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## Concepts and Procedures for Updating the National Wetland Plant List

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September 2008



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Prepared for U.S. Army Corps of Engineers

**Abstract:** The National Wetland Plant List, formerly called the National List of Plant Species that Occur in Wetlands and last officially updated in 1988, is being revised by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the Natural Resources Conservation Service. The list is used as part of the wetland delineation process, in the restoration of wetlands, and as a resource of botanical information about wetland plants. The new revision will be based on more precise scientific criteria than previous lists, it will reflect changes in botanical nomenclature, and it will be divided into regions based on ecological rather than political boundaries. Proposed changes from the 1988 list will be vetted by botanists and wetland ecologists on regional and national panels using a national database with a web interface.

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# Contents

<b>Figures and Tables.....</b>	<b>iv</b>
<b>Preface.....</b>	<b>v</b>
<b>1 Introduction.....</b>	<b>1</b>
<b>2 History.....</b>	<b>2</b>
<b>3 Current Update .....</b>	<b>6</b>
<b>4 Technical Issues .....</b>	<b>9</b>
Regional Boundaries.....	9
Indicator Status .....	11
Frequency and Abundance .....	13
Nomenclature Issues.....	14
Other Technical Issues .....	16
<b>5 General Guidelines for Reviewers and Commenters .....</b>	<b>18</b>
<b>6 Additional Guidelines for Regional Panels.....</b>	<b>23</b>
<b>References.....</b>	<b>25</b>
<b>Appendix A: Glossary .....</b>	<b>26</b>
<b>Report Documentation Page.....</b>	<b>30</b>

# Figures and Tables

## Figures

Figure 1. Change in regional boundaries. ....10

Figure 2. Example curves for a plant that is equally frequent in wetlands and uplands but is more abundant in wetlands. ....14

## Tables

Table 1. History of the List. .... 2

## Preface

This report was prepared by Robert W. Lichvar, Research Ecologist, Cold Regions Research and Engineering Laboratory (CRREL), U.S. Army Engineer Research and Development Center (ERDC), Hanover, New Hampshire; and Paul Minkin, Ecologist, New England District, U.S. Army Corps of Engineers.

Funding comes from the U.S. Army Corps of Engineers Wetland Regulatory Assistance Program (WRAP).

The authors thank Mark Sudol, Chief of Regulatory, and Katherine Trott, Regulatory headquarters, Office of the Chief of Engineers, for their support of this overall effort. All members of the National Plant Panel are thanked for their sincere efforts to improve the wetland plant list and their ability to collaborate productively with science foremost in their minds. The authors also thank Holly Fritchman and The Humboldt Field Research Institute/Eagle Hill Institute for providing the cover illustration.

The report was prepared under the general supervision of Timothy Pangburn, Chief, Remote Sensing/GIS and Water Resources Branch; Dr. Justin B. Berman, Chief, Research and Engineering Division; and Dr. Robert E. Davis, Director, CRREL.

The Commander and Executive Director of ERDC is COL Gary E. Johnston. The Director is Dr. James R. Houston.

# 1 Introduction

The National Wetland Plant List (NWPL), formerly called the National List of Plant Species that Occur in Wetlands and last updated in 1988, is being revised by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the Natural Resources Conservation Service. The list is used as part of the wetland delineation process, in the restoration of wetlands, and as a resource of botanical information about wetland plants.

In previous efforts to develop and update the NWPL, Porter Reed (Reed 1988) led regional meetings and provided instructions in person about various aspects of nomenclature and other details needed to develop or revise the list. Since those efforts, the technology of using a web-based application to revise and support the NWPL has become available. However, the ability to provide instructions, take input on ratings, and interact on basic concepts is lost when using a web-based system. This document is intended to provide background information, concepts about wetland ratings, and many other details about the process that will be used by botanists and wetland ecologists in updating the national list. As such, this document is intended to bring a certain level of standardization to the process across the country.

## 2 History

The effort to develop a comprehensive wetland plant list started with the U.S. Fish and Wildlife Service (FWS) in 1976 and paralleled the development of their wetland classification system for the National Wetland Inventory, which culminated in *Classification of Wetlands and Deepwater Habitats of the United States* in 1979 (Cowardin et al. 1979) (Table 1). A brief footnote in that publication mentions the FWS's intent to produce "a list of hydrophytes and other plants occurring in wetlands of the United States" for use in conjunction with their classification system. About that same time, a somewhat parallel effort was initiated by the USDA Natural Resources Conservation Service (NRCS), then the Soil Conservation Service (SCS), to prepare a preliminary list of hydric soils, again for use with the FWS's wetland classification system. Through a series of subsequent drafts, the FWS effort eventually led to the production of the National List of Plant Species that Occur in Wetlands (hereafter called the List, with specific versions noted by their year of establishment, so this first one is List 88) and the associated regional lists.\*

**Table 1. History of the National Wetland Plant List.**

Year	Agency	Event
1979	FWS	Published <i>Classification of Wetlands and Deepwater Habitats of the United States</i>
Early 1980s	Corps, EPA, FWS, NRCS	Began using FWS plant lists in wetland delineation manuals
1988	FWS	Completed first version of <i>Annotated National Wetland Plant Species Database</i> (List 88)
1993	FWS	Published supplement for Region 9 (Northwest)
1996	Corps, EPA, FWS, NRCS	Signed a Memorandum of Agreement to publish changes in List 88
1997	FWS	Published changes to List 88
1998	FWS	Prepared but did not finalize new version of List 88 (List 98)
2005	NRCS	Published supplement for Region H (Hawaii)
2005	FWS	Developed (but did not proceed with) plans to update List 98 (List 05)
2006	Corps	Took over administration of the list
2008–2010	Corps, EPA, FWS, NRCS	Developing update of the list, now called <i>National Wetland Plant List</i>

\* Much of the information in this section comes from an unpublished document by P.C. Reed, U.S. Fish and Wildlife Service, National Wetland Inventory, St. Petersburg, Florida.

The procedure for producing List 88 and the various derivative regional lists was thorough and rigorous. The FWS initially derived the lists by searching all appropriate regional floras and botanical manuals (almost 300 nationally) and by developing a vast computer database, the Annotated National Wetland Plant Species Database, documenting the taxonomy, distribution, and ecology of the taxa included. In 1982, the SCS (through a contract with the Smithsonian Institution) produced a revised *List of Scientific Plant Names* (U.S. Department of Agriculture 1982). This national treatment provided an important nomenclatural standard for various drafts of the wetland plant list, which culminated in List 88. During the initial development of the database, a wetland fidelity rating system was created, based on verbatim habitat descriptions derived from the various regional floras and botanical manuals.

In the early 1980s, the four primary Federal agencies involved in wetland delineation—U.S. Army Corps of Engineers (Corps), U.S. Environmental Protection Agency (EPA), FWS, and NRCS—soon realized the potential utility of the plant and soil lists for wetland delineation purposes in conjunction with wetland delineation manuals that were under development at that time. Therefore, all wetland delineation manuals produced at the Federal level during the 1980s cross-reference these plant lists in relation to defining what constitutes hydrophytic vegetation. (A parallel sanctioning was acknowledged for the hydric soils list, although field indicators per se eventually became the primary tool for establishing hydric soil conditions in the field for delineating wetlands.)

The four agencies also agreed to participate cooperatively on Regional Interagency Review Panels and a National Panel composed of wetland ecologists to further revise the various plant lists and review and revise the fidelity rating system established earlier by the FWS. This rating system, based on each taxon's frequency of occurrence in wetlands versus uplands, eventually led to the five indicator categories listed in List 88 (i.e., obligate wetland, facultative wetland, facultative, facultative upland, and obligate upland). Input was also sought from other reviewers, principally field botanists and ecologists from state and Federal agencies and universities, with the number of reviewers ranging from 10 to 30 per region. The main task of the Regional Panels was to interpret and synthesize the technical reviewers' comments and the range of habitat descriptions given for each taxon by the authors of the floras and botanical manuals into a single wetland fidelity indicator category for their region. Thus, assigning an

indicator status to a given taxon involved a thorough review of the literature (applicable floras and botanical manuals) and the consideration of substantial field input from numerous technical reviewers with many years of field botanical expertise in their regions. The various panel members, of course, also had considerable field experience within the geographic area covered by their respective panels. The major benefit of this endeavor has been the consistent utility of the lists for establishing what constitutes hydrophytic vegetation under the 404 Regulatory Program under the Clean Water Act and the Swampbuster Program under the Food Security Act. However, there are other uses, such as for wetland restoration and creation projects.

Despite the publication of List 88, the FWS realized that subsequent editions were inevitable. In fact, from the very beginning an appeal procedure was established for submitting proposed changes to the list, such as additions, deletions, and changes in indicator statuses. And since the publication of List 88, a considerable number of proposals have been submitted. Similarly, changes are continually occurring in botanical nomenclature, which tends to evolve for various reasons consistent with the International Code of Botanical Nomenclature. These changes prompted the publication of supplements for Region 9 (Northwest) in 1993 and Region H (Hawaii) in 2005. In addition, since the publication of List 88, the FWS had adopted a newer taxonomic standard, *Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland* (Kartesz 1994), as its basis for the names in the proposed list, *National List of Vascular Plant Species that Occur in Wetlands* (List 98). In this regard, the National Panel and the FWS considered it necessary to respond to these requests for changes to List 88 and the numerous plant nomenclatural changes by proposing List 98 and its derivative regional lists. Consequently the FWS published proposed changes to List 88 in the *Federal Register* (Volume 62, Number 12) on January 17, 1997, in compliance with a 1996 Memorandum of Agreement between the Corps, EPA, FWS, and NRCS. Comments were received and the National Panel, in conjunction with the Regional Panels, reviewed and considered all comments in developing the final draft of List 98. For a variety of reasons, List 98 was never finalized, and List 88 remains the only approved list of plant indicator statuses.

In 2005 the FWS developed plans to update List 98 species names and wetland indicators as necessitated by species changes to produce List 05

and move forward to produce an approved, updated list of plant indicator statuses. However, this update never proceeded forward.

In December 2006 the administration of the list was transferred from the FWS to the Corps, which renamed the list the National Wetland Plant List; it continues to be an interagency product maintained by the Corps, FWS, EPA, and NRCS. Representatives from each of the four agencies were chosen to direct the further development of the NWPL as members of the National Panel. They guide the work towards updating the scientific names and wetland indicator statuses of wetland plant species nationwide. In July 2007 the National Panel, including agency representatives Robert Lichvar (Corps), Ralph Tiner, who was replaced by William Kirchner (FWS), Mary Butterwick (EPA), and Norman Melvin (NRCS), met and drafted protocols and schedules for updating the NWPL.

### 3 Current Update

There is an increasing need to update the NWPL. The most recent nationally approved version of the list remains List 88.\* Since 1988, and even 1998, the nomenclatural status for many species has changed. It is estimated that there are approximately 1500 indicator status changes as a result of taxonomic changes (lumping and splitting of species) in the past 20 years. In addition, more field knowledge and scientific information has been published for many wetland species.

The update process will proceed through a web-based application, allowing many users to access information at different levels. The National and Regional Panels will have access through a secure site so that evaluations may be made as NWPL business. The public and other governmental entities will have access to much of the site but not the Panels' evaluation area.

Here is the order of events of this update:

1. The National Panel with representatives from the Corps, FWS, NRCS, and EPA will provide oversight of the entire development and updating of the NWPL (July 2007). The initial updating process will be developed by the National Panel approved by each agency's headquarters and will provide periodic updates and briefing to agencies' headquarters. An independent external scientific peer review group will follow throughout the entire process.
2. Regional Panels with agency representation will be assembled. Representatives must meet certain minimum botanical and wetland experience and expertise. Each agency is responsible for submitting their nominations to the National Panel.
3. The Corps will re-sort the NWPL to reflect the new regional boundaries. This will include the current nomenclature, as well as geographic modifications due to realigned regions.

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\* including the prior approved portion of the Pacific Northwest 1993 List 88 supplement.

4. Regional Panels, using the web-based system, will develop a first draft of the updated regional lists.
5. The Regional Panels will conduct a second review of those plants for which there is not agreement and will develop a second draft of the updated regional lists. Species newly proposed as wetland plants will be added to the list as they are proposed. These species will be checked for current nomenclatural status, and their supportive data will be added to the web site to assist with assignment of a wetland rating.
6. The National Panel will review the draft regional lists, particularly evaluating taxa where there may not have been full agreement on the indicator status.
7. The National Panel will approve a draft list, which will then be sent as a web-based system nationally to states and Tribes for a 30-day evaluation and comment period. The Regional Panels will identify the State and Tribal contacts for their region.
8. The Regional Panels will evaluate comments and develop final draft regional ratings, which will then go back to the National Panel for review.
9. A draft NWPL will be compiled by the National Panel and submitted to the agencies' headquarters for approval.
10. Notice of the draft NWPL and its web address will be announced in the *Federal Register*.
11. Public comments will be compiled based on input received through the web-based system.
12. Regional Panels, in conjunction with the National Panel, will review comments from the public and will develop the final regional lists.
13. The National Panel will review the final regional lists and will develop the overall NWPL.
14. Agencies' headquarters will approve the final NWPL.

15. Notice of the final NWPL will be published in the *Federal Register* with the web address.
16. Maintenance and annual reviews and updates of the NWPL will be done using the web-based system.

The protocols are intended to ensure that updates to the NWPL will occur as needed and will follow scientifically acceptable procedures. The updating process provides guidelines established by the National Panel for testing wetland indicator status ratings for future recommended changes and additions to the NWPL. The process is supported by an interactive website where all procedures and supportive information are posted. Information on this searchable website includes the names of all National and Regional Panel members, prior ecological information obtained by the FWS or John Kartesz for each species and any input made by others previously on various species that was retained in the FWS database on the NWPL, and links to botanical literature and plant ecology information to support assignment of wetland indicator statuses of all species under consideration.

Once the NWPL is initially updated, this website will facilitate regular updates (every 1–2 years) as additional information is submitted and nomenclature changes. These will be generated through a modification of the web-based process outlined above. Regular updates based on nomenclature changes will be developed on a biennial basis. Anyone may petition for a change in indicator status for any taxon by submitting appropriate data that follows the established protocol that will be developed and described by the time the NWPL becomes official. This will include frequency and abundance data for the taxon in wetlands and uplands in a broad range of the region or subregion for which the change is proposed. Such data will be reviewed and evaluated by the appropriate Regional Panel, and any changes they then recommend would go through vetting similar to the initial NWPL update. The website will contain the most recent, currently valid indicator statuses. Requests for changes would also go through the website.

## 4 Technical Issues

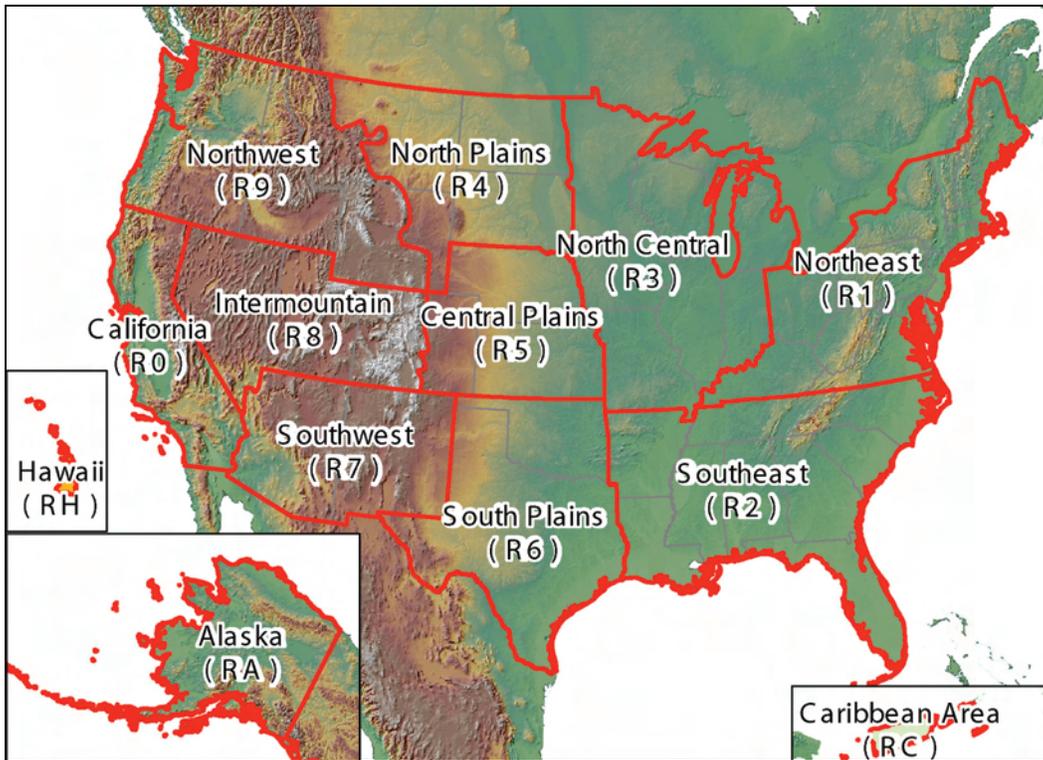
The updating of the NWPL reflects an increased knowledge about plant distribution patterns, changes in nomenclature, and regionalization of the Corps wetland delineation manual along more ecological boundaries.

These changes create a need to revise and update the plant list in the best professional manner to support various wetland program needs. To do so, it is necessary to present and discuss various procedural topics and to provide definitions, terminology, and concepts needed by reviewers to ensure that the revised list represents a standardized effort nationally.

### Regional Boundaries

Region indicator boundaries for List 88 and List 98 were based largely on political boundaries, such as state and FWS agency regional boundaries (Fig. 1a). There is an inherent difference between political boundaries (county, state, region) and ecological regions (similar patterns of land-form, geography, habitat, and/or climate); plant species distribution and occurrence in a habitat are based on ecological factors, not political boundaries. For convenience, the earlier lists had followed state and regional political boundaries and were developed with the knowledge that these boundaries were artificial and did not restrict the distribution of species. Since 2002, the Corps has been developing regional supplements to its 1987 Wetland Delineation Manual to better account for regional variability of wetland types. The NWPL will now be updated using the new regional supplement boundaries to allow for more accurate wetland ratings based on more natural phytogeographic and physiographic boundaries (Fig. 1b).

Protocols have been developed for making the change in regional boundaries. For instance, where there may be different indicator statuses for the same species in a new region because of the overlap of more than one old region, the indicator status that covers the larger geographic portion of the region, taking into account species distribution, will be used. Subregionalization may be used and will be based on the NRCS's Land Resource Regions (LRRs) and Major Land Resource Areas (MLRAs). A subregional panel may be established under the Regional Panel to deal with recommendations for a specific subregion. The Regional Panel for Hawaii will review the Hawaiian List 2005 ratings (which will be the default for



a. Former regional boundaries based on political borders.



b. New regional boundaries based on ecological factors.

Figure 1. Change in regional boundaries.

this region) that have prior approval by NRCS for use under the Food Security Act of 1985. Needed changes to the Hawaiian list will follow the same procedures developed for entire NWPL updating. The Hawaiian and Pacific Islands list will be part of this update and will be published along with the other nine regions when finalized.

The specific operating protocols developed for updating and maintaining the NWPL call for reconfiguring the interagency Regional Panels, based on the new boundaries of the regional delineation manual supplements ([http://www.usace.army.mil/cw/cecwo/reg/map\\_del\\_region.pdf](http://www.usace.army.mil/cw/cecwo/reg/map_del_region.pdf)). The agency nominees for membership on these Regional Panels were evaluated by the National Panel, which made the final selections for each Regional Panel. The Regional Panels are composed of agency representatives with botanical and wetland expertise, and they will evaluate and assign draft wetland indicator statuses for plants within their regions, with the National Panel as the oversight group. The entire process will be independently evaluated in a scientific peer review process established by the Corps.

## **Indicator Status**

In List 88, there are five indicator statuses, or ratings, used to designate a plants species' preference for occurrence in a wetland or upland: Obligate Upland (UPL), Facultative Upland (FACU), Facultative (FAC), Facultative Wetland (FACW), and Obligate Wetland (OBL). The statuses represent the estimated probability of a species occurring in wetlands versus non-wetlands in a region. The terms were defined as follows:

- UPL species could occur more frequently in wetlands in another region but almost always (estimated probability >99%) occur under natural conditions in non-wetlands in the region specified.
- FACU usually occur in non-wetlands (estimated probability 67–99%) but occasionally are found in wetlands (estimated probability 1–33%).
- FAC are equally likely to occur in wetlands or non-wetlands (estimated probability 34–66%).
- FACW usually occur in wetlands (estimated probability 67–99%) but occasionally are found in non-wetlands.
- OBL occur almost always, under natural conditions, in a wetland (estimated probability >99%).

Historically, statuses have been assigned based on an FWS definition:

The National Indicators reflect the range of estimated probabilities (expressed as a frequency of occurrence) of a species occurring in wetlands versus non-wetlands across the entire distribution of the species.

List 88 was compiled using literature resources, field observations, and years of previous raters experience and the assigned indicator statuses were defined based on a simple concept of frequency of occurrence in wetlands as observed by reviewers. This method is problematic for several reasons:

- The ratings are not supported by numerical data;
- The previous FWS definition of frequency, which was the numerical division of groups to which the wetland plant ratings were tied, did not include a mathematical expression or sampling design, leading to misinterpretations of the frequency formula; and
- The use of frequency alone to determine a plant species' habitat preference can lead to skewed results.

To address some of these problems, the definitions for the indicator status categories have been modified to increase clarity and to better describe species occurrences. The definitions for indicator statuses on List 88 are noted above. The ones developed recently by the National Panel for updating the NWPL are:

- OBL: almost always is a hydrophyte, rarely in uplands
- FACW: Usually is a hydrophyte but occasionally found in uplands
- FAC: Commonly occurs as either a hydrophyte or non-hydrophyte
- FACU: Occasionally is a hydrophyte but usually occurs in uplands
- UPL: Rarely is a hydrophyte, almost always in uplands

The original information supporting indicator status assignments, from List 88 through List 98, was qualitative, not quantitative. To better reflect the supporting information, the new category definitions are based on qualitative descriptions. The percentage frequency categories used in the older definitions can still be used for testing problematic or contested species being recommended for indicator status changes.

## Frequency and Abundance

To better circumscribe a species' preference for wetlands and to more accurately assign an indicator status, the National Panel now bases the indicator status on an index of wetland fidelity that considers the frequency and abundance in wetlands versus uplands and the availability of wetland habitat across the local to regional landscape. When combined, these elements describe a species' fidelity and preference for wetlands or uplands, and Regional Panel members need to consider all three factors when reviewing and assigning indicator ratings where empirical data are provided, i.e., for those species whose indicator status is challenged.

The availability of wetland habitat (i.e., the relative percentages of wetlands and uplands in the landscape) affects the interpretation of fidelity data. For example, if the area under review for a particular species (e.g., a region or subregion) is 5% wetland and 95% upland, the raw data will be different than for a review area where wetlands comprise 25% of the landscape, though the species' wetland fidelity could be similar between the regions. If these differences are not acknowledged, the frequency data can be skewed towards the dominating landscape type, i.e., wetlands or uplands.

Frequency and abundance measurements provide another method for addressing a species' wetland fidelity. For example, a species can have equal frequency of occurrence in both wetlands and uplands but may increase in abundance in either the wetland or uplands; this can be a useful indicator of a species' preference for a particular type of habitat (Fig. 2).

For species for which the normal review procedures are inadequate, a sampling and testing protocol is being developed to refine their indicator status. A more accurate fidelity formula is being created to allow problematic wetland ratings to be adjusted for various species, possibly by weighting the frequency and abundance formulas to remove any landscape bias. Combining abundance with a simple frequency statement will produce a wetland fidelity rating that will better reflect a species' response to wet

### Definitions of Fidelity Terms

**Frequency:** A measure of how often a plant species occurs in a specified area, expressed as percent of occurrences within all plots sampled.

**Abundance:** A measure of the area covered by members of a plant species within a specified area, expressed as percent cover or basal area.

### **Habitat Availability at the Landscape**

**Scale:** A measure of the relative percentages of wetlands and uplands in the landscape.

conditions. Statistical models and sampling requirements are being developed to produce more scientifically reliable indicator ratings for problematic species.

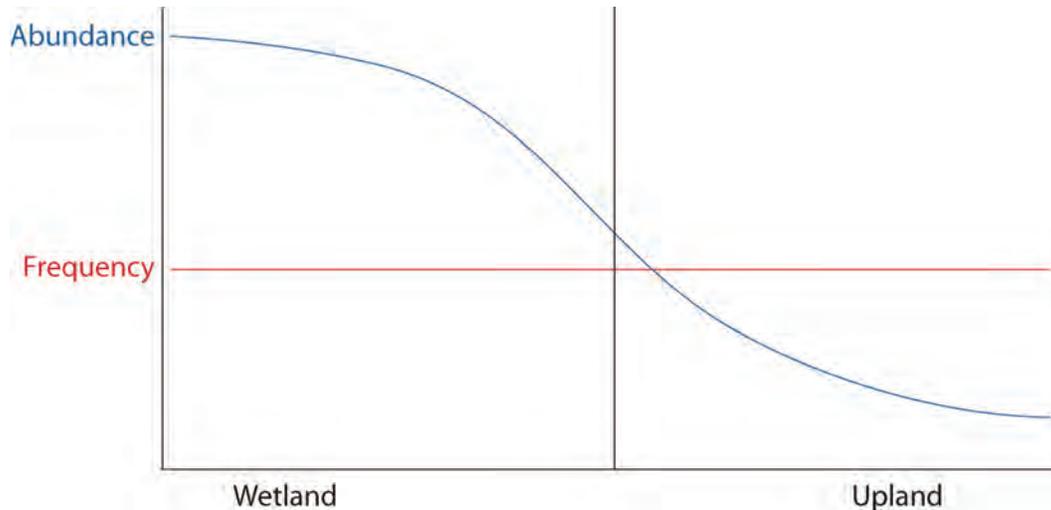


Figure 2. Example curves for a plant that is equally frequent in wetlands and uplands but is more abundant in wetlands. In other words, the species is equally likely to be found in wetland and upland plots, but it covers more area in wetlands. This combined set of concepts better describes a species' fidelity to wetlands.

## Nomenclature Issues

Changes in nomenclature frequently affect the wetland indicator status. Current nomenclature and synonymy has been supplied by John Kartesz at the Biota of North America Program (BONAP). In the updated database, the currently accepted name is linked to the List 98 and List 88 scientific names or synonyms. This linkage allows a reviewer to consider prior ratings, which may be critical information for species that have been lumped or split. The National Panel established methods using List 98 draft ratings as the default starting point so as to minimize effort and recognize prior efforts. Many nomenclatural issues are being updated with the new NWPL. Taxa will include:

1. Species names from List 98 that did not change and are currently accepted.
2. Species names from List 98 that were assigned a new species name (these include misapplication of genus, spelling, recognized author changed, etc.).

3. Two or more species names from List 98 that merged into one species name (these include all nomenclatural adjustments such as autonyms, homonyms, hybrids, isonyms, synonyms, tautonyms, etc.).
4. Species names from List 98 that were split into two or more species names.
5. New species of wetland taxa since Kartesz's 1994 checklist.

An example of how nomenclature shifts can affect wetland ratings is the genus *Aster*, which has recently undergone several taxonomic changes. *Aster coerulescens* (Fig. 3) was listed as an OBL in FWS Region 7 and had an OBL national rating on the 1988 list. The first nomenclatural change for this species from the 1988 list occurred when *A. coerulescens* DC. was transferred and included within *A. praealtum* Poir. var. *coerulescens* (DC.) A.G. Jones (the North American authority in decades past). The OBL wetland rating was retained in Region 7 in the 1996 list under that name, but its national rating was modified to FACW. The second nomenclatural change occurred after the draft 1996 list, which was released when the variety name was orthographically corrected (spelling) to var. *caerulescens*. The third nomenclatural change occurred when *A.*



Figure 3. *Symphyotrichum praealtum*. (Photograph copyright by Charles Lewallen; used with permission granted to BONAP and U.S. Army Corps of Engineers.)

*caerulescens* was placed within *A. praealtum* var. *praealtum* (FACW– on the 1998 list), and the fourth change occurred when the entire species complex was transferred and placed under the genus *Symphyotrichum*. All of these changes have resulted in a need to re-evaluate the wetland indicator status of *S. praealtum*, since the current name, i.e. *Symphyotrichum*, now contains the former OBL wetland ratings from *A. caerulescens* of the 1988 list and the FACW– rating of *A. praealtum* var. *praealtum* for the 1996 list in Region 7. The taxon now needs an appropriate rating to cover this latest taxonomic interpretation.

In preparation for evaluation by the Regional Panels, information for each taxon (in most cases at the species level but in some cases at the variety or subspecies level) will include currently accepted scientific and common names, List 98 scientific and common names, family name, region(s) and subregion(s), and habit modifiers. The completed NWPL update will include synonymy down through List 88 for a clear nomenclature trail.

The species nomenclatural rankings, wetland ratings, and distribution maps follow the precedent established for List 88 and 96, which was that wetland plants were recognized primarily at the species level. Thus, nearly all data in 2008 are intended to support the evaluation of wetland ratings at the species level. The names for infraspecific taxa (at the ranks of subspecies and varieties) are included because these entries were a result of nomenclatural changes that occurred between List 88 and 96 or are retained as valid infraspecific taxa from these earlier lists. These specific rankings in the 2008 list match their nomenclatural equivalence on either the 1988 or 1996 listings.

For example, *Abies lasiocarpa*, which was recognized at full species rank in 1988 and 1996, is now in 2008 recognized as *Abies bifolia* var. *bifolia*. Since the latter species name has other varietal expressions (i.e., var. *arizonica* and var. *bifolia*) that lack wetland ratings, for the purpose of nomenclatural precision, the previous ("old") name *Abies lasiocarpa* is precisely linked to the typical expression of *Abies bifolia* var. *bifolia* specifically. A total of 354 such infraspecific names are recognized currently. Where these infraspecific taxa are recognized with a different indicator status than at the species level, it is only the named infraspecific taxa that have a different indicator status than the species. Any other infraspecific taxa that may exist within the species will have the same indicator status as the overall species. *Acer rubrum* is rated FAC, while two

varieties, *Acer rubrum* var. *trilobum* and *Acer rubrum* var. *drummondii*, are rated FACW. Any other variety of *Acer rubrum* would have an indicator of FAC along with the overall species.

## Other Technical Issues

Some general NWPL formatting issues were examined by the National Panel. Wetland indicator designations such as No Indicator (NI), No Occurrence (NO), and No Agreement (NA) will not be used in the updated NWPL. Also, in the revision of the NWPL, the +/- modifiers will be dropped and only five indicator designations will be used (OBL, FACW, FAC, FACU, UPL) in the final published document. Because the National Panel has shifted the definitions from a series of numerical categories to written definitions, the use of +/- suffixes is difficult to apply accurately. All plants previously assigned +/- modifiers will be automatically merged into their broader indicator category. The National and Regional Panels will be required to review all species from the List 98 that were assigned FAC- to appropriately categorize their wetland fidelity. There are also a few typographical errors on List 88 that are being corrected on the updated NWPL.

Inclusion of all Upland (UPL) plants was considered, and it was decided that they would not be included because not all regions have up-to-date local floras and there are no equivalent data to support their review. Further, the understanding of plant species distribution varies from state to state and region to region. Plant distribution continues to change, because of the impact of humans to the spread of non-native species and horticultural varieties; rapid and extensive travel and transportation of materials by roadway, rail, and air, which can inadvertently distribute plants across state and regional boundaries; and the rapid distribution of many invasive and noxious species. As a result, some taxa that actually occur within an area may not be listed in regional lists or even the national list.

## 5 General Guidelines for Reviewers and Commenters

Members of the Regional Panels and commenters from states, Tribes, and the public will submit indicator status evaluations and general comments through the website. The following guidelines provide the framework within which these inputs should be made.

1. In all cases, the most useful inputs are from specific knowledge or studies related to individual taxa. Reviewers should use their regional botanical and ecological expertise, field observations, reviews of most recent indicator status information, appropriate botanical literature, floras, herbarium specimens with notation of habitat and associated species, habit data, relevant studies, and historic list information. Guessing is discouraged, and for taxa unknown to the reviewer, it is preferable that they select the "I do not know" option rather than simply guessing an indicator status.
2. For the purposes of determining a species frequency and abundance in wetlands, wetlands are defined 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 (33 CFR 328.3 and 40 CFR 230.3). Identification of such wetlands is made using the Corps' 1987 Wetland Delineation Manual or relevant regional supplements, whichever is more recent. Wetlands are identified using the three-factor approach. Since the species being evaluated is part of a vegetation assemblage, examining the other species present in relation to their assigned wetland fidelity may be useful in assessing hydrophytic vegetation.
3. Reviewers should consider all nomenclature information available for each taxon, which will include currently accepted scientific and common names, List 98 scientific and common names, family name, region(s) and subregion(s), and habit modifiers. The starting point for this update effort is List 98 for synonymy and most recent indicator status. The completed NWPL update will include synonymy down the List 88, and in many cases older, for a clear nomenclature trail. Species newly proposed as wetland plants will be added to the list as they are proposed. These species will be

- checked for current nomenclatural status, and their supportive data will be added to the web site to assist with assignment of a wetland rating. These newly proposed species will be sent to the Regional Panels for an initial rating, and input and comment on the newly proposed species will continue through the same process as for existing species already on the list. For infraspecific taxa, the reviewer will first see the species level and determine an indicator at this level and then go to the infraspecific rating. For the majority of these infraspecific taxa, created solely from nomenclatural changes, developing an overall species-level rating is encouraged.
4. The change in region boundaries will change some of the indicator status ratings for specific taxa in specific areas. For instance, where there may be different indicator statuses for the same species in the new region due to the overlap of more than one old region, the indicator status that covers the larger geographic portion of the region, taking into account species distribution, will be used. In some cases the largest FWS geographic unit didn't include any known occurrences for the species, so the indicator status in the next-smaller FWS region within the new Corps region was used (Table 2). Recommendations for a different indicator status based on subregion may be submitted. The subregions will be based on Land Resource Regions (LRRs) and Major Land Resource Areas (MLRAs) (<http://soils.usda.gov/survey/geography/mlra/>). Also, because the borders of the new regions still intergrade and there may be some overlap, it was determined that there should be no more than one indicator status level difference between adjoining regions.

**Table 2. FWS regions lying within the COE regions.**

COE Region	FWS Regions*
Arid West	9, 8, 7, 0, 6
Atlantic and Gulf Coastal Plain	2, 6, 1, 3
Eastern Mountains and Piedmont	1, 2, 3, 6
Great Plains	6, 4, 5, 7
Midwest	3, 5, 1, 4
Northcentral and Northeast	3, 1
Western Mountains, Valleys, and Coasts	9, 8, 0, 7, 4, 5

\* Listed in descending order of area.

5. When assigning wetland indicator statuses, reviewers should consider the ecological information on the website, which includes prior information obtained by the FWS and others.
6. Reviewers should use the status definitions developed by the National Panel for updating the NWPL:

OBL: Almost always is a hydrophyte, rarely in uplands

FACW: Usually is a hydrophyte but occasionally found in uplands

FAC: Commonly occurs as either a hydrophyte or non-hydrophyte

FACU: Occasionally is a hydrophyte, but usually occurs in uplands

UPL: Rarely is a hydrophyte, almost always in uplands.

The percentage frequency categories used in the older definitions can still be used for testing problematic or contested species being recommended for indicator status changes.

7. To more accurately reflect what hydrophytic vegetation is indicating about a site, the National Panel now considers an indicator status as an index of wetland fidelity that is based on the species frequency and abundance in wetlands versus uplands, while taking into account the landscape component (i.e., relative percentages of wetlands and uplands in the landscape). Reviewers will need to consider these elements when evaluating and assigning indicator ratings, especially in relation to empirical data supporting proposed changes in indicator status.
8. A sampling and testing protocol is being developed so that recommended additions and changes can be scientifically evaluated in light of their wetland fidelity. The NWPL homepage will have an option for proposing additions of new species, which will then provide an email asking for submission of information, such as the proposed new species, supporting information, and the proposed rating. Suggested new additions of species to the NWPL will be first evaluated by the Regional Panel and posted for review according to the process; the National Panel will make final evaluation and acceptance. Submissions for recommended changes in indicator status will have established protocols and will include

- submission of ecological data, literature review, testing description, and geographical data.
9. Wetland indicator designations such as No Indicator (NI), No Occurrence (NO), and No Agreement (NA) will not be used in the updated NWPL. Inclusion of Upland (UPL) plants was considered, and it was decided that either they not be included on the NWPL, or the entire regional flora be included with the appropriate indicator statuses, many being UPL. If a plant species has been identified as occurring in a wetland habitat but is not listed in a regional or state list, the NWPL should be consulted to verify whether that species occurs in wetlands in adjacent areas before it is assumed to be UPL.
  10. The +/- modifiers will be dropped and only five indicator designations will be used (OBL, FACW, FAC, FACU, UPL) in the final published document. Because the National Panel has shifted the definitions from a series of numerical categories to written definitions, the use of +/- suffixes is difficult to apply accurately. All plants previously assigned +/- modifiers will be automatically merged into their broader indicator category (see below) during the review and revision process with the exception of those plants assigned FAC-. The National and Regional Panels will be required to review all species from List 98 that were assigned FAC- to appropriately categorize their wetland fidelity. This action by the National Plant Panel will merge the following (former) categories:
    - OBL = OBL
    - FACW+, FACW, FACW- = FACW
    - FAC+, FAC = FAC
    - FACU+, FACU, FACU- = FACU
    - UPL = UPL
    - FAC- = re-evaluated by panels to determine if FAC or FACU.
  11. Optional additional information may be noted for each taxon. This can include information on whether the taxon is native, invasive, etc. Use of a coefficient of conservatism is encouraged and it should follow *Development of a Floristic Quality Assessment Methodology for Wisconsin*, where Bernthal (2003) noted a system where "each native plant is assigned a coefficient of conservatism representing an estimated probability that a species is likely to occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition. The most conservative species

require a narrow range of ecological conditions, are intolerant of disturbance, and are unlikely to be found outside undegraded remnant natural areas, while the least conservative species can be found in a wide variety of settings and thrive on disturbance. Coefficients range from 0 (highly tolerant of disturbance, little fidelity to any natural community) to 10 (highly intolerant of disturbance, restricted to pre-settlement remnants). Conceptually this 10-point scale can be subdivided into several ranges. The following description of coefficient ranges combines the discussions presented by Taft et al. (1997) and Francis et al. (2000; describing concepts used in Oldham 1995):

0-3: taxa found in a wide variety of plant communities and very tolerant of disturbance

4-6: taxa typically associated with a specific plant community, but tolerate moderate disturbance

7-8: taxa found in a narrow range of plant communities in advanced stages of succession, but can tolerate minor disturbance

9-10: taxa restricted to a narrow range of synecological conditions, with low tolerance of disturbance."

## 6 Additional Guidelines for Regional Panels

The Corps members chair the Regional Panels and initiate panel discussions via email and telephone. Panel members should base their indicator status assignments on their regional botanical and ecological expertise, field observations, review of most recent indicator status information, appropriate botanical literature, floras, herbarium specimens with notation of habitat and associated species, habit data, relevant studies, and historic list information. For evaluation of challenges to existing indicators and proposals for including new species, this information should also incorporate frequency and abundance of individual taxa within the entire region (uplands and wetlands) and the relative availability of wetlands within the region. Evaluations will be more detailed evaluation for species that are affected by taxonomic changes (lumping and splitting taxa) or that are new on the NWPL. While panel members will use their expertise and available data in assigning indicator status, “networking”—contacting regional botanical experts—may be used for determining the indicator status for unfamiliar taxa. If a plant species is unknown to the reviewer and review of available resources and networking gathers no useful information, the reviewer should not use the data to guess an indicator status, but should indicate “not known” on the evaluation screen. Panel decisions are carried with a minimum three out of four votes. The National Panel will establish tie-breaking procedures where ties cannot be resolved by the Regional Panels.

Although the new regions are based more on geologic, climatic, and ecologic conditions than the List 88’s political boundaries, the borders of these new regions still intergrade and there may be some overlap. Therefore, it was determined that there should be a difference of no more than one indicator status level between adjoining regions. Subregionalization (following this same guidance) is acceptable as the data suggest but must be based on Land Resource Regions (LRRs) and Major Land Resource Areas (MLRAs). A subregional panel may be established under the Regional Panel to deal with recommendations for a specific subregion. Therefore, if the regional panel decides that they need one or more subregions, these should be discussed and their geographic limits determined during initial conversations prior to assigning indicator statuses. The Regional Panel, with National Panel approval, will select members for

the Subregional Panel. The Subregional Panel will review the draft indicators developed by the Regional Panel and determine which species should have different indicators within their subregion. These subregional indicators will then be vetted back through the Regional and National Panels.

## References

- Bernthal, T.W. 2003. *Development of a floristic quality assessment methodology for Wisconsin*. Madison, Wisconsin: Wisconsin Department of Natural Resources, Bureau of Fisheries Management and Habitat Protection.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. FWS/OBS-79/31. U.S. Fish and Wildlife Service.
- Environmental Laboratory. 1987. *Corps of Engineers wetlands delineation manual*. Technical Report Y-87-1. Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station.
- Francis, C.M., M.J.W. Austen, J.M. Bowles, and W.B. Draper. 2000. Assessing floristic quality in southern Ontario woodlands. *Natural Areas Journal* 20(1): 66-77.
- Kartesz, J.T. 1994. *A synonymized checklist of the vascular flora of the United States, Canada, and Greenland* (2 volumes). Portland, Oregon: Timber Press.
- Mueller-Dombois, D., and H. Ellenberg. 1974. *Aims and methods of vegetation ecology*. New York: John Wiley and Sons.
- Oldham, M.J., W.D. Bakowski, and D.L. Sutherland. 1995. *Floristic quality assessment system for southern Ontario*. Natural Heritage Information Centre, Ontario Ministry of Natural Resources.
- Reed, P.B., Jr. 1988. *National list of plant species that occur in wetlands: Northeast (Region 1)*. Biology Report 88(26.1). Washington, D.C.: U.S. Fish and Wildlife Service.
- Sokal, R.R., and F.J. Rohlf. 1981. *Biometry: The principles and practice of statistics in biological research*. Second Edition. New York: W.H. Freeman and Company.
- Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment of vegetation in Illinois, a method for assessing vegetation integrity. *Erigenia*, No. 15, November 1997.
- U.S. Department of Agriculture. 1982. *National list of scientific plant names*. Vol. 1. *List of plant names*. Vol. 2. *Synonymy*. SCS-TP-159. Washington, DC: Soil Conservation Service.

## Appendix A: Glossary

Accepted name: The name of a taxon that is considered to be the correct name or the most acceptable name, based on recent botanical references.

Aggressive: Able to quickly colonize newly open areas.

Annual: A plant that naturally completes its life cycle, from seed to seed, in one year.

Autonym: A subspecies or variety name that is the duplicate of the specific epithet.

Biennial: A plant that naturally completes its life cycle, from seed to seed, in two years.

Broadleaf: Woody plants that bear broad, flat leaves rather than needle-like foliage.

Coefficient of Conservatism: The estimated probability that a species will occur in a landscape relatively unaltered from what is believed to be a pre-settlement condition.

Community: The local or regional names of the ecological communities derived from the habitat descriptions contained in over 300 botanical manuals and floras.

Deciduous plants: Woody plants that lose their leaves seasonally because of changes in temperature, photoperiod, or moisture availability.

Emergent: Emerging from open water or inundated areas.

Epiphyte: A plant that grows on another for support, without drawing nutrients from it.

Epithet: The part of a taxonomic name identifying a subordinate unit within a genus.

Evergreen: Woody plants that do not lose all of their leaves seasonally.

Fern: Non-flowering vascular plants (classified in the Division Pteridophyta) that lack seeds and reproduce through spores; typically with complex-veined fronds.

Floating: Plants that float freely on the surface of water and lack attachment to a substrate.

Forb: Non-graminoid herbaceous plants.

Graminoids: Grasslike plants, including grasses, sedges, and rushes.

Grass: True grasses, members of the Poaceae (Gramineae).

Habit: Growth form of a plant, such as tree, shrub, vine.

Habitat: Summary words or phrases derived from the habitat descriptions contained in over 300 botanical manuals and floras. Keywords reflect landscape position, substrate, soil and water chemistry, standing and flowing water systems, woody and herbaceous vegetation, water regime, wetland type, land use, and climate.

Herbaceous: Plants that lack woody tissue.

Herbaceous vine: A twining or scrambling plant that lacks woody tissue.

Homonyms: Identical names, described by different authors at different times and referring to different species based on different types.

Hybrid: A plant created by mating two different species (or any other taxonomic rank).

Invasive: Capable of spreading by pushing out existing flora.

Isonyms: Two or more names of identical spelling that are published independently by different authors at different times and that are based on the same type specimen.

**Native:** Evolved and naturally colonized without human efforts, past or present.

**Naturalized:** Non-native but reproducing and colonizing in nature.

**Needleleaf:** Woody plants that bear narrow, needle-like leaves.

**Non-native:** Plants that did not naturally evolve in that specific area, their spread often fomented by human activity.

**Parasite:** Plant that lives in or on a host plant and obtains nourishment from the host plant without benefiting the host.

**Perennial:** A plant that naturally completes its life cycle, from seed to seed, in more than two years.

**Saprophyte:** A living organism that obtains all nutrients from non-living organic sources.

**Scaleleaf:** Leaf reduced to small, thin, or flat scale-like structure.

**Sedge:** Grasslike plants of the family Cyperaceae.

**Semi-evergreen:** Woody plants that are evergreen where the weather is mild but deciduous in colder parts of their range.

**Shrub:** Woody perennial plants, usually branching from the base.

**Succulent:** Plants adapted to arid conditions and characterized by fleshy, water-storing tissues.

**Submerged:** Plants that live all or a major portion of their lives under the surface of water.

**Tautonyms:** A species name in which the genus and specific epithet are identical. This practice is permitted in zoological nomenclature, but not in botany, so only old, no-longer-valid plant names might be tautonyms.

**Tree:** A woody perennial having a main stem.

Woody: Plants bearing secondary growth of ligneous tissue.

Woody vine: Woody plants that climb or scramble, lacking self-support.

Zone: The Merriam life zones, or adaptations thereof, derived from the habitat descriptions contained in over 300 botanical manuals and floras.

# REPORT DOCUMENTATION PAGE

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<b>1. REPORT DATE (DD-MM-YYYY)</b> September 2008		<b>2. REPORT TYPE</b> Technical Note		<b>3. DATES COVERED (From - To)</b>	
<b>4. TITLE AND SUBTITLE</b> Concepts and Procedures for Updating the National Wetland Plant List				<b>5a. CONTRACT NUMBER</b>	
				<b>5b. GRANT NUMBER</b>	
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b> Robert W. Lichvar and Paul Minkin				<b>5d. PROJECT NUMBER</b>	
				<b>5e. TASK NUMBER</b>	
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> U.S. Army Engineer Research and Development Center Cold Regions Research and Engineering Laboratory 72 Lyme Road Hanover, NH 03755-1290				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>  ERDC/CRREL TN-08-3	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	
				<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>	
<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited.  Available from NTIS, Springfield, Virginia 22161.					
<b>13. SUPPLEMENTARY NOTES</b>					
<b>14. ABSTRACT</b> The National Wetland Plant List, formerly called the National List of Plant Species that Occur in Wetlands and last officially updated in 1988, is being revised by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the Natural Resources Conservation Service. The list is used as part of the wetland delineation process, in the restoration of wetlands, and as a resource of botanical information about wetland plants. The new revision will be based on more precise scientific criteria than previous lists, it will reflect changes in botanical nomenclature, and it will be divided into regions based on ecological rather than political boundaries. Proposed changes from the 1988 list will be vetted by botanists and wetland ecologists on regional and national panels using a national database with a web interface.					
<b>15. SUBJECT TERMS</b> National Wetland Plant List Wetland delineation		Wetland plants Wetlands			
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>	<b>18. NUMBER OF PAGES</b>	<b>19a. NAME OF RESPONSIBLE PERSON</b>
<b>a. REPORT</b>	<b>b. ABSTRACT</b>	<b>c. THIS PAGE</b>			<b>19b. TELEPHONE NUMBER (include area code)</b>
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