY,CANADA	FAC-	NS
Cornus drummondii	DOGWOOD,ROUGH-LEAF	FAC	NT
Cornus florida	DOGWOOD,FLOWERING	FACU-	NT
Cornus foemina	DOGWOOD,STIFF	FAC	NS
Cornus stolonifera	DOGWOOD,RED-OSIER	FACW+	NS
Corydalis flavula	CORYDALIS,YELLOW	FACU	ANF
Corylus americ	HAZEL-NUT,AMERICAN	FACU-	NS
Corylus cornuta	HAZEL-NUT,BEAKED	FACU-	NS

Scientific Name	Common Name	Region 1	Habit
Cosmos bipinnatus	COSMOS,GARDEN	FACU-	AIF
Cosmos parviflorus	COSMOS,SOUTHWEST	NI	AIF
Crassula aquatica	PYGMY-WEED,WATER	OBL	AN$F
Crataegus berberifolia	HAWTHORN,BARBERRY-LEAF	FACU	NT
Crataegus crus-galli	HAWTHORN,COCKSPUR	FACU	NTS
Crataegus marshallii	HAWTHORN,PARSLEY	FACU+	NST
Crataegus mollis	HAWTHORN,DOWNY	FACU	NT
Crataegus phaenopyrum	HAWTHORN,WASHINGTON	FAC	NT
Crataegus pulcherrima	HAWTHORN,BEAUTIFUL	NI	N
Crataegus spathulata	HAWTHORN,LITTLE-HIP	FAC	NST
Crataegus viridis	HAWTHORN,GREEN	FACW	NT
Crataegus x nitida	HAWTHORN,GLOSSY	FACU+	NT
Crotalaria rotundifolia	RATTLE-BOX,PROSTRATE	UPL	PNF
Crypsis alopecuroides	TIMOTHY,FOX-TAIL	NI	AIG
Crypsis schoenoides	TIMOTHY,SWAMP	NI	AIG
Cryptogramma stelleri	ROCKBRAKE,FRAGILE	FACU-	PNF3
Cryptotaenia canadensis	HONEWORT,CANADA	FAC	PNF
Ctenium aromaticum	GRASS,TOOTHACHE	FACW	PNG
Cuphea viscosissima	WAXWEED,BLUE	FAC-	ANF
Cycloloma atriplicifolium	PIGWEED,WINGED	FACU-	ANF
Cynoctonum mitreola	HORNPOD,LAX	FACW+	ANF
Cynoctonum sessilifolium	HORNPOD,SWAMP	FACW+	ANF
Cynodon dactylon	GRASS,BERMUDA	FACU	PIG
Cynosurus cristatus	GRASS,CRESTED DOG-TAIL	UPL	PIG
Cyperus acuminatus	FLATSEDGE,SHORT-POINT	OBL	ABPNGL
Cyperus albomarginatus	CYPERUS,WHITE-EDGE	FAC	ANGL
Cyperus alternifolius	FLATSEDGE,ALTERNATE-LEAF	NI	PIGL
Cyperus aristatus	FLATSEDGE,AWNED	FACW+	ANGL
Cyperus brevifolioides	FLATSEDGE,PASTURE	NI	PNGL
Cyperus brevifolius	FLATSEDGE,SHORT-LEAF	FACW	PNGL
Cyperus compressus	FLATSEDGE,POORLAND	FAC+	PNGL
Cyperus dentatus	FLATSEDGE,TOOTHED	FACW+	PNGL
Cyperus diandrus	FLATSEDGE,UMBRELLA	FACW	ANGL
Cyperus difformis	FLATSEDGE,VARIABLE	OBL	AIGL
Cyperus engelmannii	FLATSEDGE,ENGELMANN	FACW+	ANGL
Cyperus eragrostis	FLATSEDGE,TALL	NI	PNEGL
Cyperus erythrorhizos	FLATSEDGE,RED-ROOT	FACW+	APNEGL
Cyperus esculentus	CHUFA	FACW	PNGL
Cyperus ferax	CYPERUS,COARSE	FACW	ANGL
Cyperus ferruginescens	FLATSEDGE,RUSTY	FACW	ANGL
Cyperus filicinus	FLATSEDGE,SLENDER	OBL	ANGL
Cyperus filiculmis	FLATSEDGE,SLENDER	UPL	PNGL
Cyperus flavescens	FLATSEDGE,YELLOW	OBL	ANGL
Cyperus flavus	FLATSEDGE,INFLATED-SCALE	NI	PNGL
Cyperus fuscus	FLATSEDGE,BROWN	FAC	ANGL
Cyperus globulosus	FLATSEDGE,BALDWIN	FACU	PNGL
Cyperus granitiphilus	FLATSEDGE,GRANITE-LOVING	FACW	GL
Cyperus haspan	FLATSEDGE,SHEATHED	OBL	PNEGL
Cyperus iria	FLATSEDGE,IRIA	FACW	ANGL
Cyperus lancastriensis	FLATSEDGE,MANY-FLOWER	FACU	PNGL
Cyperus ochraceus	FLATSEDGE,POND	NI	PNGL
Cyperus odoratus	FLATSEDGE,RUSTY	FACW	APNGL
Cyperus ovularis	FLATSEDGE,GLOBOSE	FACU	PNGL
Cyperus polystachyos	FLATSEDGE,MANY-SPIKE	FACW	PNGL
Cyperus pseudovegetus	FLATSEDGE,MARSH	FACW	PNEGL
Cyperus refractus	FLATSEDGE,REFLEXED	FACU+	PNGL
Cyperus retrorsus	FLATSEDGE,RETRORSE	FAC-	PNGL
Cyperus rivularis	FLATSEDGE,SHINING	FACW+	ANGL
Cyperus rotundus	FLATSEDGE,PURPLE	FAC	PIGL
Cyperus schweinitzii	FLATSEDGE,SCHWEINITZ'S	FACU	PNGL
Cyperus serotinus	FLATSEDGE,TIDAL-MARSH	[illegible]	GL
Cyperus strigosus	FLATSEDGE,STRAW-COLOR	[illegible]W	PNEGL
Cyperus tenuifolius	FLATSEDGE,THIN-LEAF	[illegible]W	ANGL
Cyperus virens	FLATSEDGE,GREEN	[illegible]CW	PNEGL

Scientific Name	Common Name	Region 1	Habit
Cypripedium acaule	LADY'S-SLIPPER,PINK	FACU	PNF
Cypripedium arietinum	LADY'S-SLIPPER,RAM'S-HEAD	FACW+	PNF
Cypripedium calceolus	LADY'S-SLIPPER,SMALL YELLOW	FAC+	PNF
Cypripedium candidum	LADY'S-SLIPPER,SMALL WHITE	OBL	PNF
Cypripedium reginae	LADY'S-SLIPPER,SHOWY	FACW	PNF
Cyrilla racemiflora	CYRILLA,SWAMP	FACW	NT
Cystopteris bulbifera	FERN,BULBLET	FAC	PNF3
Cystopteris fragilis	FERN,BRITTLE	FACU	PNF3
Cystopteris montana	FERN,MOUNTAIN BLADDER	NI	PNF3
Dactylis glomerata	GRASS,ORCHARD	FACU	PIG
Dalea leporina	PRAIRIE-CLOVER,FOX-TAIL	NI	ANF
Dalibarda repens	ROBIN-RUN-AWAY	FAC	PNF
Danthonia compressa	OATGRASS,FLATTENED	FACU-	PNG
Danthonia sericea	OATGRASS,SILKY	FACU	PNG
Dasistoma macrophylla	FOXGLOVE,MULLEIN	FACU	AN+F
Decodon verticillatus	SWAMP-LOOSESTRIFE,HAIRY	OBL	PNF
Decumaria barbara	DECUMARIA,SOUTHEAST	OBL	NWV
Dendranthema arcticum	DAISY,ARCTIC	NI	PNF
Deschampsia cespitosa	HAIRGRASS,TUFTED	FACW	PNG
Deschampsia danthonioides	HAIRGRASS,ANNUAL	NI	ANG
Deschampsia elongata	HAIRGRASS,SLENDER	NI	PNG
Desmanthus illinoensis	BUNDLE-FLOWER,PRAIRIE	FAC	PNF
Desmodium canadense	TICK-TREFOIL,SHOWY	FAC	PNF
Desmodium paniculatum	TICK-TREFOIL,MARROW-LEAF	UPL	PNF
Desmodium tenuifolium	TICK-TREFOIL,SLIM-LEAF	FAC*	PNF
Diamorpha smallii	SMALL'S-STONECROP	FACW+	AN$F
Dichanthelium aciculare	WITCHGRASS,NEEDLE-LEAF	FACU	PNG
Dichanthelium acuminatum	GRASS,PANIC	FAC	PNG
Dichanthelium boreale	WITCHGRASS,NORTHERN	FACU	PNG
Dichanthelium clandestinum	WITCHGRASS,DEER-TONGUE	FAC+	PNG
Dichanthelium commutatum	WITCHGRASS,VARIABLE	FACU+	PNG
Dichanthelium consanguineum	WITCHGRASS,BLOOD	FACU	PNG
Dichanthelium dichotomum	WITCHGRASS,CYPRESS	FAC	PNG
Dichanthelium latifolium	WITCHGRASS,BROAD-LEAF	FACU-	PNG
Dichanthelium laxiflorum	WITCHGRASS,LAX-FLOWER	FACU	PNG
Dichanthelium leibergii	WITCHGRASS,LEIBERG'S	FACU	PNG
Dichanthelium oligosanthes	WITCHGRASS,HELLER'S	FACU	PNG
Dichanthelium ovale	WITCHGRASS,EGG-LEAF	FACU	PNG
Dichanthelium ravenelii	WITCHGRASS,RAVENEL'S	FACU-	PNG
Dichanthelium sabulorum	WITCHGRASS,HEMLOCK	FACU	PNG
Dichanthelium scabriusculum	GRASS,WOOLLY PANIC	OBL	PNG
Dichanthelium scoparium	GRASS,BROOM PANIC	FACW	PNG
Dichanthelium sphaerocarpon	GRASS,ROUND-SEED PANIC	FACU	PNG
Dichondra caroliniensis	PONY-FOOT,CAROLINA	FACW	PNF
Dichromena colorata	WHITE-TOP-SEDGE,STARBRUSH	FACW	PNGL
Dicliptera brachiata	MUDWORT,WILD	FACW	ANF
Didiplis diandra	WATER-PURSLANE	OBL	ANZEF
Digitaria insularis	SOURGRASS	NI	PNG
Digitaria ischaemum	CRABGRASS,SMOOTH	UPL	AIG
Digitaria sanguinalis	CRABGRASS,HAIRY	FACU-	AIG
Digitaria serotina	CRABGRASS,DWARF	FAC	ANG
Dioclea multiflora	CLUSTER-PEA,BOYKIN	FAC	PNS
Diodia teres	BUTTON-WEED,ROUGH	UPL	APNF
Diodia virginiana	BUTTON-WEED,VIRGINIA	FACW	APNEF
Dioscorea hirticaulis	YAM,HAIRY-STEM	FACW	PNF
Dioscorea quaternata	YAM,FOUR-LEAF	FACU	PNVF
Dioscorea villosa	YAM,YELLOW	FAC+	PNV
Diospyros virginiana	PERSIMMON,COMMON	FAC-	NT
Diphylleia cymosa	UMBRELLA-LEAF,AMERICAN	FACU+	PNF
Dipsacus sylvestris	TEASEL	NI	BIF
Dirca palustris	LEATHER-WOOD,EASTERN	FAC	NS
Distichlis spicata	SALTGRASS,SEASHORE	FACW+	PNG
Dodecatheon meadia	SHOOTING-STAR,COMMON	FACU	PNF
Dracocephalum parviflorum	DRAGON-HEAD,AMERICAN	FACU-	PNF

Scientific Name	Common Name	Region 1	Habit
Drosera anglica	SUNDEW,ENGLISH	NI	PNF
Drosera brevifolia	SUNDEW,DWARF	OBL	PNF
Drosera capillaris	SUNDEW,PINK	OBL	PNEF
Drosera filiformis	SUNDEW,THREAD-LEAF	OBL	PNF
Drosera intermedia	SUNDEW,SPOON-LEAF	OBL	PNEF
Drosera linearis	SUNDEW,SLENDER-LEAF	OBL	PNF
Drosera longifolia	SUNDEW,NARROW-LEAF	OBL	N
Drosera rotundifolia	SUNDEW,ROUND-LEAF	OBL	PNEF
Dryopteris atropalustris	WOODFERN	OBL	F3
Dryopteris celsa	FERN,LOG	OBL	F3
Dryopteris clintoniana	WOODFERN,CLINTON	FACW+	PNF3
Dryopteris cristata	SHIELD-FERN,CRESTED	FACW+	PNEF3
Dryopteris goldiana	WOODFERN,GOLDIE	FAC+	PNF3
Dryopteris intermedia	WOODFERN,EVERGREEN	FACU	PNF3
Dryopteris ludoviciana	SHIELD-FERN,SOUTHERN	NI	PNF3
Dryopteris marginalis	SHIELD-FERN,MARGINAL	FACU-	PNF3
Dryopteris spinulosa	WOODFERN,SPINULOSE	FAC+	F3
Dryopteris x australis	WOODFERN,SOUTHERN	NI	F3
Dryopteris x boottii	WOODFERN,BOOTT	FACW	PNF3
Dryopteris x triploidea	WOODFERN,FRUITY SHIELD	FAC	PNF3
Dryopteris x uliginosa	WOODFERN,OVIEDO	FAC	F3
Duchesnea indica	MOCK-STRAWBERRY,INDIAN	FACU-	PIF
Dulichium arundinaceum	SEDGE,THREE-WAY	OBL	PNEGL
Echinochloa colona	JUNGLE-RICE	FACW	AIG
Echinochloa crus-pavonis	COCKSPUR,GULF	FACW+	AIEG
Echinochloa crusgalli	GRASS,BARNYARD	FACU	AIG
Echinochloa muricata	GRASS,ROUGH BARNYARD	FACW+	ANG
Echinochloa walteri	COCKSPUR,COAST	FACW+	ANEG
Echinocystis lobata	MOCK-CUCUMBER,WILD	FAC	ANF
Echinodorus cordifolius	BURHEAD,CREEPING	OBL	PNEF
Echinodorus parvulus	BURHEAD,DWARF	OBL	PNEF
Echinodorus rostratus	BURHEAD,UPRIGHT	OBL	PNEF
Eclipta alba	YERBA DE TAJO	FAC	ANF
Egeria densa	WATER-WEED,BRAZILIAN	OBL	PNZF
Eichhornia crassipes	WATER-HYACINTH,COMMON	OBL	PNE/F
Elaeagnus angustifolia	OLIVE,RUSSIAN	FACU	IST
Elaeagnus commutata	SILVER-BERRY,AMERICAN	NI	NS
Elatine americana	WATER-WORT,AMERICAN	OBL	ANEF
Elatine brachysperma	WATER-WORT,SHORT-SEED	OBL	ANE/F
Elatine minima	WATER-WORT,SMALL	OBL	ANEF
Elatine triandra	WATER-WORT,THREE-STAMEN	OBL	ANE/F
Eleocharis acicularis	SPIKERUSH,LEAST	OBL	PNEGL
Eleocharis albida	SPIKERUSH,WHITE	OBL	PNEGL
Eleocharis baldwinii	SPIKERUSH,BALDWIN'S	OBL	APNGL
Eleocharis caribaea	SPIKERUSH,CAPITATE	FACW	ANGL
Eleocharis compressa	SPIKERUSH,FLAT-STEM	FACW+	PNEGL
Eleocharis engelmannii	SPIKERUSH,ENGELMANN'S	FACW+	ANGL
Eleocharis equisetoides	SPIKERUSH,HORSE-TAIL	OBL	PNEGL
Eleocharis erythropoda	SPIKERUSH,BALD	OBL	PNGL
Eleocharis fallax	SPIKERUSH,CREEPING	OBL	PNGL
Eleocharis flavescens	SPIKERUSH,PALE	OBL	PNGL
Eleocharis geniculata	SPIKERUSH,CLUSTERED	OBL	ANEGL
Eleocharis halophila	SPIKERUSH,SALTMARSH	OBL	GL
Eleocharis intermedia	SPIKERUSH,MATTED	FACW+	PNGL
Eleocharis macrostachya	SPIKERUSH,CREEPING	OBL	PNEGL
Eleocharis melanocarpa	SPIKERUSH,BLACK-FRUIT	FACW+	PNGL
Eleocharis microcarpa	SPIKERUSH,SMALL-FRUIT	OBL	ANEGL
Eleocharis nitida	SPIKERUSH,SLENDER	OBL	PNGL
Eleocharis obtusa	SPIKERUSH,BLUNT	OBL	APNEG
Eleocharis olivacea	SPIKERUSH,BRIGHT-GREEN	OBL	PNGL
Eleocharis ovata	SPIKERUSH,OVATE	OBL	ANEGL
Eleocharis palustris	SPIKERUSH,CREEPING	OBL	PNEGL
Eleocharis parvula	SPIKERUSH,SMALL	OBL	PNGL
Eleocharis pauciflora	SPIKERUSH,FEW-FLOWER	OBL	PNGL

Scientific Name	Common Name	Region 1	Habit
Eleocharis quadrangulata	SPIKERUSH,SQUARE-STEM	OBL	PNEGL
Eleocharis radicans	SPIKERUSH,ROOTED	OBL	PNGL
Eleocharis robbinsii	SPIKERUSH,ROBBINS'	OBL	PNGL
Eleocharis rostellata	SPIKERUSH,BEAKED	OBL	PNGL
Eleocharis smallii	SPIKERUSH,SMALL'S	OBL	PNGL
Eleocharis tenuis	SPIKERUSH,SLENDER	FACW+	PNGL
Eleocharis tortilis	SPIKERUSH,TWISTED	FACW+	PNGL
Eleocharis tricostata	SPIKERUSH,THREE-ANGLE	OBL	GL
Eleocharis tuberculosa	SPIKERUSH,LONG-TUBERCLE	OBL	PNGL
Eleocharis uniglumis	SPIKERUSH,CREEPING	OBL	PNGL
Eleocharis vivipara	SPIKERUSH,VIVIPAROUS	OBL	ANGL
Eleocharis wolfii	SPIKERUSH,WOLF'S	OBL	PNEGL
Elephantopus carolinianus	ELEPHANT-FOOT,CAROLINA	FACU	PNF
Elephantopus nudatus	ELEPHANT-FOOT,SMOOTH	FAC	PNF
Eleusine indica	GOOSEGRASS,INDIA	FACU-	AIG
Ellisia nyctelea	BABY-BLUE-EYES,FALSE	FACU	ANF
Elodea canadensis	WATER-WEED,BROAD	OBL	PNZF
Elodea nuttallii	WATER-WEED,NUTTALL'S	OBL	PNZF
Elymus arenarius	LYME-GRASS,SEA	FACU-	PIG
Elymus canadensis	WILD-RYE,NODDING	FACU+	PNG
Elymus glaucus	WILD-RYE,BLUE	FACU	PNG
Elymus riparius	WILD-RYE,RIVERBANK	FACW	PNG
Elymus villosus	WILD-RYE,HAIRY	FACU-	PNG
Elymus virginicus	WILD-RYE,VIRGINIA	FACW-	PNG
Elymus wiegandii	WILD-RYE,WIEGAND'S	FAC	G
Empetrum nigrum	CROWBERRY,BLACK	FACW	NS
Empetrum rubrum	CROWBERRY,PURPLE	FAC*	NS
Enemion biternatum	RUE-ANEMONE,FALSE	FACU-	PNF
Epilobium anagallidifolium	WILLOW-HERB,PIMPERNEL	FACW	PNF
Epilobium angustifolium	FIREWEED	FAC	PNF
Epilobium ciliatum	WILLOW-HERB,HAIRY	FAC-	PNF
Epilobium coloratum	WILLOW-HERB,PURPLE-LEAF	OBL	PNF
Epilobium hirsutum	WILLOW-HERB,GREAT-HAIRY	FACW	PIF
Epilobium homemannii	WILLOW-HERB,HORNEMANN'S	FACW	PNF
Epilobium lactiflorum	WILLOW-HERB,WHITE-FLOWER	FACW	PNF
Epilobium leptophyllum	WILLOW-HERB,LINEAR-LEAF	OBL	PNF
Epilobium palustre	WILLOW-HERB,MARSH	OBL	PNF
Epilobium strictum	WILLOW-HERB,DOWNY	OBL	PNF
Equisetum arvense	HORSETAIL,FIELD	FAC	PNH2
Equisetum fluviatile	HORSETAIL,WATER	OBL	PNH2
Equisetum hyemale	HORSETAIL,ROUGH	FACW	PNH2
Equisetum laevigatum	SCOURING-RUSH,SMOOTH	FACW	PNH2
Equisetum palustre	HORSETAIL,MARSH	FACW	PNH2
Equisetum pratense	HORSETAIL,MEADOW	FACW	PNH2
Equisetum scirpoides	SCOURING-RUSH,DWARF	FAC	PNH2
Equisetum sylvaticum	HORSETAIL,WOODLAND	FACW	PNH2
Equisetum telmateia	HORSETAIL,GIANT	NI	PNH2
Equisetum variegatum	HORSETAIL,VARIEGATED	FACW	PNH2
Equisetum x ferrissii	SCOURING-RUSH,INTERMEDIATE	NI	PNH2
Equisetum x litorale	HORSETAIL,SHORE	OBL	PNH2
Equisetum x nelsonii	HORSETAIL,NELSON VARIEGATED	NI	PNH2
Equisetum x trachyodon	HORSETAIL,ROUGH-TOOTH	NI	PH2
Eragrostis cilianensis	STINKGRASS	FACU	AIG
Eragrostis frankii	LOVEGRASS,FRANK'S	FACW	ANG
Eragrostis hirsuta	LOVEGRASS,BIG-TOP	UPL	PNG
Eragrostis hypnoides	LOVEGRASS,TEAL	OBL	ANG
Eragrostis mexicana	LOVEGRASS,MEXICAN	UPL	ANG
Eragrostis pectinacea	LOVEGRASS,PURPLE	FAC	ANG
Eragrostis pilosa	LOVEGRASS,INDIA	FACU	AIG
Eragrostis refracta	LOVEGRASS,MEADOW	FACW	PNG
Eragrostis reptans	LOVEGRASS,HAIRY CREEPING	FACW+	ANG
Eragrostis spect[redacted]	LOVEGRASS,PURPLE	UPL	PNG
Erechtites hiera[redacted]	BURN,AMERICAN	FACU	ANF
Erianthus alopec[redacted]	PLUMEGRASS,WOOLLY	FAC	PNG

Scientific Name	Common Name	Region 1	Habit
Erianthus brevibarbis	PLUMEGRASS,SHORT-BEARD	OBL	PNG
Erianthus contortus	PLUMEGRASS,BENT-AWN	FAC	PNG
Erianthus giganteus	PLUMEGRASS,SUGAR,CANE	FACW+	PNG
Erianthus ravennae	PLUMEGRASS,RAVENNA	UPL	PIG
Erianthus strictus	PLUMEGRASS,NARROW	OBL	PNG
Erica tetralix	HEATH,CROSS-LEAF	FACU	IS
Erigeron acris	FLEABANE,BITTER	FACU	BPF
Erigeron annuus	FLEABANE,WHITE-TOP	FACU	ANF
Erigeron hyssopifolius	FLEABANE,HYSSOP-LEAF	FACW	PNF
Erigeron philadelphicus	FLEABANE,PHILADELPHIA	FACU	BNF
Erigeron pulchellus	PLANTAIN,ROBIN'S	FACU	PNF
Erigeron quercifolius	FLEABANE,OAK-LEAF	FACW	ANF
Erigeron strigosus	FLEABANE,PRAIRIE	FACU+	ANF
Erigeron vernus	FLEABANE,EARLY WHITETOP	OBL	PNF
Eriocaulon compressum	PIPEWORT,FLATTENED	OBL	PIEF
Eriocaulon decangulare	PIPEWORT,TEN-ANGLE	OBL	PIEF
Eriocaulon parkeri	PIPEWORT,ESTUARY	OBL	PIEF
Eriocaulon septangulare	BUTTONS,WHITE	OBL	PIEF
Eriochloa contracta	CUPGRASS,PRAIRIE	FACU	ANG
Eriochloa gracilis	CUPGRASS,SOUTHWESTERN	NI	ANG
Eriophorum alpinum	COTTON-GRASS,ALPINE	OBL	PNGL
Eriophorum angustifolium	COTTON-GRASS,NARROW-LEAF	OBL	PNGL
Eriophorum gracile	COTTON-GRASS,SLENDER	OBL	PNEGL
Eriophorum polystachion	COTTON-GRASS,COLDSWAMP	OBL	PNGL
Eriophorum spissum	HARE'S-TAIL	OBL	PNGL
Eriophorum tenellum	COTTON-GRASS,FEW-NERVE	OBL	PNGL
Eriophorum vaginatum	COTTON-GRASS,TUSSOCK	OBL	PNGL
Eriophorum virginicum	COTTON-GRASS,TAWNY	OBL	PNEGL
Eriophorum viridicarinatum	COTTON-GRASS,GREEN-KEEL	OBL	PNEGL
Eryngium aquaticum	COYOTE-THISTLE,MARSH	OBL	BNF
Eryngium campestre	COYOTE-THISTLE,SNAKEROOT	NI	PNF
Eryngium integrifolium	COYOTE-THISTLE,BLUE-FLOWER	NI	PNF
Eryngium prostratum	COYOTE-THISTLE,CREEPING	OBL	PNF
Eryngium yuccifolium	RATTLESNAKE-MASTER	FAC	PNF
Erysimum cheiranthoides	WALLFLOWER,WORM-SEED	FAC	ANF
Erythronium rostratum	FAWNLILY,YELLOW	UPL	PNF
Erythronium umbilicatum	FAWNLILY,DIMPLED	FAC	PNF
Eulalia viminea	MICROSTEGIUM,NEPAL	FAC	G
Euonymus americanus	STRAWBERRY-BUSH,AMERICAN	FAC	NS
Euonymus atropurpureus	BURNING-BUSH,EASTERN	FACU	NST
Eupatoriadelphus dubius	JOE-PYE-WEED,COASTAL-PLAIN	FACW	PNF
Eupatoriadelphus fistulosus	JOE-PYE-WEED,HOLLOW	FACW	PNF
Eupatoriadelphus maculatus	JOE-PYE-WEED,SPOTTED	FACW	PNF
Eupatoriadelphus purpureus	JOE-PYE-WEED,SWEET	FAC	PNF
Eupatorium capillifolium	THOROUGH-WORT,SMALL DOG-FENNEL	FACU-	PNF
Eupatorium leucolepis	THOROUGH-WORT,WHITE-BRACT	FACW+	PNF
Eupatorium perfoliatum	BONESET,COMMON	FACW+	PNF
Eupatorium pilosum	THOROUGH-WORT,HAIRY	FACW	PNF
Eupatorium recurvans	THOROUGH-WORT,COASTAL-PLAIN	FAC+	PNF
Eupatorium resinosum	THOROUGH-WORT,PINEBARRENS	OBL	PNF
Eupatorium rotundifolium	THOROUGH-WORT,ROUND-LEAF	FAC-	PNF
Eupatorium semiserratum	THOROUGH-WORT,SMALL-FLOWER	FACW	PNF
Eupatorium serotinum	THOROUGH-WORT,LATE-FLOWERING	FAC-	PNF
Euphorbia commutata	SPURGE,TINTED WOOD	FACU	ANF
Euphorbia heterophylla	SPURGE,PAINTED	FACU-	ANF
Euphorbia humistrata	BROOMSPURGE,SPREADING	FACU	ANF
Euphorbia hypericifolia	BROOMSPURGE,TROPICAL	UPL	ANF
Euphorbia maculata	BROOMSPURGE,SPOTTED	FACU-	ANF
Euphorbia marginata	SNOW-ON-THE-MOUNTAIN	UPL	ANF
Euphorbia nutans	BROOMSPURGE,EYEBANE	FACU-	AIF
Euphorbia obtusata	SPURGE,BLUNT-LEAF	[redacted]U-	ANF
Euphorbia polygonifolia	BROOMSPURGE,SEASIDE	[redacted]	ANF
Euphorbia purpurea	SPURGE,GLADE	[redacted]	PNF
Euphrasia randii	EYEBRIGHT,SMALL	FACW	NF

Scientific Name	Common Name	Region 1	Habit
Eustachys petraea	GRASS,PINEWOODS FINGER	NI	NG
Euthamia camporum	FRAGRANT-GOLDEN-ROD,VISCID	FACU	PNF
Euthamia galetorum	FRAGRANT-GOLDEN-ROD,NARROW-LEAF	FAC	PNF
Euthamia graminifolia	FRAGRANT-GOLDEN-ROD,FLAT-TOP	FAC	PNF
Euthamia leptocephala	FRAGRANT-GOLDEN-ROD,BUSHY	NI	PNF
Euthamia minor	FRAGRANT-GOLDEN-ROD,SLENDER	FACU	PNF
Euthamia remota	FRAGRANT-GOLDEN-ROD,PRAIRIE	UPL	PNF
Fagus grandifolia	BEECH	FAC+	NT
Fagus grandifolia	BEECH,AMERICAN	FACU	NT
Festuca arundinacea	FESCUE,KENTUCKY	FACU	PIG
Festuca obtusa	FESCUE,NODDING	FACU	PNG
Festuca paradoxa	FESCUE,CLUSTER	FAC	PNG
Festuca pratensis	FESCUE,MEADOW	FACU-	PIG
Festuca rubra	FESCUE,RED	FACU	PNG
Filaginella uliginosa	CUDWEED,LOW	FAC	N
Filipendula rubra	QUEEN-OF-THE-PRAIRIE	FACW	PNF
Fimbristylis annua	FIMBRY,ANNUAL	FAC	ANGL
Fimbristylis autumnalis	FIMBRY,SLENDER	FACW+	GL
Fimbristylis caroliniana	FIMBRY,CAROLINA	FACW+	PNGL
Fimbristylis castanea	FIMBRY,MARSH	OBL	PNEGL
Fimbristylis dichotoma	FIMBRY,TALL	NI	APNEGL
Fimbristylis miliacea	FIMBRY,GRASSY-LIKE	NI	ANGL
Fimbristylis perpusilla	FIMBRY,HARPER'S	NI	ANGL
Fimbristylis puberula	FIMBRY,VAHL'S HAIRY	OBL	PNEGL
Fimbristylis vahlii	FIMBRY,VAHL'S	NI	ANEGL
Fleischmannia incarnata	THOROUGH-WORT,PINK	FAC	N
Floerkea proserpinacoides	MERMAID-WEED,FALSE	FAC	ANF
Foeniculum vulgare	FENNEL,SWEET	UPL	BPIF
Forestiera acuminata	PRIVET,SWAMP	OBL	NST
Forestiera ligustrina	SWAMP PRIVET,UPLAND	NI	NS
Fothergilla gardenii	WITCH-ALDER,DWARF	FACW	NS
Fragaria virginiana	STRAWBERRY,VIRGINIA	FACU	PNF
Fraxinus americana	ASH,WHITE	FACU	NT
Fraxinus caroliniana	ASH,CAROLINA	OBL	NETS
Fraxinus nigra	ASH,BLACK	FACW	NT
Fraxinus pennsylvanica	ASH,GREEN	FACW	NT
Fraxinus profunda	ASH,PUMPKIN	OBL	NT
Fuirena breviseta	UMBRELLA-SEDGE,SALTMARSH	OBL	PNGL
Fuirena pumila	UMBRELLA-SEDGE,DWARF	OBL	ANGL
Fuirena simplex	UMBRELLA-SEDGE,WESTERN	NI	PNGL
Fuirena squarrosa	UMBRELLA-SEDGE,HAIRY	OBL	PNGL
Galactia macreei	MILKPEA,DOWNY	FAC+	PNV
Galium aparine	BEDSTRAW,CATCHWEED	FACU	ANF
Galium asprellum	BEDSTRAW,ROUGH	OBL	PNF
Galium boreale	BEDSTRAW,NORTHERN	FACU	PNF
Galium brevipes	BEDSTRAW,LIMESTONE SWAMP	OBL	PNF
Galium circaezans	LICORICE,WILD	UPL	PNF
Galium concinnum	BEDSTRAW,SHINING	UPL	PNF
Galium labradoricum	BEDSTRAW,NORTHERN BOG	OBL	PNF
Galium obtusum	BEDSTRAW,BLUNT-LEAF	FACW+	PNF
Galium palustre	BEDSTRAW,MARSH	OBL	PNF
Galium parisiense	BEDSTRAW,WALL	FACU	AIF
Galium tinctorium	BEDSTRAW,STIFF MARSH	OBL	PNF
Galium trifidum	BEDSTRAW,SMALL	FACW+	PNF
Galium triflorum	BEDSTRAW,SWEET-SCENT	FACU	PNF
Gamochaeta pennsylvanica	CUDWEED,PENNSYLVANIA	UPL*	N
Gamochaeta purpurea	CUDWEED,PURPLE	UPL	N
Gastridium ventricosum	NITGRASS	FACU	AIG
Gaultheria hispidula	SNOWBERRY,CREEPING	FACW	NS
Gaultheria procumbens	TEABERRY	FACU	NS
Gaura biennis	BUTTERFLY-WEED,BIENNIAL	FACU	BNF
Gaura parviflora	BUTTERFLY-WEED,VELVET-LEAF	NI	ANF
[illegible]	HUCKLEBERRY,BLACK	FACU	NS
[illegible]	[illegible]	FAC	NS

Scientific Name	Common Name	Region 1	Habit
Gaylussacia frondosa	DANGLE-BERRY	FAC	NS
Gelsemium sempervirens	JESSAMINE,YELLOW	FAC	NWVS
Gentiana alba	GENTIAN,YELLOW	FACU	PF
Gentiana andrewsii	GENTIAN,FRINGE-TOP BOTTLE	FACW	PNF
Gentiana autumnalis	GENTIAN,PINEBARREN	FACW	PNF
Gentiana catesbaei	GENTIAN,ELLIOTT'S	OBL	PNF
Gentiana clausa	GENTIAN,CLOSED	FACW	PNF
Gentiana linearis	GENTIAN,NARROW-LEAF	OBL	PNF
Gentiana prostrata	GENTIAN,PYGMY	NI	ABNF
Gentiana rubricaulis	GENTIAN,CLOSED	OBL	PNF
Gentiana saponaria	GENTIAN,SOAPWORT	FACW	PNF
Gentianella amarella	GENTIAN,NORTHERN	FAC	ABNF
Gentianella quinquefolia	GENTIAN,STIFF	FAC	ANF
Gentianopsis crinita	GENTIAN,FRINGED	OBL	ABF
Gentianopsis procera	GENTIAN,LESSER FRINGED	NI	ANF
Gentianopsis virgata	GENTIAN,LESSER FRINGED	FACW+	ANF
Geocaulon lividum	TOADFLAX,NORTHERN RED-FRUIT	FAC	N
Geranium maculatum	CRANE'S-BILL,PURPLE	FACU	PNF
Geranium pratense	CRANE'S-BILL,MEADOW	UPL	PNF
Geum aleppicum	AVENS,YELLOW	FAC	PNF
Geum canadense	AVENS,WHITE	FACU	PNF
Geum laciniatum	AVENS,ROUGH	FAC+	PNF
Geum macrophyllum	AVENS,LARGE-LEAF	FACW	PNF
Geum peckii	AVENS,MOUNTAIN	OBL	PNF
Geum rivale	AVENS,PURPLE	OBL	PNF
Geum triflorum	WHISKERS,OLD-MAN'S	UPL	PNF
Geum vernum	AVENS,SPRING	FACU	PIF
Geum virginianum	AVENS,PALE	FAC-	PNF
Glaux maritima	SEA-MILKWORT	OBL	PI$F
Glecoma hederacea	IVY,GROUND	FACU	PIF
Gleditsia aquatica	WATER-LOCUST	OBL	NETS
Gleditsia triacanthos	HONEY-LOCUST	FAC-	NTS
Glyceria acutiflora	GRASS,CREEPING MANNA	OBL	PNG
Glyceria borealis	GRASS,SMALL FLOATING MANNA	OBL	PNEG
Glyceria canadensis	GRASS,CANADA MANNA	OBL	PNG
Glyceria fluitans	GRASS,WATER MANNA	OBL	PIG
Glyceria maxima	MEADOWGRASS,REED	OBL	PIG
Glyceria melicaria	GRASS,MELIC MANNA	OBL	PNG
Glyceria obtusa	GRASS,ATLANTIC MANNA	OBL	PNG
Glyceria septentrionalis	GRASS,EASTERN MANNA	OBL	PNEG
Glyceria striata	GRASS,FOWL MANNA	OBL	PNEG
Glycyrrhiza lepidota	LICORICE,AMERICAN	UPL	PNF
Gnaphalium chilense	CUDWEED,COTTON-BATTING	FAC	ABIF
Goodyera oblongifolia	RATTLESNAKE-PLANTAIN,GIANT	FACU-	PNF
Goodyera pubescens	RATTLESNAKE-PLANTAIN,DOWNY	FACU-	PNF
Goodyera repens	RATTLESNAKE-PLANTAIN,DWARF	FACU+	PNF
Goodyera tesselata	RATTLESNAKE-PLANTAIN,CHECKERED	FACU-	PNF
Gratiola aurea	HEDGEHYSSOP,GOLDEN	OBL	PNF
Gratiola neglecta	HEDGEHYSSOP,CLAMMY	OBL	ANEF
Gratiola pilosa	HEDGEHYSSOP,SHAGGY	FACU	PNF
Gratiola ramosa	HEDGEHYSSOP,BRANCHING	FACW	PNF
Gratiola virginiana	HEDGEHYSSOP,ROUND-FRUIT	OBL	ABNEF
Gratiola viscidula	HEDGEHYSSDP,SHAGGY	OBL	PNF
Grindelia squarrosa	GUMWEED,CURLY-CUP	FACU	ABPN$
Gymnocarpium dryopteris	FERN,OAK	UPL	PNF3
Gymnocarpium robertianum	FERN,LIMESTONE OAK	UPL	PNF3
Gymnopogon brevifolius	GRASS,SLIM SKELETON	FACU	PNG
Hackelia floribunda	STICKSEED,DAVIS MOUNTAIN	FACU*	BPNF
Hackelia virginiana	STICKSEED,VIRGINIA	FACU	BPNF
Halenia deflexa	SPURRED-GENTIAN,AMERICAN	FAC	ANF
Halesia carolina	SILVER-BELL,CAROLINA	FACU	NST
Hamamelis virginiana	WITCH-HAZEL,AMERICAN	FAC-	NST
Haplopappus divaricatus	GOLD,SLENDER SPRING	UPL	ANF
Hasteola suaveolens	INDIAN-PLANTAIN,SWEET-SCENT	FAC-	PNF

Scientific Name	Common Name	Region 1	Habit
Hedysarum alpinum	SWEETVETCH,ALPINE	FAC-	PNF
Helenium amarum	SNEEZEWEED,FIVE-LEAF	FACU-	ANF
Helenium autumnale	SNEEZEWEED,COMMON	FACW+	PNF
Helenium brevifolium	SNEEZEWEED,SHORT-LEAF	OBL	PNF
Helenium flexuosum	SNEEZEWEED,PURPLE-HEAD	FAC-	PNF
Helianthus angustifolius	SUNFLOWER,SWAMP	FACW	ANF
Helianthus annuus	SUNFLOWER,COMMON	FAC-	ANF
Helianthus debilis	SUNFLOWER,CUCUMBER-LEAF	UPL	APNF
Helianthus decapetalus	SUNFLOWER,THIN-LEAF	FACU	PNF
Helianthus giganteus	SUNFLOWER,TALL	FACW	PNF
Helianthus grosseserratus	SUNFLOWER,SAW-TOOTH	FACW	PNF
Helianthus maximiliani	SUNFLOWER,MAXIMILIAN'S	UPL	PNF
Helianthus microcephalus	SUNFLOWER,SMALL-HEAD	NI	PNF
Helianthus occidentalis	SUNFLOWER,FEW-LEAF	UPL	PNF
Helianthus tuberosus	JERUSALEM-ARTICHOKE	FAC	PNF
Heliotropium curassavicum	HELIOTROPE,SEASIDE	OBL	APISF
Heliotropium indicum	HELIOTROPE,INDIAN	FAC+	AIF
Helonias bullata	SWAMP-PINK	OBL	PNEF
Hemarthria altissima	JOINTGRASS,AFRICAN	NI	PIG
Hemianthus micranthemoides	MUDFLOWER,DELAWARE RIVER	OBL	ANF
Hemicarpha micrantha	DWARF-BULLRUSH	FACW+	ANGL
Hemizonia pungens	TARWEED,COMMON	NI	ANF
Heracleum lanatum	COW-PARSNIP	FACU-	PNF
Heracleum sphondylium	COW-PARSNIP,AMERICAN	UPL	PIF
Heteranthera limosa	MUD-PLANTAIN,BLUE	OBL	ANEF
Heteranthera reniformis	MUD-PLANTAIN,KIDNEY-LEAF	OBL	PNE/F
Heterotheca graminifolia	SILKGRASS	UPL	PNF
Heterotheca mariana	GOLDEN-ASTER,MARYLAND	UPL	PNF
Heterotheca subaxillaris	CAMPHOR-WEED	UPL	ANF
Heuchera americana	ALUM-ROOT,AMERICAN	FACU-	PNF
Hexalectris spicata	CORALROOT,CRESTED	UPL	PN-F
Hibiscus laevis	ROSEMALLOW,HALBERD-LEAF	OBL	PNF
Hibiscus moscheutos	ROSEMALLOW,SWAMP	OBL	PNEF
Hieracium gronovii	HAWKWEED,GRONOV'S	UPL	PNF
Hieracium trailii	HAWKWEED,MARYLAND	FACU	PNF
Hierochloe odorata	GRASS,HOLY	FACW	PNG
Hippuris vulgaris	MARE'S-TAIL,COMMON	OBL	PNZF
Holcus lanatus	GRASS,COMMON VELVET	FACU	PNG
Honkenya peploides	SANDWORT,SEABEACH	FACU	PNF
Hordeum brachyantherum	BARLEY,MEADOW	FAC+	PNG
Hordeum geniculatum	BARLEY	NI	AIG
Hordeum hystrix	BARLEY,MEDITERRANEAN	NI	AIG
Hordeum jubatum	BARLEY,FOX-TAIL	FAC	PNG
Hordeum leporinum	BARLEY	NI	AIG
Hordeum pusillum	BARLEY,LITTLE	FAC	ANG
Hottonia inflata	FEATHERFOIL,AMERICAN	OBL	ANZ/F
Houstonia caerulea	INNOCENCE	FACU	PNF
Houstonia minima	STAR-VIOLET	NI	ANF
Houstonia serpyllifolia	BLUET,MICHAUX'S	FAC	PNF
Humulus japonicus	HOP,JAPANESE	FACU	APIVF
Humulus lupulus	HOP,COMMON	NI	PNVF
Hybanthus concolor	VIOLET,GREEN	FACU-	PNF
Hydrangea arborescens	HYDRANGEA,WILD	FACU	NS
Hydrangea paniculata	HYDRANGEA,PANICLE	FAC*	IS
Hydrocharis morsus-ranae	FROGBIT,COMMON	OBL	PZF
Hydrocotyle americana	PENNY-WORT,AMERICAN MARSH	OBL	PIEF
Hydrocotyle ranunculoides	PENNY-WORT,FLOATING	OBL	PN/F
Hydrocotyle umbellata	PENNY-WORT,MANY-FLOWER	OBL	PN/F
Hydrocotyle verticillata	PENNY-WORT,WORLED	OBL	PNF
Hydrolea ovata	FALSE-FIDDLE-LEAF,OVATE	NI	PNF
Hydrolea quadrivalvis	WATER-POD	OBL	PNF
Hydrolea uniflo[illegible]e	FALSE-FIDDLE-LEAF,ONE-FLOWER	NI	PNF
Hydrophyllum [illegible]	WATER-LEAF,BLUNT-LEAF	FACU	PNF
Hydrophyllum v[illegible]um	WATER-LEAF,VIRGINIA	FAC	PNF

Scientific Name	Common Name	Region 1	Habit
Hymenocallis caroliniana	SPIDER-LILY,CAROLINA	NI	PNF
Hymenocallis occidentalis	SPIDER-LILY,NORTHERN	OBL	PNF
Hypericum adpressum	ST. JOHN'S-WORT,CREEPING	OBL	PNF
Hypericum apocynifolium	ST. JOHN'S-WORT	NI	NES
Hypericum boreale	ST. JOHN'S-WORT,NORTHERN	OBL	PNF
Hypericum canadense	ST. JOHN'S-WORT,CANADIAN	FACW	ANF
Hypericum cistifolium	ST. JOHN'S-WORT,ROUND-POD	FACW	ANF
Hypericum densiflorum	ST. JOHN'S-WORT,BUSHY	FAC+	NS
Hypericum denticulatum	ST. JOHN'S-WORT,COPPERY	FACW-	PNF
Hypericum dissimulatum	ST. JOHN'S-WORT,DISGUISED	FACW	PNF
Hypericum drummondii	ST. JOHN'S-WORT,DRUMMOND'S	UPL	ANF
Hypericum ellipticum	ST. JOHN'S-WORT,PALE	OBL	PNF
Hypericum gentianoides	ORANGE-GRASS	UPL	ANF
Hypericum gymnanthum	ST. JOHN'S-WORT,CLASPING-LEAF	OBL	PNF
Hypericum kalmianum	ST. JOHN'S-WORT,KALM'S	FAC	NS
Hypericum majus	ST. JOHN'S-WORT,LARGE CANADIAN	FACW	ANF
Hypericum mitchellianum	ST. JOHN'S-WORT,BLUE RIDGE	FACU	PNF
Hypericum mutilum	ST. JOHN'S-WORT,SLENDER	FACW	PNF
Hypericum nudiflorum	ST. JOHN'S-WORT,PRETTY	OBL	NS
Hypericum prolificum	ST. JOHN'S-WORT,SHRUBBY	FACU	NS
Hypericum punctatum	ST. JOHN'S-WORT,DOTTED	FAC-	PNF
Hypericum pyramidatum	ST. JOHN'S-WORT,GREAT	FAC	PNF
Hypericum setosum	ST. JOHN'S-WORT,HAIRY	OBL	PNF
Hypericum sphaerocarpum	ST. JOHN'S-WORT,ROUND-FRUIT	FACU	NHS
Hypoxis hirsuta	STARGRASS,EASTERN YELLOW	FAC	PNF
Hypoxis leptocarpa	GOLDSTAR,CLUBPOD	FACW	PNEF
Hypoxis micrantha	STARGRASS,PINELAND YELLOW	FAC	PNF
Hypoxis sessilis	STARGRASS,GLOSS-SEED	FACU-	PNF
Hyptis mutabilis	BUSHMINT,TROPICAL	FAC	PIF
Ilex amelanchier	HOLLY,SARVIS	OBL	NS
Ilex coriacea	HOLLY,BAY-GALL	FACW	NS
Ilex decidua	HOLLY,DECIDUOUS	FACW	NT
Ilex glabra	INK-BERRY	FACW-	NS
Ilex laevigata	HOLLY,SMOOTH	OBL	NS
Ilex longipes	HOLLY,GEORGIA	NI	NS
Ilex opaca	HOLLY,AMERICAN	FACU+	NTS
Ilex verticillata	WINTERBERRY,COMMON	FACW+	NST
Ilex vomitoria	YAUPON	FAC-	NST
Impatiens capensis	TOUCH-ME-NOT,SPOTTED	FACW	ANF
Impatiens pallida	TOUCH-ME-NOT,PALE	FACW	ANF
Iodanthus pinnatifidus	PURPLE-ROCKET	FACW	PNF
Ipomoea coccinea	MORNING-GLORY,RED	FACU	AIV
Ipomoea hederacea	MORNING-GLORY,IVY-LEAF	FACU	AIV
Ipomoea hederifolia	MORNING-GLORY,IVY-LEAF	NI	AIV
Ipomoea lacunosa	MORNING-GLORY,SMALL-FLOWER WHITE	FACW	ANVF
Ipomoea littoralis	MORNING-GLORY,HAWAII	NI	PNV
Ipomoea pandurata	VINE,WILD SWEET-POTATO	FACU	PNF
Ipomoea purpurea	MORNING-GLORY,COMMON	UPL	AIV
Ipomoea quamoclit	CYPRESS-VINE	UPL*	AIV
Iresine rhizomatosa	BLOODLEAF,ROOTSTOCK	FACW-	PNF
Iris brevicaulis	IRIS,LAMANCE	OBL	PNF
Iris fulva	IRIS,COPPER	OBL	PNF
Iris hookeri	IRIS,BEACH-HEAD	FACU-	PNF
Iris lacustris	IRIS,DWARF LAKE	NI	PNF
Iris prismatica	IRIS,SLENDER BLUE	OBL	PIF
Iris pseudacorus	IRIS,YELLOW	OBL	PIEF
Iris setosa	IRIS,BEACH-HEAD	NI	PNF
Iris shrevei	BLUEFLAG,SOUTHERN	OBL	PNEF
Iris versicolor	BLUEFLAG	OBL	PNF
Iris virginica	BLUEFLAG,VIRGINIA	OBL	PNF
Isoetes butleri	QUILLWORT,BUTLER'S	[illegible]CW+	PNQ
Isoetes echinospora	QUILLWORT,SPINY-SPORE	[illegible]	PZQ
Isoetes engelmannii	QUILLWORT,APPALACHIAN	[illegible]	PNZQ
Isoetes macrospora	QUILLWORT,LAKE	[illegible]BL	PNZQ

Scientific Name	Common Name	Region 1	Habit
Isoetes melanopoda	QUILLWORT,BLACKFOOT	OBL	PNEQ
Isoetes riparia	QUILLWORT,SHORE	OBL	PNEQ
Isoetes tuckermanii	QUILLWORT,TUCKERMAN'S	OBL	Q
Isoetes virginica	QUILLWORT,VIRGINIA	OBL	Q
Isoetes x eatonii	QUILLWORT,EATON'S	OBL	Q
Isoetes x foveolata	QUILLWORT,PITTED	OBL	NQ
Isotria medeoloides	POGONIA,SMALL WHORLED	FACU	PNF
Isotria verticillata	POGONIA,LARGE WHORLED	FACU	PNF
Itea virginica	WILLOW,VIRGINIA	OBL	NS
Iva annua	SUMPWEED,ANNUAL	FAC	AIF
Iva frutescens	SUMPWEED,BIG-LEAF	FACW+	PNH$F
Iva imbricata	SUMPWEED,SEACOAST	FACU	PNH$F
Iva xanthifolia	SUMPWEED,COARSE	FAC	ANF
Jacquemontia tamnifolia	CLUSTER-VINE,HAIRY	FACU-	AIFV
Juglans cinerea	BUTTERNUT	FACU+	NT
Juglans nigra	WALNUT,BLACK	FACU	NT
Juncus abortivus	RUSH,PINEBARREN	OBL	PNGL
Juncus acuminatus	RUSH,TAPER-TIP	OBL	PNEGL
Juncus alpinus	RUSH,RICHARDSON'S	OBL	PNGL
Juncus arcticus	RUSH,ARCTIC	OBL	PNGL
Juncus articulatus	RUSH,JOINTED	OBL	PNGL
Juncus balticus	RUSH,BALTIC	FACW+	PNGL
Juncus biflorus	RUSH,TURNFLOWER	FACW	PNGL
Juncus brachycarpus	RUSH,WHITE-ROOT	FACW	PNGL
Juncus brachycephalus	RUSH,SMALL-HEAD	OBL	PNGL
Juncus brevicaudatus	RUSH,NARROW-PANICLE	OBL	PNGL
Juncus bufonius	RUSH,TOAD	FACW	ANGL
Juncus caesariensis	RUSH,NEW JERSEY	OBL	PNGL
Juncus canadensis	RUSH,CANADA	OBL	PNGL
Juncus coriaceus	RUSH,LEATHERY	FACW+	PNGL
Juncus debilis	RUSH,WEAK	OBL	APNGL
Juncus dichotomus	RUSH,FORKED	FACW	PNGL
Juncus diffusissimus	RUSH,SLIM-POD	FACW	PNGL
Juncus effusus	RUSH,SOFT	FACW+	PNEGL
Juncus elliottii	RUSH,BOG	FACW+	PNGL
Juncus filiformis	RUSH,THREAD	FACW	PNGL
Juncus filipendulus	RUSH,PLAIN'S	NI	PNEGL
Juncus gerardii	RUSH,SALTMEADOW	FACW+	PNGL
Juncus greenei	RUSH,GREENE'S	FAC	PNGL
Juncus griscomii	RUSH,GRISCOM'S	OBL	PNGL
Juncus gymnocarpus	RUSH,FEW-FLOWER	OBL	PNGL
Juncus inflexus	RUSH,EUROPEAN MEADOW	FACW	PIGL
Juncus interior	RUSH,INLAND	FACU	PNGL
Juncus longii	RUSH,LONG'S	OBL	PNGL
Juncus longistylis	RUSH,LONG-STYLE	NI	PNGL
Juncus marginatus	RUSH,GRASS-LEAF	FACW	PNGL
Juncus megacephalus	RUSH,BIG-HEAD	OBL	PNGL
Juncus militaris	RUSH,BAYONET	OBL	PNGL
Juncus nodatus	RUSH,STOUT	NI	PNGL
Juncus nodosus	RUSH,KNOTTED	OBL	PNGL
Juncus pelocarpus	RUSH,BROWN-FRUIT	OBL	PNGL
Juncus pervetus	RUSH,CAPE COD	OBL	PNGL
Juncus platyphyllus	RUSH,FLAT-LEAF	FAC	PNGL
Juncus polycephalus	RUSH,MANY-HEAD	OBL	PNGL
Juncus repens	RUSH,CREEPING	OBL	PNGL
Juncus roemeranus	RUSH,NEEDLEGRASS	OBL	PNGL
Juncus scirpoides	RUSH,NEEDLE-POD	FACW	PNGL
Juncus secundus	RUSH,SECUND	FACU	PNGL
Juncus stygius	RUSH,MOOR	OBL	PNGL
Juncus subcaudatus	RUSH,WOODS	OBL	PNGL
Juncus subtilis	RUSH,CREEPING	OBL	PNGL
Juncus tenuis	RUSH,SLENDER	FAC-	PNGL
Juncus torreyi	RUSH,TORREY'S	FACW	PNGL
[illegible]	[illegible] HEAD	FACW	PNGL

Scientific Name	Common Name	Region 1	Habit
Juncus vaseyi	RUSH,VASEY'S	FACW	PNGL
Juncus x oronensis	RUSH,MAINE	FACW	PNGL
Juniperus horizontalis	JUNIPER,CREEPING	FACU	NS
Juniperus virginiana	CEDAR,EASTERN RED	FACU	NT
Justicia americana	WATER-WILLOW,COMMON	OBL	PNF
Justicia mortuifluminis	WATER-WILLOW,DEAD	OBL	PNF
Justicia ovata	WATER-WILLOW,LODSE-FLOWER	OBL	PNF
Kalmia angustifolia	SHEEP-LAUREL	FAC	NS
Kalmia carolina	KALMIA,CAROLINA	FAC	NS
Kalmia latifolia	LAUREL,MOUNTAIN	FACU	NST
Kalmia polifolia	LAUREL,PALE	OBL	NS
Kickxia elatine	FLUELLIN,SHARP-POINT	FAC	AIF
Kobresia sibirica	KOBRESIA,SIBERIAN	NI	PNGL
Kochia scoparia	SUMMER-CYPRESS,MEXICAN	UPL	AIF
Kosteletzkya althaeifolia	MALLOW,ALTHEA SEASHORE	OBL	PNF
Kosteletzkya virginica	MALLOW,VIRGINIA SEASHORE	OBL	PNEF
Krigia biflora	DWARF-DANDELION,TWO-FLOWER	FACU	PNF
Krigia cespitosa	DWARF-DANDELION,COMMON	FAC	ANF
Krigia dandelion	DWARF-DANDELION,POTATO	FAC	PNF
Krigia virginica	DWARF-DANDELION,VIRGINIA	UPL	ANF
Lachnanthes caroliniana	REDROOT,CAROLINA	OBL	PNF
Lachnocaulon anceps	BOGBUTTON,WHITE-HEAD	OBL	PNZEF
Lactuca biennis	LETTUCE,BIENNIAL	FACU	ABNF
Lactuca canadensis	LETTUCE,TALL YELLOW	FACU-	ABNF
Lactuca floridana	LETTUCE,WOODLAND	FACU-	ABNF
Lactuca ludoviciana	LETTUCE,BIENNIAL	NI	BPNF
Lactuca pulchella	LETTUCE,CHICORY	FAC	PNF
Lactuca saligna	LETTUCE,WILLOW-LEAF	UPL	ABIF
Lactuca serriola	LETTUCE,PRICKLY	FAC-	ABIF
Lactuca x graminifolia	LETTUCE,GRASS-LEAF	UPL	BPNF
Laportea canadensis	WOOD-NETTLE,CANADA	FACW	PNF
Larix decidua	LARCH,EUROPEAN	NI	IT
Larix laricina	LARCH,AMERICAN	FACW	NT
Lathyrus japonicus	PEAVINE,BEACH	FACU-	PNF
Lathyrus palustris	PEAVINE,VETCHLING	FACW+	PNF
Lathyrus pratensis	PEAVINE,MEADOW	FACU	PIF
Lathyrus pusillus	PEAVINE,LOW	FAC	ANFV
Lathyrus venosus	PEAVINE,SMOOTH VEINY	FACW	PNF
Leavenworthia aurea	GLADECRESS,GOLDEN	NI	ANF
Leavenworthia torulosa	GLADECRESS,NECKLACE	OBL	ANF
Leavenworthia uniflora	GLADECRESS,MICHAUX'S	FAC	ANF
Ledum groenlandicum	LABRADOR-TEA,GREENLAND	OBL	NS
Leersia hexandra	CUTGRASS,CLUB-HEAD	OBL	PNG
Leersia lenticularis	CUTGRASS,CATCHFLY	OBL	PNG
Leersia oryzoides	CUTGRASS,RICE	OBL	PNG
Leersia virginica	WHITEGRASS	FACW	PNG
Leiophyllum buxifolium	SAND-MYRTLE	FACU-	NS
Lemna minima	DUCKWEED,LEAST	OBL	PN/F
Lemna minor	DUCKWEED,LESSER	OBL	PN/F
Lemna perpusilla	DUCKWEED,MINUTE	OBL	PN/F
Lemna trinervis	DUCKWEED	NI	PN/F
Lemna trisulca	DUCKWEED,STAR	OBL	PN/F
Lemna valdiviana	DUCKWEED,PALE	OBL	PN/F
Leontodon leysseri	HAWKBIT,HAIRY	FACU	PIF
Lepidium densiflorum	PEPPER-GRASS,DENSE-FLOWER	FAC	ABNF
Lepidium latifolium	PEPPER-GRASS,BROAD-LEAF	FACU	AIF
Lepidium perfoliatum	PEPPER-GRASS,CLASPING	UPL	AIF
Lepidium virginicum	PEPPER-GRASS,POOR-MAN'S	FACU-	ABNF
Leptochloa fascicularis	SPRANGLE-TOP,BEARDED	FACW	ANG
Leptochloa filiformis	SPRANGLE-TOP,RED	FACW	ANG
Leptochloa panicoides	SPRANGLE-TOP,AMAZON	NI	AIG
Leptochloa uninervia	SPRANGLE-TOP,MEXICAN	FACW-	ANG
Lespedeza angustifolia	BUSHCLOVER,NARROW-LEAF	FAC	PNF
Lespedeza capitata	BUSHCLOVER,ROUND-HEAD	FACU-	PNF

Scientific Name	Common Name	Region 1	Habit
Lespedeza cuneata	BUSHCLOVER,CHINESE	NI	PIFH
Lespedeza stipulacea	LESPEDEZA,KOREAN	FACU	AIF
Lespedeza striata	CLOVER,JAPANESE	FACU	AIF
Leucospora multifida	PALESEED,NARROW-LEAF	OBL	ANF
Leucothoe axillaris	DOG-HOBBLE,COASTAL	FACW+	NS
Leucothoe racemosa	FETTER-BUSH	FACW	NS
Leucothoe recurva	DOG-HOBBLE,RED-TWIG	FACU	NS
Liatris pycnostachya	GAYFEATHER,CATTAIL	FACU	PNF
Liatris spicata	GAYFEATHER,SPIKED	FAC+	PNF
Liatris x nieuwlandii	STAR,BLAZING	UPL	PNF
Ligusticum canadense	LOVAGE,NONDO	FAC	PNF
Ligusticum scothicum	LOVAGE,SCOTCH	FAC	PNF
Ligustrum sinense	PRIVET,CHINESE	FACU	IS
Ligustrum vulgare	PRIVET,EUROPEAN	FACU	IS
Lilaeopsis attenuata	LILAEOPSIS,CAROLINA	OBL	PNEF
Lilaeopsis chinensis	LILAEOPSIS,EASTERN	OBL	PNEF
Lilium canadense	LILY,CANADA	FAC+	PNF
Lilium catesbaei	LILY,SOUTHERN RED	FACW	PNF
Lilium grayi	LILY,GRAY'S	FACU	PNF
Lilium michauxii	LILY,CAROLINA	FAC	PNF
Lilium philadelphicum	LILY,WOOD	FACU+	PNF
Lilium superbum	LILY,TURK'S-CAP	FACW+	PF
Limnobium spongia	FROGBIT,AMERICAN	OBL	PN/F
Limonium carolinianum	SEA-LAVENDER,CAROLINA	OBL	PNF
Limonium nashii	SEA-LAVENDER,NORTHERN	OBL	PNF
Limosella aquatica	MUDWORT,NORTHERN	OBL	APNEF
Limosella subulata	MUDWORT,SOUTHERN	OBL	ANF
Lindera benzoin	SPICEBUSH,NORTHERN	FACW-	NST
Lindernia anagallidea	FALSE-PIMPERNEL	OBL	ANF
Lindernia dubia	FALSE-PIMPERNEL,YELLOW-SEED	OBL	ANF
Lindernia grandiflora	FALSE-PIMPERNEL,SAVANNAH	NI	ANF
Lindernia procumbens	FALSE-PIMPERNEL,EUROPEAN	FACW	PNF
Linnaea borealis	TWINFLOWER	FAC	PNHF
Linum floridanum	FLAX,FLORIDA YELLOW	FAC	PNF
Linum medium	FLAX,STIFF YELLOW	FACU	PNF
Linum striatum	FLAX,RIDGED YELLOW	FACW	PNF
Linum virginianum	FLAX,VIRGINIA	FACU	PNF
Liparis liliifolia	TWAYBLADE,LARGE	FACU-	PNF
Liparis loeselii	ORCHID,FEN	FACW	PNF
Lipocarpha maculata	LIPOCARPHA,AMERICAN	OBL	ANGL
Liquidambar styraciflua	GUM,SWEET	FAC	NT
Liriodendron tulipifera	TREE,TULIP	FACU	NT
Listera auriculata	TWAYBLADE,AURICLED	FACW	PNF
Listera australis	TWAYBLADE,SOUTHERN	FACW	PNF
Listera convallarioides	TWAYBLADE,BROAD-LEAF	FACW	PNF
Listera cordata	TWAYBLADE,HEART-LEAF	FACW+	PNF
Listera smallii	TWAYBLADE,KIDNEY-LEAF	FACW	PNF
Litsea aestivalis	PONDSPICE	OBL	NS
Littorella uniflora	SHOREWEED,EUROPEAN	OBL	PNF
Lobelia amoena	LOBELIA,SOUTHERN	OBL	PNF
Lobelia boykinii	LOBELIA,BOYKIN'S	OBL	PNF
Lobelia canbyi	LOBELIA,CANBY'S	OBL	PNF
Lobelia cardinalis	FLOWER,CARDINAL	FACW+	PNF
Lobelia dortmanna	LOBELIA,WATER	OBL	PNEF
Lobelia elongata	LOBELIA,ELONGATED	OBL	PNF
Lobelia georgiana	LOBELIA,GEORGIA	FACW	PNF
Lobelia glandulosa	LOBELIA,GLANDULAR	OBL	PNF
Lobelia inflata	INDIAN-TOBACCO	FACU	ANF
Lobelia kalmii	LOBELIA,BROOK	OBL	PNF
Lobelia nuttallii	LOBELIA,NUTTALL'S	FACW	PNF
Lobelia puberula	LOBELIA,DOWNY	FACW-	PNF
Lobelia siphilitica	LOBELIA,GREAT BLUE	FACW+	PNF
Lobelia spicata	LOBELIA,PALE-SPIKE	FAC-	PNF
Lolium perenne	RYEGRASS,PERENNIAL	FACU	PIG

Scientific Name	Common Name	Region 1	Habit
Lomatogonium rotatum	FELWORT,MARSH	OBL	ABNF
Lonicera caerulea	HONEYSUCKLE,SWEET-BERRY	FACW+	NS
Lonicera canadensis	FLY-HONEY-SUCKLE,AMERICAN	FACU	NS
Lonicera dioica	HONEYSUCKLE,MOUNTAIN	FACU	NWV
Lonicera hirsuta	HONEYSUCKLE,HAIRY	FAC	NWV
Lonicera japonica	HONEYSUCKLE,JAPANESE	FAC-	NSWV
Lonicera morrowii	HONEYSUCKLE,MORROW'S	NI	IS
Lonicera oblongifolia	FLY-HONEY-SUCKLE,SWAMP	OBL	NS
Lonicera sempervirens	HONEYSUCKLE,TRUMPET	FACU	PNSWV
Lonicera tatarica	HONEYSUCKLE,TARTARIAN	FACU*	IS
Lonicera x bella	HONEYSUCKLE	FACU-	IS
Lophiola americana	GOLDEN-CREST	OBL	PNF
Lotus corniculatus	TREFOIL,BIRDS-FOOT	FACU-	PIF
Ludwigia alata	SEEDBOX,WINGED	OBL	PNEF
Ludwigia alternifolia	SEEDBOX,BUSHY	FACW+	PNEF
Ludwigia brevipes	SEEDBOX,LONG BEACH	OBL	PNEF
Ludwigia decurrens	WILLOW,PRIMROSE	OBL	NEF
Ludwigia glandulosa	SEEDBOX,CYLINDRIC-FRUIT	OBL	PNEF
Ludwigia hirtella	SEEDBOX,HAIRY	OBL	PNEF
Ludwigia leptocarpa	SEEDBOX,RIVER	OBL	PNEF
Ludwigia linearis	SEEDBOX,NARROW-LEAF	OBL	PNEF
Ludwigia palustris	SEEDBOX,MARSH	OBL	PNEF
Ludwigia peploides	SEEDBOX,FLOATING	OBL	PNE/F
Ludwigia pilosa	SEEDBOX,HAIRY	OBL	PNEF
Ludwigia polycarpa	SEEDBOX,MANY-FRUIT	OBL	PNEF
Ludwigia sphaerocarpa	SEEDBOX,GLOBE-FRUIT	OBL	PNEF
Ludwigia uraguayensis	SEEDBOX,URAGUAY	OBL	PN/F
Ludwigia virgata	SEEDBOX,SAVANNA	OBL	PNEF
Ludwigia x lacustris	SEEDBOX	OBL	NF
Lupinus polyphyllus	LUPINE,LARGE-LEAVED	NI	PNF
Luzula acuminata	WOODRUSH,HAIRY	FAC	PNGL
Luzula bulbosa	WOODRUSH,SOUTHERN	FACU	PNGL
Luzula confusa	WOODRUSH,NORTHERN	NI	PNGL
Luzula echinata	WOODRUSH,HEDGEHOG	FACU	PNGL
Luzula multiflora	WOODRUSH,COMMON	FACU	PNGL
Luzula parviflora	WOODRUSH,SMALL-FLOWER	FACU*	PIGL
Luzula spicata	WOODRUSH,SPIKED	UPL*	PNGL
Lychnis flos-cuculi	RAGGED-ROBIN	FACU	PIF
Lycopodium alopecuroides	CLUBMOSS,FOX-TAIL	FACW+	PNC
Lycopodium annotinum	CLUBMOSS,STIFF	FAC	PNC
Lycopodium appressum	CLUBMOSS,SOUTHERN BOG	FACW+	PNC
Lycopodium carolinianum	CLUBMOSS,SLENDER	FACW+	PNC
Lycopodium clavatum	PINE,RUNNING	FAC	PNC
Lycopodium complanatum	CLUBMOSS,TRAILING	FACU-	PNC
Lycopodium dendroideum	CLUBMOSS,TREE-LIKE	FACU	C
Lycopodium inundatum	CLUBMOSS,NORTHERN BOG	OBL	ANC
Lycopodium lucidulum	CLUBMOSS,SHINING	FACW-	PNC
Lycopodium obscurum	CLUBMOSS,TREE	FACU	PNC
Lycopodium porophilum	CLUBMOSS,ROCK	FACU-	PNC
Lycopodium prostratum	CLUBMOSS,FEATHER-STEM	NI	C
Lycopodium selago	CLUBMOSS,FIR	FAC	PNC
Lycopodium x chapmanii	CLUBMOSS,INTERMEDIATE	NI	PNC
Lycopodium x copelandii	CLUBMOSS	NI	NC
Lycopus americanus	BUGLEWEED,AMERICAN	OBL	PNF
Lycopus amplectens	BUGLEWEED,SESSILE-LEAF	OBL	PNF
Lycopus asper	BUGLEWEED,ROUGH	OBL	PNEF
Lycopus europaeus	BUGLEWEED,EUROPEAN	OBL	PIF
Lycopus rubellus	BUGLEWEED,TAPER-LEAF	OBL	PNEF
Lycopus uniflorus	BUGLEWEED,NORTHERN	OBL	PNF
Lycopus virginicus	BUGLEWEED,VIRGINIA	[illegible]	PNF
Lygodium palmatum	FERN,AMERICAN CLIMBING	[illegible]	PNF3
Lyonia ligustrina	MALEBERRY	[illegible]	NS
Lyonia lucida	FETTER-BUSH	[illegible]V	NS
Lyonia mariana	STAGGER-BUSH,PIEDMONT	FAC-	NS

Scientific Name	Common Name	Region 1	Habit
Lysimachia ciliata	LOOSESTRIFE,FRINGED	FACW	PNF
Lysimachia fraseri	LOOSESTRIFE,FRASER'S	NI	PNF
Lysimachia hybrida	LOOSESTRIFE,LOWLAND	OBL	PNF
Lysimachia lanceolata	LOOSESTRIFE,LANCE-LEAF	FAC	PNF
Lysimachia nummularia	JENNIE,CREEPING	OBL	PIF
Lysimachia punctata	LOOSESTRIFE,SPOTTED	OBL	PIF
Lysimachia quadriflora	LOOSESTRIFE,FOUR-FLOWER	FACW+	PNF
Lysimachia quadrifolia	LOOSESTRIFE,WHORLED	FACU-	PNF
Lysimachia radicans	LOOSESTRIFE,TRAILING	OBL	PNF
Lysimachia terrestris	LOOSESTRIFE,SWAMP	OBL	PNF
Lysimachia thyrsiflora	LOOSESTRIFE,TUFTED	OBL	PIF
Lysimachia vulgaris	LOOSESTRIFE,GOLDEN	FAC+	PIF
Lysimachia x producta	LOOSESTRIFE	FAC*	PNF
Lythrum alatum	LOOSESTRIFE,WINGED	FACW+	PNH
Lythrum hyssopifolia	LOOSESTRIFE,HYSSOP	OBL	AIF
Lythrum lineare	LOOSESTRIFE,SALTMARSH	OBL	PNF
Lythrum salicaria	LOOSESTRIFE,PURPLE	FACW+	PIF
Maclura pomifera	OSAGE-ORANGE	UPL	NT
Madia glomerata	TARWEED,MOUNTAIN	NI	ANF
Magnolia fraseri	MAGNOLIA,FRASER'S	FACU	NT
Magnolia grandiflora	MAGNOLIA,LARGE-FLOWER	FACU	NT
Magnolia tripetala	MAGNOLIA,UMBRELLA	FACU	NT
Magnolia virginiana	MAGNOLIA,SWEETBAY	FACW+	NT
Maianthemum canadense	WILD-LILY-OF-THE-VALLEY	FAC-	PNF
Malaxis monophyllos	ADDER'S-MOUTH,WHITE	FACW	PNF
Malaxis spicata	ADDER'S-MOUTH,FLORIDA	FACW*	PNF
Malaxis unifolia	ADDER'S-MOUTH,GREEN	FAC	PNF
Marrubium vulgare	HOREHOUND,COMMON	UPL	PIF
Marshallia graminifolia	BARBARA'S-BUTTONS,GRASS-LEAF	NI	PNF
Marshallia grandiflora	BARBARA'S-BUTTONS,LARGE-FLOWER	FAC	PNF
Marshallia trinervia	MARSHALLIA,BROAD-LEAF	FACU-	PNF
Marsilea quadrifolia	FERN,EUROPEAN WATER	OBL	PIEP3
Matelea suberosa	MILKVINE,ANGULAR-FRUIT	FACW	PNV
Matricaria maritima	MAYWEED,FALSE	UPL	AIF
Matricaria matricarioides	PINEAPPLE-WEED	FACU	ANF
Matricaria perforata	MAYWEED,SCENTLESS	UPL	N
Matteuccia struthiopteris	FERN,OSTRICH	FACW	PNF3
Mayaca aubletii	BOG-MOSS,AUBLET'S	OBL	PNZEF
Mazus japonicus	MAZUS,JAPANESE	FACU-	AIF
Mecardonia acuminata	MECARDONIA,PURPLE	OBL	PNF
Medicago lupulina	MEDIC,BLACK	UPL	AIF
Megalodonta beckii	WATER-MARIGOLD,BECK'S	OBL	PNZF
Melampyrum lineare	COW-WHEAT,AMERICAN	FACU	AIF
Melanthera nivea	SQUARESTEM,SNOW	NI	PNF
Melanthium latifolium	BUNCHFLOWER,SLENDER	FACU	PNF
Melanthium virginicum	BUNCHFLOWER,VIRGINIA	FACW+	PNF
Melilotus alba	SWEETCLOVER,WHITE	FACU-	ABIF
Melilotus indica	SWEETCLOVER,INDIAN	FACU	AIF
Melilotus officinalis	SWEETCLOVER,YELLOW	FACU-	ABIF
Melochia corchorifolia	CHOCOLATE-WEED	NI	IEH
Melothria pendula	CUCUMBER,CREEPING	FAC	PNV
Menispermum canadense	MOONSEED,CANADA	NI	NWV
Mentha aquatica	MINT,WATER	OBL	PIF
Mentha arvensis	MINT,FIELD	FACW	PNF
Mentha cardiaca	MINT,SMALL-LEAF	FACW	PIF
Mentha citrata	MINT,BERGAMOT	FACW+	PIF
Mentha longifolia	MINT,HORSE	FACU	PIF
Mentha pulegium	PENNY-ROYAL	NI	PIF
Mentha rotundifolia	MINT,APPLE	FACW	PIF
Mentha spicata	SPEARMINT	FACW+	PIF
Mentha x piperita	PEPPERMINT	FACW+	PIEF
Menyanthes trifoliata	BUCKBEAN	OBL	PNEF
Menziesia pilosa	MINNIEBUSH	FAC-	NS
[illegible] NOXAU		NI	PNF

Scientific Name	Common Name	Region 1	Habit
Mertensia maritima	OYSTERLEAF	FACW	PNF
Mertensia virginica	BLUEBELLS,VIRGINIA	FACW	PNF
Micranthemum umbrosum	MUDFLOWER,SHADE	OBL	PIF
Mikania scandens	HEMPWEED,CLIMBING	FACW+	PNV
Mimulus alatus	MONKEY-FLOWER,SHARP-WING	OBL	PNF
Mimulus guttatus	MONKEY-FLOWER,COMMON LARGE	OBL	ANF
Mimulus moschatus	MUSKFLOWER	OBL	PNF
Mimulus ringens	MONKEY-FLOWER,ALLEGHANY	OBL	PNF
Minuartia glabra	STITCHWORT,APPALACHIAN	UPL	PNF
Minuartia patula	STITCHWORT,PITCHER'S	UPL	ANF
Minuartia rubella	STITCHWORT,BOREAL	UPL	APNF
Mirabilis nyctaginea	FOUR-O'CLOCK,HEART-LEAF	FACU-	PNF
Miscanthus sinensis	GRASS,CHINESE SILVER	FACU	PIG
Mitchella repens	PARTRIDGE-BERRY	FACU	PNF
Mitella diphylla	BISHOP'S-CAP,TWO-LEAF	FACU	PNF
Mitella nuda	BISHOP'S-CAP,NAKED	FACW-	PNF
Modiola caroliniana	BRISTLE-MALLOW,CAROLINA	FACU	BPN
Moehringia lateriflora	SANDWORT,GROVE	FAC	PNF
Mollugo verticillata	CARPET-WEED,GREEN	FAC	ANF
Monarda didyma	BEEBALM,OSWEGO TEA	FAC+	PNF
Monarda fistulosa	BERGAMOT,WILD	UPL	PNF
Monarda punctata	BEEBALM,SPOTTED	UPL	ABPNF
Monolepis nuttalliana	POVERTY-WEED,NUTTALL'S	NI	ANF
Monotropa uniflora	INDIAN-PIPE	FACU-	PN-$F
Montia chamissoi	MINER'S-LETTUCE,CHAMISSO'S	NI	PNEF
Montia fontana	MINER'S-LETTUCE,FOUNTAIN	OBL	ANEF
Montia lamprosperma	BLINKS	FACW+	ANF
Morus alba	MULBERRY,WHITE	UPL	IT
Morus rubra	MULBERRY,RED	FACU	NT
Mosla dianthera	FACU	AIF	
Muhlenbergia asperifolia	MUHLY,ALKALI	FACW	PNG
Muhlenbergia capillaris	MUHLY,LONG-AWN	FACU-	PNG
Muhlenbergia expansa	MUHLY,CUT-OVER	FACW	PNG
Muhlenbergia frondosa	MUHLY,WIRE-STEM	FAC	PNG
Muhlenbergia glomerata	MUHLY,MARSH	FACW	PNG
Muhlenbergia mexicana	MUHLY,MEXICAN	FACW	PNG
Muhlenbergia racemosa	MUHLY,GREEN	FAC	PNG
Muhlenbergia richardsonis	MUHLY,MAT	FAC	PNG
Muhlenbergia schreberi	NIMBLE-WILL	FAC	PNG
Muhlenbergia sylvatica	MUHLY,FOREST	FAC+	PNG
Muhlenbergia torreyana	MUHLY,NEW JERSEY	FACW+	PNG
Muhlenbergia uniflora	MUHLY,BOG	OBL	PNG
Murdannia keisak	DEWFLOWER,MARSH	OBL	I
Myosotis arvensis	FORGET-ME-NOT,FIELD	UPL	AIF
Myosotis discolor	FORGET-ME-NOT,YELLOW AND BLUE	UPL	PNF
Myosotis laxa	FORGET-ME-NOT,BAY	OBL	PNF
Myosotis macrosperma	FORGET-ME-NOT,LARGE-SEED	FAC	ANF
Myosotis scorpioides	FORGET-ME-NOT,TRUE	OBL	PIF
Myosotis sylvatica	FORGET-ME-NOT,WOODLAND	UPL	PIF
Myosotis verna	FORGET-ME-NOT,SPRING	FAC-	AIF
Myosoton aquaticum	CHICKWEED,GIANT	FACW	PIF
Myosurus minimus	MOUSE-TAIL,TINY	FACW+	ANF
Myrica cerifera	BAYBERRY,SOUTHERN	FAC	NST
Myrica gale	SWEETGALE	OBL	NS
Myrica heterophylla	BAYBERRY,EVERGREEN	FAC	NS
Myrica pensylvanica	BAYBERRY,NORTHERN	FAC	NS
Myrica pusilla	BAYBERRY,DWARF	FACU	NS
Myriophyllum alterniflorum	WATER-MILFOIL,ALTERNATE-FLOWER	OBL	PZF
Myriophyllum brasiliense	PARROT-FEATHER	OBL	PNZF
Myriophyllum farwellii	WATER-MILFOIL,FARWELL'S	OBL	PNZF
Myriophyllum heterophylium	WATER-MILFOIL,TWO-LEAF	OBL	PNZF
Myriophyllum hippuroides	WATER-MILFOIL,WESTERN	OBL	PNZF
Myriophyllum humile	WATER-MILFOIL,LOW	OBL	PNZF
Myriophyllum pinnatum	WATER-MILFOIL,CUT-LEAF	OBL	PNE:

Scientific Name	Common Name	Region 1	Habit
Myriophyllum spicatum	WATER-MILFOIL,EURASIAN	OBL	PNZF
Myriophyllum tenellum	WATER-MILFOIL,SLENDER	OBL	PNZF
Myriophyllum verticillatum	WATER-MILFOIL,WHORLED	OBL	PNZF
Najas flexilis	NAIAD,SLENDER	OBL	ANZF
Najas gracillima	NAIAD,THREAD-LIKE	OBL	ANZF
Najas guadalupensis	NAIAD,SOUTHERN	OBL	ANZF
Najas marina	NAIAD,SPINY	OBL	ANZF
Najas minor	NAIAD,BRITTLE	OBL	AIZF
Napaea dioica	MALLOW,GLADE	FACW	PNF
Narthecium americanum	ASPHODEL,YELLOW	FACW+	PNF
Nasturtium microphyllum	WATER-CRESS,ONE-ROW	OBL	PIZEF
Nasturtium officinale	WATER-CRESS,TRUE	OBL	PIZEF
Nelumbo lutea	LOTUS,AMERICAN	OBL	PNZ/F
Nelumbo nucifera	LOTUS,SACRED	OBL	PIZF
Nemopanthus mucronatus	CATBERRY	OBL	NS
Nemophila aphylla	BABY-BLUE-EYES,SMALL-FLOWER	FACW	ANF
Nepeta cataria	CATNIP	FACU	PIF
Nuphar luteum	COW-LILY,YELLOW	OBL	PNZF
Nymphaea alba	WATER-LILY,EUROPEAN WHITE	OBL	PIZ/F
Nymphaea odorata	WATER-LILY,WHITE	OBL	PNZ/F
Nymphaea tetragona	WATER-LILY,PYGMY	OBL	PNZF
Nymphaea tuberosa	WATER-LILY,WHITE	OBL	PNZF
Nymphoides aquatica	FLOATING-HEART,BIG	OBL	PNZ/F
Nymphoides cordata	FLOATING-HEART,LITTLE	OBL	PNZ/F
Nymphoides peltata	FLOATING-HEART,YELLOW	OBL	PIZ/F
Nyssa aquatica	WATER-TUPELO	OBL	NT
Nyssa sylvatica	TUPELO,SWAMP	FACW+	NT
Nyssa sylvatica	GUM,BLACK	FAC	NT
Oenanthe aquatica	DROPWORT,MARSH	OBL	PIZF
Oenothera biennis	EVENING-PRIMROSE,COMMON	FACU-	BIF
Oenothera elata	EVENING-PRIMROSE,HOOKER'S	NI	BPNF
Oenothera fruticosa	SUNDROPS,NARROW-LEAF	FAC	PNF
Oenothera laciniata	EVENING-PRIMROSE,CUT-LEAF	FACU-	ANF
Oenothera parviflora	EVENING-PRIMROSE,NORTHERN	FACU-	BIF
Oenothera perennis	EVENING-PRIMROSE,SMALL	FAC-	PNF
Oenothera pilosella	EVENING-PRIMROSE,MEADOW	FAC	PNF
Oenothera rhombipetala	EVENING-PRIMROSE,FOUR-POINT	FACU	ABNF
Oenothera villosa	EVENING-PRIMROSE,HAIRY	FAC	BPNF
Oldenlandia boscii	BLUET,BDSC'S	FACW	PNF
Oldenlandia uniflora	BLUET,CLUSTERED	FACW	AIF
Onoclea sensibilis	FERN,SENSITIVE	FACW	PNEF3
Ophioglossum engelmannii	ADDER'S-TONGUE,LIMESTONE	FACU	PNF3
Ophioglossum vulgatum	ADDER'S-TONGUE,NORTHERN	FACW	PNF3
Opuntia stricta	PRICKLY-PEAR,ERECT	UPL	N$S
Ornithogalum umbellatum	STAR-OF-BETHLEHEM,COMMON	FACU	PIF
Orobanche uniflora	BROOMRAPE,ONE-FLOWER	FACU	AN-F
Orontium aquaticum	CLUB,GOLDEN	OBL	PNZF
Oryza sativa	RICE,CULTIVATED	OBL	AIG
Osmanthus americanus	DEVIL-WOOD	FAC	NT
Osmorhiza claytonii	SWEETCICELY,HAIRY	FACU-	PNF
Osmorhiza longistylis	SWEETCICELY,SMOOTHER	FACU	PNF
Osmunda cinnamomea	FERN,CINNAMON	FACW	PNEF3
Osmunda claytoniana	FERN,INTERRUPTED	FAC	PNF3
Osmunda regalis	FERN,ROYAL	OBL	PNF3
Osmunda x ruggii	FERN	NI	F3
Ostrya virginiana	HOP-HORNBEAM,EASTERN	FACU-	NT
Oxalis corniculata	WOODSORREL,CREEPING	FACU	PIF
Oxalis europaea	WOODSORREL,UPRIGHT YELLOW	UPL	PIF
Oxalis montana	WOODSORREL,WHITE	FAC-	PNF
Oxydendrum arboreum	SOURWOOD	NI	NT
Oxypolis canbyi	COWBANE,CANBY'S	OBL	PNF
Oxypolis filiformis	COWBANE,WATER	OBL	PNF
Oxypolis rigidior	COWBANE,STIFF	OBL	PNF
Oxypolis ternata	COWBANE,PIEDMONT	FACW	PNF
Oxyria digyna	MOUNTAIN-SORREL,ALPINE	FACW	PNF
Panicum amarum	GRASS,BITTER PANIC	FACU-	PNG
Panicum anceps	GRASS,BEAKED PANIC	FAC	PNG
Panicum capillare	WITCHGRASS	FAC-	ANG
Panicum dichotomiflorum	GRASS,FALL PANIC	FACW-	ANG
Panicum diffusum	GRASS,SPREADING PANIC	NI	PNG
Panicum flexile	WITCHGRASS,WIRY	FACU	ANG
Panicum gattingeri	GRASS,GATTINGER PANIC	FAC	ANG
Panicum hemitomon	MAIDEN-CANE	FACW+	PNEG
Panicum hirstii	GRASS,HIRST'S PANIC	OBL	G
Panicum longifolium	GRASS,PANIC	OBL	PNG
Panicum rigidulum	GRASS,RED-TOP PANIC	FACW+	PNG
Panicum tuckermanii	GRASS,TUCKERMAN PANIC	FAC-	ANG
Panicum verrucosum	GRASS,WARTY PANIC	FACW	ANG
Panicum virgatum	SWITCHGRASS	FAC	PNG
Parapholis incurva	GRASS,SICKLE	OBL	AIG
Parietaria floridana	PELLITORY,FLORIDA	NI	ANF
Parietaria pensylvanica	PELLITORY,PENNSYLVANIA	FACU-	ANF
Parnassia asarifolia	GRASS-OF-PARNASSUS,KIDNEY-LEAF	OBL	PNF
Parnassia glauca	GRASS-OF-PARNASSUS,WAXY	OBL	PNF
Parnassia grandifolia	GRASS-OF-PARNASSUS,LARGE-FLOWER	OBL	PNF
Parnassia palustris	GRASS-OF-PARNASSUS,NORTHERN	NI	PNF
Parthenocissus quinquefolia	CREEPER,VIRGINIA	FACU	NWV
Parthenocissus vitacea	CREEPER,THICKET	FACU	NWV
Paspalum bifidum	PASPALUM,PITCHFORK	FACW	PNG
Paspalum boscianum	PASPALUM,BULL	FACW	ANG
Paspalum dilatatum	DALLISGRASS	FAC+	PIG
Paspalum dissectum	PASPALUM,MUDBANK	OBL	PNG
Paspalum distichum	PASPALUM,JOINT	FACW+	PNEG
Paspalum floridanum	PASPALUM,FLORIDA	FACW	PNG
Paspalum fluitans	PASPALUM,WATER	OBL	AN/EG
Paspalum laeve	PASPALUM,FIELD	FAC+	PNG
Paspalum notatum	GRASS,BAHIA	FACU+	PIG
Paspalum orbiculare	PASPALUM,INDIA	NI	PIG
Paspalum praecox	PASPALUM,EARLY	FACW+	PNG
Paspalum pubiflorum	PASPALUM,HAIRY-SEED	FAC	PNG
Paspalum repens	PASPALUM,WATER	OBL	G
Paspalum setaceum	PASPALUM,THIN	FACU+	PNG
Paspalum urvillei	GRASS,VASEY	FAC	PIG
Paspalum vaginatum	PASPALUM,SEASHORE	NI	PNG
Passiflora edulis	PASSION-FLOWER,PURPLE	UPL	NWV
Paulownia tomentosa	PAULOWNIA,ROYAL	UPL	IT
Pedicularis canadensis	LOUSEWORT,EARLY WOOD	FACU	PNF
Pedicularis furbishiae	LOUSEWORT,FURBISH	FACW+	PNF
Pedicularis lanceolata	LOUSEWORT,SWAMP	FACW	PNF
Peltandra luteospadix	ARUM,GREEN ARROW	OBL	PNEF
Peltandra virginica	ARUM,ARROW	OBL	PNEF
Penstemon alluviorum	BEARDTONGUE,LOWLAND	FACW	PNF
Penstemon calycosus	BEARDTONGUE,LONG-SEPAL	UPL	PNF
Penstemon digitalis	BEARDTONGUE,FOXGLOVE	FAC	PNF
Penstemon laevigatus	BEARDTONGUE,SMOOTH	FACU	PNF
Penstemon pallidus	BEARDTONGUE,PALE	FACU	PNF
Penthorum sedoides	DITCH-STONECROP	OBL	PNF
Perilla frutescens	PLANT,BEEF-STEAK	FACU+	AIF
Persea borbonia	BAY,RED	FACW	NT
Petasites frigidus	COLTSFOOT,ARCTIC SWEET	FACW	PNF
Petasites palmatus	COLTSFOOT,SWEET	FACW	PNF
Petunia parviflora	PETUNIA,SEASIDE	FACW	ANF
Phacelia ranunculacea	SCORPION-WEED,BLUE	FACW	ANF
Phacelia viscida	SCORPION-WEED,STICKY	NI	ANF
Phalaris arundinacea	GRASS,REED CANARY	FACW+	PNG
Phalaris canariensis	GRASS,COMMON CANARY	[illegible]	AIG
Phalaris caroliniana	GRASS,CAROLINA CANARY	[illegible]	ANG
Phleum alpinum	TIMOTHY,ALPINE	FACW	PNG

Scientific Name	Common Name	Region 1	Habit
Phleum pratense	TIMOTHY	FACU	PIG
Phlox carolina	PHLOX,THICK-LEAF	FACU	PNF
Phlox divaricata	PHLOX,WOODLAND	FACU	PNF
Phlox glaberrima	PHLOX,SMOOTH	FAC	PNF
Phlox maculata	PHLOX,MEADOW	FACW	PNF
Phlox paniculata	PHLOX,FALL	FACU	PNF
Phlox pilosa	PHLOX,DOWNY	FACU	PNF
Phragmites australis	REED,COMMON	FACW	PNEG
Phryma leptostachya	LOPSEED,AMERICAN	UPL	PNF
Phyla lanceolata	FROG-FRUIT,LANCE-LEAF	OBL	PNF
Phyla nodiflora	FROG-FRUIT,COMMON	FACW	PNF
Phyllanthus caroliniensis	LEAF-FLOWER,CAROLINA	FAC+	ANF
Physalis angulata	GROUND-CHERRY,CUT-LEAF	FAC	ANF
Physalis ixocarpa	TOMATO,MEXICAN HUSK	UPL	AIF
Physalis pubescens	GROUND-CHERRY,LOW HAIRY	FACU-	ANF
Physocarpus opulifolius	NINEBARK,EASTERN	FACW-	NS
Physostegia intermedia	DRAGON-HEAD,SLENDER	FACW-	PNF
Physostegia leptophylla	DRAGON-HEAD,SLENDER-LEAF	OBL	PNF
Physostegia purpurea	DRAGON-HEAD,PURPLE	FACW	PNF
Physostegia virginiana	DRAGON-HEAD,FALSE	FAC+	PNF
Phytolacca americana	POKEWEED,COMMON	FACU+	PNF
Picea glauca	SPRUCE,WHITE	FACU	NT
Picea mariana	SPRUCE,BLACK	FACW-	NT
Picea rubens	SPRUCE,RED	FACU	NT
Picris echioides	OXTONGUE,BRISTLY	UPL*	AIF
Pilea fontana	CLEARWEED,SPRINGS	FACW+	ANF
Pilea pumila	CLEARWEED,CANADA	FACW	ANF
Pinguicula vulgaris	BUTTERWORT,COMMON	OBL	PNF
Pinus banksiana	PINE,JACK	FACU	NT
Pinus elliottii	PINE,SLASH	NI	NT
Pinus palustris	PINE,LONG-LEAF	FAC	NT
Pinus resinosa	PINE,RED	FACU	NT
Pinus rigida	PINE,PITCH	FACU	NT
Pinus serotina	PINE,POND	OBL	NT
Pinus strobus	PINE,EASTERN WHITE	FACU	NT
Pinus taeda	PINE,LOBLOLLY	FAC-	NT
Pistia stratiotes	WATER-LETTUCE	NI	PN/F
Planera aquatica	PLANER-TREE	OBL	NET
Plantago cordata	PLANTAIN,HEART-LEAF	OBL	PNF
Plantago coronopus	PLANTAIN,CUT-LEAF	NI	AIF
Plantago eriopoda	PLANTAIN,SALINE	FAC	PNF
Plantago heterophylla	PLANTAIN,SLENDER	FAC+	ANF
Plantago lanceolata	PLANTAIN,ENGLISH	UPL	ABPIF
Plantago major	PLANTAIN,COMMON	FACU	PIF
Plantago maritima	PLANTAIN,SEASIDE	FACW	PF
Plantago patagonica	PLANTAIN,WOOLLY	UPL	ANF
Plantago pusilla	PLANTAIN,DWARF	UPL	ANF
Plantago rhodosperma	PLANTAIN,RED-SEED	NI	ANF
Plantago rugelii	PLANTAIN,BLACK-SEED	FACU	PNF
Plantago virginica	PLANTAIN,PALE-SEED	UPL	ANF
Platanthera blephariglottis	ORCHID,WHITE FRINGE	OBL	PNF
Platanthera ciliaris	ORCHID,YELLOW-FRINGE	FACW	PNF
Platanthera cristata	ORCHID,YELLOW-CREST	FACW+	PNF
Platanthera dilatata	ORCHID,LEAFY WHITE	FACW	PNF
Platanthera flava	ORCHID,PALE GREEN	FACW	PNF
Platanthera grandiflora	ORCHID,LARGE PURPLE-FRINGE	FACW	PNF
Platanthera hookeri	ORCHID,HOOKER'S	FAC	PNF
Platanthera hyperborea	ORCHID,NORTHERN GREEN	FACW	PNF
Platanthera integra	ORCHID,YELLOW FRINGELESS	OBL	PNF
Platanthera integrilabia	ORCHID,WHITE FRINGELESS	OBL	PNF
Platanthera lacera	ORCHID,GREEN-FRINGE	FACW	PNF
Platanthera leucophaea	ORCHID,PRAIRIE WHITE-FRINGE	FACW+	PNF
	ORCHID,SNOW	FACW	PNF
		FACW	PNF

Scientific Name	Common Name	Region 1	Habit
Platanthera orbiculata	ORCHID,LARGE ROUND-LEAF	FAC	PNF
Platanthera peramoena	ORCHID,PURPLE FRINGELESS	FACW	PNF
Platanthera psychodes	ORCHID,SMALL PURPLE-FRINGE	FACW	PNF
Platanthera x andrewsii	REINORCHID,ANDREW'S	OBL	PNF
Platanthera x chapmanii	BOGORCHID	NI	PNF
Platanthera x clavellata	ORCHID,SMALL GREEN WOODLAND	FACW+	PNF
Platanus occidentalis	SYCAMORE,AMERICAN	FACW-	NT
Pluchea camphorata	CAMPHOR-WEED,SALT MARSH	FACW	APIF
Pluchea foetida	CAMPHOR-WEED,STINKING	OBL	PNF
Pluchea purpurascens	CAMPHOR-WEED,SALTMARSH	OBL	AIEF
Poa alpigena	BLUEGRASS,LOW	FACW-	PNG
Poa alpina	BLUEGRASS,ALPINE	FACU	PNG
Poa alsodes	BLUEGRASS,GROVE	FACW-	PNG
Poa angustifolia	BLUEGRASS,BROAD-LEAF KENTUCKY	FACU-	PIG
Poa annua	BLUEGRASS,ANNUAL	FACU	AIG
Poa autumnalis	BLUEGRASS,AUTUMN	FAC	PNG
Poa chapmaniana	BLUEGRASS,CHAPMAN'S	UPL	ANG
Poa compressa	BLUEGRASS,CANADA	FACU	PIG
Poa nemoralis	BLUEGRASS,WOODS	FAC	PNG
Poa paludigena	BLUEGRASS,BOG	FACW+	PNG
Poa palustris	BLUEGRASS,FOWL	FACW	PNG
Poa pratensis	BLUEGRASS,KENTUCKY	FACU	PNG
Poa sylvestris	BLUEGRASS,WOODLAND	FACW	PNG
Poa trivialis	BLUEGRASS,ROUGH	FACW	PIG
Podophyllum peltatum	MAY-APPLE	FACU	PNF
Podostemum ceratophyllum	RIVERWEED,HORN-LEAF	OBL	PNZF
Pogonia ophioglossoides	PDGONIA,ROSE	OBL	PNEF
Polanisia dodecandra	CLAMMY-WEED,ROUGH-SEED	FACU	ANF
Polemonium acutiflorum	JACOB'S-LADDER,STICKY TALL	NI	PNF
Polemonium reptans	VALERIAN,GREEK	FACU	PNF
Polemonium van-bruntiae	JACOB'S-LADDER,BOG	FACW	PNF
Polygala brevifolia	MILKWORT,LITTLE-LEAF	OBL	ANF
Polygala cruciata	MILKWORT,CROSS-LEAF	FACW+	ANF
Polygala cymosa	MILKWORT,TALL PINEBARREN	OBL	BNF
Polygala incarnata	MILKWORT,PINK	UPL	ANF
Polygala lutea	MILKWORT,ORANGE	FACW+	BNF
Polygala mariana	MILKWORT,MARYLAND	FACW	ANF
Polygala nuttallii	MILKWORT,NUTTALL'S	FAC	ANF
Polygala paucifolia	GAY-WINGS	FACU	PNF
Polygala polygama	MILKWORT,RACEMED	UPL	BNF
Polygala ramosa	MILKWORT,LOW PINEBARREN	FACW+	ANF
Polygala sanguinea	MILKWORT,RED	FACU	ANF
Polygala senega	SNAKEROOT,SENECA	FACU	PNF
Polygala verticillata	MILKWORT,WHORLED	UPL	ANF
Polygonatum biflorum	SOLOMON'S-SEAL,SMALL	FACU	PNF
Polygonatum commutatum	SOLOMON'S-SEAL,GREAT	FACU	PNF
Polygonum achoreum	KNOTWEED,LEATHERY	FACU	ANF
Polygonum amphibium	SMARTWEED,WATER	OBL	PNE/
Polygonum argyrocoleon	KNOTWEED,SILVER-SHEATH	NI	AIF
Polygonum arifolium	TEARTHUMB,HALBERD-LEAF	OBL	ANEI
Polygonum aviculare	KNOTWEED,PROSTRATE	FACU	APIF
Polygonum bistorta	BISTORT,MEADOW	FACW	PIF
Polygonum careyi	SMARTWEED,CAREY'S	FACW	ANF
Polygonum cespitosum	KNOTWEED,CESPITOSE	FACU-	AIF
Polygonum convolvulus	BINDWEED,BLACK	FACU	AIVF
Polygonum cuspidatum	KNOTWEED,JAPANESE	FACU-	PIF
Polygonum densiflorum	SMARTWEED,DENSE-FLOWER	OBL	PNE
Polygonum douglasii	KNOTWEED,DOUGLAS'	UPL	ANF
Polygonum erectum	KNOTWEED,ERECT	FACU	ANF
Polygonum glaucum	KNOTWEED,SEABEACH	FACU	ANI
Polygonum hydropiper	SMARTWEED,MARSHPEPPER	OBL	AIE
Polygonum hydropiperoides	SMARTWEED,SWAMP	OBL	PNI
Polygonum lapathifolium	WILLOW-WEED	FACW+	AN
Polygonum minimum	KNOTWEED,BROAD-LEAF	NI	AN

Scientific Name	Common Name	Region 1	Habit
Polygonum opelousanum	PEPPER,LITTLE WATER	OBL	PNF
Polygonum orientale	FEATHER,PRINCE'S	FACU-	AIF
Polygonum patulum	SMARTWEED,BELLARD'S	NI	ANEF
Polygonum pensylvanicum	SMARTWEED,PENNSYLVANIA	FACW	ANEF
Polygonum perfoliatum	TEARTHUMB,ASIATIC	FAC*	AIF
Polygonum persicaria	THUMB,LADY'S	FACW	AIF
Polygonum polystachyum	KNOTWEED,CULTIVATED	NI	PIF
Polygonum punctatum	SMARTWEED,DOTTED	OBL	PNEF
Polygonum ramosissimum	KNOTWEED,BUSHY	FAC	ANF
Polygonum robustius	SMARTWEED,STOUT	OBL	PNF
Polygonum sachalinense	KNOTWEED,GIANT	UPL*	PIF
Polygonum sagittatum	TEARTHUMB,ARROW-LEAF	OBL	APNF
Polygonum scandens	FALSE-BUCKWHEAT,CLIMBING	FAC	PNV
Polygonum setaceum	SMARTWEED,SWAMP	OBL	PNEF
Polygonum virginianum	KNOTWEED,VIRGINIA	FAC	APNF
Polygonum viviparum	KNOTWEED,VIVIPAROUS	FAC	PNF
Polypogon monspeliensis	GRASS,ANNUAL RABBIT-FOOT	FACW+	AIG
Polypremum procumbens	JUNIPER-LEAF	UPL	APNF
Polystichum acrostichoides	FERN,CHRISTMAS	FACU-	PNF3
Polystichum lonchitis	FERN,NORTHERN HOLLY	NI	PNF3
Pontederia cordata	WEED,PICKEREL	OBL	PNEF
Ponthieva racemosa	SHADOW-WITCH	OBL	PNF
Populus balsamifera	POPLAR,BALSAM	FACW	NT
Populus deltoides	COTTON-WOOD,EASTERN	FAC	NT
Populus grandidentata	ASPEN,BIG-TOOTH	FACU-	NT
Populus heterophylla	COTTON-WOOD,SWAMP	FACW+	NT
Populus tremula	ASPEN,QUAKING	FACU	IT
Portulaca oleracea	PURSLANE,COMMON	FAC	AN$F
Portulaca pilosa	PURSLANE,PINK	NI	AI$F
Potamogeton alpinus	PONDWEED,ALPINE	OBL	PN/F
Potamogeton amplifolius	PONDWEED,LARGE-LEAF	OBL	PN/F
Potamogeton bicupulatus	PONDWEED,SNAIL-SEED	OBL	PN/F
Potamogeton confervoides	PONDWEED,TUCKERMAN'S	OBL	PNZF
Potamogeton crispus	PONDWEED,CURLY	OBL	PIZF
Potamogeton diversifolius	PONDWEED,WATER-THREAD	OBL	PN/F
Potamogeton epihydrus	PONDWEED,RIBBON-LEAF	OBL	PN/F
Potamogeton filiformis	PONDWEED,FINE-LEAF	OBL	PNZF
Potamogeton foliosus	PONDWEED,LEAFY	OBL	PNZF
Potamogeton friesii	PONDWEED,FRIES'S	OBL	PNZF
Potamogeton gramineus	PONDWEED,GRASSY	OBL	PNZF
Potamogeton hillii	PONDWEED,HILL'S	OBL	PNZF
Potamogeton illinoensis	PONDWEED,ILLINOIS	OBL	PN/F
Potamogeton lateralis	PONDWEED,OPPOSITE-LEAF	OBL	PN/F
Potamogeton natans	PONDWEED,FLOATING-LEAF	OBL	PN/F
Potamogeton nodosus	PONDWEED,LONG-LEAF	OBL	PN/F
Potamogeton oakesianus	PONDWEED,OAKE'S	OBL	PN/F
Potamogeton obtusifolius	PONDWEED,BLUNT-LEAF	OBL	PNZF
Potamogeton pectinatus	PONDWEED,SAGO	OBL	PNZF
Potamogeton perfoliatus	PONDWEED,CLASPING-LEAF	OBL	PNZF
Potamogeton praelongus	PONDWEED,WHITE-STEM	OBL	PNZF
Potamogeton pulcher	PONDWEED,SPOTTED	OBL	PN/F
Potamogeton pusillus	PONDWEED,SMALL	OBL	PNZF
Potamogeton richardsonii	PONDWEED,RICHARDSON	OBL	PNZF
Potamogeton robbinsii	PONDWEED,ROBBIN'S	OBL	PNZF
Potamogeton spirillus	PONDWEED,SPIRAL	OBL	PN/F
Potamogeton strictifolius	PONDWEED,NARROW-LEAF	OBL	PNZF
Potamogeton tennesseensis	PONDWEED,TENNESSEE	OBL	PN/F
Potamogeton vaginatus	PONDWEED,SHEATHED	OBL	PNZF
Potamogeton vaseyi	PONDWEED,VASEY'S	OBL	PN/F
Potamogeton x faxonii	PONDWEED,FAXON'S	OBL	PNZF
Potamogeton x hagstroemii	PONDWEED	NI	PNZF
Potamogeton x lo[illegible]latus	PONDWEED,LONG-TONGUE	OBL	PNZF
Potamogeton x [illegible]	PONDWEED,MYSTIC POND	OBL	PNZF
Potamogeton x [illegible]s	PONDWEED	NI	PNZF

Scientific Name	Common Name	Region 1	Habit
Potamogeton x spathuliformis	PONDWEED	OBL	PNZF
Potamogeton zosteriformis	PONDWEED,FLAT-STEM	OBL	PNZF
Potentilla anserina	SILVERWEED	OBL	PNF
Potentilla argentea	CINQUEFOIL,SILVER	UPL	PIF
Potentilla arguta	CINQUEFOIL,TALL	UPL	PNF
Potentilla fruticosa	CINQUEFOIL,SHRUBBY	FACW	NS
Potentilla millegrana	CINQUEFOIL,DIFFUSE	OBL	ABNF
Potentilla norvegica	CINQUEFOIL,NORWEGIAN	FACU	ABPNF
Potentilla palustris	CINQUEFOIL,MARSH	OBL	PNF
Potentilla paradoxa	CINQUEFOIL,BUSHY	OBL	ABPNF
Potentilla rivalis	CINQUEFOIL,BROOK	NI	ANF
Potentilla simplex	CINQUEFOIL,OLD FIELD	FACU-	PNF
Prenanthes alba	RATTLESNAKE-ROOT,WHITE	FACU	PNF
Prenanthes altissima	RATTLESNAKE-ROOT,TALL	FACU-	PNF
Prenanthes aspera	RATTLESNAKE-ROOT,ROUGH	UPL	PNF
Prenanthes autumnalis	RATTLESNAKE-ROOT,SLENDER	FAC	PNF
Prenanthes crepidinea	RATTLESNAKE-ROOT,NODDING	FACU	PNF
Prenanthes racemosa	RATTLESNAKE-ROOT,GLAUCOUS	FACW-	PNF
Primula laurentiana	PRIMROSE,BIRDSEYE	FAC	PNF
Primula mistassinica	PRIMROSE,MISTASSINI	FACW	PNF
Prionopsis ciliata	GOLDEN-WEED,FALSE	NI	ANF
Proboscidea louisianica	UNICORN-PLANT,LOUISIANA	FACU	ANF
Proserpinaca palustris	MERMAID-WEED,MARSH	OBL	PNEZF
Proserpinaca pectinata	MERMAID-WEED,COMB-LEAF	OBL	PNZF
Proserpinaca x intermedia	MERMAID-WEED,INTERMEDIATE	OBL	PNZF
Prunella vulgaris	HEAL-ALL	FACU+	PIF
Prunus alleghaniensis	PLUM,ALLEGHENY	UPL	NT
Prunus americana	PLUM,AMERICAN	FACU-	NST
Prunus nigra	PLUM,CANADA	UPL	NT
Prunus pensylvanica	CHERRY,FIRE	FACU-	NST
Prunus serotina	CHERRY,BLACK	FACU	NT
Prunus virginiana	CHERRY,CHOKE	FACU	NST
Psilocarya nitens	BALDRUSH,SHORT-BEAK	OBL	APNEGL
Psilocarya scirpoides	BALDRUSH,LONG-BEAK	OBL	ANGL
Psilotum nudum	FERN,WHISK	NI	PNF3
Psoralea psoralioides	SCURFPEA,FALSE	FACU-	PNF
Ptelea trifoliata	WAFER-ASH	FAC	NST
Pteridium aquilinum	FERN,BRACKEN	FACU	PNF3
Ptilimnium capillaceum	BISHOP-WEED,HAIR-LIKE MOCK	OBL	ANEF
Ptilimnium costatum	BISHOP-WEED,RIBBED MOCK	NI	ANEF
Ptilimnium fluviatile	BISHOP-WEED,RIVER MOCK	OBL	ANF
Ptilimnium nuttallii	BISHOP-WEED,NUTTALL'S MOCK	FACW	ANF
Puccinellia airoides	GRASS,NUTTALL ALKALI	OBL	PNG
Puccinellia distans	GRASS,WEEPING ALKALI	OBL	PIG
Puccinellia fasciculata	GRASS,SALTMARSH ALKALI	OBL	PNG
Puccinellia fernaldii	GRASS,FERNALD ALKALI	OBL	PNEG
Puccinellia langeana	GRASS,SWARK ALKALI	FACW+	PNEG
Puccinellia maritima	GRASS,SEASIDE ALKALI	OBL	PIEG
Puccinellia nuttalliana	GRASS,NUTTALL'S ALKALI	FAC	PNG
Puccinellia pallida	GRASS,PALE MANNA	OBL	PNG
Puccinellia pumila	GRASS,DWARF ALKALI	FACW	PNG
Pycnanthemum albescens	MOUNTAIN-MINT,WHITE-LEAF	UPL	PNF
Pycnanthemum flexuosum	MOUNTAIN-MINT,NARROW-LEAF	FACW	PNF
Pycnanthemum muticum	MOUNTAIN-MINT,BLUNT	FACW	PNF
Pycnanthemum setosum	MOUNTAIN-MINT,AWNED	FACU	N
Pycnanthemum tenuifolium	MOUNTAIN-MINT,SLENDER	FACW	PNF
Pycnanthemum verticillatum	MOUNTAIN-MINT,WHORLED	FAC	N
Pycnanthemum virginianum	MOUNTAIN-MINT,VIRGINIA	FAC	PNF
Pyrola asarifolia	WINTERGREEN,PINK	FACW	PNF
Pyrola chlorantha	WINTERGREEN,GREENISH-FLOWER	UPL	PNF
Pyrola minor	WINTERGREEN,LESSER	[illegible]	PNF
Pyrola rotundifolia	WINTERGREEN,ROUND-LEAF	[illegible]	PNF
Pyrola secunda	WINTERGREEN,ONE-SIDED	[illegible]	PNF
Pyrola uliginosa	WINTERGREEN,BOG	FACW	PNF

Scientific Name	Common Name	Region 1	Habit
Pyrola uniflora	WINTERGREEN,ONE-FLOWERED	FAC	PNF
Pyrularia pubera	BUFFALO-NUT	UPL	N+S
Pyxidanthera barbulata	PYXIE-MOSS,FLOWERING	FACU-	PNF
Quercus alba	OAK,WHITE	FACU-	NT
Quercus bicolor	OAK,SWAMP WHITE	FACW+	NT
Quercus falcata	OAK,CHERRY-BARK	FACW	NT
Quercus falcata	OAK,SOUTHERN RED	FACU-	NT
Quercus imbricaria	OAK,SHINGLE	FAC	NT
Quercus laurifolia	OAK,LAUREL	FACW-	NT
Quercus lyrata	OAK,OVERCUP	OBL	NT
Quercus macrocarpa	OAK,BUR	FAC-	NTS
Quercus michauxii	OAK,SWAMP CHESTNUT	FACW	NT
Quercus muhlenbergii	OAK,CHINKAPIN	NI	NT
Quercus nigra	OAK,WATER	FAC	NT
Quercus palustris	OAK,PIN	FACW	NT
Quercus phellos	OAK,WILLOW	FAC+	NT
Quercus prinoides	OAK,DWARF CHINKAPIN	NI	NS
Quercus prinus	OAK,CHESTNUT	UPL	NT
Quercus rubra	OAK,NORTHERN RED	FACU-	NT
Quercus shumardii	OAK,SHUMARD	FAC+	NT
Quercus stellata	OAK,POST	UPL	NT
Quercus virginiana	OAK,LIVE	FACU	NT
Quercus x beadlei	OAK,BEADLE	NI	NT
Ranunculus abortivus	BUTTER-CUP,SUBALPINE	FACW-	BPNF
Ranunculus acris	BUTTER-CUP,TALL	FAC+	PIF
Ranunculus alleghenlensis	BUTTER-CUP,ALLEGHENY MOUNTAIN	FAC	PNF
Ranunculus ambigens	SPEARWORT,WATER-PLANTAIN	OBL	PNEF
Ranunculus aquatilis	BUTTER-CUP,WHITE WATER	OBL	PNZF
Ranunculus arvensis	BUTTER-CUP,CORN	NI	AIF
Ranunculus bulbosus	BUTTER-CUP,BULBOUS	UPL*	PIF
Ranunculus carolinianus	BUTTER-CUP,CAROLINA	FACW	PNEF
Ranunculus cymbalaria	BUTTER-CUP,SEASIDE	OBL	PNEF
Ranunculus fascicularis	BUTTER-CUP,EARLY	FACU	PNF
Ranunculus flabellaris	BUTTER-CUP,YELLOW WATER	OBL	PNEF
Ranunculus flammula	BUTTER-CUP,SPEARWORT	FACW	PNEF
Ranunculus gmelinii	BUTTER-CUP,SMALL YELLOW WATER	FACW	PNEF
Ranunculus hederaceus	BUTTER-CUP,IVY	OBL	PNZF
Ranunculus hispidus	BUTTER-CUP,BRISTLY	FAC	PNF
Ranunculus lapponicus	BUTTER-CUP,LAPLAND	OBL	PNF
Ranunculus laxicaulis	BUTTER-CUP,MISSISSIPPI	OBL	APNEF
Ranunculus longirostris	BUTTER-CUP,LONG-BEAK WATER	OBL	PNZ/F
Ranunculus macounii	BUTTER-CUP,MACOUN'S	OBL	PNF
Ranunculus micranthus	BUTTER-CUP,ROCK	FACU	PNF
Ranunculus parviflorus	BUTTER-CUP,SMALL-FLOWER	FAC	AIF
Ranunculus pensylvanicus	BUTTER-CUP,PENNSYLVANIA	OBL	APNEF
Ranunculus pusillus	SPEARWORT,LOW	OBL	ANEF
Ranunculus recurvatus	BUTTER-CUP,HOOKED	FAC+	PNF
Ranunculus repens	BUTTER-CUP,CREEPING	FAC	PIF
Ranunculus sardous	BUTTER-CUP,HAIRY	UPL	APIF
Ranunculus sceleratus	BUTTER-CUP,CELERY-LEAF	OBL	APNEF
Ranunculus septentrionalis	BUTTER-CUP,NORTHERN SWAMP	OBL	PNF
Ranunculus subrigidus	BUTTER-CUP,POND	OBL	PNZ/F
Ranunculus trichophyllus	WATER-CROWFOOT,WHITE	OBL	PN/F
Rhamnus alnifolia	BUCKTHORN,ALDER-LEAF	OBL	NS
Rhamnus caroliniana	BUCKTHORN,CAROLINA	FAC	NST
Rhamnus cathartica	BUCKTHORN,COMMON	UPL	IT
Rhamnus frangula	BUCKTHORN,GLOSSY	FAC	IS
Rhamnus lanceolata	BUCKTHORN,LANCE-LEAF	NI	NS
Rhexia aristosa	MEADOW-BEAUTY,AWN-PETAL	OBL	PNF
[illegible]	MEADOW-BEAUTY,MARYLAND	OBL	PNF
	MEADOW-BEAUTY,NASH'S	OBL	PNF
			PNF

Scientific Name	Common Name	Region 1	Habit
Rhododendron arborescens	AZALEA,SMOOTH	FAC	NS
Rhododendron atlanticum	AZALEA,DWARF	FAC	NS
Rhododendron canadense	RHODORA	FACW	NS
Rhododendron canescens	AZALEA,HOARY	FACW	NS
Rhododendron lapponicum	AZALEA,LAPLAND	UPL	NS
Rhododendron maximum	RHODODENDRON,ROSEBAY	FAC	NT
Rhododendron periclymenoides	AZALEA,PINK	FAC	NS
Rhododendron prinophyllum	AZALEA,EARLY	FAC	NS
Rhododendron serrulatum	AZALEA,HAMMOCK SWEET	FACW+	NS
Rhododendron viscosum	AZALEA,SWAMP	OBL	NS
Rhus copallinum	SUMAC,WINGED	NI	NST
Rhynchospora alba	BEAKRUSH,WHITE	OBL	PNGL
Rhynchospora caduca	BEAKRUSH,FALLING	OBL	PNGL
Rhynchospora capillacea	BEAKRUSH,NEEDLE	OBL	PNGL
Rhynchospora capitellata	BEAKRUSH,BROWNISH	OBL	PNGL
Rhynchospora cephalantha	BEAKRUSH,CLUSTERED	OBL	PNGL
Rhynchospora chalarocephala	BEAKRUSH,LOOSE-HEAD	OBL	GL
Rhynchospora corniculata	BEAKRUSH,SHORT-BRISTLE	OBL	PNEGL
Rhynchospora distans	BEAKRUSH,BROWN	OBL	APNGL
Rhynchospora fascicularis	BEAKRUSH,FASCICULATE	OBL	PNGL
Rhynchospora filifolia	BEAKRUSH,THREAD-LEAF	FAC	PNGL
Rhynchospora fusca	BEAKRUSH,BROWN	OBL	PNGL
Rhynchospora globularis	BEAKRUSH,GLOBE	FACW	PNGL
Rhynchospora glomerata	BEAKRUSH,CLUSTERED	OBL	PNGL
Rhynchospora gracilenta	BEAKRUSH,SLENDER	OBL	PNEGL
Rhynchospora grayi	BEAKRUSH,GRAY'S	FAC	PNGL
Rhynchospora harveyi	BEAKRUSH,HARVEY'S	FAC	PNGL
Rhynchospora inexpansa	BEAKRUSH,NODDING	FACW	PNGL
Rhynchospora inundata	BEAKRUSH,HORNED	OBL	PNGL
Rhynchospora knieskernii	BEAKRUSH,KNIESKERN'S	OBL	GL
Rhynchospora macrostachya	BEAKRUSH,TALL	OBL	PNEGL
Rhynchospora microcephala	BEAKRUSH,CAPITATE	FACW+	GL
Rhynchospora miliacea	BEAKRUSH,MILLET	OBL	PNEGL
Rhynchospora oligantha	BEAKRUSH,FEW-FLOWER	OBL	PNEGL
Rhynchospora pallida	BEAKRUSH,PALE	OBL	GL
Rhynchospora perplexa	BEAKRUSH,PINELAND	FACW+	PNGL
Rhynchospora rariflora	BEAKRUSH,FEW-FLOWER	OBL	PNGL
Rhynchospora smallii	BEAKRUSH,SMALL'S	OBL*	APNG
Rhynchospora torreyana	BEAKRUSH,TORREY'S	FACW+	PNGL
Rhynchospora wrightiana	BEAKRUSH,WRIGHT'S	OBL	APNG
Ribes americanum	CURRANT,WILD BLACK	FACW	NS
Ribes glandulosum	CURRANT,SKUNK	FACW	NS
Ribes hirtellum	GOOSEBERRY,HAIRY-STEM	FAC	NS
Ribes lacustre	CURRANT,PRICKLY	FACW	NS
Ribes odoratum	CURRANT,BUFFALO	FACU	NS
Ribes triste	CURRANT,SWAMP RED	OBL	IS
Ricinus communis	CASTOR-BEAN	UPL*	APIF
Robinia pseudoacacia	LOCUST,BLACK	FACU-	NT
Rorippa amphibia	YELLOW-CRESS,AMPHIBIOUS	FACW	PIEF
Rorippa austriaca	YELLOW-CRESS,AUSTRIAN	FAC-	PIEF
Rorippa palustris	YELLOW-CRESS,BOG	OBL	ANE
Rorippa prostrata	YELLOW-CRESS,PROSTRATE	FAC	PIE
Rorippa sessiliflora	YELLOW-CRESS,STALKLESS	OBL	ANF
Rorippa sinuata	YELLOW-CRESS,SPREADING	NI	PN
Rorippa sylvestris	YELLOW-CRESS,CREEPING	FACW	PIE
Rosa acicularis	ROSE,PRICKLY	FACU	NS
Rosa arkansana	ROSE,PRAIRIE	NI	NS
Rosa blanda	ROSE,SMOOTH	FACU	NS
Rosa bracteata	ROSE,MACARTNEY	NI	IM
Rosa carolina	ROSE,CAROLINA	UPL	N
Rosa micrantha	ROSE,SMALL-FLOWER	FACU	IS
Rosa multiflora	ROSE,MULTIFLORA	FACU	IS
Rosa nitida	ROSE,SHINING	FACW+	N
Rosa palustris	ROSE,SWAMP	OBL	N

Scientific Name	Common Name	Region 1	Habit
Rosa rugosa	ROSE,RUGOSA	FACU-	IS
Rosa setigera	ROSE,PRAIRIE	FACU	NWV
Rosa virginiana	ROSE,VIRGINIA	FAC	NS
Rotala ramosior	TOOTHCUP	OBL	ANF
Rubus acaulis	RASPBERRY,DWARF	NI	PNF
Rubus akermanii	BLACKBERRY,AKERMAN'S	FAC+	NS
Rubus allegheniensis	BLACKBERRY,ALLEGHENY	FACU-	NS
Rubus alumnus	BLACKBERRY,OLD FIELD	FACU-	NS
Rubus ambigens	DEWBERRY,SAVANNA	FACW	NS
Rubus amnicolus	BLACKBERRY,RIVERSIDE	FACU*	NS
Rubus arcticus	RASPBERRY,ARCTIC	NI	IS
Rubus argutus	BLACKBERRY,SERRATE-LEAF	FACU	NS
Rubus ascendens	BLACKBERRY,EDGE	FAC	NS
Rubus baileyanus	DEWBERRY,BAILEY'S	UPL	NS
Rubus chamaemorus	CLOUDBERRY	FACW	PNF
Rubus cuneifolius	BLACKBERRY,SAND	UPL	NS
Rubus discolor	BLACKBERRY,HIMALAYAN	NI	I
Rubus enslenii	DEWBERRY,ENSLEN'S	FACU	NS
Rubus flagellaris	DEWBERRY,NORTHERN	UPL	NS
Rubus floricomus	BLACKBERRY,MANY-FLOWER	FACU	NS
Rubus hispidoides	BLACKBERRY,BOG	FACW	NS
Rubus hispidus	BLACKBERRY,BRISTLY	FACW	NS
Rubus hypolasius	DEWBERRY,PINELAND	OBL*	NS
Rubus idaeus	RASPBERRY,COMMON RED	FAC-	IS
Rubus laciniatus	BLACKBERRY,CUT-LEAF	UPL*	IS
Rubus lawrencei	BLACKBERRY,LAWRENCE'S	OBL	NS
Rubus longii	BLACKBERRY,LONG'S	FAC	NS
Rubus louisianus	BLACKBERRY,LOUISIANA	FACU	NS
Rubus missouricus	BLACKBERRY,MISSOURI	NI	NS
Rubus multiformis	BLACKBERRY,VARIABLE	FAC	NS
Rubus paganus	DEWBERRY,ST. LAWRENCE	FAC	NS
Rubus probabilis	BLACKBERRY,TREE	FAC	NS
Rubus procerus	BLACKBERRY,HIMALAYA	UPL*	IS
Rubus pubescens	BLACKBERRY,DWARF	FACW	PNF
Rubus semisetosus	BLACKBERRY,NEW ENGLAND	FAC	NS
Rubus setosus	BLACKBERRY,SETOSE	FACW+	NS
Rubus strigosus	RASPBERRY,RED	NI	PNS
Rubus subtractus	BLACKBERRY,HIGHBUSH	NI	NS
Rubus suus	BLACKBERRY,BRANCHED	NI	NS
Rubus tardatus	BLACKBERRY,VERMONT	FAC	NS
Rubus trivialis	DEWBERRY,SOUTHERN	FACU	NS
Rubus uvidus	BLACKBERRY	NI	NS
Rubus vigil	DEWBERRY,WET-WOODS	FACW	NS
Rubus wheeleri	DEWBERRY	FACW	NS
Rubus x groutianus	BRISTLEBERRY	FAC	NS
Rudbeckia fulgida	CONEFLOWER,ORANGE	FAC	PNF
Rudbeckia hirta	SUSAN,BLACK-EYED	FACU-	BPNF
Rudbeckia laciniata	CONEFLOWER,CUT-LEAF	FACW	PNF
Rudbeckia subtomentosa	CONEFLOWER,SWEET	FAC	PNF
Rudbeckia triloba	SUSAN,BROWN-EYED	FACU	PNF
Ruellia humilis	WILD-PETUNIA,HAIRY	UPL	PNF
Ruellia strepens	WILD-PETUNIA,LIMESTONE	FAC	PNF
Rumex acetosa	SORREL,GARDEN	FACU	PIF
Rumex acetosella	SORREL,SHEEP	UPL	PIF
Rumex altissimus	DOCK,PALE	FACW-	PNF
Rumex britannica	DOCK,GREAT WATER	OBL	F
Rumex conglomeratus	DOCK,CLUSTERED	FAC	PIF
Rumex crispus	DOCK,CURLY	FACU	PIF
Rumex domesticus	DOCK,DOORYARD	FAC	PIF
Rumex fueginus	DOCK,SEA-SIDE	FACW	ABNF
Rumex hastatulus	SORREL,HEART-WING	FACU-	PNF
Rumex maritimus	DOCK,GOLDEN	FACW	ABNF
Rumex mexicanus	DOCK,MEXICAN	FAC	PNF
Rumex obtusifolius	DOCK,BITTER	FACU-	PIF

Scientific Name	Common Name	Region 1	Habit
Rumex occidentalis	DOCK,WESTERN	OBL	PNF
Rumex orbiculatus	DOCK,GREAT WATER	OBL	PNEF
Rumex pallidus	DOCK,SEABEACH	FACW	PNF
Rumex pulcher	DOCK,FIDDLE	FACW-	PIF
Rumex triangulivalvis	DOCK,TRIANGULAR-VALVE	FACU	PNF
Rumex verticillatus	DOCK,SWAMP	OBL	PNEF
Ruppia maritima	WIDGEON-GRASS	OBL	PNZF
Sabatia angularis	ROSE-GENTIAN,SQUARE-STEM	FAC+	ANF
Sabatia brachiata	ROSE-GENTIAN,NARROW-LEAF	FACU	BNF
Sabatia calycina	ROSE-GENTIAN,COAST	OBL	PNF
Sabatia campanulata	ROSE-GENTIAN,SLENDER	FACW	PNF
Sabatia campestris	ROSE-GENTIAN,PRAIRIE	FACU	ANF
Sabatia difformis	ROSE-GENTIAN,LANCE-LEAF	OBL	PNF
Sabatia dodecandra	ROSE-GENTIAN,LARGE	OBL	PNF
Sabatia kennedyana	ROSE-GENTIAN,PLYMOUTH	OBL	PNF
Sabatia quadrangula	ROSE-GENTIAN,FOUR-ANGLE	FAC	ANF
Sabatia stellaris	ROSE-GENTIAN,SALTMARSH	FACW+	ANF
Sacciolepis striata	CUPSCALE,AMERICAN	OBL	PNG
Sagina decumbens	PEARLWORT,TRAILING	FAC	ANF
Sagina nodosa	PEARLWORT,KNOTTED	FAC	PIF
Sagina procumbens	PEARLWORT,PROCUMBENT	FACW-	PIF
Sagittaria brevirostra	ARROW-HEAD,SHORT-BEAK	OBL	PNEF
Sagittaria calycina	ARROW-HEAD,HOODED	OBL	PNEF
Sagittaria cuneata	ARROW-HEAD,NORTHERN	OBL	PNEF
Sagittaria engelmanniana	ARROW-HEAD,ENGELMANN	OBL	PNEF
Sagittaria falcata	ARROW-HEAD,COASTAL	OBL	PNEF
Sagittaria graminea	ARROW-HEAD,GRASS-LEAF	OBL	PNEF
Sagittaria latifolia	ARROW-HEAD,BROAD-LEAF	OBL	PNEF
Sagittaria montevidensis	ARROW-HEAD,LONG-LOBED	OBL	PIEF
Sagittaria platyphylla	ARROW-HEAD,DELTA	OBL	PNEF
Sagittaria rigida	ARROW-HEAD,STIFF	OBL	PNEF
Sagittaria stagnorum	ARROW-HEAD,WATER	OBL	PNZ/F
Sagittaria subulata	ARROW-HEAD,AWL-LEAF	OBL	PNEF
Salicomia bigelovii	GLASSWORT,DWARF	OBL	ANE$F
Salicornia europaea	GLASSWORT,SLENDER	OBL	AIE$F
Salicornia perennis	GLASSWORT,WOODY	OBL	PNE$F
Salicomia rubra	SALTWORT,RED	NI	AN$F
Salicomia virginica	GLASSWORT,VIRGINIA	OBL	NE$H
Salix alba	WILLOW,WHITE	FACW	IT
Salix amygdaloides	WILLOW,PEACH-LEAF	FACW	NT
Salix arctophila	WILLOW,OVAL-LEAF	FACW	NS
Salix argyrocarpa	WILLOW,LABRADOR	FACU	NS
Salix babylonica	WILLOW,WEEPING	FACW-	IT
Salix bebbiana	WILLOW,BEBB	FACW	NS
Salix candida	WILLOW,HOARY	OBL	NS
Salix caroliniana	WILLOW,COASTAL-PLAIN	OBL	NT
Salix commutata	WILLOW,UNDER-GREEN	NI	NS
Salix cordata	WILLOW,HEART-LEAF	FACW	NS
Salix discolor	WILLOW,PUSSY	FACW	NS
Salix eriocephala	WILLOW,MISSOURI RIVER	FACW	NS
Salix exigua	WILLOW,SANDBAR	OBL	NS
Salix fragilis	WILLOW,CRACK	FAC+	IT
Salix humilis	WILLOW,TALL PRAIRIE	FACU	NS
Salix lucida	WILLOW,SHINING	FACW	NT
Salix lutea	WILLOW,YELLOW	NI	NS
Salix myricoides	WILLOW,BAYBERRY	FAC	NS
Salix nigra	WILLOW,BLACK	FACW+	NT
Salix pedicellaris	WILLOW,BOG	OBL	NS
Salix pellita	WILLOW,SATINY	FACW	NS
Salix petiolaris	WILLOW,MEADOW	OBL	NS
Salix planifolia	WILLOW,DIAMOND-LEAF	OBL	NS
Salix purpurea	WILLOW,PURPLE-OSIER		IS
Salix pyrifolia	WILLOW,BALSAM	FACW	NS
Salix rigida	WILLOW,HEART-LEAF	OBL	NS

Scientific Name	Common Name	Region 1	Habit
Salix sericea	WILLOW,SILKY	OBL	NS
Salix serissima	WILLOW,AUTUMN	OBL	NS
Salix viminalis	WILLOW,OSIER	FACW-	IT
Salix x subsericea	WILLOW	FACW	NS
Salsola kali	THISTLE,RUSSIAN	FACU	AIF
Salsola pestifer	THISTLE,RUSSIAN	FACU-	I
Salvia lyrata	SAGE,LYRE-LEAF	UPL	PNF
Salvinia auriculata	WATER-MOSS,EARED	NI	PNW
Sambucus canadensis	ELDER,AMERICAN	FACW-	NS
Sambucus racemosa	ELDER,EUROPEAN RED	FACU	NS
Samolus parviflorus	PIMPERNEL,WATER	OBL	PNF
Sanguinaria canadensis	BLOODROOT	NI	PNF
Sanguisorba canadensis	BURNET,CANADA	FACW+	PNF
Sanguisorba minor	BURNET,SMALL	FAC	PNF
Sanguisorba officinalis	BURNET,GREAT	FACW	PNF
Sanicula canadensis	BLACK-SNAKEROOT,CANADIAN	UPL*	BNF
Sanicula gregaria	BLACK-SNAKEROOT,CLUSTERED	FACU	PNF
Sanicula marilandica	BLACK-SNAKEROOT	NI	PNF
Saponaria officinalis	BOUNCING-BET	FACU-	PIF
Sarracenia flava	PITCHER-PLANT,YELLOW	OBL	PNF
Sarracenia purpurea	PITCHER-PLANT,NORTHERN	OBL	PNF
Sassafras albidum	SASSAFRAS	FACU-	NT
Satureja arkansana	SAVORY,LIMESTONE	FACU	PNF
Saururus cernuus	TAIL,LIZARD'S	OBL	PNEF
Saxifraga aizoides	SAXIFRAGE,YELLOW MOUNTAIN	FACW	PNF
Saxifraga aizoon	SAXIFRAGE,AIZOON	UPL	PNF
Saxifraga careyana	SAXIFRAGE,GOLDEN-EYE	FAC	PNF
Saxifraga caroliniana	SAXIFRAGE,CAROLINA	FACW	PNF
Saxifraga cernua	SAXIFRAGE,NODDING	NI	PNF
Saxifraga michauxil	SAXIFRAGE,MICHAUX'S	FACU	PNF
Saxifraga micranthidifolia	SAXIFRAGE,LETTUCE-LEAF	OBL	PNF
Saxifraga oppositifolia	SAXIFRAGE,TWIN-LEAF	FAC	PNF
Saxifraga pensylvanica	SAXIFRAGE,SWAMP	OBL	PNF
Saxifraga rivularis	SAXIFRAGE,ALPINE-BROOK	OBL	PNF
Saxifraga stellaris	SAXIFRAGE,STAR	NI	PNF
Saxifraga virginiensis	SAXIFRAGE,VIRGINIA	FAC-	PNF
Scheuchzeria palustris	POD-GRASS	OBL	PNEF
Schizachne purpurascens	MELIC,FALSE	FACU-	PNG
Schizachyrium scoparium	BLUESTEM,LITTLE	FACU-	PNG
Schizaea pusilla	FERN,CURLY-GRASS	OBL	PNF3
Schwalbea americana	CHAFFSEED	FACU	PNF
Scirpus acutus	BULRUSH,HARD-STEM	OBL	PNEGL
Scirpus americanus	BULRUSH,OLNEY'S	OBL	PNEGL
Scirpus ancistrochaetus	BULRUSH,BARBED-BRISTLE	OBL	PNEGL
Scirpus atrocinctus	BULRUSH,BLACK-GIRDLE	FACW+	PNEGL
Scirpus atrovirens	BULRUSH,GREEN	OBL	PNEGL
Scirpus cespitosus	BULRUSH,TUFTED	OBL	PNGL
Scirpus clintonii	BULRUSH,CLINTON'S	FACU	PNGL
Scirpus cylindricus	BULRUSH,NEW ENGLAND	OBL	PNEGL
Scirpus cyperinus	WOOL-GRASS	FACW+	PNEGL
Scirpus divaricatus	BULRUSH,SPREADING	OBL	PNEGL
Scirpus etuberculatus	BULRUSH,CANBY'S	OBL	PNZGL
Scirpus expansus	BULRUSH,WOODLAND	OBL	PNEGL
Scirpus flaccidifolius	BULRUSH,RECLINING	OBL	PNEGL
Scirpus fluviatilis	BULRUSH,RIVER	OBL	PNEGL
Scirpus georgianus	BULRUSH,DARK-GREEN	OBL	PNEGL
Scirpus hallii	BULRUSH,HALL'S	OBL	PNEGL
Scirpus hattorianus	BULRUSH	NI	PNEGL
Scirpus heterochaetus	BULRUSH,SLENDER	OBL	PNEGL
Scirpus koilolepis	BULRUSH,KEELED	NI	ANGL
	BULRUSH,LONG'S	OBL	PNEGL
	SALTMARSH	OBL	PNEGL
		OBL	PNGL

Scientific Name	Common Name	Region 1	Habit
Scirpus peckii	BULRUSH,PECK'S	OBL	PNGL
Scirpus pedicellatus	BULRUSH,STALKED	OBL	PNEGL
Scirpus pendulus	BULRUSH,DROOPING	OBL	PNEGL
Scirpus polyphyllus	BULRUSH,LEAFY	OBL	PNEGL
Scirpus pungens	BULRUSH,THREE-SQUARE	FACW+	PNEGL
Scirpus purshianus	BULRUSH,WEAK-STALK	OBL	ANEGL
Scirpus robustus	BULRUSH,ALKALI	OBL	PNEGL
Scirpus saximontanus	BULRUSH,ROCKY MOUNTAIN	OBL	PNEGL
Scirpus setaceus	BULRUSH,BRISTLE-LEAF	NI	PIGL
Scirpus smithii	BULRUSH,SMITH'S	OBL	ANEGL
Scirpus subterminalis	BULRUSH,SUBTERMINATE	OBL	PNZGL
Scirpus torreyi	BULRUSH,TORREY'S	OBL	PNEGL
Scirpus tuberosus	BULRUSH,TUBEROUS	NI	PIEGL
Scirpus validus	BULRUSH,SOFT-STEM	OBL	PNEGL
Scleranthus annuus	KNAWEL,ANNUAL	FACU-	AIF
Scleria ciliata	NUTRUSH,FRINGED	FAC	PNGL
Scleria flaccida	NUTRUSH	FACW	GL
Scleria minor	NUTRUSH,SLENDER	FACW	GL
Scleria nitida	NUTRUSH,SHINING	FACU-	GL
Scleria oligantha	NUTRUSH,LITTLE-HEAD	FACU+	PNGL
Scleria pauciflora	NUTRUSH,FEW-FLOWER	FACU+	PNGL
Scleria reticularis	NUTRUSH,NETTED	OBL	ANGL
Scleria setacea	NUTRUSH,TORREY'S	FAC+	PNGL
Scleria triglomerata	NUTRUSH,WHIP	FAC	PNGL
Scleria verticillata	NUTRUSH,LOW	OBL	ANGL
Sclerolepis uniflora	HARDSCALE,ONE-FLOWER	OBL	PNEF
Scrophularia lanceolata	FIGWORT,LANCE-LEAF	FACU+	PNF
Scrophularia marilandica	SQUARE,CARPENTER'S	FACU-	PNF
Scutellaria churchilliana	SKULLCAP	FACW	PNF
Scutellaria galericulata	SKULLCAP,HOODED	OBL	PNF
Scutellaria integrifolia	SKULLCAP,HYSSOP	FACW	PNF
Scutellaria lateriflora	SKULLCAP,BLUE	FACW+	PNF
Scutellaria nervosa	SKULLCAP,VEINED	FAC	PNF
Scutellaria ovata	SKULLCAP,EGG-LEAF	FACU	PNF
Scutellaria parvula	SKULLCAP,SMALL	UPL	PNF
Sedum pulchellum	STONECROP,ROCK	FACU	ABN$F
Sedum rosea	STONECROP,ROSEROOT	FACU-	PN$F
Selaginella apoda	SPIKE-MOSS,MEADOW	FACW	PNC
Selaginella selaginoides	SPIKE-MOSS,CLUB	FACW	PNC
Senecio anonymus	GROUNDSEL,SMALL'S	UPL	PNF
Senecio aureus	RAGWORT,GOLDEN	FACW	PNF
Senecio eremophilus	GROUNDSEL,DESERT	OBL	PNF
Senecio glabellus	GROUNDSEL,GRASS-LEAF	OBL	ANF
Senecio obovatus	GROUNDSEL,ROUND-LEAF	FACU-	PNF
Senecio pauperculus	GROUNDSEL,BALSAM	FAC	PNF
Senecio plattensis	GROUNDSEL,PRAIRIE	UPL	BPNF
Senecio pseudaureus	GROUNDSEL,GOLDEN	FAC*	PNF
Senecio schweinitzianus	GROUNDSEL,SCHWEINITZ'S	FACW	PNF
Senecio tomentosus	GROUNDSEL,WOOLLY	FACU	PNF
Senecio vulgaris	GROUNDSEL,COMMON	FACU	AIF
Sesbania exaltata	HEMP,SESBANIA	FAC	ANF
Sesbania vesicaria	RATTLE-BUSH,BAG-POD	NI	ANF
Sesuvium maritimum	SEA-PURSLANE,PUERTO RICO	FACW	AN$F
Sesuvium portulacastrum	SEA-PURSLANE	NI	PN$F
Setaria faberi	GRASS,JAPANESE BRISTLE	UPL	AIG
Setaria geniculata	GRASS,KNOTROOT BRISTLE	FAC	PNG
Setaria glauca	GRASS,YELLOW BRISTLE	FAC	AIG
Setaria italica	GRASS,FOX-TAIL BRISTLE	FACU	AIG
Setaria magna	GRASS,GIANT BRISTLE	FACW	ANE
Setaria verticillata	GRASS,BUR BRISTLE	FAC	AIG
Seymeria cassioides	BLACK-SENNA	FAC	ANF
Shepherdia canadensis	BUFFALO-BERRY,CANADA	NI	PNS
Shortia galacifolia	OCONEE-BELLS	NI	PNF
Sibara virginica	ROCKCRESS,VIRGINIA	UPL	ANF

Scientific Name	Common Name	Region 1	Habit
Sicyos angulatus	BUR-CUCUMBER,ONE-SEED	FACU	ANF
Sida hermaphrodita	MALLOW,VIRGINIA	FAC	PNF
Sida rhombifolia	SIDA,ARROW-LEAF	UPL	APIFH
Sida spinosa	MALLOW,PRICKLY	UPL*	ANF
Silene acaulis	CAMPION,MOSS	UPL	PNF
Silene nivea	CAMPION,SNOWY	FAC	PNF
Silphium perfoliatum	CUP-PLANT	FACU	PNF
Silphium terebinthinaceum	ROSIN-WEED,PRAIRIE	UPL*	PNF
Sisymbrium altissimum	MUSTARD,TALL TUMBLE	FACU-	ABIF
Sisyrinchium albidum	BLUE-EYE-GRASS,WHITE	UPL	PNF
Sisyrinchium angustifolium	BLUE-EYE-GRASS,POINTED	FACW-	PNF
Sisyrinchium arenicola	BLUE-EYE-GRASS,SANDPLAIN	FACU	PNF
Sisyrinchium atlanticum	BLUE-EYE-GRASS,EASTERN	FACW	PNF
Sisyrinchium capillare	BLUE-EYE-GRASS	FACW+	PNF
Sisyrinchium montanum	BLUE-EYE-GRASS,STRICT	FAC	PNF
Sisyrinchium mucronatum	BLUE-EYE-GRASS,MICHAUX'S	FAC+	PNF
Sium carsonii	WATER-PARSNIP,CARSON'S	OBL	PNZ/F
Sium floridanum	WATER-PARSNIP,FLORIDA	OBL	PNZ/F
Sium suave	WATER-PARSNIP,HEMLOCK	OBL	PNEF
Smilacina racemosa	FALSE-SOLOMON'S-SEAL,FEATHER	FACU-	PNF
Smilacina stellata	FALSE-SOLOMON'S-SEAL,STARRY	FACW	PNF
Smilacina trifolia	FALSE-SOLOMON'S-SEAL,THREE-LEAF	OBL	PNF
Smilax bona-nox	GREENBRIER,SAW	FACU	NHV
Smilax glauca	GREENBRIER,CAT	FACU	NSWV
Smilax herbacea	CARRION-FLOWER,SMOOTH	FAC	PNVF
Smilax hispida	GREENBRIER,BRISTLY	FAC	NWVS
Smilax laurifolia	GREENBRIER,LAUREL-LEAF	OBL	NWV
Smilax pseudochina	GREENBRIER,LONG-STALK	FAC+	NWV
Smilax pulverulenta	CARRION-FLOWER,DOWNY	FACU	PNV
Smilax rotundifolia	GREENBRIER,COMMON	FAC	NWV
Smilax smallii	GREENBRIER,LANCE-LEAF	NI	NWV
Smilax tamnoides	GREENBRIER,HALBERD-LEAF	FAC	NWV
Smilax walteri	GREENBRIER,CORAL	OBL	NWV
Solanum americanum	NIGHTSHADE,BLACK	FACU-	ANF
Solanum carolinense	NIGHTSHADE,CAROLINA	UPL	NSF
Solanum dulcamara	NIGHTSHADE,CLIMBING	FAC-	PIF
Solanum nigrum	NIGHTSHADE,BLACK	FACU-	AIF
Solanum tuberosum	POTATO,WHITE	NI	APIF
Solidago altissima	GOLDEN-ROD,TALL	FACU-	PNF
Solidago austrina	GOLDEN-ROD	OBL	PNF
Solidago boottii	GOLDEN-ROD,BOOTT	UPL	PNF
Solidago caesia	GOLDEN-ROD,WREATH	FACU	PNF
Solidago canadensis	GOLDEN-ROD,CANADA	FACU	PNF
Solidago elliottii	GOLDEN-ROD,ELLIOTT'S	OBL	PNF
Solidago elongata	GOLDEN-ROD,CREEK	FACU	PNF
Solidago fistulosa	GOLDEN-ROD,PINEBARREN	FACW	PNF
Solidago flexicaulis	GOLDEN-ROD,ZIGZAG	FACU	PNF
Solidago gigantea	GOLDEN-ROD,GIANT	FACW	PNF
Solidago gracillima	GOLDEN-ROD,VIRGINIA	NI	PNF
Solidago houghtonii	GOLDEN-ROD,HOUGHTON'S	OBL	PNF
Solidago nuttallii	GOLDEN-ROD,NUTTALL	FACU+	PNF
Solidago ohioensis	GOLDEN-ROD,OHIO	OBL	PNF
Solidago patula	GOLDEN-ROD,ROUGH-LEAF	OBL	PNF
Solidago puberula	GOLDEN-ROD,DOWNY	FACU-	PNF
Solidago riddellii	GOLDEN-ROD,RIDDELL'S	OBL	PNF
Solidago rigida	GOLDEN-ROD,STIFF	UPL	PNF
Solidago rugosa	GOLDEN-ROD,WRINKLED	FAC	PNF
Solidago salicina	GOLDEN-ROD,WILLOW	OBL	PNF
Solidago sempervirens	GOLDEN-ROD,SEASIDE	FACW	PN$F
Solidago spathulata	GOLDEN-ROD,COAST	FACU-	PNF
Solidago stricta	GOLDEN-ROD,WILLOW-LEAF	FACW	PNF
Solidago uligino	GOLDEN-ROD,BOG	OBL	PNF
Solidago x asp	GOLDEN-ROD	OBL*	PNF
Sonchus arvens	SOWTHISTLE,FIELD	UPL	PIF
Sonchus asper	SOWTHISTLE,PRICKLY	FAC	AIF
Sonchus oleraceus	SOWTHISTLE,COMMON	UPL	AIF
Sorbus americana	MOUNTAIN-ASH,AMERICAN	FACU	NT
Sorbus decora	MOUNTAIN-ASH,SHOWY	FAC*	NT
Sorghastrum nutans	GRASS,INDIAN	UPL	PNG
Sorghum bicolor	BROOM-CORN	UPL	AIG
Sorghum halepense	GRASS,JOHNSON	FACU	PIG
Sparganium americanum	BURREED,AMERICAN	OBL	PNEF
Sparganium androcladum	BURREED,BRANCHING	OBL	PNEF
Sparganium chlorocarpum	BURREED,GREENFRUIT	OBL	PNEF
Sparganium emersum	BURREED,NARROW-LEAF	OBL	PNEF
Sparganium eurycarpum	BURREED,GIANT	OBL	PNEF
Sparganium fluctuans	BURREED,FLOATING	OBL	PNEF
Sparganium minimum	BURREED,SMALL	OBL	PNEF
Spartina alterniflora	CORDGRASS,SALTMARSH	OBL	PNEG
Spartina caespitosa	GRASS,SALTMEADOW	OBL	PNG
Spartina cynosuroides	CORDGRASS,BIG	OBL	PNEG
Spartina patens	CORDGRASS,SALTMEADOW	FACW+	PNG
Spartina pectinata	CORDGRASS,PRAIRIE	OBL	PNG
Spergularia canadensis	SANDSPURRY,CANADA	OBL	ANF
Spergularia marina	SANDSPURRY,SALTMARSH	OBL	AN$F
Spergularia media	SANDSPURRY,MIDDLE-SIZE	FACW	AIF
Spergularia rubra	SANDSPURRY,PURPLE	FACU	AIF
Spermacoce glabra	BUTTON-PLANT,SMOOTH	FACW	PNF
Spermolepis divaricata	SPERMOLEPIS,ROUGH-FRUIT	FACU	ANF
Sphenopholis filiformis	WEDGESCALE,LONG-LEAF	UPL	PNG
Sphenopholis obtusata	WEDGEGRASS,PRAIRIE	FAC-	APNG
Sphenopholis pensylvanica	WEDGESCALE,SWAMP	OBL	PNG
Sphenopholis x pallens	WEDGEGRASS,SLENDER	FAC	PNG
Spiraea alba	MEADOW-SWEET,NARROW-LEAF	FACW+	NS
Spiraea betulifolia	MEADOW-SWEET,WHITE	NI	NS
Spiraea japonica	MEADOW-SWEET,JAPANESE	FACU-	IS
Spiraea latifolia	MEADOW-SWEET,BROAD-LEAF	FAC+	NS
Spiraea salicifolia	MEADOW-SWEET,WILLOW-LEAF	FACW+	IS
Spiraea tomentosa	STEEPLE-BUSH	FACW	NS
Spiraea virginiana	MEADOW-SWEET,VIRGINIA	FACU	NS
Spiranthes brevilabris	LADIES'-TRESSES,TEXAS	NI	PNF
Spiranthes cernua	LADIES'-TRESSES,NODDING	FACW	PNF
Spiranthes grayi	LADIES'-TRESSES,LITTLE	FACU-	PNF
Spiranthes lacera	LADIES'-TRESSES,NORTHERN SLENDER	FACU-	PNF
Spiranthes laciniata	LADIES'-TRESSES,LACE-LIP	OBL	PNEF
Spiranthes longilabris	LADIES'-TRESSES,GIANT SPIRAL	OBL*	PNF
Spiranthes lucida	LADIES'-TRESSES,SHINING	FACW	PNF
Spiranthes magnicamporum	LADIES'-TRESSES,GREAT PLAINS	NI	PNF
Spiranthes odorata	LADIES'-TRESSES,FRAGRANT	OBL	PNF
Spiranthes ovalis	LADIES'-TRESSES,OVAL	FAC	PNF
Spiranthes praecox	LADIES'-TRESSES,GRASS,LEAF	OBL	PNEF
Spiranthes romanzoffiana	LADIES'-TRESSES,HOODED	OBL	PNF
Spiranthes vernalis	LADIES'-TRESSES,SPRING	FAC	PNF
Spirodela oligorrhiza	DUCKWEED	OBL	PN/F
Spirodela polyrhiza	DUCKWEED,GREATER	OBL	PI/F
Sporobolus airoides	SACATON,ALKALI	NI	PNG
Sporobolus asper	DROPSEED,TALL	UPL*	PNG
Sporobolus cryptandrus	DROPSEED,SAND	UPL*	PNG
Sporobolus heterolepis	DROPSEED,PRAIRIE	UPL	PNG
Sporobolus indicus	DROPSEED,WEST INDIAN	NI	PIG
Sporobolus jacquemontii	RUSH-GRASS,WEST INDIAN	NI	G
Sporobolus neglectus	DROPSEED,PUFFSHEATH	FACU-*	ANG
Sporobolus pyramidatus	DROPSEED,WHORLED	UPL*	PNG
Sporobolus vaginiflorus	DROPSEED,POVERTY	UPL	ANG
Sporobolus virginicus	DROPSEED,SEASHORE	CW+	PNG
Stachys aspera	HEDGENETTLE,ROUGH	W	ANF
Stachys clingmanii	HEDGENETTLE,CLINGMAN'S	C+	ANF
Stachys cordata	HEDGENETTLE,NUTTALL'S	FAC	PNF

Scientific Name	Common Name	Region 1	Habit
Stachys eplingii	HEDGENETTLE,EPLING'S	NI	PNF
Stachys floridana	ARTICHOKE,CHINESE	NI	PNF
Stachys hispida	HEDGENETTLE,SMOOTH	OBL	PNF
Stachys hyssopifolia	HEDGENETTLE,HYSSOP-LEAF	FACW+	PNF
Stachys latidens	HEDGENETTLE,BROAD-TOOTH	FAC	PNF
Stachys palustris	HEDGENETTLE,MARSH	OBL	PIF
Stachys tenuifolia	HEDGENETTLE,SMOOTH	FACW+	PNF
Staphylea trifolia	BLADDERNUT,AMERICAN	FAC	NST
Steinchisma hians	GRASS,GAPING PANIC	FACW	PNG
Stellaria alsine	STARWORT,BOG	OBL	AIF
Stellaria calycantha	STARWORT,NORTHERN	FACW	PNF
Stellaria fontinalis	STARWORT,WATER	FACW	PNF
Stellaria graminea	STARWORT,LESSER	FACU-	PNF
Stellaria humifusa	STARWORT,LOW	OBL	PNEF
Stellaria laeta	STARWORT,LONG-STALK	NI	PNF
Stellaria longifolia	STARWORT,LONG-LEAF	FACW	PNF
Stellaria longipes	STARWORT,LONG-STALK	FACU-	PNF
Stellaria media	CHICKWEED,COMMON	UPL*	APIF
Stellaria palustris	STARWORT,MARSH	FACU	AIF
Stenanthium gramineum	FEATHER-BELLS,EASTERN	FACW	PNF
Stenotaphrum secundatum	GRASS,ST. AUGUSTINE	NI	PNG
Stipa avenacea	GRASS,BLACKSEED NEEDLE	UPL	PNG
Streptopus amplexifolius	TWISTED-STALK,CLASP-LEAF	FAC+	PNF
Streptopus roseus	TWISTED-STALK,ROSY	FAC-	PF
Strophostyles helvola	WILDBEAN,TRAILING	FACU-	ANVF
Strophostyles umbellata	WILDBEAN,PINK	FACU	PNVF
Stylisma aquatica	MORNING-GLORY,WATER SOUTHERN	FACW	PNFV
Styrax americana	SNOWBELL,AMERICAN	OBL	NST
Styrax grandifolia	SNOWBELL,BIG-LEAF	FACU	NT
Suaeda americana	SEEPWEED,AMERICAN	OBL	PNEF
Suaeda depressa	SEEPWEED,PURSH	NI	APNF
Suaeda linearis	SEEPWEED,ANNUAL	OBL	ANEF
Suaeda maritima	SEEPWEED,WHITE	OBL	PIEF
Suaeda richii	SEEPWEED,RICH'S	OBL	PNEF
Subularia aquatica	AWLWORT,WATER	OBL	ANZF
Symphoricarpos albus	SNOWBERRY	FACU-	NS
Symphoricarpos orbiculatus	CORAL-BERRY	UPL	NS
Symphytum tuberosum	COMFREY,TUBER	NI	PIF
Symplocarpus foetidus	SKUNK-CABBAGE	OBL	PNF
Symplocos tinctoria	HORSE-SUGAR	FAC+	NTS
Synandra hispidula	BEAUTY,GYANDOTTE	FAC-	PNF
Tamarix parviflora	TAMARISK,SMALL-FLOWER	NI	IT
Tamarix ramosissima	SALTCEDAR	NI	IT
Taraxacum officinale	DANDELION,COMMON	FACU-	PIF
Taxodium distichum	CYPRESS,BALD	OBL	NET
Taxus canadensis	YEW,AMERICAN	FAC	NS
Teucrium canadense	GERMANDER,AMERICAN	FACW-	PNEF
Thalictrum clavatum	MEADOW-RUE,MOUNTAIN	FACW	PNF
Thalictrum confine	MEADOW-RUE,CRITICAL	FACW	PNF
Thalictrum dasycarpum	MEADOW-RUE,PURPLE	FACW	PNF
Thalictrum dioicum	MEADOW-RUE,EARLY	FAC	PNF
Thalictrum macrostylum	MEADOW-RUE,PIEDMONT	FACW	PNF
Thalictrum mirable	MEADOW-RUE,LITTLE MOUNTAIN	FAC*	PNF
Thalictrum pubescens	MEADOW-RUE,TALL	FACW+	PNF
Thalictrum revolutum	MEADOW-RUE,WAX-LEAF	UPL	PNF
Thalictrum steeleanum	MEADOW-RUE,STEELE'S	FACU	N
Thaspium barbinode	MEADOW-PARSNIP,HAIRY JOINT	UPL	PNF
Thelypteris dentata	FERN,DOWNY MAIDEN	NI	PIF3
Thelypteris hexagonoptera	FERN,BROAD BEECH	FAC	PNF3
Thelypteris noveboracensis	FERN,NEW YORK	FAC	PNF3
Thelypteris simulata	FERN,MASSACHUSETTS	FACW	PNF3
Thelypteris thelypteroides	FERN,MARSH	FACW+	F3
Thlaspi arvense	PENNY-CRESS,FIELD	NI	AIF
Thuja occidentalis	CEDAR,NORTHERN WHITE	FACW	NT

Scientific Name	Common Name	Region 1	Habit
Tiarella cordifolia	FOAMFLOWER,HEART-LEAF	FAC-	PNF
Tilia americana	BASSWOOD,AMERICAN	FACU	NT
Tipularia discolor	ORCHID,CRANEFLY	FACU	PNF
Tofieldia glutinosa	FALSE-ASPHODEL,STICKY	OBL	PNF
Tofieldia racemosa	FALSE-ASPHODEL,COASTAL	OBL	PNF
Toxicodendron quercifolia	OAK,POISON	FACU	NS
Toxicodendron radicans	IVY,POISON	FAC	NWVS
Toxicodendron rydbergii	IVY,RYDBERG POISON	FAC-	NHS
Toxicodendron vernix	SUMAC,POISON	OBL	N
Trachelospermum difforme	CLIMBING-DOGBANE	FACW	PNVH
Tradescantia bracteata	SPIDER-WORT,LONG-BRACT	UPL	PNF
Tradescantia occidentalis	SPIDER-WORT,PRAIRIE	UPL	PNF
Tradescantia ohiensis	SPIDER-WORT,OHIO	FAC	PNF
Tradescantia virginiana	SPIDER-WORT,VIRGINIA	FACU	PNF
Trapa natans	CHESTNUT,WATER	OBL	PIF
Trautvetteria caroliniensis	TASSEL-RUE,CAROLINA	FACW-	PNF
Trepocarpus aethusae	TREPOCARPUS,AETHUSA-LIKE	NI	ANF
Triadenum fraseri	ST. JOHN'S-WORT,MARSH	OBL	PNEF
Triadenum tubulosum	ST. JOHN'S-WORT,LARGE MARSH	OBL	PNEF
Triadenum virginicum	ST. JOHN'S-WORT,MARSH	OBL	PNEF
Triadenum walteri	ST. JOHN'S-WORT,LARGER MARSH	OBL	PNEF
Trianthema portulacastrum	HORSE-PURSLANE,DESERT	UPL*	APN$F
Trichomanes boschianum	FERN,APPALACHIAN BRISTLE	FACW	PNF3
Tridens flavus	TRIDENS,PURPLE-TOP	FACU*	PNG
Tridens strictus	TRIDENS,LONG-SPIKE	NI	PNG
Trientalis borealis	STARFLOWER,AMERICAN	FAC	PNF
Trifolium dubium	CLOVER,SUCKLING	UPL	AIF
Trifolium fragiferum	CLOVER,STRAWBERRY	FACU	PIF
Trifolium hybridum	CLOVER,ALSIKE	FACU-	PIF
Trifolium pratense	CLOVER,RED	FACU-	BPIF
Trifolium repens	CLOVER,WHITE	FACU-	PIF
Trifolium resupinatum	CLOVER,PERSIAN	UPL	AIF
Triglochin maritimum	ARROW-GRASS,SEASIDE	OBL	PNF
Triglochin palustre	ARROW-GRASS,MARSH	OBL	PNF
Triglochin striatum	ARROW-GRASS,THREE-RIB	OBL	PNF
Trilisa odoratissima	VANILLA-LEAF	NI	PNF
Trillium cernuum	TRILLIUM,NODDING	FACW	PNF
Trillium erectum	TRILLIUM,PURPLE	FACU-	PNF
Trillium flexipes	TRILLIUM,WHITE	FAC	PNF
Trillium lancifolium	TRILLIUM,NARROW-LEAF	NI	PNF
Trillium pusillum	TRILLIUM,CAROLINA	FACW	PNF
Trillium recurvatum	TRILLIUM,PRAIRIE	UPL	PNF
Trillium sessile	TRILLIUM,SESSILE	NI	PNF
Trillium undulatum	TRILLIUM,PAINTED	FACU*	PNF
Triodanis perfoliata	VENUS'-LOOKING-GLASS,CLASP-LEAF	FAC	ANF
Triphora trianthophora	POGONIA,NODDING	UPL	PNF
Tripsacum dactyloides	GRASS,EASTERN GAMA	FACW	PNG
Trisetum melicoides	FALSE-OATS,PURPLE	FAC*	PNG
Trisetum spicatum	FALSE-OATS,SPIKED	FACU	PNG
Trollius laxus	GLOBEFLOWER,AMERICAN	OBL	PNF
Tsuga canadensis	HEMLOCK,EASTERN	FACU	NT
Tussilago farfara	COLT'S-FOOT	FACU	PIF
Typha angustifolia	CATTAIL,NARROW-LEAF	OBL	PNEF
Typha domingensis	CATTAIL,SOUTHERN	OBL	PNEF
Typha latifolia	CATTAIL,BROAD-LEAF	OBL	PNEF
Typha x glauca	CATTAIL,BLUE	OBL	PNEF
Ulmus alata	ELM,WINGED	FACU	NT
Ulmus americana	ELM,AMERICAN	FACW-	NT
Ulmus rubra	ELM,SLIPPERY	FAC	NT
Ulmus serotina	ELM,SEPTEMBER	FAC+	NT
Ulmus thomasii	ELM,ROCK	FACU+	NT
Uniola paniculata	SEA-OATS	FACU-	PNG
Urtica chamaedryoides	NETTLE,HEART-LEAF	FACU	ANF
Urtica dioica	NETTLE,STINGING	FACU	PIF

Scientific Name	Common Name	Region 1	Habit
Utricularia biflora	BLADDERWORT,TWO-FLOWER	OBL	PNZ/F
Utricularia comuta	BLADDERWORT,HORNED	OBL	APN/F
Utricularia fibrosa	BLADDERWORT,FIBROUS	OBL	PNZ/F
Utricularia geminiscapa	BLADDERWORT,HIDDEN-FRUIT	OBL	APNZ/
Utricularia gibba	BLADDERWORT,HUMPED	OBL	APNZ/
Utricularia inflata	BLADDERWORT,FLOATING	OBL	PN/ZF
Utricularia intermedia	BLADDERWORT,FLAT-LEAF	OBL	ANZF
Utricularia juncea	BLADDERWORT,RUSH	OBL	APN/F
Utricularia macrorhiza	BLADDERWORT,COMMON	OBL	PN/F
Utricularia minor	BLADDERWORT,LESSER	OBL	PNZF
Utricularia ochroleuca	BLADDERWORT,DWARF	NI	PNZF
Utricularia olivacea	BLADDERWORT,PIEDMONT	OBL	APNZF
Utricularia purpurea	BLADDERWORT,PURPLE	OBL	APNZ/
Utricularia radiata	BLADDERWORT,LITTLE FLOATING	OBL	APNZ/
Utricularia resupinata	BLADDERWORT,LAVENDER	OBL	APNZF
Utricularia subulata	BLADDERWORT,ZIGZAG	OBL	APNF
Uvularia perfoliata	BELLWORT,PERFOLIATE	FACU	PNF
Uvularia puberula	BELLWORT,MOUNTAIN	FACU	PNF
Uvularia sessilifolia	BELLWORT,SESSILE-LEAF	FACU-	PNF
Vaccinium amoenum	BLUEBERRY,HIGHBUSH	FACW	NS
Vaccinium angustifolium	BLUEBERRY,LOWBUSH	FACU-	NS
Vaccinium arboreum	FARKLEBERRY	FACU	NST
Vaccinium australe	BLUEBERRY,HIGHBUSH	OBL	NS
Vaccinium caesariense	BLUEBERRY,NEW JERSEY	OBL	NS
Vaccinium caesium	DEERBERRY	FAC	NS
Vaccinium cespitosum	BLUEBERRY,DWARF	FACW	NS
Vaccinium constablaei	BLUEBERRY,MOUNTAIN	FAC	NS
Vaccinium corymbosum	BLUEBERRY,HIGHBUSH	FACW-	NS
Vaccinium crassifolium	BLUEBERRY,CREEPING	FAC	NWV
Vaccinium elliottii	BLUEBERRY,ELLIOTT	FACW	NS
Vaccinium erythrocarpum	CRANBERRY,SOUTHERN MOUNTAIN	FAC	NS
Vaccinium macrocarpon	CRANBERRY,LARGE	OBL	NS
Vaccinium marianum	BLUEBERRY,HIGHBUSH	FAC	NS
Vaccinium myrtilloides	BLUEBERRY,VELVET-LEAF	FAC	NS
Vaccinium oxycoccos	CRANBERRY,SMALL	OBL	NS
Vaccinium simulatum	BLUEBERRY,HIGHBUSH	FACU	NS
Vaccinium stamineum	DEERBERRY	FACU-	NS
Vaccinium tenellum	BLUEBERRY,GALE-LEAF	UPL*	NS
Vaccinium uliginosum	BLUEBERRY,BOG	FACU+	IS
Vaccinium vitis-idaea	CRANBERRY,MOUNTAIN	FAC	NS
Vahlodea atropurpurea	HAIRGRASS,MOUNTAIN	FACW	PNG
Valeriana edulis	VALERIAN,EDIBLE	OBL	PNF
Valeriana pauciflora	VALERIAN,LARGE-FLOWER	FACW	PNF
Valeriana sitchensis	VALERIAN,SITKA	OBL	PNF
Valerianella radiata	CORNSALAD,BEAKED	FAC	ANF
Valerianella umbilicata	CORNSALAD,NAVEL-SHAPE	FAC	ANF
Valerianella woodsiana	CORNSALAD,WOODS'	FACU*	ANF
Vallisneria americana	WILD-CELERY	OBL	PIZF
Veratrum viride	FALSE-HELLEBORE,AMERICAN	FACW+	PNF
Verbascum blattaria	MULLEIN,MOTH	UPL	BIF
Verbena bonariensis	VERVAIN,SOUTH AMERICAN	NI	PIF
Verbena bracteata	VERVAIN,PROSTRATE	UPL*	APNF
Verbena brasiliensis	VERVAIN,BRAZILIAN	UPL*	AIF
Verbena hastata	VERVAIN,BLUE	FACW+	PNF
Verbena lasiostachys	VERVAIN,WESTERN	NI	PNF
Verbena officinalis	VERVAIN,EUROPEAN	FACU-	AIF
Verbena riparia	VERVAIN,RIVER-BANK	FACW	ANF
Verbena scabra	VERVAIN,SANDPAPER	FACW	PNEFS
Verbena urticifolia	VERVAIN,WHITE	FACU	APNF
Verbena x engelmannii	VERVAIN	NI	PNF
Verbesina alternifolia	WINGSTEM	FAC	PNF
Verbesina encelioides	CROWNBEARD,GOLDEN	FACU-	ANF
Verbesina occidentalis	CROWNBEARD,YELLOW	UPL	PNF
Verbesina virginica	CROWNBEARD,WHITE	UPL	PNF

Scientific Name	Common Name	Region 1	Habit
Vernonia arkansana	IRONWEED,BUR	NI	PNF
Vernonia fasciculata	IRONWEED,PRAIRIE	FAC+	PNF
Vernonia gigantea	IRONWEED,TALL	FAC	PNF
Vernonia missurica	IRONWEED,MISSOURI	FACU+	PNF
Vernonia noveboracensis	IRONWEED,NEW YORK	FACW+	PNF
Veronica americana	SPEEDWELL,AMERICAN	OBL	PNE$F
Veronica anagallis-aquatica	SPEEDWELL,WATER	OBL	BPNEF
Veronica arvensis	SPEEDWELL,CORN	NI	AIF
Veronica beccabunga	SPEEDWELL,EUROPEAN	OBL	PIF
Veronica catenata	SPEEDWELL,PINK WATER	OBL	PNEF
Veronica officinalis	SPEEDWELL,COMMON	FACU-	PIF
Veronica peregrina	SPEEDWELL,PURSLANE	FACU-	ANEF
Veronica scutellata	SPEEDWELL,MARSH	OBL	PIF
Veronica serpyllifolia	SPEEDWELL,THYME-LEAF	FAC+	PIF
Veronica wormskjoldii	SPEEDWELL,AMERICAN ALPINE	FAC	PNF
Veronicastrum virginicum	CULVER'S-ROOT	FACU	PNF
Viburnum acerifolium	VIBURNUM,MAPLE-LEAF	UPL*	NS
Viburnum cassinoides	WITHE-ROD	FACW	NS
Viburnum dentatum	ARROW-WOOD	FAC	NTS
Viburnum edule	SQUASHBERRY	FACW	NS
Viburnum lantanoides	HOBBLE-BUSH	FAC	NS
Viburnum lentago	NANNYBERRY	FAC	NTS
Viburnum nudum	VIBURNUM,POSSUM-HAW	OBL	NST
Viburnum plicatum	SNOWBALL,JAPANESE	NI	IS
Viburnum prunifolium	BLACK-HAW	FACU	NST
Viburnum recognitum	ARROW-WOOD,NORTHERN	FACW-	NS
Viburnum rufidulum	BLACK-HAW,RUSTY	UPL	NTS
Viburnum trilobum	CRANBERRYBUSH,AMERICAN	FACW	N
Vicia americana	VETCH,AMERICAN PURPLE	NI	PNFV
Vicia caroliniana	VETCH,CAROLINA WOOD	FACU-	PNFV
Vicia sativa	VETCH,COMMON	FACU-	AIFV
Viola adunca	VIOLET,HOOKED-SPUR	FAC	PNF
Viola affinis	VIOLET,LECONTE'S	FACW	PNF
Viola appalachiensis	VIOLET,APPALACHIAN BLUE	FACU	NF
Viola bicolor	PANSY,FIELD	FACU	ANF
Viola blanda	VIOLET,SWEET WHITE	FACW	PNF
Viola brittoniana	VIOLET,COASTAL	FAC	PNF
Viola conspersa	VIOLET,AMERICAN DOG	FACW	PNF
Viola cucullata	VIOLET,MARSH BLUE	FACW+	PNF
Viola esculenta	VIOLET,EDIBLE	FACW	PNF
Viola hastata	VIOLET,HALBERD-LEAF YELLOW	UPL	PNF
Viola incognita	VIOLET,LARGE-LEAF WHITE	FACW	PNF
Viola labradorica	VIOLET,ALPINE	FAC	PNF
Viola lanceolata	VIOLET,LANCE-LEAF	OBL	PNF
Viola missouriensis	VIOLET,MISSOURI	NI	PNF
Viola nephrophylla	VIOLET,NORTHERN BOG	FACW	PNF
Viola novae-angliae	VIOLET,NEW ENGLAND BLUE	OBL	PNF
Viola pallens	VIOLET,NORTHERN WHITE	OBL	NF
Viola palustris	VIOLET,MARSH	FACW+	PNF
Viola papilionacea	VIOLET,COMMON BLUE	FAC	PNF
Viola pedata	VIOLET,BIRD'S-FOOT	UPL	PNF
Viola pedatifida	VIOLET,PRAIRIE	FACU-	PNF
Viola pensylvanica	VIOLET,SMOOTH YELLOW	FACU	PNF
Viola pratincola	VIOLET,BLUE PRAIRIE	NI	PNF
Viola primulifolia	VIOLET,PRIMROSE-LEAF	FAC+	PNF
Viola pubescens	VIOLET,DOWNY YELLOW	FACU-	PNF
Viola renifolia	VIOLET,KIDNEY-LEAF WHITE	FACW	PNF
Viola rostrata	VIOLET,LONG-SPUR	FACU	PNF
Viola rotundifolia	VIOLET,ROUND-LEAF YELLOW	FAC+	PNF
Viola sagittata	VIOLET,ARROW-LEAF	FACW	PNF
Viola septemloba	VIOLET,SOUTHERN COAST	[illegible]W	PNF
Viola septentrionalis	VIOLET,NORTHERN BLUE	[illegible]	PNF
Viola sororia	VIOLET,WOOLLY BLUE	[illegible]	PNF
Viola striata	VIOLET,STRIPED CREAM	FACW	PNF

Viola viarum	VIOLET,TWO-FLOWER	NI	PNF
Viola villosa	VIOLET,CAROLINA	FACU-	PNF
Vitis aestivalis	GRAPE,SUMMER	FACU	NWV
Vitis cinerea	GRAPE,PIGEON	FACW	NWV
Vitis labrusca	GRAPE,FOX	FACU	NWV
Vitis novae-angliae	GRAPE,NEW ENGLAND	NI	NWV
Vitis palmata	GRAPE,CAT	NI	NWV
Vitis riparia	GRAPE,RIVER-BANK	FACW	NWV
Vitis rotundifolia	GRAPE,MUSCADINE	FAC-	NWV
Vitis rupestris	GRAPE,SAND	UPL*	NSWV
Vitis vulpina	GRAPE,FROST	FAC	NWV
Vittaria lineata	FERN,APPALACHIAN SHOESTRING	NI	PNF3
Vulpia bromoides	GRASS,BROME SIX-WEEKS	FACW	AIG
Vulpia myuros	FESCUE,RAT-TAIL	UPL	AIG
Vulpia octoflora	FESCUE,SIX-WEEKS	UPL	ANG
Wisteria frutescens	WISTERIA,AMERICAN	FACW-	NWV
Wisteria macrostachya	WISTERIA,KENTUCKY	FACW+	NWV
Wolffia columbiana	WATER-MEAL,COLUMBIA	OBL	PN/F
Wolffia papulifera	WATER-MEAL	OBL	PN/F
Wolffia punctata	WATER-MEAL,DOTTED	OBL	PN/F
Wolffiella floridana	BOGMAT	OBL	PN/F
Wolffiella gladiata	BOGMAT,SWORD	NI	PN/F
Woodwardia areolata	CHAINFERN,NETTED	FACW+	PNEF3
Woodwardia virginica	CHAINFERN,VIRGINIA	OBL	PNF3
Xanthium spinosum	COCKLE-BUR,SPINY	FACU	ANF
Xanthium strumarium	COCKLE-BUR,ROUGH	FAC	ANF
Xanthorhiza simplicissima	YELLOW-ROOT,SHRUBBY	FACW	NS
Xyris ambigua	YELLOW-EYED-GRASS,COASTAL-PLAIN	OBL	PNEF
Xyris caroliniana	YELLOW-EYED-GRASS,CAROLINA	FACW+	PNF
Xyris difformis	YELLOW-EYED-GRASS,COMMON	OBL	PNEF
Xyris fimbriata	YELLOW-EYED-GRASS,FRINGED	OBL	PNEF
Xyris iridifolia	YELLOW-EYED-GRASS,IRIS-LEAF	OBL	PNEF
Xyris jupicai	YELLOW-EYED-GRASS,RICHARD'S	OBL	APNEF
Xyris montana	YELLOW-EYED-GRASS,NORTHERN	OBL	PNEF
Xyris platylepis	YELLOW-EYED-GRASS,TALL	OBL	PNEF
Xyris smalliana	YELLOW-EYED-GRASS,SMALL'S	OBL	PNEF
Xyris torta	YELLOW-EYED-GRASS,TWISTED	OBL	PNEF
Youngia japonica	HAWKSBEARD,ORIENTAL	NI	AIF
Zannichellia palustris	PONDWEED,HORNED	OBL	PNZF
Zanthoxylum clava-herculis	HERCULES-CLUB	FAC	NST
Zenobia pulverulenta	ZENOBIA,DUSTY	FACW	NS
Zephyranthes atamasca	LILY,ATAMASCO	FACW	PNF
Zigadenus densus	CROW-POISON	OBL	PNF
Zigadenus elegans	DEATHCAMAS,MOUNTAIN	NI	PNF
Zigadenus glaberrimus	DEATHCAMAS,ATLANTIC	OBL	PNF
Zigadenus glaucus	CAMAS,WHITE	FAC	PNF
Zigadenus leimanthoides	DEATHCAMAS,PINEBARREN	OBL	PNF
Zizania aquatica	WILDRICE,ANNUAL	OBL	ANEG
Zizaniopsis miliacea	WILDRICE,SOUTHERN	OBL	PNG
Zizia aptera	ALEXANDERS,HEART-LEAF	FAC	PNF
Zizia aurea	ALEXANDERS,GOLDEN	FAC	PNF
Zizia trifoliata	ALEXANDERS,MEADOW	UPL	PNF
Zostera marina	EEL-GRASS	OBL	PNZF
Zosterella dubia	STAR-GRASS,WATER	OBL	APN/F

Symbol	Characteristic or Life Form
A	Annual
B	Biennial
C	Clubmoss (Lycopodiaceae or Selaginellaceae families)
E	Emergent
@	Epiphytic
F	Forb
/	Floating
F3	Fern
G	Grass (Poaceae family)
GL	Grasslike (Cyperaceae or Juncaceae families)
H	Partly woody
HS	Half Shrub
H2	Horsetail (Equisetaceae family)
I	Introduced
N	Native
P	Perennial
+	Parasitic
P3	Pepperwort (Marsileaceae family)
Q	Quillwort (Isoetaceae family)
S	Shrub
-	Saprophytic
Z	Submerged
$	Succulent
T	Tree
V	Herbaceous Vine
W	Water fern (Azollaceae or Salviniaceae families)
WV	Woody Vine

(THE "HYDRIC CRITERIA NUMBER" COLUMN INDICATES WHAT CAUSED THE SOIL TO BE INCLUDED IN THE HYDRIC LIST.
SEE THE "CRITERIA FOR HYDRIC SOILS" TO DETERMINE THE MEANING OF THIS COLUMN.)

SERIES AND SUBGROUP	TEMPERATURE	DRAINAGE CLASS	HIGH WATER TABLE DEPTH	HIGH WATER TABLE MONTHS	PERM. WITHIN 20 INCHES	FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HYDRIC CRITERIA NUMBER	CAPABILITY CRITICAL PHASE CRITERIA	CAPABILITY CLASS AND SUBCLASS
ALDEN (NY0100) MOLLIC HAPLAQUEPTS	MESIC	VP	+1 -0.5	NOV-JUN	<6.0	NONE			2B3,3	DRAINED UNDRAINED	4W 5W
ALDEN, STONY (NY0101) MOLLIC HAPLAQUEPTS	MESIC	VP	+1 -0.5	NOV-JUN	<6.0	NONE			2B3,3	ALL	7S
ALLIS (NY0108) AERIC HAPLAQUEPTS	MESIC	P	0 -1.0	NOV-JUN	<6.0	NONE			2B3	0-8% SIL,SICL 3-8%SICL,SEV ER	4W 4W
ANDOVER (PA0093) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	OCT-JUN	<6.0	NONE			2B3	0-3% 3-8% 8-15%	4W 4W 4W
ANDOVER, STONY (PA0092) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	OCT-JUN	<6.0	NONE			2B3	0-3% STV,STX 3-8% STV,STX 8-15% STV,STX	7S 7S 7S
ARMAGH (PA0094) TYPIC ENDOAQUULTS	MESIC	P	0 -0.5	OCT-JUN	<6.0	NONE			2B3	ALL	4W
ARMAGH, STONY (PA0095) TYPIC ENDOAQUULTS	MESIC	P	0 -0.5	OCT-JUN	<6.0	NONE			2B3	ALL	7S
ATHERTON (NY0223) AERIC HAPLAQUEPTS	MESIC	P,VP	+.5-0.5	NOV-JUN	<6.0	NONE			2B3,3	UNDRAINED DRAINED	4W 3W
ATHERTON, STONY (NY0515) AERIC HAPLAQUEPTS	MESIC	P,VP	+.5-0.5	NOV-JUN	<6.0	NONE			2B3,3	ALL	7S
ATKINS (WV0008) TYPIC FLUVAQUENTS	MESIC	P	0 -1.0	NOV-JUN	<6.0	COMMON	V BRIEF	SEP-JUL	2B3	ALL	3W
BAILE (MD0023) TYPIC OCHRAQUULTS	MESIC	P	0 -0.5	NOV-APR	<6.0	NONE			2B3	0-3% 3-8%	5W 6W
BIRDSALL (MA0033) TYPIC HUMAQUEPTS	MESIC	VP	+1 -1.0	OCT-JUL	<6.0	NONE			2B3,3	UNDRAINED DRAINED	5W 3W
BOWMANSVILLE (PA0048) AERIC FLUVAQUENTS	MESIC	P,SP	0 -1.5	SEP-MAY	<6.0	COMMON	BRIEF	NOV-JUN	2B3	ALL	3W
BRINKERTON (PA0090) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	OCT-MAY	<6.0	NONE			2B3	0-3% 3-8% 8-15%	4W 4W 4W
BRINKERTON, STONY (PA0091) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	OCT-MAY	<6.0	NONE			2B3	0-3% STV 3-8% STV 8-15% STV	6 6 6
CANADICE (NY0163) TYPIC OCHRAQUALFS	MESIC	P	0 -1.0	DEC-JUN	<6.0	NONE			2B3	0-3%	4
CANADICE, TILL SUBSTRATUM (NY0271) TYPIC OCHRAQUALFS	MESIC	P	+1 -1.0	DEC-JUN	<6.0	NONE			2B3,3	ALL	
CARLISLE (MI0020) TYPIC MEDISAPRISTS	MESIC	VP	+.5-1.0	SEP-JUN	<6.0	NONE			1,3	DRAINED UNDRAINED	
CARLISLE, FLOODED (MI0372) TYPIC MEDISAPRISTS	MESIC	VP	+.5-1.0	SEP-JUN	<6.0	FREQUENT	V BRIEF-LONG	NOV-APR	1,3,4	DRAINED UNDRAINED	
CARLISLE, HIGH PPT (MI0117) TYPIC MEDISAPRISTS	MESIC	VP	+.5-1.0	SEP-JUN	<6.0	NONE			1,3	DRAINED UNDRAINED	
CARLISLE, MAAT>50 (MI0386) TYPIC MEDISAPRISTS	MESIC	VP	+.5-1.0	SEP-JUN	<6.0	NONE			1,3	DRAINED UNDRAINED	
CARLISLE, OVERWASH (MI0311) TYPIC MEDISAPRISTS	MESIC	VP	+1 -1.0	SEP-JUN	<6.0	NONE			1,3	DRAINED UNDRAINED	
#CHEWACLA (NC0055) FLUVAQUENTIC DYSTROCHREPTS	THERMIC	SP	0.5-1.5	NOV-APR	<6.0	FREQUENT	LONG	NOV-APR	4	FREQ	
CHIPPEWA (NY0068) TYPIC FRAGIAQUEPTS	MESIC	P	+.5-0.5	NOV-MAY	<6.0	NONE			2B3,3	ALL	

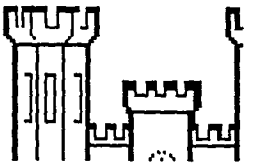
CHIPPEWA, STONY (NY0069) TYPIC FRAGIAQUEPTS	MESIC	P	+.5-0.5	NOV-MAY	<6.0	NONE			2B3,3	ALL	7S
COLVIN (ND0002) TYPIC CALCIAQUOLLS	FRIGID	P	0 -1.0	APR-JUL	<6.0	NONE			2B3	DRAINED, PE>44	2W
										UNDRAINED, PE>44	4W
										PE<44, DRAINED	2W
										PE<44, UNDRAINED	4W
CROTON (NJ0001) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	NOV-MAY	<6.0	NONE			2B3	0-8% SIL, SICL	[redacted]
										0-3% ST-SIL, ST-SICL	5
										3-8% ST-SIL, ST-SICL	6S
CROTON, STONY (NJ0094) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	NOV-MAY	<6.0	NONE			2B3	0-8% STV	6S
										0-8% STX	7S
DOYLESTOWN (PA0041) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	SEP-MAY	<6.0	NONE			2B3	0-3% SIL	5W
										3-8% SIL	6W
										0-3% STV	5S
										3-8% STV	6S
										6-12% SIL	6W
DUNNING (KY0055) FLUVAQUENTIC ENDOAQUOLLS	MESIC	VP,P	0 -0.5	JAN-APR	<6.0	RARE-COMMON	BRIEF	DEC-MAY	2B3	ALL	3W
EDGEMERE, STONY (PA0161) TYPIC FRAGIAQUEPTS	MESIC	VP,P	+.5-0.5	NOV-MAY	<6.0	NONE			2B3,3	ALL	7S
ELKINS, DRAINED (WV0021) HUMAQUEPTIC FLUVAQUENTS	MESIC	P,VP	0 -1.5	NOV-JUN	<6.0	OCCASIONAL	BRIEF	NOV-APR	2B3	ALL	3W
ELKINS, PONDED (WV0079) HUMAQUEPTIC FLUVAQUENTS	MESIC	P,VP	+2 -0.5	JAN-DEC	<6.0	FREQUENT	V LONG	SEP-JUN	2B3,3,4	ALL	5W
FALLSINGTON (MD0033) TYPIC OCHRAQUULTS	MESIC	P	0 -1.0	DEC-MAY	<6.0	NONE			2B3	DRAINED	3W
										UNDRAINED	4W
FRENCHTOWN (OH0085) TYPIC FRAGIAQUALFS	MESIC	P	+1 -1.0	OCT-MAY	<6.0	NONE			2B3,3	ALL	3W
FRENCHTOWN, BEDROCK SUBSTRATUM (OH0234) TYPIC FRAGIAQUALFS	MESIC	P	+1 -1.0	OCT-MAY	<6.0	NONE			2B3,3	ALL	3W
FRENCHTOWN, SLOPING (OH0319) TYPIC FRAGIAQUALFS	MESIC	P	0 -1.0	OCT-MAY	<6.0	NONE			2B3	0-3%	[redacted]
										3-8%	
										3-8% ERODED	
FRENCHTOWN, STONY (OH0299) TYPIC FRAGIAQUALFS	MESIC	P	0 -1.0	OCT-MAY	<6.0	NONE			2B3	ALL	7S
GINAT (IN0063) TYPIC FRAGIAQUALFS	MESIC	P	0 -1.0	JAN-MAY	<6.0	NONE-RARE			2B3	ALL	3W
GLENEYRE (PA0172) TYPIC FLUVAQUENTS	MESIC	VP	+1.-0.5	JAN-DEC	<6.0	FREQUENT	LONG	SEP-JUN	2B3,3,4	ALL	5W
GUTHRIE (TN0045) TYPIC FRAGIAQUULTS	THERMIC	P	0.5-1.0	JAN-APR	<6.0	NONE-COMMON	BRIEF	JAN-APR	2B3	NONE, RARE	3W
										OCCAS	4W
										FREQ	5W
GUTHRIE, PONDED (TN0172) TYPIC FRAGIAQUULTS	THERMIC	P	+2 -1.0	DEC-MAY	<6.0	NONE-RARE			2B3,3	ALL	5W
HALSEY (NJ0039) MOLLIC ENDOAQUEPTS	MESIC	VP	+0.-0.5	SEP-JUN	<6.0	NONE-COMMON	BRIEF	SEP-JUN	2B3,3	DRAINED	3W
										UNDRAINED	5W
HATBORO (PA0016) TYPIC FLUVAQUENTS	MESIC	P	0 -0.5	OCT-MAY	<6.0	COMMON	V BRIEF	NOV-MAY	2B3	ALL	3W
HOLLY (OH0032) TYPIC FLUVAQUENTS	MESIC	VP,P	0 -1.0	DEC-MAY	<6.0	FREQUENT	LONG	NOV-MAY	2B3,4	ALL	3W
HOLLY, PONDED (OH0210) TYPIC FLUVAQUENTS	MESIC	VP	+1 -0.5	JAN-DEC	<6.0	FREQUENT	V LONG	SEP-JUN	2B3,3,4	ALL	5W
HOLLY, RARELY FLOODED (OH0292) TYPIC FLUVAQUENTS	MESIC	VP,P	0 -1.0	DEC-MAY	<6.0	RARE			2B3	ALL	3W
KIMBLES (PA0173) TYPIC ENDOAQUEPTS	MESIC	P	0 -0.5	OCT-JUN	<6.0	NONE			2B3	ALL	4W
KNAUERS (PA0163) TYPIC FLUVAQUENTS	MESIC	P	+.5-0.5	SEP-JUN	<6.0	COMMON	V BRIEF	NOV-JUN	2B3,3	ALL	4W
LAMINGTON (PA0118) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	NOV-MAR	<6.0	NONE			2B3	ALL	[redacted]
LICKDALE (MD0017) HUMIC HAPLAQUEPTS	MESIC	VP	0 -0.5	NOV-MAY	<6.0	NONE			2B3	ALL	4W

LICKDALE, STONY (MD0082) HUMIC HAPLAQUEPTS	MESIC	VP	+0.5-0.5	NOV-MAY	<6.0	NONE					
MARKES (PA0123) TYPIC ENDOAQUALFS	MESIC	P	0 -0.5	SEP-MAY	<6.0	NONE			2B3	ALL	4W
[redacted]VIN (KY0025) [redacted]PIC FLUVAQUENTS	MESIC	P	0 -1.0	DEC-MAY	<6.0	COMMON	BRIEF-LONG	DEC-MAY	2B3,4	OCCAS FREQ,BRIEF FREQ,LONG	3W 3W 4W
MELVIN, COOL (KY0127) TYPIC FLUVAQUENTS	MESIC	P	0 -1.0	DEC-MAY	<6.0	COMMON	BRIEF	DEC-MAY	2B3	ALL	3W
MELVIN, PONDED (KY0119) TYPIC FLUVAQUENTS	MESIC	P	+2 -0.5	JAN-DEC	<6.0	FREQUENT	V LONG	SEP-JUN	2B3,3,4	ALL	5W
MINER (OH0121) MOLLIC EPIAQUALFS	MESIC	VP	+1 -1.0	NOV-JUN	<6.0	NONE			2B3,3	ALL	3W
MINER, BEDROCK SUBSTRATUM (OH0284) MOLLIC EPIAQUALFS	MESIC	VP	+1 -1.0	NOV-JUN	<6.0	NONE			2B3,3	ALL	3W
#*NEWARK (KY0003) AERIC FLUVAQUENTS	MESIC	SP	0.5-1.5	DEC-MAY	<6.0	FREQUENT	LONG	JAN-APR	4	FREQ,LONG	3W
*NEWARK, PONDED (KY0109) AERIC FLUVAQUENTS	MESIC	SP	+1 -1.0	SEP-JUL	<6.0	FREQUENT	V LONG	OCT-JUN	2A,3,4	ALL	5W
*NEWARK, PONDED, COOL (KY0124) AERIC FLUVAQUENTS	MESIC	SP	+1 -1.0	SEP-JUL	<6.0	FREQUENT	V LONG	OCT-JUN	2A,3,4	ALL	5W
#*NOLIN (KY0017) DYSTRIC FLUVENTIC EUTROCHREPTS	MESIC	W	3.0-6.0	FEB-MAR	<6.0	FREQUENT	LONG	FEB-MAY	4	FREQ,LONG	3W
#*NOLIN, SUMMER FLOODING (KY0145) DYSTRIC FLUVENTIC EUTROCHREPTS	MESIC	W	3.0-6.0	FEB-MAR	<6.0	FREQUENT	LONG	DEC-JUL	4	FREQ	5W
NOLO (PA0129) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	SEP-JUN	<6.0	NONE			2B3	0-3% 3-8% 8-15%	4W 4W 4W
NOLO, STONY (PA0130) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	SEP-JUN	<6.0	NONE			2B3	ALL	7S
NORWICH (NY0072) TYPIC FRAGIAQUEPTS	MESIC	VP,P	0 -0.5	NOV-MAY	<6.0	NONE			2B3	DRAINED UNDRAINED	4W 5W
NORWICH, STONY (NY0073) TYPIC FRAGIAQUEPTS	MESIC	VP,P	0 -0.5	NOV-MAY	<6.0	NONE			2B3	ALL	7S
OTHELLO (MD0032) TYPIC OCHRAQUULTS	MESIC	P	0 -1.0	JAN-MAY	<6.0	NONE			2B3	0-5% DRAINED 0-5% UNDRAINED	3 4
PALMS, MAAT<50 (MI0023) TERRIC MEDISAPRISTS	MESIC	VP	+1 -1.0	NOV-MAY	<6.0	NONE			1,3	DRAINED UNDRAINED	3 5
PAUPACK (PA0180) TERRIC MEDISAPRISTS	MESIC	VP	1.0-0	SEP-JUN	<6.0	NONE			1	ALL	5
POCOMOKE, PONDED (MD0002) TYPIC UMBRAQUULTS	THERMIC	VP	+1.-0	NOV-JUN	<6.0	NONE			2B3,3	ALL	
PUCKUM (MD0132) TYPIC MEDISAPRISTS	MESIC	VP	+1 -0	JAN-DEC	<6.0	FREQUENT	BRIEF	JAN-DEC	1,3	ALL	
PURDY (WV0034) TYPIC ENDOAQUULTS	MESIC	P,VP	+1 -1.0	NOV-JUN	<6.0	NONE			2B3,3	ALL	
REXFORD (PA0017) AERIC FRAGIAQUEPTS	MESIC	SP,P	0 -1.5	OCT-MAY	<6.0	NONE-RARE			2B3	0-8% 8-15%	
ROBERTSVILLE (KY0059) TYPIC FRAGIAQUALFS	MESIC	P	0 -1.0	DEC-MAY	<6.0	NONE-COMMON	BRIEF	DEC-APR	2B3	ALL	
SHEFFIELD (OH0073) TYPIC FRAGIAQUALFS	MESIC	P	+1 -1.0	DEC-MAY	<6.0	NONE			2B3,3	ALL	
SHEFFIELD, STRATIFIED SUBSTRATUM (OH0231) TYPIC FRAGIAQUALFS	MESIC	P	+1 -1.0	DEC-MAY	<6.0	NONE			2B3,3	ALL	
SHELMADINE (PA0088) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	SEP-JUN	<6.0	NONE			2B3	0-3% 3-8% 8-15%	
SHELMADINE, STONY (PA0089) TYPIC FRAGIAQUULTS	MESIC	P	0 -0.5	SEP-JUN	<6.0	NONE			2B3	0-3% STV 3-8% STV 8-15% STV	

SLOAN, HIGH PPT (OH0207) FLUVAQUENTIC ENDOAQUOLLS	MESIC	VP	+.5-1.0	NOV-JUN	<6.0	COMMON	BRIEF	NOV-JUN	2B3,3	OCCAS FREQ FREQ, PONDED	3W 3W 5W
SLOAN, MAAT<50 (OH0132) FLUVAQUENTIC ENDOAQUOLLS	MESIC	VP	0 -1.0	NOV-JUN	<6.0	RARE-COMMON	BRIEF	NOV-JUN	2B3	OCCAS FREQ FREQ, PONDED RARE	3W 3W 5W
SLOAN, MAAT>50 (OH0060) FLUVAQUENTIC ENDOAQUOLLS	MESIC	VP	0 -1.0	NOV-JUN	<6.0	RARE-COMMON	BRIEF	NOV-JUN	2B3	OCCAS FREQ FREQ, PONDED RARE	3W 3W 5W 3W
SLOAN, SANDY SUBSTRATUM (OH0164) FLUVAQUENTIC ENDOAQUOLLS	MESIC	VP	0 -1.0	NOV-JUN	<6.0	RARE-COMMON	BRIEF	NOV-JUN	2B3	OCCAS FREQ FREQ, PONDED RARE	3W 3W 5W 3W
THORNDALE (PA0042) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	SEP-MAY	<6.0	NONE			2B3	0-3% SIL, SICL 3-8% SIL, SICL 0-8% STV-SIL	4W 4W 6S
TOWHEE (PA0135) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	SEP-JUN	<6.0	NONE			2B3	0-3% 3-8%	4W 4W
TOWHEE, STONY (PA0136) TYPIC FRAGIAQUALFS	MESIC	P	0 -0.5	SEP-JUN	<6.0	NONE			2B3	0-3% STV, STX 3-8% STV, STX	7S 7S
TRUMBULL (OH0127) TYPIC EPIAQUALFS	MESIC	P	+1 -1.0	NOV-JUN	<6.0	NONE			2B3,3	0-2% 2-6%	4W 4E
TUGHILL (NY0202) HISTIC HUMAQUEPTS	FRIGID	VP	+1 -0.5	NOV-JUN	<6.0	NONE			2B3,3	ALL	5W
TUGHILL, STONY (NY0203) HISTIC HUMAQUEPTS	FRIGID	VP	+1 -0.5	NOV-JUN	<6.0	NONE			2B3,3	ALL	7S
WARNERS (NY0077) FLUVAQUENTIC HAPLAQUOLLS	MESIC	VP	+.5-0.5	NOV-JUN	<6.0	FREQUENT	LONG	NOV-JUN	2B3,3,4	DRAINED UNDRAINED	4W 5W
WARNERS, NONFLOODED (NY0319) FLUVAQUENTIC HAPLAQUOLLS	MESIC	VP	0 -0.5	NOV-JUN	<6.0	NONE			2B3	DRAINED UNDRAINED	3W 5W
WARNERS, PONDED (NY0378) FLUVAQUENTIC HAPLAQUOLLS	MESIC	VP	+.5-1.0	NOV-MAY	<6.0	NONE			2B3,3	DRAINED UNDRAINED	5W
WATCHUNG (MD0007) TYPIC OCHRAQUALFS	MESIC	P	0 -1.0	DEC-JUN	<6.0	NONE			2B3	0-3% 3-8%	4W 6W
WATCHUNG, STONY (MD0028) TYPIC OCHRAQUALFS	MESIC	P	0 -1.0	DEC-JUN	<6.0	NONE			2B3	0-8%	7S
WAYLAND (NY0078) MOLLIC FLUVAQUENTS	MESIC	P,VP	+.5-1.0	NOV-JUN	<6.0	FREQUENT	BRIEF-LONG	NOV-JUN	2B3,3,4	MK, DRAINED MK, UNDRAINED L, SIL, SICL, FSL, DRAINED L, SIL, SICL, FSL, UNDRAINED	4W 5W 3W 4W
WEHADKEE (NC0052) TYPIC FLUVAQUENTS	THERMIC	P	0 -1.0	NOV-MAY	<6.0	COMMON	BRIEF-LONG	NOV-JUN	2B3,4	DRAINED UNDRAINED	4W 6W
WORSHAM (VA0009) TYPIC OCHRAQUULTS	THERMIC	P	0 -1.0	NOV-APR	<6.0	NONE			2B3	0-3% 3-8%	4W 4W
WYALUSING (PA0143) TYPIC FLUVAQUENTS	MESIC	P	0 -0.5	SEP-JUN	>=6.0	FREQUENT	V BRIEF-LONG		2B2	0-5%	4W
ZIPP (IN0055) VERTIC ENDOAQUEPTS	MESIC	VP	+.5-1.0	DEC-MAY	<6.0	NONE			2B3,3	SIC SICL, SIL	3W 3W
ZIPP, FLOODED (IN0196) VERTIC ENDOAQUEPTS	MESIC	VP	+.5-1.0	DEC-MAY	<6.0	RARE-COMMON	BRIEF-LONG	DEC-MAY	2B3,3,4	RARE OCCAS, BRIEF, DRAINED FREQ, BRIEF, DRAINED OCCAS, LONG, DRAINED FREQ, LONG, DRAINED UNDRAINED	3W 3W 3W 4W 4W 5W

@ SOME DRAINAGE CLASSES FOR THIS SOIL ARE NOT HYDRIC.
# SOME PHASES OF THIS SOIL ARE NOT FREQUENTLY FLOODED OF LONG DURATION.
* SOME SOIL INTERPRETATION RECORDS REPRESENTING PHASES OF THIS SERIES ARE NOT HYDRIC.

Nationwide Permits and Conditions



US Army Corps of Engineers

A. Index of the Nationwide Permits and Conditions

Nationwide Permits

1. Aids to Navigation
2. Structures in Artificial Canals
3. Maintenance
4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
5. Scientific Measurement Devices
6. Survey Activities
7. Outfall Structures
8. Oil and Gas Structures
9. Structures in Fleeting and Anchorage Areas
10. Mooring Buoys
11. Temporary Recreational Structures
12. Utility Line Discharges
13. Bank Stabilization
14. Road Crossings
15. U.S. Coast Guard Approved Bridges
16. Return Water from Upland Contained Disposal Areas
17. Hydropower Projects
18. Minor Discharges
19. Minor Dredging
20. Oil Spill Cleanup
21. Surface Coal Mining Activities
22. Removal of Vessels
23. Approved Categorical Exclusions
24. State Administered Section 404 Programs
25. Structural Discharges
26. Headwaters and Isolated Waters Discharges
27. Wetland and Riparian Restoration and Creation Activities
28. Modifications of Existing Marinas
29. Single-Family Housing
30. Moist Soil Management for Wildlife
31. Maintenance of Existing Flood Control Projects
32. Completed Enforcement Actions
33. Temporary Construction, Access and Dewatering
34. Cranberry Production Activities
35. Maintenance Dredging of Existing Basins

36. Boat Ramps
37. Emergency Watershed Protection and Rehabilitation
38. Cleanup of Hazardous and Toxic Waste
39. Reserved
40. Farm Buildings

Nationwide Permit Conditions

General Conditions:

1. Navigation
2. Proper Maintenance
3. Erosion and Siltation Controls
4. Aquatic Life Movements
5. Equipment
6. Regional and Case-by-Case Conditions
7. Wild and Scenic Rivers
8. Tribal Rights
9. Water Quality Certification
10. Coastal Zone Management
11. Endangered Species
12. Historic Properties
13. Notification
14. Compliance Certification
15. Multiple Use of Nationwide Permits.

Section 404 Only Conditions:

1. Water Supply Intakes
2. Shellfish Production
3. Suitable Material
4. Mitigation
5. Spawning Areas
6. Obstruction of High Flows
7. Adverse Effects from Impoundments
8. Waterfowl Breeding Areas
9. Removal of Temporary Fills

B. Nationwide Permits and Conditions

1. Aids to Navigation. The placement of aids to navigation and regulatory markers which are approved by and installed in accordance with the requirements of the U.S. Coast Guard. (See 33 CFR Part 66, Chapter I, Subchapter C). (Section 10)

2. Structures in Artificial Canals. Structures constructed in artificial canals within principally residential developments where the connection of the canal to a navigable water of the United States has been previously authorized (see 33 CFR 322.5(g)). (Section 10)

3. Maintenance. The repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make repair, rehabilitation, or

replacement are permitted, provided the environmental effects resulting from such repair, rehabilitation, or replacement are minimal. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction. This NWP authorizes the repair, rehabilitation, or replacement of those structures destroyed by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced or under contract to commence within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the District Engineer, provided the permittee can demonstrate funding, contract, or other similar delays. Maintenance dredging and beach restoration are not authorized by this NWP. (Sections 10 and 404)

4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities. Fish and wildlife harvesting devices and activities such as pound nets, crab traps, crab dredging, eel pots, lobster traps, duck blinds, clam and oyster digging; and small fish attraction devices such as open water fish concentrators (sea kites, etc.). This NWP authorizes shellfish seeding provided this activity does not occur in wetlands or sites that support submerged aquatic vegetation (including sites where submerged aquatic vegetation is documented to exist, but may not be present in a given year.). This NWP does not authorize artificial reefs or impoundments and semi-impoundments of waters of the United States for the culture or holding of motile species such as lobster, or the use of covered oyster trays or clam racks. (Sections 10 and 404)

5. Scientific Measurement Devices. Devices whose purpose is to measure and record scientific data such as staff gages, tide gages, water recording devices, water quality testing and improvement devices and similar structures. Small weirs and flumes constructed primarily to record water quantity and velocity are also authorized provided the discharge is limited to 25 cubic yards and further for discharges of 10 to 25 cubic yards provided the permittee notifies the District Engineer in accordance with the "Notification" general condition. (Sections 10 and 404)

6. Survey Activities. Survey activities including core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, soil survey and sampling, and historic resources surveys. Discharges and structures associated with the recovery of historic resources are not authorized by this NWP. Drilling and the discharge of excavated material from test wells for oil and gas exploration is not authorized by this NWP; the plugging of such wells is authorized. Fill placed for roads, pads and other similar activities is not authorized by this NWP. The NWP does not authorize any permanent structures. The discharge of drilling muds and cuttings may require a permit under Section 402 of the Clean Water Act. (Sections 10 and 404)

7. Outfall Structures. Activities related to construction of outfall structures and associated intake structures where the effluent from the outfall is authorized, conditionally authorized, or specifically exempted, or are otherwise in compliance with regulations issued under the National Pollutant Discharge Elimination System program (Section 402 of the Clean Water Act), provided that the permittee notifies the District Engineer in accordance with the "Notification" general condition. (Also see 33 CFR 330.1(e)). Intake structures per se are not included--only those directly associated with an outfall structure. (Sections 10 and 404)

8. Oil and Gas Structures. Structures for the exploration, production, and transportation of oil, gas, and minerals on the outer continental shelf within areas leased for such purposes by the Department of the Interior, Minerals Management Service. Such structures shall not be placed within the limits of any designated shipping safety fairway or traffic separation scheme, except temporary anchors that comply with the fairway regulations in 33 CFR 322.5(l). (Where such limits have not been designated, or where changes are anticipated, District Engineers will consider asserting discretionary authority in accordance with 33 CFR 330.4(e) and will also review such proposals to ensure they comply with the provisions of

the fairway regulations in 33 CFR 322.5(l). Any Corps review under this permit will be limited to the effects on navigation and national security in accordance with 33 CFR 322.5(f)). Such structures will not be placed in established danger zones or restricted areas as designated in 33 CFR Part 334: nor will such structures be permitted in EPA or Corps designated dredged material disposal areas. (Section 10)

9. Structures in Fleeting and Anchorage Areas. Structures, buoys, floats and other devices placed within anchorage or fleeting areas to facilitate moorage of vessels where such areas have been established for that purpose by the U.S. Coast Guard. (Section 10)

10. Mooring Buoys. Non-commercial, single-boat, mooring buoys. (Section 10)

11. Temporary Recreational Structures. Temporary buoys, markers, small floating docks, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use provided that such structures are removed within 30 days after use has been discontinued. At Corps of Engineers reservoirs, the reservoir manager must approve each buoy or marker individually. (Section 10)

12. Utility Line Discharges. Discharges of dredged or fill material associated with excavation, backfill or bedding for utility lines, including outfall and intake structures, provided there is no change in preconstruction contours. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquefiable, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone and telegraph messages, and radio and television communication. The term "utility line" does not include activities which drain a water of the United States, such as drainage tile; however, it does apply to pipes conveying drainage from another area. This NWP authorizes mechanized landclearing necessary for the installation of utility lines, including overhead utility lines, provided the cleared area is kept to the minimum necessary and preconstruction contours are maintained. However, access roads, temporary or permanent, or foundations associated with overhead utility lines are not authorized by this NWP. Material resulting from trench excavation may be temporarily sidecast (up to three months) into waters of the United States, provided that the material is not placed in such a manner that it is dispersed by currents or other forces. The DE may extend the period of temporary side-casting not to exceed a total of 180 days, where appropriate. The area of waters of the United States that is disturbed must be limited to the minimum necessary to construct the utility line. In wetlands, the top 6" to 12" of the trench should generally be backfilled with topsoil from the trench. Excess material must be removed to upland areas immediately upon completion of construction. Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line. (See 33 CFR Part 322).

Notification: The permittee must notify the district engineer in accordance with the "Notification" general condition, if any of the following criteria are met:

a. Mechanized landclearing in a forrested wetland;
b. A Section 10 permit is required for the utility line;
c. The utility line in waters of the United States exceeds 500 feet; or,
d. The utility line is placed within a jurisdictional area (i.e., a water of the United States), and it runs parallel to a streambed that is within that jurisdictional area. (Sections 10 and 404)

13. Bank Stabilization. Bank stabilization activities necessary for erosion prevention provided the activity meets all of the following criteria:

a. No material is placed in excess of the minimum needed for erosion protection;
b. The bank stabilization activity is less than 500 feet in length;
c. The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line;

d. No material is placed in any special aquatic site, including wetlands;
e. No material is of the type, or is placed in any location, or in any manner, so as to impair surface water flow into or out of any wetland area;
f. No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and,
g. The activity is part of a single and complete project.

Bank stabilization activities in excess of 500 feet in length or greater than an average of one cubic yard per running foot may be authorized if the permittee notifies the District Engineer in accordance with the "Notification" general condition and the District Engineer determines the activity complies with the other terms and conditions of the NWP and the adverse environmental effects are minimal both individually and cumulatively. This NWP may not be used for the channelization of a water of the Unitied States. (Sections 10 and 404)

14. Road Crossings. Fills for roads crossing waters of the United States (including wetlands and other special aquatic sites) provided the activity meets all of the following criteria:
    a. The width of the fill is limited to the minimum necessary for the actual crossing;
    b. The fill placed in waters of the United States is limited to a filled area of no more than 1/3 acre. Furthermore, no more than a total of 200 linear feet of the fill for the roadway can occur in special aquatic sites, including wetlands;
    c. The crossing is culverted, bridged or otherwise designed to prevent the restriction of, and to withstand, expected high flows and tidal flows, and to prevent the restriction of low flows and the movement of aquatic organisms;
    d. The crossing, including all attendant features, both temporary and permanent, is part of a single and complete project for crossing of a water of the United States; and,
    e. For fills in special aquatic sites, including wetlands, the permittee notifies the District Engineer in accordance with the "Notification" general condition. The notification must also include a delineation of affected special aquatic sites, including wetlands.

    This NWP may not be combined with NWP 18 or NWP 26 for the purpose of increasing the footprint of the road crossing. Some road fills may be eligible for an exemption from the need for a Section 404 permit altogether (see 33 CFR 323.4). Also, where local circumstances indicate the need, District Engineers will define the term "expected high flows" for the purpose of establishing applicability of this NWP. (Sections 10 and 404)

15. U.S. Coast Guard Approved Bridges. Discharges of dredged or fill material incidental to the construction of bridges across navigable waters of the United States, including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills provided such discharges have been authorized by the U.S. Coast Guard as part of the bridge permit. Causeways and approach fills are not included in this NWP and will require an individual or regional Section 404 permit. (Section 404)

16. Return Water From Upland Contained Disposal Areas. Return water from an upland, contained dredged material disposal area. The dredging itself may require a Section 404 permit (33 CFR 323.2(d)), but will require a Section 10 permit if located in navigable waters of the United States. The return water from a contained disposal area is administratively defined as a discharge of dredged material by 33 CFR 323.2(d) even though the disposal itself occurs on the upland and thus does not require a Section 404 permit. This NWP satisfies the technical requirement for a Section 404 permit for the return water where the quality of the return water is controlled by the state through the Section 401 certification procedures. (Section 404)

17. Hydropower Projects. Discharges of dredged or fill material associated with (a) small hydropower projects at existing reservoirs where the project, which includes the fill, are licensed by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act of 1920, as amended; and has a total generating capacity of not more than 5000 KW;

and the permittee notifies the District Engineer in accordance with the "Notification" general condition; or (b) hydropower projects for which the FERC has granted an exemption from licensing pursuant to Section 408 of the Energy Security Act of 1980 (16 U.S.C. 2705 and 2708) and Section 30 of the Federal Power Act, as amended; provided the permittee notifies the District Engineer in accordance with the "Notification" general condition. (Section 404)

18. Minor Discharges. Minor discharges of dredged or fill material into all waters of the United States provided that the activity meets all of the following criteria:
    a. The quantity of discharged material and the volume of excavated area does not exceed 25 cubic yards below the plane of the ordinary high water mark or the high tide line;
    b. The discharge, including any excavated area, will not cause the loss of more than 1/10 acre of a special aquatic site, including wetlands. For the purposes of this NWP, the acreage limitation includes the filled area and excavated area plus special aquatic sites that are adversely affected by flooding and special aquatic sites that are drained so that they would no longer be a water of the United States as a result of the project;
    c. If the discharge, including any excavated area, exceeds 10 cubic yards below the plane of the ordinary high water mark or the high tide line or if the discharge is in a special aquatic site, including wetlands, the permittee notifies the District Engineer in accordance with the "Notification" general condition. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands (Also see 33 CFR 330.1(e)); and
    d. The discharge, including all attendant features, both temporary and permanent, is part of a single and complete project and is not placed for the purpose of a stream diversion.
    e. This NWP can not be used in conjunction with NWP 26 for any single and complete project. (Sections 10 and 404)

19. Minor Dredging. Dredging of no more than 25 cubic yards below the plane of the ordinary high water mark or the mean high water mark from navigable waters of the United States (i.e., Section 10 waters) as part of a single and complete project. This NWP does not authorize the dredging or degradation through siltation of coral reefs, sites that support submerged aquatic vegetation (including sites where submerged aquatic vegetation is documented to exist, but may not be present in a given year), anadromous fish spawning areas, or wetlands, or the connection of canals or other artificial waterways to navigable waters of the United States (see Section 33 CFR 322.5(g)). (Sections 10 and 404)

20. Oil Spill Cleanup. Activities required for the containment and cleanup of oil and hazardous substances which are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300) provided that the work is done in accordance with the Spill Control and Countermeasure Plan required by 40 CFR Part 112.3 and any existing State contingency plan and provided that the Regional Response Team (if one exists in the area) concurs with the proposed containment and cleanup action. (Sections 10 and 404)

21. Surface Coal Mining Activities. Activities associated with surface coal mining activities provided they are authorized by the Department of the Interior, Office of Surface Mining (OSM), or by states with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977 and provided the permittee notifies the District Engineer in accordance with the "Notification" general condition. The notification must include an OSM or state approved mitigation plan. The Corps, at the discretion of the District Engineer, may require a bond to ensure success of the mitigation, if no other Federal or state agency has required one. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands. (Also see 33 CFR 330.1(e)) (Sections 10 and 404)

22. Removal of Vessels. Temporary structures or minor discharges of dredged or fill material required for the removal of wrecked, abandoned, or disabled vessels, or the removal of man-made obstructions to navigation. This NWP does not authorize the removal of vessels listed or determined eligible for listing on the National Register of Historic Places unless the District Engineer is notified and indicates that there is compliance with the "Historic Properties" general condition. This NWP does not authorize maintenance dredging, shoal removal, or river bank snagging. Vessel disposal in waters of the United States may need a permit from EPA (see 40 CFR 229.3). (Sections 10 and 404)

23. Approved Categorical Exclusions. Activities undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another Federal agency or department where that agency or department has determined, pursuant to the Council on Environmental Quality Regulation for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Part 1500 et seq.), that the activity, work, or discharge is categorically excluded from environmental documentation because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the human environment, and the Office of the Chief of Engineers (ATTN: CECW-OR) has been furnished notice of the agency's or department's application for the categorical exclusion and concurs with that determination. Prior to approval for purposes of this NWP of any agency's categorical exclusions, the Chief of Engineers will solicit public comment. In addressing these comments, the Chief of Engineers may require certain conditions for authorization of an agency's categorical exclusions under this NWP. (Sections 10 and 404)

24. State Administered Section 404 Program. Any activity permitted by a state administering its own Section 404 permit program pursuant to 33 U.S.C. 1344(g)-(l) is permitted pursuant to Section 10 of the Rivers and Harbors Act of 1899. Those activities which do not involve a Section 404 state permit are not included in this NWP, but certain structures will be exempted by Section 154 of Public Law 94-587, 90 Stat. 2917 (33 U.S.C. 591) (see 33 CFR 322.3(a)(2)). (Section 10)

25. Structural Discharges. Discharges of material such as concrete, sand, rock, etc. into tightly sealed forms or cells where the material will be used as a structural member for standard pile supported structures, such as bridges, transmission line footings, and walkways or for general navigation, such as mooring cells, including the excavation of bottom material from within the form prior to the discharge of concrete, sand, rock, etc. This NWP does not authorize filled structural members that would support buildings, homes, parking areas, storage areas and other such structures. Housepads or other building pads are also not included in this NWP. The structure itself may require a Section 10 permit if located in navigable waters of the United States. (Section 404)

April 15, 2000?

26. Headwaters and Isolated Waters Discharges. Discharges of dredged or fill material into headwaters and isolated waters provided that the activity meets all of the following criteria:
    a. The discharge does not cause the loss of more than 3 acres of waters of the United States nor cause the loss of waters of the United States for a distance greater than 500 linear feet of the stream bed;
    b. For discharges causing the loss of greater than 1/3 acre of waters of the United States, the permittee notifies the District Engineer in accordance with the "Notification" general condition;
    c. For discharges causing a loss of 1/3 acre or less of waters of the United States the permittee must submit a report within 30 days of completion of the work, containing the information listed below;
    d. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands (Also see 33 CFR 330.1(e)); and
    e. The discharge, including all attendant features, both temporary and permanent, is part

of a single and complete project. Note, this NWP will expire on December 13, 1998.

For the purposes of this NWP, the acreage of loss of waters of the United States includes the filled area plus waters of the United States that are adversely affected by flooding, excavation or drainage as a result of the project. The 3 acre and 1/3 acre limits of NWP 26 are absolute, and cannot be increased by any mitigation plan offered by the applicant or required by the District Engineer. Whenever any other NWP is used in conjunction with this NWP, the total acreage of impacts to waters of the United States of all NWPs combined, can not exceed 3 acres.

Subdivisions: For any real estate subdivision created or subdivided after October 5, 1984, a notification pursuant to subsection (b) of this NWP is required for any discharge which would cause the aggregate total loss of waters of the United States for the entire subdivision to exceed 1/3 acre. Any discharge in any real estate subdivision which would cause the aggregate total loss of waters of the United States in the subdivision to exceed 3 acres is not authorized by this NWP; unless the District Engineer exempts a particular subdivision or parcel by making a written determination that: (1) the individual and cumulative adverse environmental effects would be minimal and the property owner had, after October 5, 1984, but prior to February 11, 1997, committed substantial resources in reliance on NWP 26 with regard to a subdivision, in circumstances where it would be inequitable to frustrate the property owner s investment-backed expectations, or (2) that the individual and cumulative adverse environmental effects would be minimal, high quality wetlands would not be adversely affected, and there would be an overall benefit to the aquatic environment. Once the exemption is established for a subdivision, subsequent lot development by individual property owners may proceed using NWP 26. For purposes of NWP 26, the term "real estate subdivision" shall be interpreted to include circumstances where a landowner or developer divides a tract of land into smaller parcels for the purpose of selling, conveying, transferring, leasing, or developing said parcels. This would include the entire area of a residential, commercial or other real estate subdivision, including all parcels and parts thereof.

Report: For discharges causing the loss of 1/3 acre or less of waters of the United States the permittee must submit a report within 30 days of completion of the work, containing the following information:

a. Name, address, and telephone number of the permittee;
b. Location of the work;
c. Description of the work; and,
d. Type and acreage (or square feet) of the loss of waters of the United States (e.g., 1/10 acre of marsh and 50 Square feet of a stream.) (Section 404)

27. Wetland and Riparian Restoration and Creation Activities. Activities in waters of the United States associated with the restoration of former non-tidal wetlands and riparian areas, the enhancement of degraded wetlands and riparian areas, and creation of wetlands and riparian areas; (i) on non-Federal public lands and private lands, in accordance with the terms and conditions of a binding wetland restoration or creation agreement between the landowner and the U.S. Fish and Wildlife Service or the Natural Resources Conservation Service (NRCS) or voluntary wetland restoration, enhancement, and creation actions documented by the NRCS pursuant to NRCS regulations; or (ii) on any Federal land; or (iii) on reclaimed surface coal mined lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the Office of Surface Mining or the applicable state agency. (The future reversion does not apply to wetlands created, restored or enhanced as mitigation for the mining impacts, nor naturally due to hydrologic or topographic features, nor for a mitigation bank.); or (iv) on any public or private land, provided the permittee notifies the District Engineer in accordance with the "Notification" general condition. Such activities include, but are not limited to: installation and maintenance of small water control structures, dikes, and berms; backfilling of existing drainage ditches; removal of existing drainage structures; construction of small nesting islands; plowing or discing for seed bed

preparation; and other related activities. This NWP applies to restoration projects that serve the purpose of restoring "natural" wetland hydrology, vegetation, and function to altered and degraded non-tidal wetlands and "natural" functions of riparian areas. This NWP does not authorize the conversion of natural wetlands to another aquatic use, such as creation of waterfowl impoundments where a forested wetland previously existed.

Reversion. For restoration, enhancement and creation projects conducted under paragraghs (ii) and (iv), this NWP does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases a separate permit at that time would be required for any reversion. For restoration, enhancement and creation projects conducted under paragraghs (i) and (iii), this NWP also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or creation activities) within five years after expiration of a limited term wetland restoration or creation agreement or permit, even if the discharge occurs after this NWP expires. The five year reversion limit does not apply to agreements without time limits reached under paragraph (i). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate state agency executing the agreement or permit. Prior to any reversion activity the permittee or the appropriate Federal or state agency must notify the District Engineer and include the documentation of the prior condition. Once an area has reverted back to its prior physical condition, it will be subject to whatever the Corps regulatory requirements will be at that future date. (Sections 10 and 404)

28. Modifications of Existing Marinas. Reconfiguration of existing docking facilities within an authorized marina area. No dredging, additional slips or dock spaces, or expansion of any kind within waters of the United States is authorized by this NWP. (Section 10)

29. Single-Family Housing. Discharges of dredged or fill material into non-tidal waters of the United States, including non-tidal wetlands for the construction or expansion of a single-family home and attendant features (such as a garage, driveway, storage shed, and/or septic field) for an individual permittee provided that the activity meets all of the following criteria:
    a. The discharge does not cause the loss of more than ~~1/2~~ 1/4 acre of non-tidal waters of the United States, including non-tidal wetlands;
    b. The permittee notifies the District Engineer in accordance with the "Notification" general condition;
    c. The permittee has taken all practicable actions to minimize the on-site and off- site impacts of the discharge. For example, the location of the home may need to be adjusted on-site to avoid flooding of adjacent property owners;
    d. The discharge is part of a single and complete project; furthermore, that for any subdivision created on or after November 22, 1991, the discharges authorized under this NWP may not exceed an aggregate total loss of waters of the United States of 1/2 1/4 acre for the entire subdivision;
    e. An individual may use this NWP only for a single-family home for a personal residence;
    f. This NWP may be used only once per parcel;
    g. This NWP may not be used in conjunction with NWP 14, NWP 18, or NWP 26, for any parcel; and,
    h. Sufficient vegetated buffers must be maintained adjacent to all open water bodies, streams, etc., to preclude water quality degradation due to erosion and sedimentation.

For the purposes of this NWP, the acreage of loss of waters of the United States includes the filled area previously permitted, the proposed filled area, and any other waters of the United States that are adversely affected by flooding, excavation, or drainage as a result of the project. Whenever any other NWP is used in conjunction with this NWP, the total acreage

of impacts to waters of the United States of all NWPs combined, can not exceed 1/2 acres. This NWP authorizes activities only by individuals; for this purpose, the term "individual" refers to a natural person and/or a married couple, but does not include a corporation, partnership, or similar entity. For the purposes of this NWP, a parcel of land is defined as "the entire contiguous quantity of land in possession of, recorded as property of, or owned (in any form of ownership, including land owned as a partner, corporation, joint tenant, etc.) by the same individual (and/or that individual s spouse), and comprises not only the area of wetlands sought to be filled, but also all land contiguous to those wetlands, owned by the individual (and/or that individual s spouse) in any form of ownership". (Sections 10 and 404)

30. Moist Soil Management for Wildlife. Discharges of dredged or fill material and maintenance activities that are associated with moist soil management for wildlife performed on non-tidal Federally-owned or managed and State-owned or managed property, for the purpose of continuing ongoing, site-specific, wildlife management activities where soil manipulation is used to manage habitat and feeding areas for wildlife. Such activities include, but are not limited to: the repair, maintenance or replacement of existing water control structures; the repair or maintenance of dikes; and plowing or discing to impede succession, prepare seed beds, or establish fire breaks. Sufficient vegetated buffers must be maintained adjacent to all open water bodies, streams, etc., to preclude water quality degradation due to erosion and sedimentation. This NWP does not authorize the construction of new dikes, roads, water control structures, etc. associated with the management areas. This NWP does not authorize converting wetlands to uplands, impoundments or other open water bodies. (Section 404)

31. Maintenance of Existing Flood Control Facilities. Discharges of dredged or fill material for the maintenance of existing flood control facilities, including debris basins, retention/detention basins, and channels that were (i) previously authorized by the Corps by individual permit, general permit, or by 33 CFR 330.3 and constructed or (ii) constructed by the Corps and transferred to a local sponsor for operation and maintenance. The maintenance is limited to that approved in a maintenance baseline determination made by the district engineer (DE). The prospective permittee will provide the DE with sufficient evidence for the DE to determine the approved and constructed baseline. Subsequent to the determination of the maintenance baseline and prior to any maintenance work, the permittee must notify the DE in accordance with the Notification general condition.

All dredged material must be placed in an upland site or a currently authorized disposal site in waters of the United States, and proper siltation controls must be used. This NWP does not authorize the removal of sediment and associated vegetation from natural water courses. (Activities that involve only the cutting and removing of vegetation above the ground, e.g., mowing, rotary cutting, and chainsawing, where the activity neither substantially disturbs the root system nor involves mechanized pushing, dragging, or other similar activities that redeposit excavated soil material, does not require a Section 404 permit in accordance with 33 CFR 323.2(d)(2)(ii)). Only constructed channels within stretches of natural rivers that have been previously authorized as part of a flood control facility could be authorized for maintenance under this NWP.

Maintenance Baseline. Upon receipt of sufficient evidence, the DE will determine the maintenance baseline. The maintenance baseline is the existing flood control project that the DE has determined can be maintained under this NWP, subject to any case-specific conditions required by the DE. In determining the maintenance baseline, the DE will consider the following factors: the approved facility, the actual constructed facility, the Corps constructed project that was transferred, the maintenance history, if the facility has been functioning at a reduced capacity and for how long, present vs. original flood control needs, and if sensitive/unique functions and values may be adversely affected. Revocation or modification of the final determination of the maintenance baseline can only be done in

accordance with 33 CFR Part 330.5. This NWP can not be used until the DE determines the maintenance baseline and the need for mitigation and any regional or activity-specific conditions. The maintenance baseline will only be determined once and will remain valid for any subsequent reissuance of this NWP. However, if the project is effectively abandoned or reduced due to lack of proper maintenance, a new determination of a maintenance baseline would be required before this NWP could be used for subsequent maintenance.

Mitigation. In determining the need for mitigation, the DE will consider the following factors: any original mitigation required, the current environmental setting, and any adverse effects of the maintenance project that were not mitigated in the original construction. The DE will not delay needed maintenance for completion of any required mitigation, provided that the DE and the applicant establish a schedule for the identification, approval, development, construction and completion of such required mitigation. (Sections 10 and 404)

32. Completed Enforcement Actions. Any structure, work or discharge of dredged or fill material, remaining in place, or undertaken for mitigation, restoration, or environmental benefit in compliance with either:
    i. the terms of a final written Corps non-judicial settlement agreement resolving a violation of Section 404 of the Clean Water Act (CWA) and/or Section 10 of the Rivers and Harbors Act of 1899; or the terms of an EPA 309(a) order on consent resolving a violation of Section 404 of the CWA, provided that:
        a. The unauthorized activity affected no more than 5 acres of nontidal wetlands or 1 acre of tidal wetlands;
        b. The settlement agreement provides for environmental benefits, to an equal or greater degree, than the environmental detriments caused by the unauthorized activity that is authorized by this nationwide permit; and
        c. The District Engineer issues a verification letter authorizing the activity subject to the terms and conditions of this nationwide permit and the settlement agreement, including a specified completion date; or
    ii. the terms of a final Federal court decision, consent decree, or settlement agreement resulting from an enforcement action brought by the United States under Section 404 of the CWA and/or Section 10 of the Rivers and Harbors Act of 1899.

    For both (i) or (ii) above, compliance is a condition of the NWP itself. Any authorization under this NWP is automatically revoked if the permittee does not comply with the terms of this NWP or the terms of the court decision, consent decree, or judicial/non-judicial settlement agreement or fails to complete the work by the specified completion date. This NWP does not apply to any activities occurring after the date of the decision, decree, or agreement that are not for the purpose of mitigation, restoration, or environmental benefit. Prior to reaching any settlement agreement the Corps will ensure compliance with the provisions of 33 CFR Part 326 and 33 CFR 330.6(d)(2) and (e). (Sections 10 and 404)

33. Temporary Construction, Access and Dewatering. Temporary structures, work and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites; provided that the associated primary activity is authorized by the Corps of Engineers or the U.S. Coast Guard, or for other construction activities not subject to the Corps or U.S. Coast Guard regulations. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must be of materials, and placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if it is determined by the District Engineer that it will not cause more than minimal adverse effects on aquatic resources. Temporary fill must be entirely removed to upland areas, or dredged material returned to its original location, following completion of the construction activity, and the affected areas must be restored to the pre-project conditions. Cofferdams cannot be used to dewater wetlands or other aquatic areas so as to change their use. Structures left in place after cofferdams are removed require

a Section 10 permit if located in navigable waters of the United States. (See 33 CFR Part 322). The permittee must notify the District Engineer in accordance with the "Notification" general condition. The notification must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic resources. The District Engineer will add special conditions, where necessary, to ensure that adverse environmental effects are minimal. Such conditions may include: limiting the temporary work to the minimum necessary; requiring seasonal restrictions; modifying the restoration plan; and requiring alternative construction methods (e.g., construction mats in wetlands where practicable.). (Sections 10 and 404)

34. Cranberry Production Activities. Discharges of dredged or fill material for dikes, berms, pumps, water control structures or leveling of cranberry beds associated with expansion, enhancement, or modification activities at existing cranberry production operations provided that the activity meets all of the following criteria:
    a. The cumulative total acreage of disturbance per cranberry production operation, including but not limited to, filling, flooding, ditching, or clearing, does not exceed 10 acres of waters of the United States, including wetlands;
    b. The permittee notifies the District Engineer in accordance with the "Notification" general condition. The notification must include a delineation of affected special aquatic sites, including wetlands; and,
    c. The activity does not result in a net loss of wetland acreage. This NWP does not authorize any discharge of dredged or fill material related to other cranberry production activities such as warehouses, processing facilities, or parking areas. For the purposes of this NWP, the cumulative total of 10 acres will be measured over the period that this NWP is valid. (Section 404)

35. Maintenance Dredging of Existing Basins. Excavation and removal of accumulated sediment for maintenance of existing marina basins, access channels to marina basins or boat slips, and boat slips to previously authorized depths or controlling depths for ingress/egress, whichever is less, provided the dredged material is disposed of at an upland site and proper siltation controls are used. (Section 10)

36. Boat Ramps. Activities required for the construction of boat ramps provided:
    a. The discharge into waters of the United States does not exceed 50 cubic yards of concrete, rock, crushed stone or gravel into forms, or placement of pre-cast concrete planks or slabs. (Unsuitable material that causes unacceptable chemical pollution or is structurally unstable is not authorized);
    b. The boat ramp does not exceed 20 feet in width;
    c. The base material is crushed stone, gravel or other suitable material;
    d. The excavation is limited to the area necessary for site preparation and all excavated material is removed to the upland; and,
    e. No material is placed in special aquatic sites, including wetlands.

    Dredging to provide access to the boat ramp may be authorized by another NWP, regional general permit, or individual permit pursuant to Section 10 if located in navigable waters of the United States. (Sections 10 and 404)

37. Emergency Watershed Protection and Rehabilitation. Work done by or funded by the Natural Resources Conservation Service qualifying as an "exigency" situation (requiring immediate action) under its Emergency Watershed Protection Program (7 CFR Part 624) and work done or funded by the Forest Service under its Burned-Area Emergency Rehabilitation Handbook (FSH 509.13) provided the District Engineer is notified in accordance with the "Notification" general condition. (Also see 33 CFR 330.1(e)). (Sections 10 and 404)

38. Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the

containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority provided the permittee notifies the District Engineer in accordance with the "Notification" general condition. For discharges in special aquatic sites, including wetlands, the notification must also include a delineation of affected special aquatic sites, including wetlands. Court ordered remedial action plans or related settlements are also authorized by this NWP. This NWP does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste. Activities undertaken entirely on a CERCLA site by authority of CERCLA as approved or required by EPA, are not required to obtain permits under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. (Sections 10 and 404)

39. Reserved

40. Farm Buildings. Discharges of dredged or fill material into jurisdictional wetlands (but not including prairie potholes, playa lakes, or vernal pools) that were in agricultural crop production prior to December 23, 1985, i.e., farmed wetlands, for foundations and building pads for farm buildings. The discharge will be limited to the minimum necessary but will in no case exceed 1 acre (see the "Mitigation" Section 404 only condition). The permittee must notify the District Engineer in accordance with the "Notification" general condition for any farm building within 500 linear feet of any flowing water. (Section 404)

C. NATIONWIDE PERMIT CONDITIONS

GENERAL CONDITIONS:

The following general conditions must be followed in order for any authorization by a NWP to be valid:

1. Navigation. No activity may cause more than a minimal adverse effect on navigation.

2. Proper maintenance. Any structure or fill authorized shall be properly maintained, including maintenance to ensure public safety.

3. Erosion and siltation controls. Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date.

4. Aquatic life movements. No activity may substantially disrupt the movement of those species of aquatic life indigenous to the waterbody, including those species which normally migrate through the area, unless the activity s primary purpose is to impound water.

5. Equipment. Heavy equipment working in wetlands must be placed on mats, or other measures must be taken to minimize soil disturbance.

6. Regional and case-by-case conditions. The activity must comply with any regional conditions which may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state or tribe in its section 401 water quality certification.

7. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System; or in a river officially designated by Congress as a "study river" for possible inclusion in the system, while the river is in an official study status; unless the appropriate Federal agency, with direct management responsibility for such river, has

determined in writing that the proposed activity will not adversely effect the Wild and Scenic River designation, or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service.)

8. Tribal rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

9. Water quality certification. In certain states, an individual Section 401 water quality certification must be obtained or waived (see 33 CFR 330.4(c)).

10. Coastal zone management. In certain states, an individual state coastal zone management consistency concurrence must be obtained or waived (see Section 330.4(d)).

11. Endangered Species.
    a. No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. Non-federal permittees shall notify the District Engineer if any listed species or critical habitat might be affected or is in the vicinity of the project, and shall not begin work on the activity until notified by the District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized.
    b. Authorization of an activity by a nationwide permit does not authorize the take of a threatened or endangered species as defined under the Federal Endangered Species Act. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with incidental take provisions, etc.) from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, both lethal and non-lethal takes of protected species are in violation of the Endangered Species Act. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. Fish and Wildlife Service and National Marine Fisheries Service or their world wide web pages at http://www.fws.gov/~r9endspp/endspp.html and http://kingfish.spp.nmfs.gov/tmcintyr/prot_res.html#ES and Recovery, respectively.

12. Historic properties. No activity which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places is authorized, until the DE has complied with the provisions of 33 CFR Part 325, Appendix C. The prospective permittee must notify the District Engineer if the authorized activity may affect any historic properties listed, determined to be eligible, or which the prospective permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin the activity until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the State Historic Preservation Office and the National Register of Historic Places (see 33 CFR 330.4(g)).

13. Notification.

    A. **Timing:** Where required by the terms of the NWP, the prospective permittee must notify the District Engineer with a Pre-Construction Notification (PCN) as early as possible and shall not begin the activity:
        1. Until notified by the District Engineer that the activity may proceed under the NWP with any special conditions imposed by the District or Division Engineer; or
        2. If notified by the District or Division Engineer that an individual permit is

required; or

3. Unless 30 days (or 45 days for NWP 26 only) have passed from the District Engineer's receipt of the notification and the prospective permittee has not received notice from the District or Division Engineer. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

B. Contents of Notification: The notification must be in writing and include the following information:

1. Name, address and telephone numbers of the prospective permittee;
2. Location of the proposed project;
3. Brief description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s) or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity; and
4. For NWPs 14, 18, 21, 26, 29, 34, and 38, the PCN must also include a delineation of affected special aquatic sites, including wetlands (see paragraph 13(f));
5. For NWP 21 - Surface Coal Mining Activities, the PCN must include an OSM or state approved mitigation plan.
6. For NWP 29-Single-Family Housing, the PCN must also include:
   i. Any past use of this NWP by the individual permittee and/or the permitee s spouse;
   ii. A statement that the single-family housing activity is for a personal residence of the permittee;
   iii. A description of the entire parcel, including its size, and a delineation of wetlands. For the purpose of this NWP, parcels of land measuring 0.5 acre or less will not require a formal on-site delineation. However, the applicant shall provide an indication of where the wetlands are and the amount of wetlands that exists on the property. For parcels greater than 0.5 acre in size, a formal wetland delineation must be prepared in accordance with the current method required by the Corps. (See paragraph 13(f));
   iv. A written description of all land (including, if available, legal descriptions) owned by the prospective permittee and/or the prospective permittee s spouse, within a one mile radius of the parcel, in any form of ownership (including any land owned as a partner, corporation, joint tenant, co-tenant, or as a tenant-by-the- entirety) and any land on which a purchase and sale agreement or other contract for sale or purchase has been executed;
7. For NWP 31- Maintenance of Existing Flood Control Projects, the prospective permittee must either notify the District Engineer with a Pre-Construction Notification (PCN) prior to each maintenance activity or submit a five year (or less) maintenance plan. In addition, the PCN must include all of the following:
   i. Sufficient baseline information so as to identify the approved channel depths and configurations and existing facilities. Minor deviations are authorized, provided that the approved flood control protection or drainage is not increased;
   ii. A delineation of any affected special aquatic sites, including wetlands; and,
   iii. Location of the dredged material disposal site.
8. For NWP 33-Temporary Construction, Access, and Dewatering, the PCN must also include a restoration plan of reasonable measures to avoid and minimize adverse effects to aquatic resources.

C. Form of Notification: The standard individual permit application form (Form ENG 4345) may be used as the notification but must clearly indicate that it is a PCN and

must include all of the information required in (b) (1)-(7) of General Condition 13. A letter may also be used.

D. **District Engineer s Decision:** In reviewing the pre-construction notification for the proposed activity, the District Engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. The prospective permittee may, optionally, submit a proposed mitigation plan with the pre-construction notification to expedite the process and the District Engineer will consider any optional mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed work are minimal. If the District Engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects are minimal, the District Engineer will notify the permittee and include any conditions the DE deems necessary.

Any mitigation proposal must be approved by the District Engineer prior to commencing work. If the prospective permittee elects to submit a mitigation plan, the District Engineer will expeditiously review the proposed mitigation plan, but will not commence a second 30-day (or 45-day for NWP 26) notification procedure. If the net adverse effects of the project (with the mitigation proposal) are determined by the District Engineer to be minimal, the District Engineer will provide a timely written response to the applicant stating that the project can proceed under the terms and conditions of the nationwide permit.

If the District Engineer determines that the adverse effects of the proposed work are more than minimal, then he will notify the applicant either: (1) that the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submitting a mitigation proposal that would reduce the adverse effects to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions.

E. **Agency Coordination:** The District Engineer will consider any comments from Federal and State agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

i. For NWP 14, 21, 26 (between 1 and 3 acres of impact) , 29, 33, 37, and 38. The District Engineer will, upon receipt of a notification, provide immediately, e.g., facsimile transmission, overnight mail or other expeditious manner, a copy to the appropriate offices of the Fish and Wildlife Service, State natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the National Marine Fisheries Service. With the exception of NWP 37, these agencies will then have 5 calendar days from the date the material is transmitted to telephone or fax the District Engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the District Engineer will wait an additional 10 calendar days (16 calendar days for NWP 26 PCNs) before making a decision on the notification. The District Engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency. The District Engineer will indicate in the administrative record associated with each notification that the resource agencies' concerns were considered. Applicants are encouraged to provide the Corps multiple copies of notifications to expedite agency notification.

ii. Optional Agency Coordination. For NWPs 5, 7, 12, 13, 17, 18, 27, 31, and 34, where a Regional Administrator of EPA, a Regional Director of USFWS, or a Regional Director of NMFS has formally requested general notification from

the District Engineer for the activities covered by any of these NWPs, the Corps will provide the requesting agency with notification on the particular NWPs. However, where the agencies have a record of not generally submitting substantive comments on activities covered by any of these NWPs, the Corps district may discontinue providing notification to those regional agency offices. The District Engineer will coordinate with the resources agencies to identify which activities involving a PCN that the agencies will provide substantive comments to the Corps. The District Engineer may also request comments from the agencies on a case by case basis when the District Engineer determines that such comments would assist the Corps in reaching a decision whether effects are more than minimal either individually or cumulatively.

iii. Optional Agency Coordination, 401 Denial. For NWP 26 only, where the state has denied its 401 water quality certification for activities with less than 1 acre of wetland impact, the EPA regional administrator may request agency coordination of PCNs between 1/3 and 1 acre. The request may only include acreage limitations within the 1/3 to 1 acre range for which the state has denied water quality certification. In cases where the EPA has requested coordination of projects as described here, the Corps will forward the PCN to EPA only. The PCN will then be forwarded to the Fish and Wildlife Service and the National Marine Fisheries Service by EPA under agreements among those agencies. Any agency receiving the PCN will be bound by the EPA timeframes for providing comments to the Corps.

F. Wetlands Delineations: Wetland delineations must be prepared in accordance with the current method required by the Corps. For NWP 29 see paragraph (b)(6)(iii) for parcels less than 0.5 acres in size. The permittee may ask the Corps to delineate the special aquatic site. There may be some delay if the Corps does the delineation. Furthermore, the 30-day period (45 days for NWP 26) will not start until the wetland delineation has been completed and submitted to the Corps, where appropriate.

G. Mitigation: Factors that the District Engineer will consider when determining the acceptability of appropriate and practicable mitigation include, but are not limited to:

i. To be practicable, the mitigation must be available and capable of being done considering costs, existing technology, and logistics in light of the overall project purposes;

ii. To the extent appropriate, permittees should consider mitigation banking and other forms of mitigation including contributions to wetland trust funds, in lieu fees to organizations such as The Nature Conservancy, state or county natural resource management agencies, where such fees contribute to the restoration, creation, replacement, enhancement, or preservation of wetlands. Furthermore, examples of mitigation that may be appropriate and practicable include but are not limited to: reducing the size of the project; establishing wetland or upland buffer zones to protect aquatic resource values; and replacing the loss of aquatic resource values by creating, restoring, and enhancing similar functions and values. In addition, mitigation must address wetland impacts, such as functions and values, and cannot be simply used to offset the acreage of wetland losses that would occur in order to meet the acreage limits of some of the NWPs (e.g., for NWP 26, 5 acres of wetlands cannot be created to change a 6-acre loss of wetlands to a 1 acre loss; however, 2 created acres can be used to reduce the impacts of a 3-acre loss.).

14. Compliance certification. Every permittee who has received a Nationwide permit verification from the Corps will submit a signed certification regarding the completed work and any required mitigation. The certification will be forwarded by the Corps with the authorization letter and will include: a.) A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions; b.) A statement that any required mitigation was completed in accordance with the permit

conditions; c.) The signature of the permittee certifying the completion of the work and mitigation.

15. Multiple use of Nationwide permits. In any case where any NWP number 12 through 40 is combined with any other NWP number 12 through 40, as part of a single and complete project, the permittee must notify the District Engineer in accordance with paragraphs a, b, and c on the Notification General Condition number 13. Any NWP number 1 through 11 may be combined with any other NWP without notification to the Corps, unless notification is otherwise required by the terms of the NWPs. As provided at 33 CFR 330.6(c) two or more different NWPs can be combined to authorize a single and complete project. However, the same NWP cannot be used more than once for a single and complete project.

SECTION 404 ONLY CONDITIONS:

In addition to the General Conditions, the following conditions apply only to activities that involve the discharge of dredged or fill material into waters of the U.S., and must be followed in order for authorization by the NWPs to be valid:

1. Water supply intakes. No discharge of dredged or fill material may occur in the proximity of a public water supply intake except where the discharge is for repair of the public water supply intake structures or adjacent bank stabilization.

2. Shellfish production. No discharge of dredged or fill material may occur in areas of concentrated shellfish production, unless the discharge is directly related to a shellfish harvesting activity authorized by NWP 4.

3. Suitable material. No discharge of dredged or fill material may consist of unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.,) and material discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

4. Mitigation. Discharges of dredged or fill material into waters of the United States must be minimized or avoided to the maximum extent practicable at the project site (i.e., on-site), unless the District Engineer approves a compensation plan that the District Engineer determines is more beneficial to the environment than on-site minimization or avoidance measures.

5. Spawning areas. Discharges in spawning areas during spawning seasons must be avoided to the maximum extent practicable.

6. Obstruction of high flows. To the maximum extent practicable, discharges must not permanently restrict or impede the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound waters).

7. Adverse effects from impoundments. If the discharge creates an impoundment of water, adverse effects on the aquatic system caused by the accelerated passage of water and/or the restriction of its flow shall be minimized to the maximum extent practicable.

8. Waterfowl breeding areas. Discharges into breeding areas for migratory waterfowl must be avoided to the maximum extent practicable.

9. Removal of temporary fills. Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation.

REPLY TO
ATTENTION OF:

CECW-OR

6 MAR 1992

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Clarification and Interpretation of the 1987 Manual

1. The purpose of this memorandum is to provide additional clarification and guidance concerning the application of the Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, January 1987, Final Report (1987 Manual). As discussed in my 20 February 1992 memorandum, procedures for the identification and delineation of wetlands must be fully consistent with both the 1987 Manual and the Questions and Answers issued 7 October 1991. The technical and procedural guidance contained in paragraphs 2 thru 6 below has been prepared by the Waterways Experiment Station (WES) and is provided as further guidance. The following guidance is considered to be consistent with the 1987 Manual and the 7 October Questions and Answers. Further, this guidance will be presented in the upcoming Regulatory IV wetlands delineation training sessions in FY 92. The alternative technical methods of data gathering discussed below are acceptable as long as the basic decision rules (i.e., criteria and indicators) established in the 1987 Manual are applied. Also enclosed is a revised data form which may be used in lieu of the routine data sheet provided with the 1987 Manual, if desired. As discussed in my 20 February 1992 memorandum to the field, regional approaches and/or alternative data sheets must be reviewed and approved by HQUSACE (CECW-OR) prior to regional implementation. Notwithstanding this requirement, we encourage interagency coordination and cooperation on implementation of the 1987 Manual. Such cooperation can facilitate the continued success of our use of the 1987 Manual.

2. Vegetation:

a. Basic rule: More than 50 percent of dominant species from all strata are OBL, FACW, or FAC (excluding FAC-) on the appropriate Fish and Wildlife Service regional list of plant species that occur in wetlands.

b. The 1987 Manual provides that the 3 most dominant species be selected from each stratum (select 5 from each str if only 1-2 strata are present). However, alternative ecologically based methods for selecting dominant species fr each stratum are also acceptable. The dominance method desc in the 1989 interagency manual is an appropriate alternative

method. (1989 Manual, p. 9, para. 3.3)

c. The 4 vegetation strata (tree, sapling/shrub, herb, and woody vine) described in the 1987 Manual are appropriate. However, a 5-stratum approach (tree, sapling, shrub, herb, and woody vine) is an acceptable alternative.

d. The 1987 Manual states on page 79 that hydrophytic vegetation is present if 2 or more dominant species exhibit morphological adaptations or have known physiological adaptations for wetlands. This rule should be used only after the basic rule is applied; use caution with adaptations (e.g., shallow roots) that can develop for reasons other than wetness. Furthermore, the morphological adaptations must be observed on most individuals of the dominant species.

e. In areas where the available evidence of wetlands hydrology or hydric soil is weak (e.g., no primary indicators of hydrology), the Facultative Neutral (FAC neutral) option may be used to help clarify a wetland delineation. Use of the FAC neutral option is explained in paragraph 35(a), page 23, of the 1987 Manual. Use of the FAC neutral option is at the discretion of the District. Further, the FAC neutral option cannot be used to exclude areas that meet the "basic vegetation rule" and the hydrology and hydric soil requirements.

3. Hydrology:

a. Areas which are seasonally inundated and/or saturated to the surface for a consecutive number of days for more than 12.5 percent of the growing season are wetlands, provided the soil and vegetation parameters are met. Areas wet between 5 percent and 12.5 percent of the growing season in most years (see Table 5, page 36 of the 1987 Manual) may or may not be wetlands. Areas saturated to the surface for less than 5 percent of the growing season are non-wetlands. Wetland hydrology exists if field indicators are present as described herein and in the enclosed data sheet.

b. To evaluate hydrologic data (e.g., from stream gages or groundwater wells) growing season dates are required. Soil temperature regime (i.e., period of the year when soil temperature at 20 inches below the surface is above 5 C) is the primary definition of growing season, but data are rarely available for individual sites. Broad regions based on soil temperature regime (e.g., mesic, thermic) are not sufficiently site-specific. For wetland determinations, growing season can be estimated from climatological data given in most SCS county soil

surveys (usually in Table 2 or 3 of modern soil surveys). Growing season starting and ending dates will generally be determined based on the "28 degrees F or lower" temperature threshold at a frequency of "5 years in 10." In the south, at the discretion of the district, it may be more appropriate to use the 32 degree F threshold.

c. In groundwater-driven systems, which lack surface indicators of wetland hydrology, it is acceptable to use local Soil Conservation Service (SCS) soil survey information to evaluate the hydrology parameter (p. 37 in the Manual) in conjunction with other information, such as the FAC neutral test. Use caution in areas that may have been recently drained.

d. Oxidized rhizospheres surrounding living roots are acceptable hydrology indicators on a case-by-case basis and may be useful in groundwater systems. Use caution that rhizospheres are not relicts of past hydrology. Rhizospheres should also be reasonably abundant and within the upper 12 inches of the soil profile. Oxidized rhizospheres must be supported by other indicators of hydrology such as the FAC neutral option if hydrology evidence is weak.

4. Soil:

a. The most recent version of National Technical Committee for Hydric Soils hydric soil criteria will be used. At this writing, criteria published in the June 1991 Hydric Soils of the United States are current. These criteria specify at least 15 consecutive days of saturation or 7 days of inundation during the growing season in most years.

b. Local Lists of Hydric Soil Mapping Units recently developed by SCS and available from county or State SCS offices give local information about presence of hydric soils on a site. When available, these local lists take precedence over the national list for hydric soil determinations.

c. SCS is currently developing regional indicators of significant soil saturation. Until finalized and adopted, these indicators may not be used for hydrology or hydric soil determinations.

d. The statement (p. 31 of the 1987 Manual) that gleyed and low-chroma colors must be observed "immediately below the A-horizon or 10 inches (whichever is shallower)" is intended as general guidance. Certain problem soils may differ.

CECW-OR
SUBJECT: Clarification and Interpretation of th

5. Methods:

a. As stated in the 1987 Manual (footnote, alternative plot sizes and dominance measures a

b. For comprehensive determinations involv diverse herb layer, a single, centrally located foot quadrat may not give a representative sampl alternative, the multiple-quadrat procedure pres 1989 Manual (p. 42) is recommended.

6. Problem Areas

a. Page 93, paragraph 78 of the 1987 Manua similar problem situations may occur in other we therefore, problem areas are not limited to this

b. Problem soil situations mentioned elsew Manual include soils derived from red parent mat Entisols, Mollisols, and Spodosols.

7. Questions concerning this information should Ms. Karen A. Kochenbach, HQUSACE (CECW-OR), at Mr. James S. Wakeley, WES, at (601) 634-3702.

Encl

FOR ARTHUR E. WILLIAMS
Major General, USA
Directorate of Civi

DISTRIBUTION:
(SEE PAGE 2 & 3)

REPLY TO
ATTENTION OF:

CECW-OR

7 October 1991

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Questions & Answers on 1987 Manual

1. In response to questions from the field, the Qs & As on the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual) have been further clarified (in particular, questions #7 & 8). We clarified that for saturated only systems, the saturation must be to the surface for the appropriate number of days during the growing season. Furthermore, we clarified that the number of days for inundation or saturation to the surface are consecutive, not cumulative. The enclosed Qs and As dated 7 October, 1991 supercede those previously distributed under the cover memorandum of 16 September, 1991.

2. I want to again emphasize that the 1987 Manual stresses the need to verify that all three parameters exist prior to identifying and delineating an area as a wetland. Further, the 1987 Manual focuses on hydrology (i.e., inundation &\or saturation to the surface). In situations where hydrology is questionable, the 1987 Manual requires stronger evidence regarding the hydrophytic nature of the vegetation. The 1987 Manual also stresses the need to use sound professional judgement, providing latitude to demonstrate whether an area is a wetland or not based on a holistic and careful consideration of evidence for all three parameters. As indicated in the 1987 Manual and the attached Qs and As, careful professional judgement must be used in situations where indicators of hydrology are not clear and the dominant vegetation is facultative.

John F. Studt

JOHN F. STUDT
Chief, Regulatory Branch
Operations, Construction and
Readiness Division
Directorate of Civil Works

Enclosure

1.Q. What is the definition and practical interpretation of t growing season which should be used in the application of the Manual?

A. The 1987 Manual defines the growing season as "the portion of the year when soil temperatures at 19.7 inches below the soil surface are higher than biological zero (5 degrees C)". This is the definition found in Soil Taxonomy, and growing season months can be assumed based on temperature regimes (e.g., mesic: March-October). The 1987 Manual further states this period can be approximated by the number of frost-free days. The Waterways Experiment Station (WES) indicates that the county soil surveys, which utilize 32 degrees, provide the growing season for each county. There is some flexibility in the determination of the growing season in the 1987 Manual. The growing season, based on air temperature in the county soil surveys, can be approximated as the period of time between the average date of the first killing frost to average date of the last killing frost, which sometimes does not accurately reflect the period of time when the soil temperatures are higher than biological zero. The source of the information may vary, however, the growing season generally is to be determined by the number of killing frost-free days. In certain parts of the country where plant communities in general have becom more adapted to regional conditions, local means of determining growing season may be more appropriate and can be used.

2.Q. Should the determination of hydric soils be based on the presence of an indicator listed in the 1987 Manual or on the series name appearing on the Hydric Soils of the United States list, an indicator which is listed as less reliable in the hierarchy of hydric soil indicators in the 1987 Manual?

A. The order of soil indicators reliability as listed in the 1987 Manual remains valid and will be used. The reliability of the indicators is based on the fact that field verification of a soil's hydric characteristics is more accurate than mapping or soils lists. Soils listed on the most recent Hydric Soils list have bee determined by the National Technical Committee for Hydric Soils (NTCHS) to meet the criteria for hydric soils. When in the field, verification that mapped hydric soils actually exhibit indicators identified in the 1987 Manual for hydric soils is recommended. Although a soil may appear on the list of hydric soils, inclusions or disturbances may alter this designation to some degree, so the list alone may not always be reliable. In obvious wetlands, if the soil is on the list and the area meets the hydrology and vegetation criteria, the area is a wetland. As found with the 1989 Manual, one cannot rely solely on the fact that a soil is mapped as hydric in making the wetland delineation. In all cases, best professional

judgement should be used. The county lists provide ... information, but again should not solely be relied on to make a final determination as to whether hydric soils are present. Verification of the presence of at least one of the indicators for hydric soils on the list (pgs. 30-34) is required in conjunction with the use of a county soils list. The national soils list to be used has recently been updated by the NTCHS (June 1991), and this list will be used by the Corps in conjunction with the 1987 Manual.

3.Q. How should the 1987 Manual be applied with respect to the definition of "normal circumstances"?

A. The definition of "under normal circumstances" in the 1987 Manual states briefly that "this term refers to situations in which the vegetation has not been substantially altered by man's activities". As stated in item #3 of the memorandum of 27 August, 1991, the definition of normal circumstances used in the 1987 Manual has been clarified by Regulatory Guidance Letter (RGL) 90-7. Although this RGL deals primarily with agricultural activities in wetlands, paragraphs #3 & #4 discuss normal circumstances with respect to all areas potentially subject to 404. Further guidance on normal circumstances is found in RGL 86-9 regarding construction sites and irrigated wetlands. The guidance should be followed in preferential sequence of; 1) RGL 90-7, 2) RGL 86-9, and 3) 1987 Manual.

4.Q. Does the vegetation criteria in the 1987 manual require the use of the facultative (FAC)-neutral vegetation test (i.e., count the dominant species wetter & drier than FAC, and ignore all of the FACs in the vegetation determination)?

A. While the 1987 Manual mentions use of the FAC-neutral test for determining the presence of wetland vegetation in several places, the first indicator of wetland vegetation criteria is the presence of more than 50% of the dominant plant species FAC or wetter (not including FAC- species, which are considered non-wetland indicators under the 1987 manual). The indicator status of each of the dominant species is determined by consulting the current regional plant list published by the FWS. The 1987 Manual provides an option in this determination of applying the FAC-neutral test in cases where the delineator questions the status designation of a particular plant species on a subregional basis (see page 23). As always, any deviation from established protocol requires documentation. The FAC-neutral option may also prove useful in questionable areas or when the determination relies on the vegetation call in an area that is not otherwise an obvious wetland. Specifically, the 1987 Manual is replete with cautions and guidance that the Corps regulators must be confident that the area is wetland when the area has a FAC-dominated plant community. Uncertainty regarding the status of an area as a wetland where the dominant vegetation is FAC would be a valid reason to use the FAC-neutral option. Situations exist where use of the FAC-neutral

method will not serve to provide any additional information as to the hydrophytic nature of the plant community (e.g., all species are FAC or there is an equal number of species wetter and drier than FAC such that they cancel each other out). In these cases, it may be appropriate to consider the + and - modifiers associated with some FAC species, which indicate the species frequency of occurrence in a wetter or drier environment, in the overall assessment of the vegetation parameter. Documentation supporting reasons for using the FAC-neutral option must always be provided and acceptance of delineations, as always, remains up to the discretion of the District.

5.Q. Can indicators for any of the criteria in the 1989 Manual be used as indicators for verification of the same or other criteria presented in the 1987 Manual?

A. The indicators of hydrology in the 1987 Manual differ from those of the 1989 Manual, and are not interchangeable. In particular, the hydrology determination in the 1989 Manual often relied on evidence of properties from the soil and/or vegetation parameters. Indicators provided in the 1989 Manual for field verification of a certain criterion that are not presented in the 1987 Manual for application with the same criterion cannot be used except as additional information in support of the verification. It is unlikely that an area which is a wetland will fail to meet a criteria utilizing the indicators which are listed in the 1987 Manual.

6.Q. Will the other Federal agencies be utilizing the 1987 Manual in their wetland determinations as well as the Corps of Engineers?

A. EPA has concurred with the Corps using the 1987 Manual for all actions. Further, we understand that EPA will likely use the 1987 Manual for EPA's delineations as well. The other agencies (SCS & FWS) typically do not make delineations for purposes of Section 404.

7.Q. To what depth should one look in the soil to find indicators of hydrology?

A. In accordance with the 1987 Manual's guidance on reading soil color (D2), after digging a 16" soil pit observations should be made immediately below the A-horizon or within 10" of the soil surface (whichever is shallower). This guidance pertains to observations of indicators of the soil criterion. For indicators of saturation to the surface in the hydrology criterion, observations are made within a major portion of the root zone (usually within 12"), again in the 16" pit. Visual observation of standing water within 12" of the surface may, under certain circumstances, be considered a positive indicator of wetland hydrology (i.e., saturation to the surface) as stated on page 38.

When using water table within 12" of the surface as an indicator of hydrology, care must be used to consider conditions and the soil types (i.e., to ensure that the capillary ability of the soil texture is considered in regard to the water table depth). Vegetation and soil properties used in the determination of hydrology in the 1989 Manual, are typically not available for field verification of this criterion in the 1987 Manual. However, the 1987 Manual allows for some flexibility with regards to indicators of wetland hydrology, and states that indicators are not limited to those listed on pages 37-41. Other indicators, such as some type of recorded data (e.g., soil surveys which provide specific and strong information about the soil series' hydrology) may be used to verify a wetland hydrology call in a saturated but not inundated area. Appropriate documentation to support the call is necessary in all cases.

8.Q. What length of time must wetland hydrology be present for an area to be determined a wetland under the 1987 Manual?

A. In the hydrology section of Part III, the 1987 Manual discusses the hydrologic zones which were developed through research at WES to indicate the duration of inundation and/or soil saturation during the growing season. Wetland hydrology is defined in the 1987 Manual as the sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation. The 1987 Manual discusses hydrology in terms of a percent of the growing season when an area is wet (page 36). Generally speaking, areas which are seasonally inundated and/or saturated to the surface for more than 12.5% of the growing season are wetlands. Areas saturated to the surface between 5% and 12.5% of the growing season are sometimes wetlands and sometimes uplands. Areas saturated to the surface for less than 5% of the growing season are non-wetlands. The percent of growing season translates to a number of days, depending on the length of the growing season in any particular area (e.g., 12.5% of a 170 day growing season is 21 consecutive days). This system for the classification of hydrologic zones based on stream gauge data transformed to mean sea level elevations is useful as a guide to time frames of wetness sufficient to create wetlands. The length of time an area is wet for hydrology is based on <u>consecutive</u> days during the growing season. If an area is only saturated to the surface for a period of between 5% and 12.5% of the growing season and no clear indicators of wetland hydrology exist (i.e., recorded or field data; also see answer #7 above), then the vegetation test should be critically reviewed. Specifically, in such cases a vegetative community dominated by FAC species would generally indicate that the area is not a wetland (unless the FAC-neutral test was indicative of wetlands). The actual number of days an area is inundated and/or saturated to the surface for an area to called a wetland varies; the identification of an indicator of recorded or field data is necessary to document that an area meet

the wetland hydrology criterion of the 1987 Manual (i.e., the list of hydrology indicators on pages 37-41, which are to be used in the preferential order shown; also see question #7). The number of days specified in the June 1991 Hydric Soils of the United States (i.e., usually more than 2 weeks during the growing season) as the criteria for hydric soils pertains to hydric soils and not the hydrology criterion of the 1987 Manual, which varies with the growing season as previously discussed.

9.Q. Will delineations made now under the 1987 Corps Manual be subject to redelineation under the revised 1989 Manual after it is finalized?

A. Wetland determinations made after 17 August, 1991, are made following the guidance provided in the 1987 Corps Manual and memoranda of 23 & 27 August, 1991 and these questions and answers. These delineations are subject to and remain valid for the period of time described in RGL 90-6. As discussed in Issue #4 of the preamble to the proposed revisions to the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands issued 14 August in the Federal Register, wetland calls made after the issuance date of these revisions but prior to finalization of the revised manual may be subject to redelineation under the new manual at the request of the landowner. Final actions will generally not be reopened. Wetland calls made under the 1989 Manual are already subject to redelineation under the 1987 Manual in accordance with the guidance issued 23 August. Until such time as the proposed revisions to the 1989 Manual are finalized, it is unclear as to what effect, if any, the equity provision in the preamble to the proposed revisions will have on the 404 program. Therefore, written delineations made with the 1987 Manual will explicitly state they are final for a period of three years as specified in RGL 90-6, subject to any equity provisions that may be adopted as part of implementation of the final revisions to the 1989 Manual.

10.Q. How does the 1987 Manual compare to the 1989 Manual or its proposed revisions?

A. The various manuals have been compared by WES and the side-by-side comparison is available for your information.

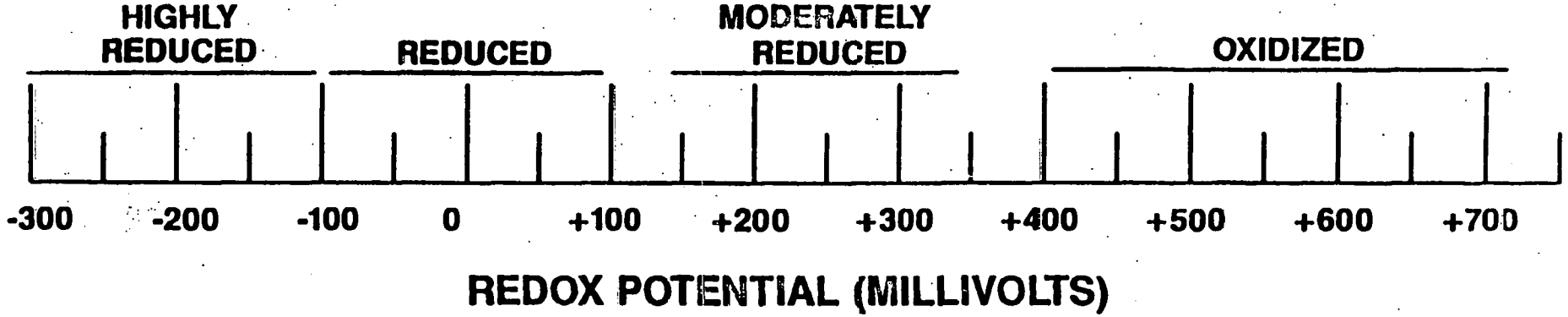
11.Q. Will applicants be subject to delay with use of 1987 Manual?

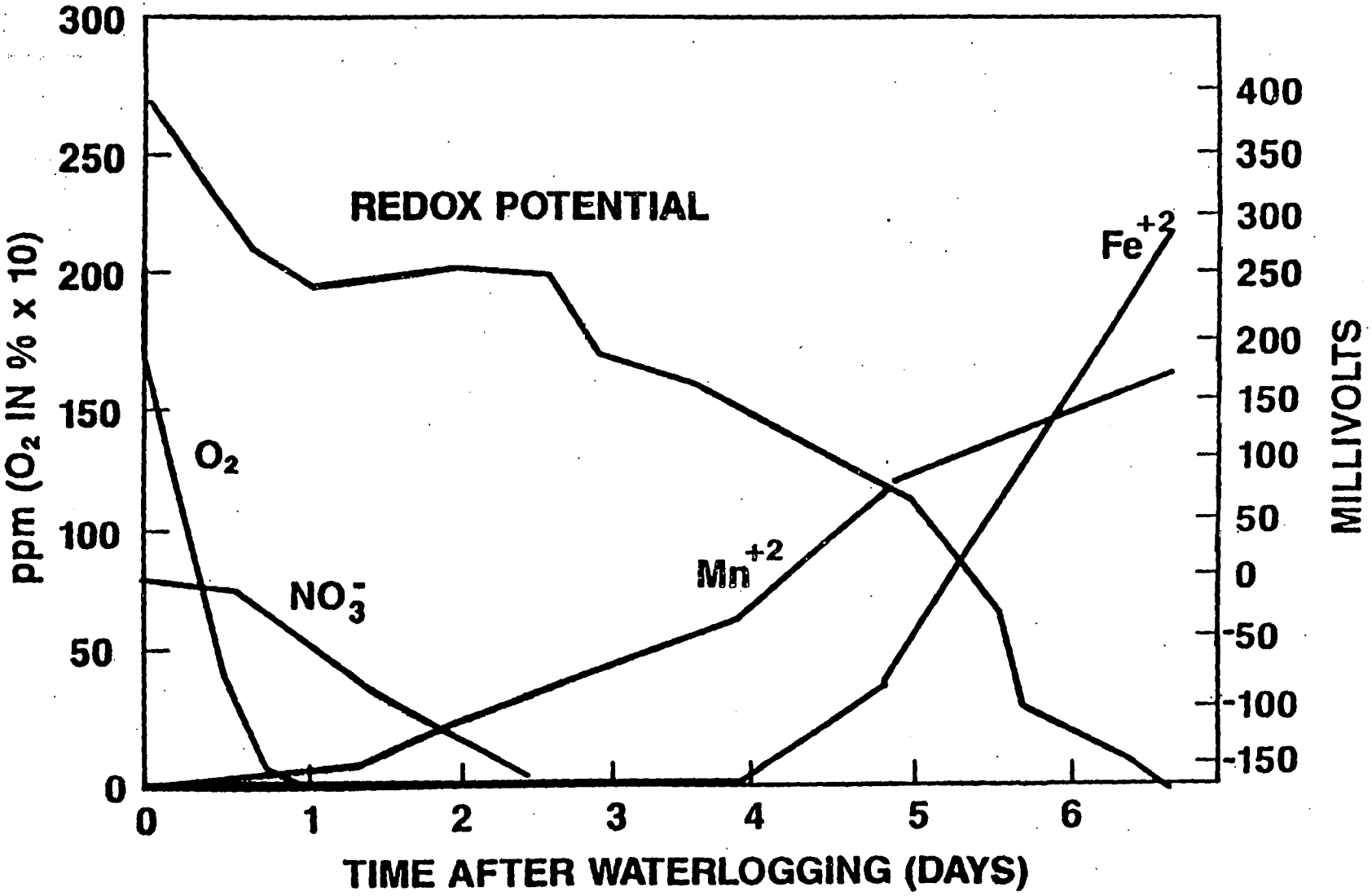
A. During the initial transition to use of the 1987 Manual for wetland delineations as of 17 August, some delays are unavoidable. The Corps field offices must adhere to the procedures provided in the 23 August memorandum, while striving to expedite the review process to the extent possible. No offices should indicate that they cannot operate due to lack of guidance during this transition period. HQUSACE recognizes that there will be delays associated with implementing the Corps 1987 Manual and we will take these delays into account when reviewing district application performance

stop the permit clock, but should indicate where substantial impacts to permit evaluation performance have resulted from implementation the 1987 Manual.

OXIDATION/REDUCTION SEQUENCE

+350 mV	OXYGEN	$O_2 \rightarrow H_2O$
+220 mV	NITROGEN	$NO_3^- \rightarrow NO_2^-, N_2, NH_4^+$
+200 mV	MANGANESE	$Mn^{+4} \rightarrow Mn^{+2}$
+120 mV	IRON	$Fe^{+3} \rightarrow Fe^{+2}$
-150 mV	SULFUR	$SO_4^{-2} \rightarrow H_2S$
-250 mV	CARBON	$CO_2 \rightarrow CH_4$





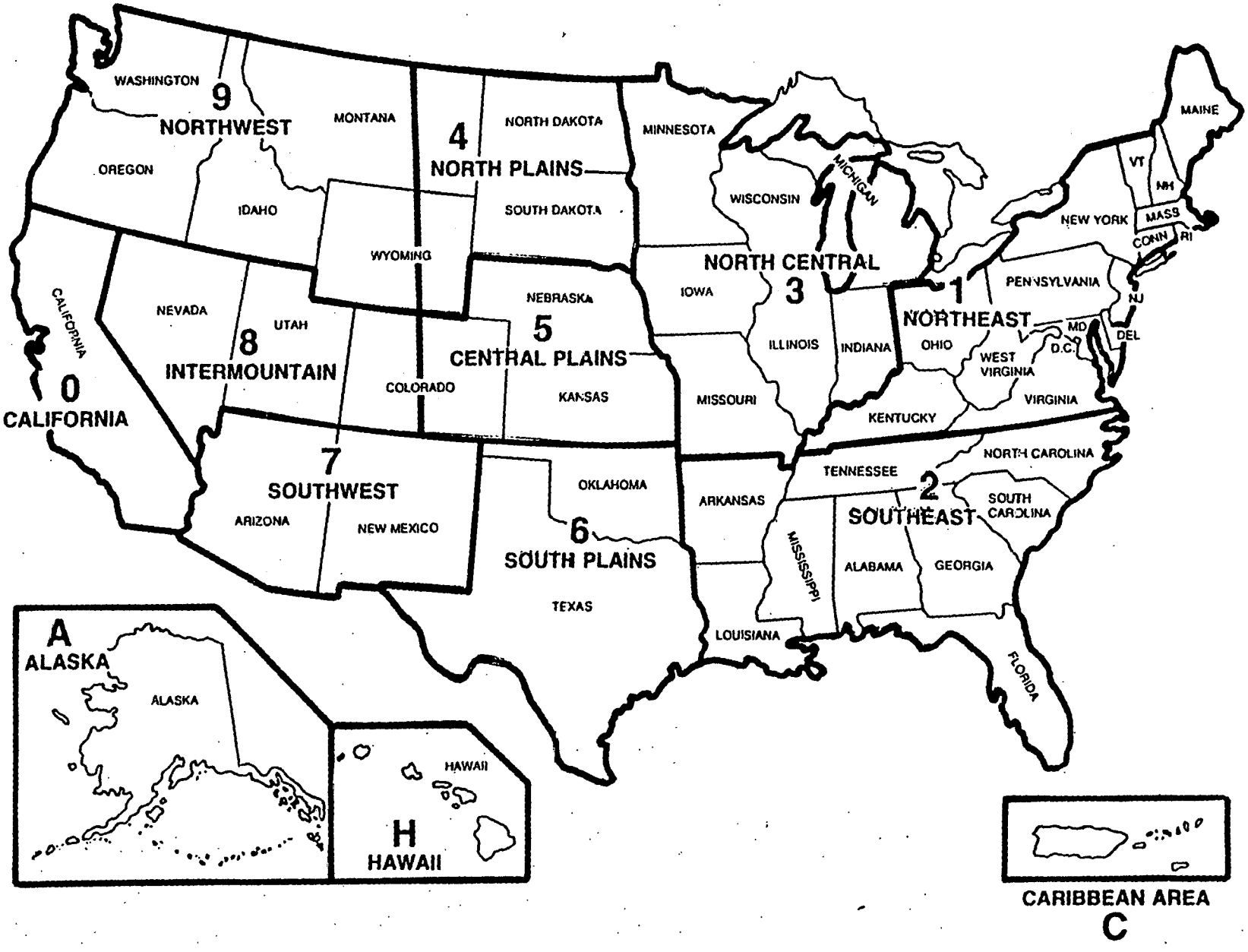
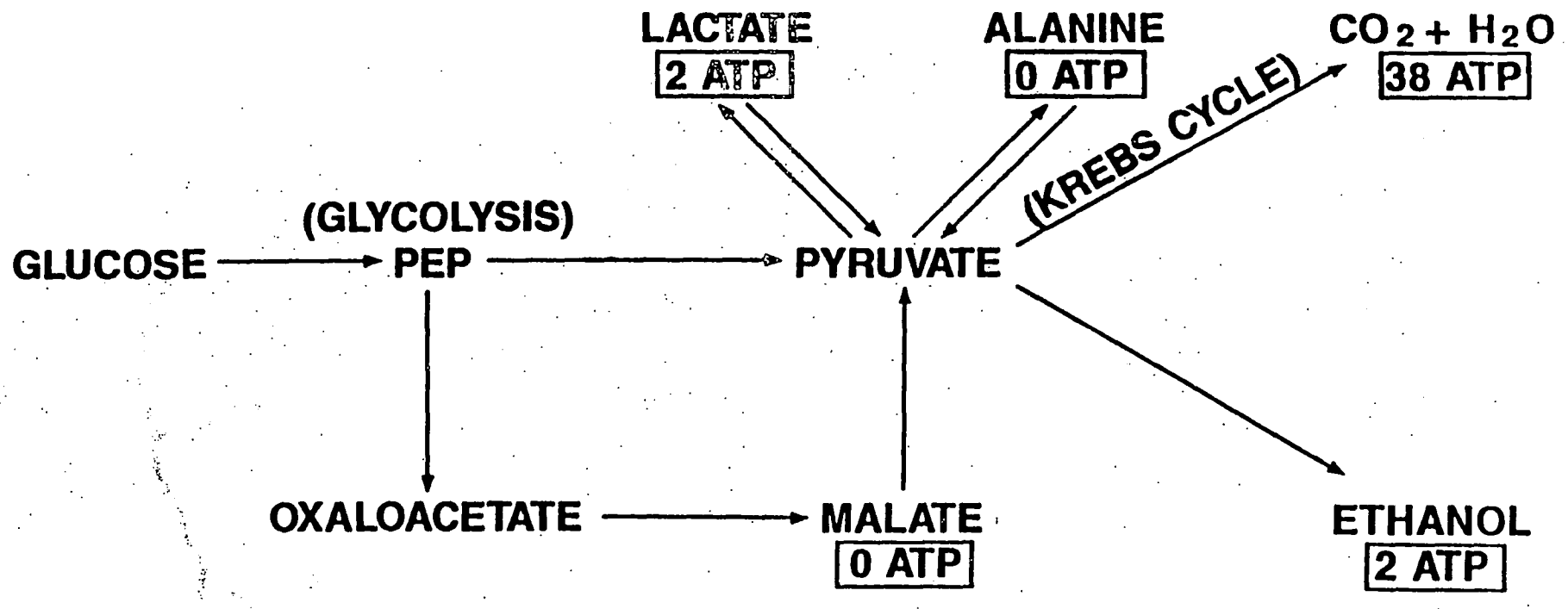


Figure 1. Regions of distribution for the National List of Scientific Plant Names (1982).

METABOLIC PATHWAYS

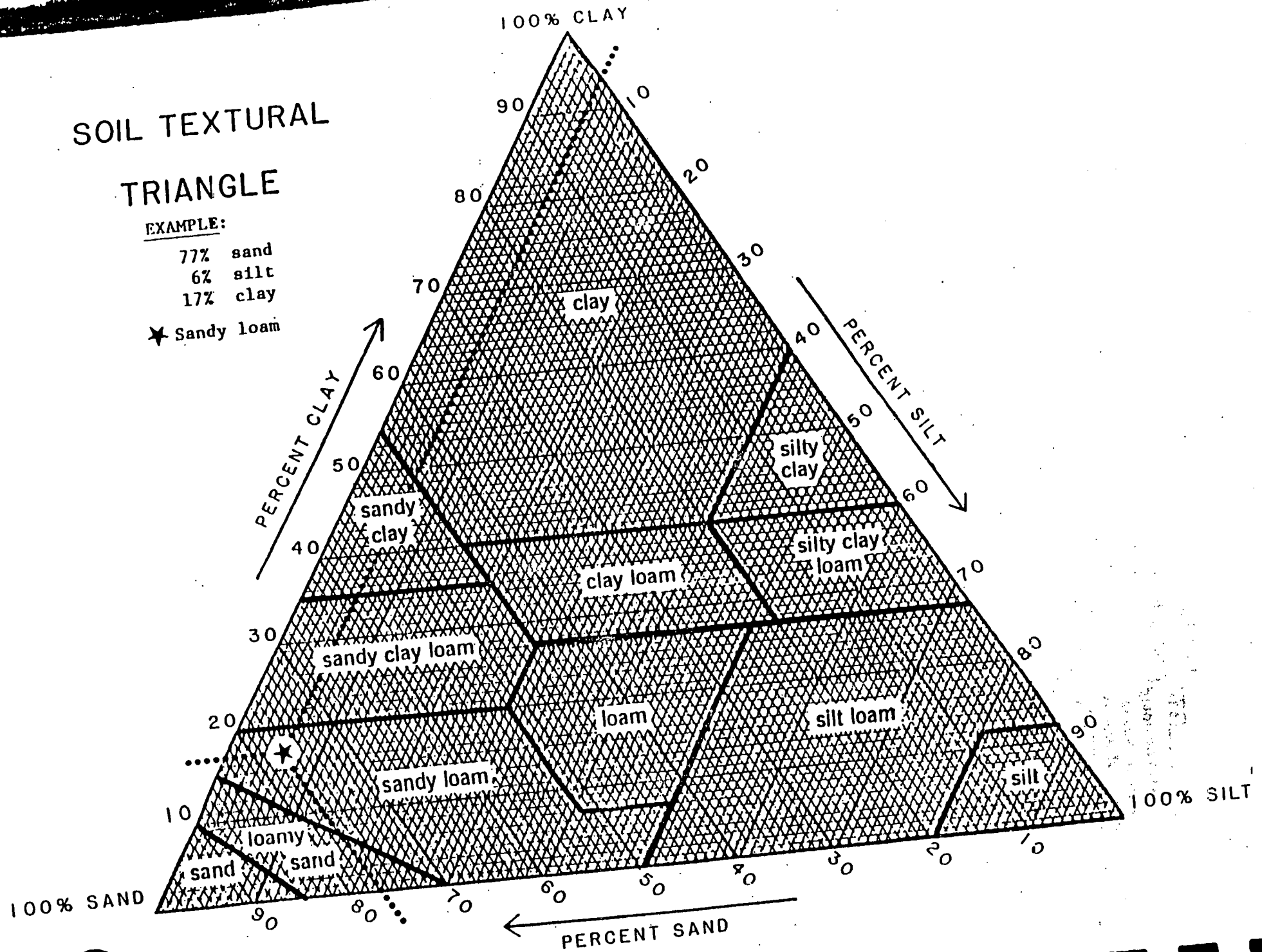


SOIL TEXTURAL TRIANGLE

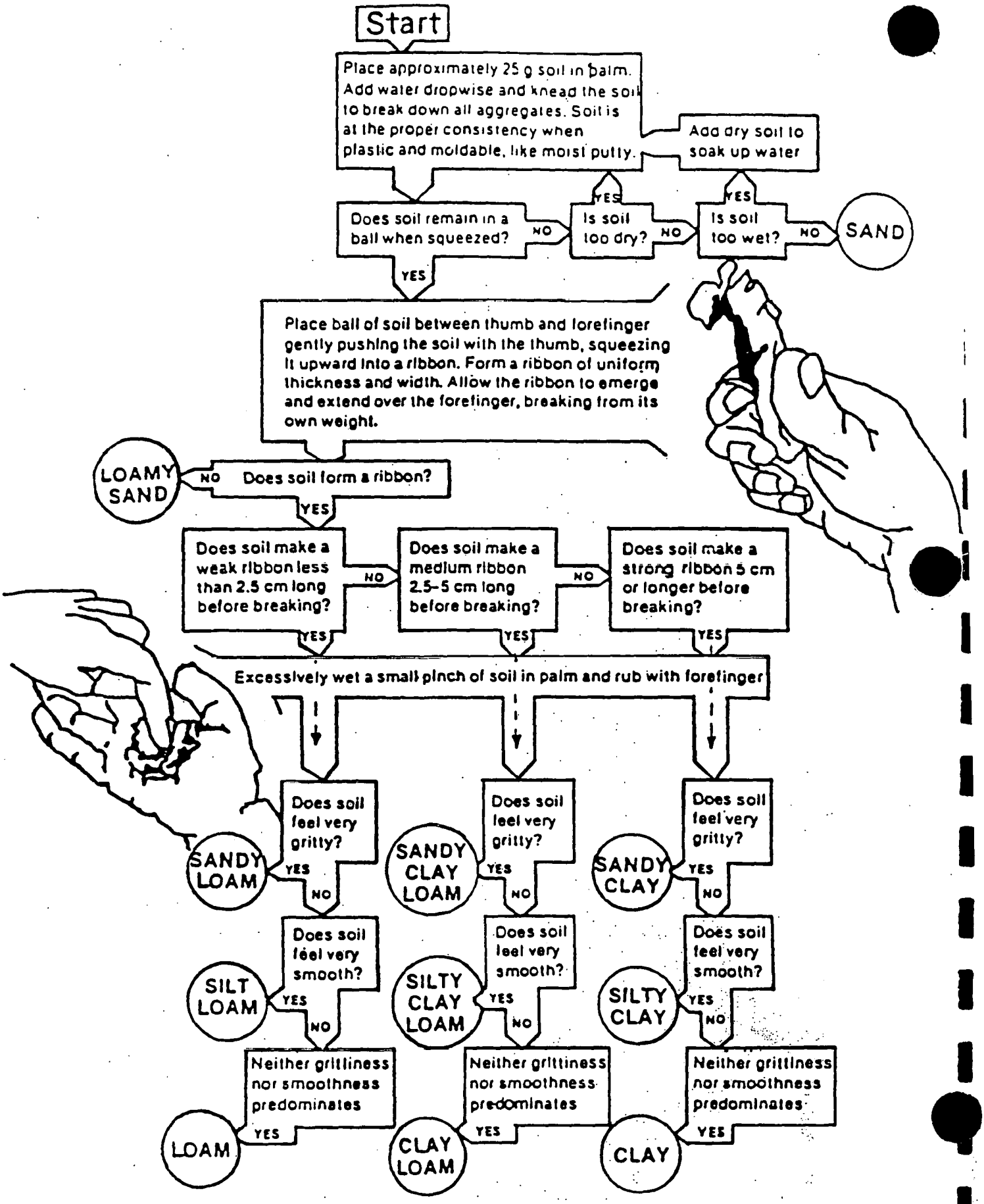
EXAMPLE:

77% sand
6% silt
17% clay

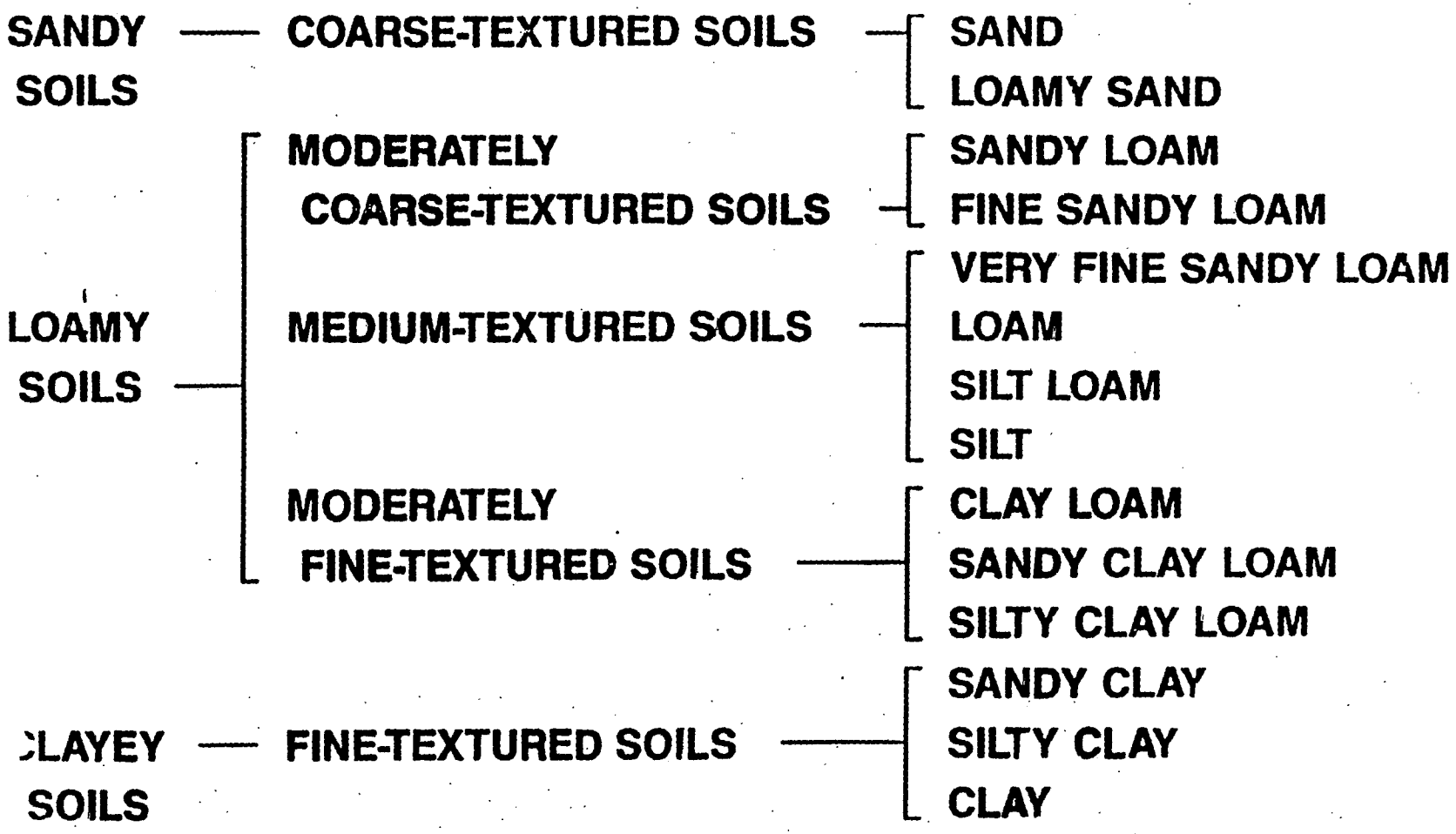
★ Sandy loam



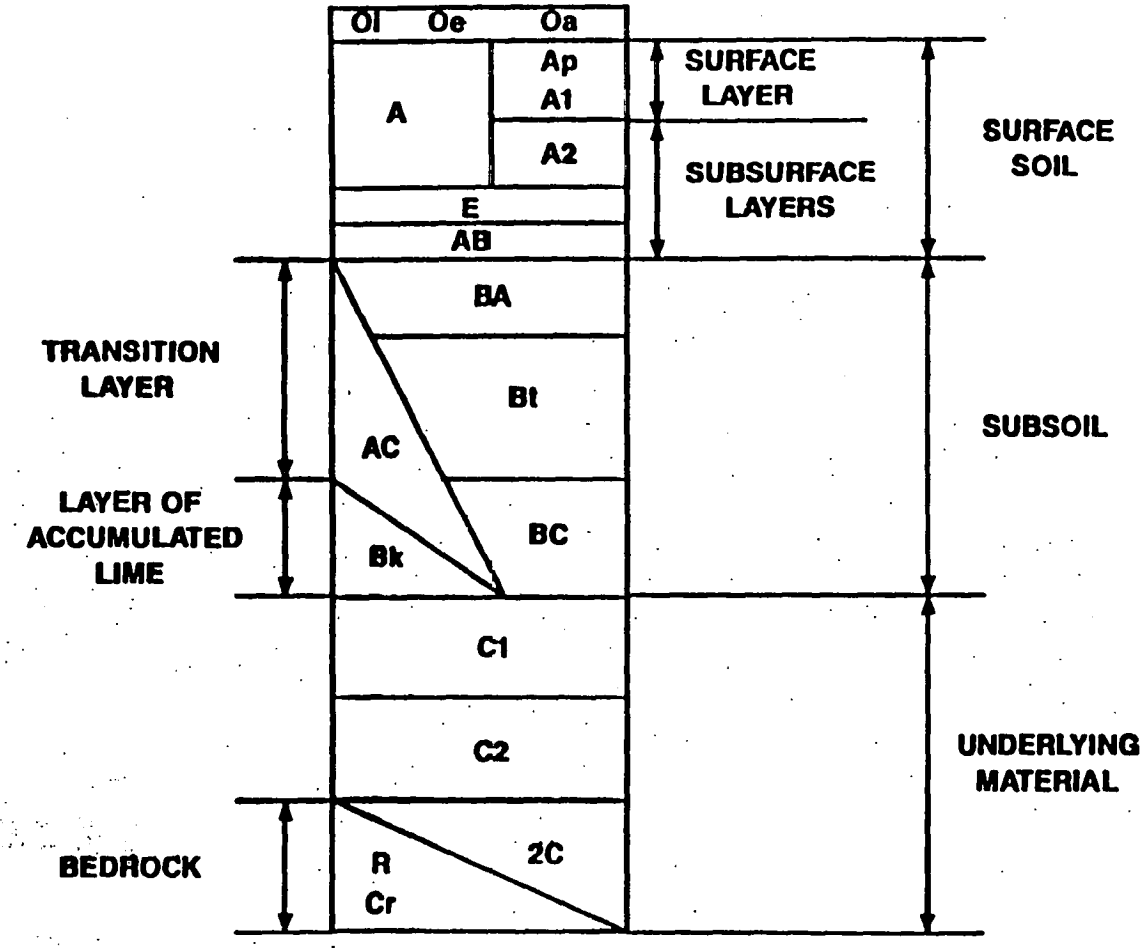
FIELD DETERMINATION OF SOIL TEXTURE



SOIL TEXTURE GROUPS



HORIZON TERMINOLOGY



WDM00277

Directions and uses for alpha, alpha' -Dipyridyl solution.

Preparation

The Soil Conservation Service uses a 0.2% solution of alpha, alpha'-dipyridyl dye to test for iron reduction. To prepare it, dissolve 77g. of ammonium acetate (NH_4OAc) in 1 liter of distilled water. Add 2 g of alpha,alpha'-dipyridil powder and stir until dissolved. Store the solution in the dark.

User Notes: You will need a stir bar and electronic mixer to dissolve the reagents. Also, you will want to do the mixing in the dark as the solution will photo-oxidize and turn pink in light. Store the solution in a amber glass or wrapped in aluminum foil.

Use

For field use, carry the solution in a small squirt bottle. (I use a 15 ml acid bottle from Forestry Suppliers; part no. 53676; 800.647.5368). Spray the solution onto a field-moist sample. A pink color will appear in a few minutes if ferrous iron is present. This indicates that the horizon from which the sample came is reduced for soil classification purposes.

User Note: The sample must be field moist. Moistening a dry sample will always produce a negative result.

All reagents are available from Sigma Chemical Company (1.800.325.3010).

Reagent Name	Product Number	Quantities Available
2,2'-dipyridil (=alpha,alpha'-dipyridil)	D 7505	5g, 10g, 25g
Ammonium acetate (NH_4OAc)	A 7262	100g, 250g, 500g

(We receive no royalties from Sigma Chemical Co.; they are merely the only company that we know of that sells AAD).

Comments

False positive readings for ferrous iron can occur if the dye solution is applied to soil that (1) has been in contact with steel (for instance augers, probes, or knives), (2) has been exposed to strong sunlight after the dye solution has been applied, or (3) has been treated with a 10% solution of hydrochloric acid to test for carbonates. More information on the use of this solution is presented in Childs (1981).

SAT

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

L

Project/Site: 45th STREET Applicant/Owner: J. JOHNSON Investigator: WAKELEY, TEAFORD, McCALEB	Date: 5/10/92 County: KALAMAZOO State: MICHIGAN
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: #2 Transect ID: Plot ID: B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. TILIA AMERICANA	T	FACU	9.		
2. FRAXINUS PENNSYL.	T	FACW	10.		
3. CARPINUS CAROLINIANA	S/S	FAC	11.		
4. CORNUS FOEMINA	S/S	FACW-	12.		
5. ULMUS AMERICANA	S/S	FACW-	13.		
6. SYMPLOCARPUS FOETIDUS	H	OBL	14.		
7. CAREX STRICTA	H	OBL	15.		
8. SENECIO AUREUS	H	FACW	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 7/8 = 87.5%

Remarks: SHALLOW ROOTS IN TILIA.
FAC-NEUTRAL TEST = 6 WET : 1 NONWET

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water:	NONE	(in.)
Depth to Free Water in Pit:	16	(in.)
Depth to Saturated Soil:	4	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ✓ Saturated in Upper 12 Inches (Not at height of wet season)
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ✓ Water-Stained Leaves
- ✓ Local Soil Survey Data
- ✓ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: SOIL SURVEY INDICATES HIGH WATER TABLE 0-1.0 FT, SEPT TO MAY. GROWING SEASON 20 APR – 27 OCT.

[SAMPLE]

SOILS

Map Unit Name (Series and Phase): HOUGHTON AND SEBEWA SOILS, PONDED (SAMPLE IS SEBEWA MEMBER)

Drainage Class: VPD

Taxonomy (Subgroup): TYPIC AQUIAQUOLL

Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-9	A	10YR 3/1	—	—	FSL
9-14	B	10YR 4/1	7.5YR 6/6	FEW, DISTINCT	CL
14-		10YR 5/1	7.5YR 5/6	COMMON, DIST.	CL

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ✓ Aquic Moisture Regime
- ___ Reducing Conditions
- ✓ Gleyed or Low-Chroma Colors

- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ✓ Listed on Local Hydric Soils List
- ✓ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 2/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: _____ Applicant/Owner: _____ Investigator: _____	Date: _____ County: _____ State: _____
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). _____

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____

Taxonomy (Subgroup): _____ Field Observations
Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes No (Circle)
Wetland Hydrology Present? Yes No
Hydric Soils Present? Yes No

(Circle)
Is this Sampling Point Within a Wetland? Yes No

Remarks:

Approved by HQUSACE 2/92

FUSRAP Document Management System

Year: 00 | ID: 3471

Further Info? ☐

Operating Unit:

Site:

Area:

MARKS Number: FN:1110-1-8100g

Primary Document Type: Site Management

Secondary Document Type: Federal, State, Local Technical Recor

Subject or Title: Corps of Engineers Wetlands Delineation Manual, Environmental Laboratory, Technical Report Y-87-1, Vicksburg, MS.

Author/Originator:

Company: CEMVD

Date: 1/1/1987

Recipient (s):

Company (-ies):

Version: Final

Original's Location: Central Files

Document Format: Paper

Confidential File? ☐

Include in which AR(s)?

- ☑ North County
- ☐ Madison
- ☐ Downtown
- ☐ Iowa

Comments:

ETI:

SAIC number:

Filed in Volume:

Bechtel ID: