

## **APPENDIX I: Standards for Ecological Classification**

A given terrestrial ecological system is defined as a group of plant community types that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. A given terrestrial ecological system will typically manifest itself in a landscape at intermediate geographic scales of 10s to 1,000s of hectares and persist for 50 or more years. Ecological processes include natural disturbances such as fire and flooding. Substrates may include a variety of soil surface and bedrock features, such as shallow soils, alkaline parent materials, sandy/gravelling soils, or peatlands. Finally, environmental gradients include hydrologically defined patterns in coastal zones, arid grassland or desert areas, or montane, alpine or subalpine zones defined by climate.

By plant community type, we mean a vegetation classification unit at the association or alliance level of the US National Vegetation Classification (US-NVC) (Grossman et al. 1998, Jennings et al. 2003, NatureServe 2004), or, if these are not available, other comparable vegetation units. US-NVC associations are used wherever possible to describe the component biotic communities of each terrestrial system.

Ecological systems are defined using both spatial and temporal criteria that influence the grouping of associations. Associations that consistently co-occur on the landscape therefore define biotic components of each ecological system type. Our approach to ecological systems definition using US-NVC associations is similar to the biotope or habitat approach used, for example, by the EUNIS habitat classification, which explicitly links meso-scale habitat units to European Vegetation Survey alliance units (Rodwell et al. 2002).

Our concept of terrestrial ecological systems includes temporal and geographic scales intermediate between those commonly considered for local stand and landscape-scale analyses, which can range from 50 to 1,000s of years and 10s to 1,000s of hectares (Delcourt and Delcourt 1988). These “meso-scales” are intended to constrain the definition of system types to scales that are of prime interest for conservation and resource managers who are managing landscapes in the context of a region or state. More precise bounds on both temporal and geographic scales take into account specific attributes of the ecological patterns that characterize a given region.

*Temporal Scale:* Within the concept of each classification unit, we clearly acknowledge the dynamic nature of ecosystems over short and long time frames. If we assumed that characteristic environmental settings (e.g., landform, soil type) remain constant over the time period that applies to ecological systems (fifty to several hundred years), we would still encounter considerable variation in vegetation throughout any portion of the system occurrence due to disturbance and successional processes. The temporal scale we have chosen determines the means by which we account for both successional changes and disturbance regimes in each classification unit. Relatively rapid successional changes resulting from disturbances are encompassed within the concept of a given system unit. Therefore, daily tidal fluctuations will be encompassed within a system type. Some of the associations describing one system may represent multiple successional stages. For example, a given floodplain system may include both early successional associations and later mature woodland stages that form dynamic mosaics along a stretch of river. Many vegetation mosaics resulting from annual to decadal changes in coastal shorelines will be encompassed within a system type. Selecting this temporal scale shares some aspects with the “habitat type” approach to

Describe potential vegetation (Daubenmire 1952, Pfister and Arno 1980), but differs in that no “climax” vegetation is implied, and all “seral” components are explicitly included in the system concept.

*Pattern and Geographic Scale:* Spatial patterns that we observe at “intermediate” scales can often be explained by landscape attributes that control the location and dynamics of moisture, nutrients, and disturbance events. An example can be taken from floodplains. Rivers provide moisture, nutrients, and scouring soil disturbance that regulate the regeneration of some plant species. In these settings we find a number of associations co-occurring due to controlling factors in the environment. We see mosaics of associations from different alliances and formations, such as woodlands, shrublands, and herbaceous meadows, occurring in a complex mosaic along a riparian corridor. Some individual associations may be found in wetland environments apart from riparian areas. But we can often predict that along riparian corridors within a given elevation zone, and along a given river size and gradient, we should encounter a limited suite of associations. It is these “meso” spatial scales that we address using ecological systems.

## Diagnostic Classifiers

As the definition for ecological systems indicates, this is a multi-factor approach to ecological classification. Multiple environmental factors—or *diagnostic classifiers*—are evaluated and combined in different ways to explain the spatial co-occurrence of NVC associations (Box 1). Diagnostic classifiers include several factors representing bioclimate, biogeographic history, physiography, landform, physical and chemical substrates, dynamic processes, landscape juxtaposition, and vegetation structure and composition. Diagnostic classifiers are used here in the sense of Di Gregorio and Jansen (2000); that is, the structure of the ecological systems classification is more “modular” in that it aggregates diagnostic classifiers in multiple, varying combinations, without a specific hierarchy. The focus is on a single set of ecological system types. This is in contrast to, for example, the framework and approach of the US-NVC. The nested US-NVC hierarchy groups associations into alliances based on common dominant or diagnostic species in the upper most canopy. This provides more of a taxonomic aggregation with no presumption that associations co-occur in a given landscape. The ecological system unit links US-NVC associations using multiple factors that explain why they tend to be found together in a given landscape. Therefore, ecological systems tend to be better “grounded” as ecological units than most US-NVC alliances and are more readily identified, mapped, and understood as practical ecological classification units.

**Box 1**  
**Diagnostic Classifiers**  
(Categories and Examples)

**Ecological Divisions**

- Continental Bioclimate and Phytogeography

**Bioclimatic Variables**

- Regional Bioclimate

**Environment**

- Landscape Position, Hydrogeomorphology
- Soil Characteristics, Specialized Substrate

**Ecological Dynamics**

- Hydrologic Regime
- Fire Regime

**Landscape Juxtaposition**

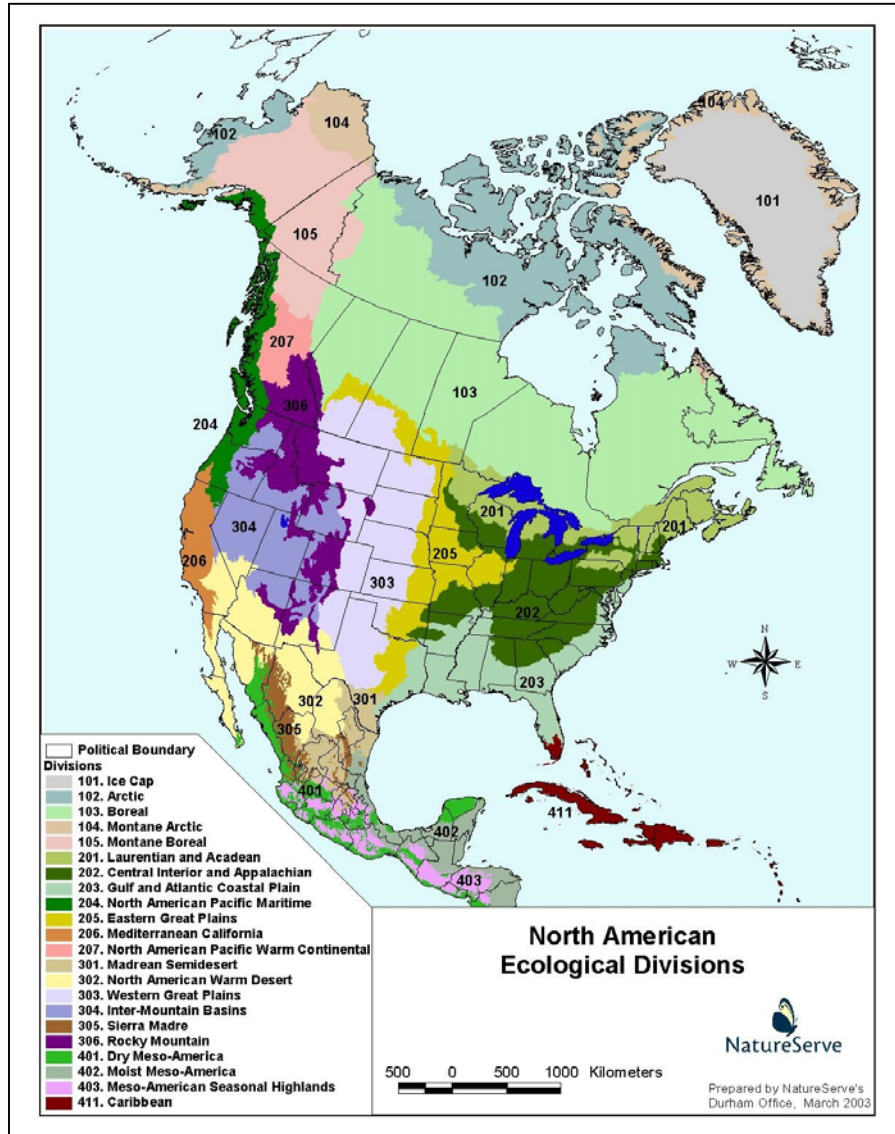
- Upland-Wetland Mosaics

**Vegetation**

- Vertical Structure and Patch Type
- Composition of component associations
- Abundance of component association patches

*Biogeographic and Bioclimatic Classifiers:* Ecological Divisions are sub-continental landscapes reflecting both climate and biogeographic history, modified from Bailey (1995 and 1998) at the Division scale (Figure A1-1). Continent-scaled climatic variation, reflecting variable humidity and seasonality (e.g., Mediterranean vs. dry

continental vs. humid oceanic) are reflected in these units, as are broad patterns in phytogeography (e.g., Takhtajan 1986). The Division lines were modified by using ecoregions established by The Nature Conservancy (Groves et al. 2002) and World Wildlife Fund (Olson et al. 2001) throughout the Western Hemisphere. These modified divisional units share much with hydrologic landscape units that have been drafted by USGS for the coterminous United States. They aid the development of system units because regional patterns of climate, physiography, disturbance regimes, and biogeographic history are well described by each



**Figure A1-1. Ecological Divisions of North America used in organization and nomenclature of NatureServe Ecological Systems.**

division. These divisions then, provide a starting point for thinking about the scale and ecological characteristics of each ecological system. Examples of these Divisions include the Inter-Mountain Basins, the North American Warm Desert, the Western Great Plains, the Eastern Great Plains, the Laurentian and Acadian region, the Rocky Mountains, and the Atlantic and Gulf Coastal Plain. Subregional bioclimatic factors are also useful for classification purposes, especially where relatively abrupt elevation-based gradients exist, or where maritime climate has a strong influence on vegetation. We integrated global bioclimatic categories of Rivas-Martinez (1997) to characterize subregional climatic classifiers. These include relative temperature, moisture, and seasonality. They may be applied globally, so they aid in describing life zone concepts (e.g., 'maritime,' 'lowland,' 'montane,' 'subalpine,' 'alpine') in appropriate context from arctic through tropical latitudes.

Biogeography and bioclimate are also utilized in our standard nomenclature for terrestrial ecological system units. Along with reference to vegetation structure, composition, and local environment, a "Gulf and Atlantic Coastal Plain" ecological system type is entirely or predominantly found (>80% of its total range) within the Gulf and Atlantic Coastal Plain Division. A "West Gulf Coastal Plain" ecological system type is limited in distribution to southern portions of the broader Gulf and Atlantic Coastal Plain Division. In a few instances, ecological systems remain very similar across two or more Ecological Divisions. In these instances, the Domain scale of Bailey (1998) was used to name and characterize the distribution of types; e.g. the "North American Arid West Emergent Marsh" spans the North American Dry Domain.

*Environment:* Within the context of biogeographic and bioclimatic factors, ecological composition, structure and function in upland and wetland systems is strongly influenced by factors determined by local physiography, landform, and surface substrate. Some environmental variables are described through existing, standard classifications and serve as excellent diagnostic classifiers for ecological systems. For example, soil moisture characteristics have been well described by the Natural Resource Conservation Service. Practical hydrogeomorphic classes are established for describing all wetland circumstances (Brinson 1993). Other factors such as landforms, specialized soil chemistry may be defined in standard ways to allow for their consistent application as diagnostic classifiers.

*Ecological Dynamics:* Many dynamic processes are sufficiently understood to serve as diagnostic classifiers in ecosystem classification. In many instances, a characteristic disturbance regime may provide the single driving factor that distinguishes system types. For example, composition and structure of many similar woodland and forest systems are distinguishable based on the frequency, intensity, periodicity, and patch characteristics of wildfire (Barnes et al. 1998). Many wetland systems are distinguishable based on the hydroperiod, as well as water flow rate, and direction (Brinson 1993; Cowardin 1979). When characterized in standard form (e.g. Frost 1998), these and other dynamic processes can be used in a multi-factor classification.

*Landscape Juxtaposition:* Local-scale climatic regime, physiography, substrate, and dynamic processes can often result in recurring mosaics. For example, large rivers often support recurring patterns of levee, floodplain, and back swamps, all resulting from seasonal hydrodynamics that continually scour and deposit sediment. Many depressional wetlands or lakeshore have predictable vegetation zonation driven by water level fluctuation. The recurrent juxtaposition of recognizable vegetation communities provides a useful and important criterion for multi-factor classification.

*Vegetation Structure, Composition, and Abundance:* As is well recognized in vegetation classification, both the physiognomy and composition of vegetation suggests much about ecosystem composition, structure, and function. However, the relative significance of vegetation physiognomy may vary among different ecosystems, especially at local scales. For example, many upland systems support vegetation of distinct physiognomy in response to fire frequency and soil moisture regimes. In general, physiognomic distinctions such as "forest and woodland," "shrubland" "savanna," "shrub steppe," "grassland," and "sparsely vegetated" are useful distinctions in upland environments. On the other hand, needleleaf or broadleaf tree species that are either evergreen or deciduous may co-occur in various combinations due more to variable responses to natural

disturbance regimes or human activities than to current environmental conditions. Many wetland systems could support herbaceous vegetation, shrubland, and forest structures in the same location, again, based on the particular strategies of the species involved and local site history.

Therefore, while recognizable differences in vegetation physiognomy may initially suggest distinctions among ecosystem types, knowledge of vegetation composition should be relied upon more heavily to indicate significant distinctions. As in vegetation classification, we recognize beta diversity, or the turnover of species composition and abundance through space, as a primary means of differentiating ecosystem types. The task of classification is to recognize where that turnover is relatively abrupt, and to explain why that abrupt change occurs on the ground.

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## **Appendix II:**

# **Dichotomous Keys to Geographically Isolated Wetlands in the United States**

### **Background**

For this study, we have established the practical definitions to identify ‘geographically isolated’ types of wetland ecological systems. Throughout the study we interchangeably use the terms *isolated wetland ecological systems*, *ecological system types*, and *isolated wetlands* to refer to the *classification units* that are the focus of this study and the primary unit of analysis. We specifically use the term “occurrence” when we reference patterns of on-the-ground located occurrences of these classification units. If the term “occurrence” is not used, we are referring the classification unit (i.e., the isolated wetland ecological system type—like Northern California Claypan Vernal Pool). So a statement like “California has more than 12 isolated wetland ecological systems,” means that there are more than 12 different classified types of isolated wetland systems in California. A statement like “Florida has more than 40 occurrences of “Central Florida Herbaceous Pondshore” means that more than 40 places where these pondshore system types have been located, mapped, and documented as occurring on the ground in Florida.

Because commonly referenced ‘isolated wetland’ definitions are intended for application to individual wetland occurrences, we used an additional criterion to account for variation among occurrences of a given wetland *type*. Therefore, our rule was that if more than 80% of all known occurrences of a given wetland type meet the above definition it would be considered a geographically isolated wetland *type*. While one could likely identify individual occurrences for most types of wetlands that could be considered ‘geographically isolated,’ this additional criterion provides focus on a subset of wetland types where the ‘isolated’ condition is quite characteristic.

In any case, resource managers and conservationists must be able to field-identify wetland types that we have identified as ‘geographically isolated.’ In this section, we hope to provide practical tools, in the form of a series of dichotomous keys, to help users identify isolated wetland *types* using information one would observe in the field among wetland *occurrences*.

### **Dichotomous Keys to Isolated Wetlands**

Dichotomous keys are devised used to help distinguish among classification units. They are often “dichotomous” in that the user follows the order of the ‘couplets’ and chooses between 2 options represented in each couplet. The ordering of the couplets in each key does matter, and the user should choose the option in each couplet that best fits the data or field situation. A choice leads the user to the next couplet to be utilized in the keying process, via a number at the far right, or else leads to a final result (e.g., an isolated wetland ecological system type).

Below are dichotomous keys to NatureServe ecological systems in the United States that meet our project-specific definitions for geographically isolated wetland. The keys have been organized by Ecological Divisions (Figure AII-1) (Comer et al. 2003). The ecological system classification uses ecological division concepts to organize the classification because they reflect continental scale patterns of climate physiography, and phytogeography. Patterns of occurrence for ecological system types tend to be partially explained by these regional units. Therefore, one will see the names of these units, such as “Inter-Mountain Basins” in the name of a given ecological system type. However, this does not imply that that type only occurs within the Inter-Mountain Basins division. It does imply that the distribution of

the type is centered in that division, but it may occur in neighboring divisions as well. As such, most of the systems included here are keyed in 2 or more of the regional keys, since they could be found on the ground within these areas.

Some wetland types that do not meet the project-specific definition for geographically isolated are included in these dichotomous keys because they share some attributes with isolated types and their presence is needed so that they may be clearly distinguished. In these instances, after the name of each type, they will be labeled as NOT ISOLATED. Since this is not intended as a comprehensive key to all ecological systems in a given area, there will be conditions described in the key that lead to the NOT IN KEY result, indicating that other sources should be consulted to appropriately identify the specific type of interest.

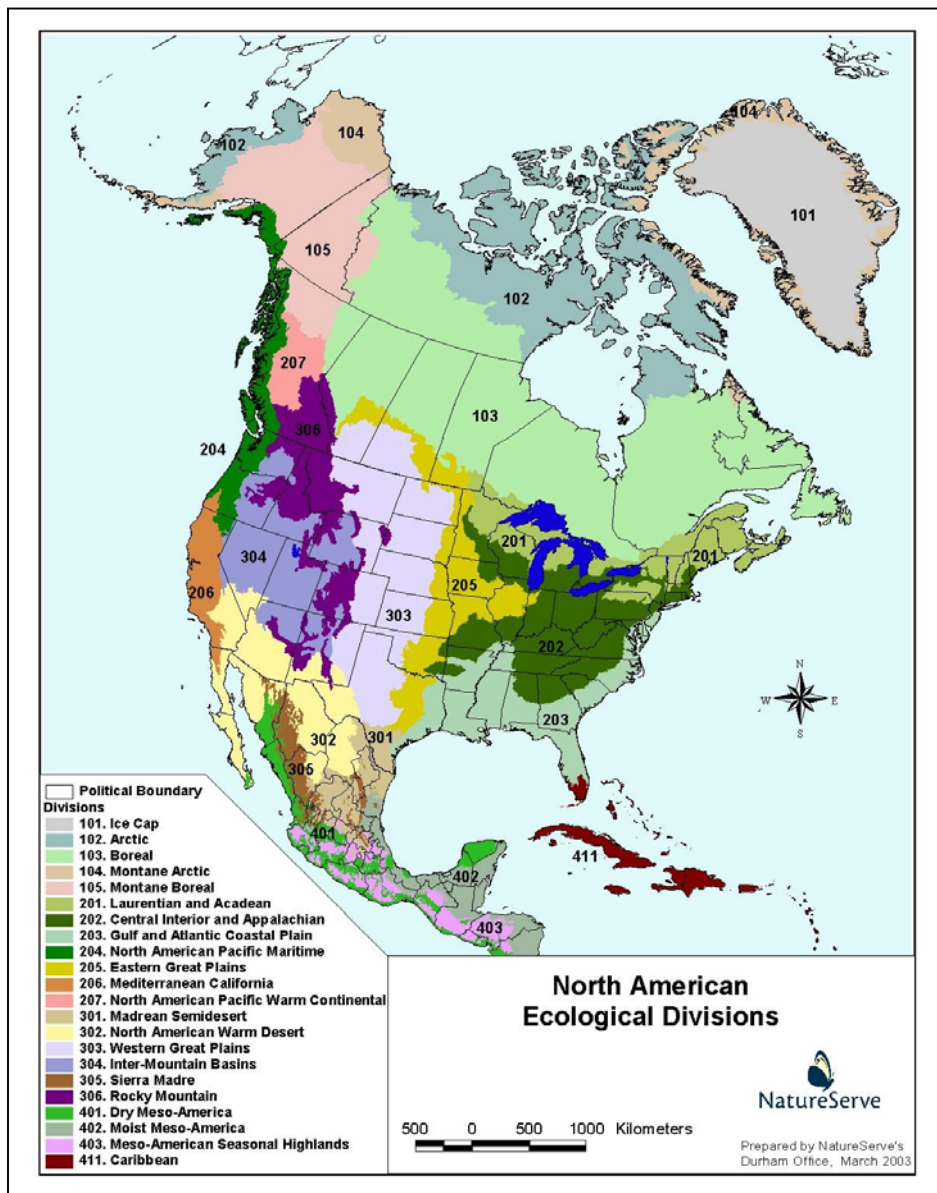


Figure VIII-1. Ecological Divisions of North America for NatureServe Ecological Systems.



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Key to Isolated Wetland Types of the Montane Boreal Division (105) .....	4
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Key to Isolated Wetland Types of the Central Interior and Appalachian Division (202) .....	7
Key to Isolated Wetland Types of the Gulf and Atlantic Coastal Plain Division (203) .....	10
KEY A - Isolated Wetland Types of the West Gulf Coastal Plain .....	10
KEY B - Isolated Wetland Types of the Florida Peninsula.....	11
KEY C - Isolated Wetland Types of the East and Upper East Gulf Coastal Plains .....	11
KEY D - Isolated Wetland Types of the Atlantic Coastal Plain (Chesapeake Bay to Long Island) .....	13
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## Wetland vs. Upland Key

- 1a. Land area occurring in a saturated or periodically inundated condition (e.g., marsh, swamp, bog, vernal pool, riparian, floodplain); indicators of such condition include presence of hydrophytic plants and/or hydric soils areas without soils but with hydrophytes (e.g., aquatic beds over bedrock, seaweed covered rocky shores); areas without soil or hydrophytes but occur as open shallow (<2 m) water over rock or sand substrates (e.g., gravel beaches, bedrock pools, ponds and pondshores)..... **Go to Wetland Key**
- 1b. Land area lacking indicators of a saturated or periodically inundated condition..... **Upland**

## Geographically Isolated Wetland Key

- 1a. Wetland occurring on the shores of open water..... 2
- 1b. Wetland not associated with open water; occurring in areas surrounded by uplands..... 3
- 2a. Wetland occurring on shores of open water > 2 meters deep (ocean, lakes) or on the banks of rivers or streams .....
- 2b. Wetland occurring on shores of open water < 2 meters maximum depth .....
- 3a. Wetland completely surrounded by uplands and, with no apparent perennial surface water inlets and outlets..... **GEOGRAPHICALLY ISOLATED WETLAND**
- 3b. Wetland either not completely surrounded by uplands or, with apparent perennial surface water inlets and or outlets .....

- 4a. Wetland surrounding shallow open bodies of water (< 2 meters) with no surface inlets or outlets ..... **GEOGRAPHICALLY ISOLATED WETLAND**
- 4b. Wetland surrounding shallow open bodies of water that are apparently connected to other perennial open bodies of water, streams, rivers, or other water sources ..... **NOT ISOLATED**

### **Key to Isolated Wetland Types of the Montane Arctic Division (102 & 104)**

- 1a. Peatland soils that include a thick, saturated organic layer (varying from muck to fiber-rich plant material) over mineral soils, occurring with *Sphagnum* mosses ..... 2
- 1b. Soils not as above..... **NOT IN KEY**
- 2a. Peatland limited to topographic depressions. Vegetation is dominated by low ericaceous shrubs (*Kalmia* spp., *Ledum* spp., *Betula* spp., *Myrica* spp., *Empetrum* spp., or *Chamaedaphne* spp.), and with patches of graminoids and bryophyte lawns. *Sphagnum* species, including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic. Conifer trees may codominate in tree and shrub layer ..... **Boreal Depressional Bog (CES103.871)**
- 2b. Peatlands that occur on expansive, flat landscapes. Vegetation is dominated by thick to widely spaced stunted trees, continuous to patchy shrubs, and open areas of herbaceous plants. Dominant tree species include *Picea mariana*, *Picea glauca*, *Picea sitchensis*, and *Larix laricina*. Low ericaceous shrubs, including *Kalmia* spp., *Ledum groenlandicum*, *Chamaedaphne calyculata*, and *Betula nana* (= *B. glandulosa*), occur with patches of graminoids and bryophyte lawns. *Sphagnum* species, including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic ..... **Boreal Blanket Bog (CES103.870) NOT ISOLATED**

### **Key to Isolated Wetland Types of the Montane Boreal Division (105)**

- 1a. Peatland soils that include a thick, saturated organic layer (varying from muck to fiber-rich plant material) over mineral soils, occurring with *Sphagnum* mosses ..... 2
- 1b. Soils not as above..... 5
- 2a. Peatlands influenced by rain water only, substrate & water pH is very acidic to moderately acidic..... 3
- 2b. Peatlands influenced by ground water, substrate & water pH is slightly acidic to alkaline, high in nutrients..... 4
- 3a. Peatlands are limited to topographic depressions. Vegetation is dominated by low ericaceous shrubs (*Kalmia* spp., *Ledum* spp., *Betula* spp., *Myrica* spp., *Empetrum* spp., or *Chamaedaphne* spp.), and with patches of graminoids and bryophytes. *Sphagnum* species including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic. Conifer trees sometimes codominate in tree and shrub layers. .... **Boreal Depressional Bog (CES103.871)**
- 3b. Peatlands that occur on expansive, flat landscapes in areas of high rainfall and low temperatures. Vegetation is dominated by thick to widely spaced stunted trees, continuous to patchy shrubs, and open areas of herbaceous plants. Dominant tree species include *Picea mariana*, *P. glauca*, *P. sitchensis*, and *Larix laricina*. Low ericaceous shrubs, including *Kalmia* spp., *Ledum groenlandicum*, *Chamaedaphne calyculata*, and *Betula nana* (= *B. glandulosa*), occur with patches of graminoids and bryophyte lawns. *Sphagnum* species, including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic .....

- ..... **Boreal Blanket Bog (CES103.870) NOT ISOLATED**
- 4a. Peatlands are nutrient rich, neutral to alkaline, and are dominated by aquatic, emergent, and dwarf shrubs, or with limited portions of raised peat dominated by shrubs and trees. Groundwater, the primary water source, is nutrient-rich due to its contact with mineral soils. Waters may be acidic or basic, but typically have a pH above 4.7. Dominant species include *Myrica gale*, *Eriophorum russeolum*, *Comarum palustre* (= *Potentilla palustris*), *Dasiphora fruticosa ssp. floribunda* (= *Potentilla fruticosa*), *Calamagrostis canadensis*, *Picea mariana*, and *Carex aquatilis var. dives* (= *Carex sitchensis*).....
- ..... **Boreal Fen (CES103.872) NOT ISOLATED**
- 4b. Wetlands not as above ..... 5
- 5a. Wetlands occur in coastal interdunal wetlands that occur within active or partially vegetated coastal barrier islands, spits and coastal dunes ranging from SE Alaska through the Aleutian Islands. Wetlands are typically dominated by *Equisetum variegatum*, *Salix communtata*, *S. sitchensis*, or *Myrica gale*. Organic mats can develop.....
- ..... **North Pacific Coastal Interdunal Wetland (CES204.062).**
- 5b. Physical setting and vegetation not in combinations as above..... **NOT IN KEY**

### Key to Isolated Wetland Types of Laurentian and Acadian Division (201)

- 1a. Wetland dominated by trees; open areas of shrubs or herbs present ..... 2
- 1b. Wetland dominated by shrubs, dwarf-shrubs, or herbs; trees, if present are sparse ..... 8
- 2a. Coniferous species largely dominant; deciduous trees, if present, not abundant..... 3
- 2b. Broadleaf deciduous trees or a mix of deciduous and coniferous trees ..... 6
- 3a. Forested coniferous peatland: *Sphagnum* mosses form a deep organic substrate; *Picea mariana* (black spruce) and *Larix laricina* (larch) are dominant conifers; saturated acidic swamp of northern New England, ranging to the Great Lakes region .....
- ..... **Boreal – Laurentian Conifer Acidic Swamp (CES103.724)**
- 3b. Wetland forests dominated by *Picea* spp. or *Thuja occidentalis* (northern white cedar), lacking deep peat mat ..... 4
- 4a. Forest characterized by *Thuja occidentalis*; occurring on gentle to moderate slopes fed by groundwater seepage..... **Acadian –Appalachian Conifer Seepage Forest (CES201.576)**
- 4b. Forests characterized by *Picea* spp. .... 5
- 5a. Spruce forests occurring on sandy outwash plains; undulating topography supports upland forest and shrublands; may include small wetland pockets .....
- ..... **Acadian Near-Boreal Spruce Barrens (CES201.561) NOT ISOLATED**
- 5b. Spruce forests of low flat areas; shrub layers poorly developed; feathermosses (*Pleurozium* spp.) form a dense carpet..... **Acadian Near-Boreal Spruce Flat (CES201.562)**
- 6a. Wetland forest of slightly lower flat areas, dominated by oak species such as *Quercus palustris* (pin oak) or *Quercus bicolor* (swamp white oak) with other deciduous trees including *Acer rubrum* (red maple), *Fagus grandifolia* (beech), *Nyssa sylvatica* (black gum), *Liquidambar styraciflua* (sweetgum); flatwoods of central and northern Midwest, ranging to southern New England .....
- ..... **North-Central Interior Wet Flatwoods (CES202.700)**
- 6b. Wetland forests comprised of a mixture of coniferous and broadleaf deciduous trees..... 7

- 7a. Wetland forest characterized by *Picea* spp., *Acer rubrum*, *Betula alleghaniensis*; understory characterized by ericaceous shrubs such as *Vaccinium corymbosum*, *Ledum groenlandicum*, as well as *Nemopanthus mucronatus*.....  
..... **Laurentian-Acadian Conifer-Hardwood Acid Swamp (CES201.574)**
- 7b. Wetland forest characterized by *Thuja occidentalis* and *Fraxinus nigra*; *Cornus sericea* is commonly present; ericaceous species sparse to absent .....  
..... **Laurentian-Acadian Alkaline Conifer-Hardwood Swamp (CES201.575)**
- 8a. Wetland complex characterized by dwarf-shrubs and herbs; trees are sparse to absent..... 9
- 8b. Wetland complex characterized by herbaceous species or shrubs; or mixed physiognomy of trees, shrubs, herbaceous species ..... 17
- 9a. Dwarf-shrub wetland with peat substrate (rather than mineral soil or muck)..... 10
- 9b. Dwarf-shrub wetland; substrate either mucky or mineral soil, but not peaty ..... 15
- 10a. Dwarf-shrubs primarily ericaceous: *Chamaedaphne calyculata* (leatherleaf), *Kalmia angustifolia* (sheep laurel), *Ledum groenlandicum* (Labrador-tea)..... 11
- 10b. Dwarf-shrubs characterized by *Dasiphora fruticosa* (shrubby cinquefoil); *Betula pumila* (bog birch), *Salix* spp. (willows), as well as ericaceous shrubs may also be present ..... 12
- 11a. Bog complex of coastal Maine and Canadian maritime provinces; *Rubus chamaemorus* (cloudberry), *Empetrum nigrum* (black crowberry) usually present; .....  
..... **Acadian Maritime Bog (CES201.580) NOT ISOLATED**
- 11b. Bog complex of interior Maine, northern New England, west to the Great Lakes; *Rubus chamaemorus* and *Empetrum nigrum* not present ..... **Boreal-Laurentian Bog (CES103.581)**
- 12a. Interdunal wetland occurring in the coastal dune complexes of the Great Lakes .....  
..... **Northern Great Lakes Interdunal Wetland (CES201.034)**
- 12b. Shrub wetlands not associated with Great Lakes dunes..... 13
- 13a. Peatland in which dwarf shrubs are characterized by bog birch (*Betula pumila*), shrubby cinquefoil (*Dasiphora fruticosa*), or willows (*Salix* spp.); ericaceous dwarf-shrubs minor or absent; peat generally shallow; *Photinia melanocarpa* (black chokeberry), *Andropogon gerardii* (big bluestem) and *Spartina pectinata* (prairie cordgrass) often present; alkaline fen system of Ontario, Ohio and west to South Dakota .....  
..... **North-Central Interior Shrub-Graminoid Alkaline Fen (CES202.702)**
- 13b. Peatland dominated by dwarf-shrubs; ericaceous species *Chamaedaphne calyculata*, *Ledum groenlandicum* common; *Dasiphora fruticosa* and *Betula pumila* may be present; ..... 14
- 14a. Northern patterned peatland with strings and pools; sedges prevalent, with *Carex lasiocarpa* most characteristic, but calciphytic species (e.g., *Carex flava*) not present .....  
..... **Boreal-Laurentian-Acadian Acidic Basin Fen (CES201.583)**
- 14b. Calcareous fen characterized by a mixture of shrubs and herbaceous species; ericaceous shrubs not as prevalent; calciphytic species such as *Carex flava*, *Lobelia kalmii*, *Rhynchospora capillacea* characteristic .....  
..... **Laurentian-Acadian Alkaline Fen (CES201.585)**
- 15a. Shrub and/or herbaceous wetland of Great Lakes interdunal swales .....  
..... **Northern Great Lakes Interdunal Wetland (CES201.034)**
- 15b. Shrub wetlands of mucky, but not peaty soil; not associated with Great Lakes interdunal swales ..... 16

- 16a. Shrub swamp of northern New England, southern Canada and upper Midwest; often a patchy mosaic of shrubland and herbaceous vegetation; typical shrubs include *Alnus* spp., *Myrica gale*, *Rosa palustris*, *Spiraea* spp., with sedges *Carex* spp. and *Schoenoplectus* spp. common; other typical graminoids include *Juncus effusus*, *Calamagrostis canadensis*, *Phalaris arundinacea* and others; setting primarily a forested landscape, often on lakeshores and streams as well as isolated basins;.....  
 ..... **Laurentian-Acadian Wet Meadow – Shrub Swamp (CES201.582) NOT ISOLATED**
- 16b. Shrub swamp of the upper Midwest from Ohio to South Dakota; typical shrubs include *Cornus sericea*, *Cephalanthus occidentalis*, *Salix* spp.; herbaceous species characterized by prairie species *Spartina pectinata*, *Andropogon gerardii*, and *Panicum virgatum*, as well as sedges (*Carex* spp.), *Typha latifolia*, *Calamagrostis canadensis*, and *Schoenoplectus* spp.; setting typically a non-forested open grassland, on glacial potholes, lake plains, and glacial outwash.....  
 ..... **North-Central Interior Wet Meadow – Shrub Swamp (CES202.701)**
- 17a. Water typically present most of the growing season; emergent aquatic species such as *Nymphaea odorata*, *Pontederia cordata*, *Peltandra virginica* occurring in wettest portions..... 18
- 17b. Vegetation of mixed physiognomy (shrubs, scattered trees, herbaceous species, patches of bare substrate) on sand dune or bedrock; standing water typically not present by late in growing season..... 19
- 18a. Marsh of New England, Mid-Atlantic states, ranging to northern Midwest; natural surroundings are primarily forested..... **Laurentian-Acadian Freshwater Marsh (CES201.594)**
- 18b. Marsh of Midwestern states; natural surroundings are primarily forest, savanna, and/or grassland ..... **North-Central Interior Freshwater Marsh (CES202.899)**
- 19a. Mixed upland and wetland vegetation of Great Lakes dunes; uplands characterized by open-to-closed canopy of trees, patches of dune grasses (*Ammophila breviligulata*); swales wet in early season and support varying levels of organic soil development (muck to peat). Characteristic species include rushes (*Juncus balticus*, *Juncus pelocarpus*), sedges (*Schoenoplectus americanus*, *Carex* spp.), *Eleocharis acicularis*, or by shrubs *Dasiphora fruticosa* ssp. *floribunda*.....  
 ..... **Great Lakes Dune and Swale (CES201.726)**
- 19b. Mixed upland and wetland vegetation of Great Lakes limestone bedrock pavement with shallow to absent soils; trees may include *Acer saccharum*, *Quercus rubra*, *Picea glauca*, *Pinus banksiana*, or *Thuja occidentalis*; shrubs and herbs form a patchy mosaic, and are characterized by *Dasiphora fruticosa* ssp. *floribunda*, *Danthonia spicata*, *Schizachyrium scoparium*, *Carex scirpoidea*, *Poa compressa*, *Sporobolus* spp. and others ..... **Great Lakes Alvar (CES201.721)**

## Key to Isolated Wetland Types of the Central Interior and Appalachian Division (202)

- 1a. Wetland of the Piedmont region or montane regions of Southern Appalachia ..... 15
- 1b. Wetland of glacial lake plain associated with the Great Lakes..... 12
- 1c. All other wetlands ..... 2
- 2a. Wetland dominated by trees; open areas of shrubs or herbs, or of upland vegetation often present, but wetland mostly forested ..... **North-Central Interior Flatwoods (CES202.700)**
- 2b. Wetland dominated by shrubs, dwarf-shrubs, or herbs; trees, if present are sparse ..... 4
- 4a. Peatland complex characterized by dwarf-shrubs; trees are sparse to absent. .... 5
- 4b. Wetland complex characterized by herbaceous species or shrubs; or mixed physiognomy of trees, shrubs, and herbaceous species in a patchy mosaic. Substrate either mucky or mineral soil, but peat rarely present 9

- 5a. Dwarf-shrubs primarily ericaceous and dominated by *Chamaedaphne calyculata* (leatherleaf) ..... 6
- 5b. Dwarf-shrubs characterized by *Dasiphora fruticosa* (shrubby cinquefoil); *Betula pumila* (bog birch), *Salix* spp. (willows), as well as ericaceous shrubs may also be present but in lesser quantities. Also contain a high component of graminoid species ..... 8
- 6a. Bog complex dominated by dwarf-shrubs; *Kalmia angustifolia* (sheep laurel), *Ledum groenlandicum* (Labrador-tea) common. Often containing scattered, stunted trees such as *Picea mariana* (black spruce) or *Larix laricina* (tamarack). Found mostly in interior Maine, northern New England, west to the Great Lakes ..... **Boreal-Laurentian Bog (CES103.581)**
- 6b. Peatland dominated by dwarf-shrubs with patches of graminoids. *Kalmia angustifolia* and *Ledum groenlandicum* not present..... 7
- 7a. Bog heath found mostly in Laurentian-Acadian and boreal regions, but can reach further south. Characterized by ribbed bogs or fens in which a pattern of narrow (2-3 m wide) low (less than 1 m deep) ridges are oriented at right angles to the direction of the drainage. *Betula pumila* can be prevalent. Contains areas of graminoid dominance, in particular *Carex* spp. .... **Boreal-Laurentian-Acadian Acidic Basin Fen (CES201.583)**
- 7b. Peatlands south of the Laurentian-Acadian region down to near the glacial boundary in the northeastern and north-central U.S. They are closed basins (many are "kettleholes") dominated by ericaceous shrubs and patches of graminoids, in particular *Carex* spp..... **North-Central Interior and Appalachian Acid Peatland (CES202.606)**
- 8a. Dwarf shrubs dominate with graminoid core area characterized by prairie forbs and grasses such as *Andropogon gerardii* (big bluestem) and *Spartina pectinata* (prairie cordgrass); alkaline fen system of Ontario, Ohio and west to South Dakota. Peat very shallow. .... **North-Central Interior Shrub-Graminoid Alkaline Fen (CES202.702)**
- 8b. Dominated primarily by sedges; dwarf shrub layer less distinct unless impacted by grazing. Found primarily in Appalachians and eastern Great Lakes regions..... **North-Central Appalachian Seepage Fen (CES202.607)**
- 9a. Water present most of growing season ..... 10
- 9b. Water absent most of growing season..... 11
- 10a. Emergent aquatic species such as *Typha* spp., *Schoenoplectus* spp., *Nymphaea odorata*, *Pontederia cordata*, *Peltandra virginica* occurring in wettest portions. Water present most of the growing season..... **North-Central Interior Freshwater Marsh (CES202.899)**
- 10b. ....Ponds vary from open water to herb-, shrub-, or tree-dominated systems. Tree-dominated examples typically contain *Quercus* species, *Platanus occidentalis*, *Fraxinus pennsylvanica*, *Acer saccharinum* or *Nyssa* species, or a combination of these. *Cephalanthus occidentalis* is a typical shrub component. This system of ponds and wetlands is found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau regions, ranging north from the southern and central Appalachians to the Northern Piedmont regions..... **Central Interior Highlands and Appalachian Sinkhole and Depression Pond (CES202.018)**
- 11a. Dominated by hydrophytic plants, which vary from mixed grass or sedge fen with complex zonation to more tallgrass prairie species mixed with calciphiles. Restricted primarily to Ozark-Ouachita region where the soil or substrate is saturated by calcareous groundwater seepage ..... **Ozark-Ouachita Fen (CES202.052)**
- 11b. Dominated by sedges (*Carex* spp.) and grasses such as *Calamagrostis canadensis*. This system also can contain a zone of wet prairie species such as *Spartina pectinata*. Shrub swamps can also be associated

- with the wet meadows within this system. Typical shrub species include *Cornus* spp., *Salix* spp., and/or *Cephalanthus occidentalis*. .....  
..... **North-Central Interior Wet Meadow-Shrub Swamp (CES202.701)**
- 12a. Wetland associated with Great Lakes coastal dunes ..... 13  
12b. Wetland not specifically associated with dune areas ..... 14
- 13a. Mixed upland and wetland vegetation of Great Lakes dunes; uplands characterized by open-to-closed canopy of trees, patches of dune grasses (*Ammophila breviligulata*); swales wet in early season and support varying levels of organic soil development (muck to peat). Characteristic species include rushes (*Juncus balticus*, *Juncus pelocarpus*), sedges (*Schoenoplectus americanus*, *Carex* spp.), *Eleocharis acicularis*, or by shrubs *Dasiphora fruticosa* ssp. *floribunda*.....  
..... **Great Lakes Dune and Swale (CES201.726)**
- 13b. Dwarf shrub and herbaceous wetland of Great Lakes interdunal swales. Supports species of *Solidago* and *Juncus* spp. Contains very little organic soil accumulation .....  
..... **Northern Great Lakes Interdunal Wetland (CES201.034)**
- 14a. Characterized by species more commonly found in the Atlantic Coastal Plain including *Rhynchospora scirpoides* (= *Psilocarya scirpoides*), *Rhynchospora macrostachya*, and *Scleria reticularis*. This system is a disjunct in this region and only located on glacial lake plain near southern Lake Michigan.....  
..... **Atlantic Coastal Plain Northern Pondshore (CES203.518)**
- 14b. The vegetation of this community is dominated by tallgrass species such as *Andropogon gerardii*, *Panicum virgatum*, *Spartina pectinata*, *Schizachyrium scoparium*, *Sorghastrum nutans* and *Calamagrostis canadensis*. Trees and shrubs are abundant in places, due to fire suppression and hydrologic alteration. This system is found on the lakeplain near the southern central Great Lakes of the United States and Canada  
..... **Great Lakes Wet-Mesic Lakeplain Prairie (CES202.027)**
- 15a. Wetland on slopes in Southern Appalachians .....  
..... **Southern Appalachian Seepage Wetland (CES202.317)**
- 15b. Wetland not on slopes ..... 16
- 16a. Small depressions in Piedmont (and adjacent Coastal Plain) fall line granite rock outcrops .....  
..... **Southern Piedmont Granite Flatrock (CES202.329)**
- 16b. Wetlands not on granite outcrops..... 17
- 17a. Ponds and wetlands found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau, southern and central Appalachians and Northern Piedmont regions. Generally in karst, in basins of sinkholes or other isolated depressions on uplands.....  
**Central Interior Highlands and Appalachian Sinkhole and Depression Pond (CES202.018)**
- 17b. Isolated wetlands primarily of the Piedmont (very limited in Southern Appalachians and Ridge and Valley) in small, shallow basins in upland settings where water pools due to limited soil drainage, generally on mafic soils .....  
..... **Southern Piedmont / Ridge and Valley Upland Depression Swamp (202.336)**

## Key to Isolated Wetland Types of the Gulf and Atlantic Coastal Plain Division (203)

- 1a. Wetlands of the West Gulf Coastal Plain, west of the Mississippi River ..... **KEY A**
- 1b. Wetlands of the Atlantic, East Gulf and Upper East Gulf Coastal Plains, from Long Island, NY to the "Florida Parishes" of Louisiana, including Florida and the Upper East Gulf Coastal Plain of western Kentucky and Tennessee..... 2
  
- 2a. Wetlands of the Florida Peninsula (including Levy, Gilchrist, Alachua, Putnam, and St. Johns Counties) **KEY B**
- 2b. Isolated Wetlands of the Atlantic and East Gulf Coastal Plains, not including the Florida Peninsula ..... 3
  
- 3a. Wetlands of the Atlantic Coastal Plain ..... 4
- 3b. Wetlands of the East and Upper East Gulf Coastal Plains..... **KEY C**
  
- 4a. Wetlands of the Atlantic Coastal Plain including the Chesapeake Bay area of Virginia, north to (and including) Long Island, NY ..... **KEY D**
- 4b. Wetlands of the Atlantic Coastal Plain from southeast Virginia (Norfolk area) south to north Florida (including St. Johns, Clay, Bradford and Union Counties)..... **KEY E**

### **KEY A - Isolated Wetland Types of the West Gulf Coastal Plain**

- 1a. Wetlands are coastal, including coastal dune, coastal grasslands or interdunal wetland habitats ..... 2
- 1b. Wetlands not on the immediate coast ..... 3
  
- 2a. Herbaceous and shrubland vegetation of barrier islands, and near-coastal areas in the northern Gulf of Mexico along the upper Texas coast. Plant communities of primary and secondary dunes, interdunal swales and adjacent mainland are included, not including the wettest dune swales.....  
 ..... **Central and Upper Texas Coast Dune and Coastal Grassland (CES203.465)**
- 2b. Pond or marsh-like vegetation of the wettest dune swales and basins on barrier islands and coastal areas from Texas to Virginia. Most examples are permanently or semi-permanently flooded with freshwater but are affected by salt spray or overwash during periodic storm events.  
 ..... **Southeastern Coastal Plain Interdunal Wetland (CES203.258)**
  
- 3b. Wetlands of coastal prairies, including prairies and prairie ponds ..... 4
- 3a. Wetlands of flatwoods (including wet hardwood flatwoods, pine - hardwood flatwoods and ponds in flatwoods..... 5
  
- 4a. Vegetation on Vertisols and Alfisols which developed over Pleistocene terraces flanking the Gulf Coast...  
 ..... **Texas-Louisiana Coastal Prairie (CES203.550)**
- 4b. Vegetation of small to moderately large ponds and swales in the coastal prairie of southeastern Texas and Louisiana..... **Texas-Louisiana Coastal Prairie Pondshore (CES203.541)**
  
- 5a. Predominately graminoid-dominated flatwoods ponds in the Outer Coastal Plain of eastern Texas and western Louisiana. These ponds are generally circular or elliptical, flat-bottomed depressions on flat terraces, associated with pine savannas .....  
 ..... **West Gulf Coastal Plain Flatwoods Pond (CES203.547)**
- 5b. Hardwood or mixed pine hardwood flatwoods, generally further north..... 6
  
- 6a. Hardwood flatwoods, which are often heavily oak-dominated, found on nonriverine, Pleistocene high terraces of southern Arkansas, eastern Texas, and western Louisiana.....



- ..... **West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods (CES203.548)**
- 6b. Pine – hardwood flatwoods found on nonriverine, Pleistocene high terraces. Topography is a complex of drier ridges and wet swales which tend to support hardwood forests or swamps. There is vegetation variability relating to soil texture, moisture and disturbance history.....
- ..... **West Gulf Coastal Plain Pine-Hardwood Flatwoods (CES203.278)**

**KEY B - Isolated Wetland Types of the Florida Peninsula**

- 1a. Coastal wet dune swales and basins on barrier islands.....
- .....**Southeastern Coastal Plain Interdunal Wetland (CES203.258)**
- 1b. Non-coastal wetlands..... 2
- 2a. Deep sinkhole depressions with steep limestone walls.....
- .....**Southern Coastal Plain Sinkhole (CES203.495)**
- 2b. Woody or herbaceous wetlands, if in sinks, then not having steep limestone walls..... 3
- 3a. Woody wetlands, dominated by trees ..... 4
- 3b. Herbaceous wetlands, not dominated by trees ..... 5
- 4a. Dominated by Pond-cypress (*Taxodium ascendens*); which is generally taller in the center of the wetland, and shorter on the edges. Examples occupy poorly drained depressions, mostly in pine flatwoods. ....
- .....**Southern Coastal Plain Nonriverine Cypress Dome (CES203.251)**
- 4b. Dominated by a mixture of wetland trees, this type is found in basins with peaty substrates. Examples are generally forested; the vegetation is characterized by Bald-cypress (*Taxodium distichum*), Swamp Blackgum (*Nyssa biflora*), evergreen "bay" shrubs and/or mixed hardwoods. Emergent Slash Pine (*Pinus elliotii*) may also be present. Some characteristic shrubs include Black Titi (*Cliftonia monophylla*), Titi (*Cyrilla racemiflora*), Shining Fetterbush (*Lyonia lucida*), and Blaspheme-vine (*Smilax laurifolia*).....
- .....**Southern Coastal Plain Nonriverine Basin Swamp (CES203.384)**
- 5a. Seasonal depression ponds, examples exhibit some zonation in vegetation generally surrounded by Saw Palmetto (*Serenoa repens*). Characteristic or dominant species associated with the interior of the ponds include Maidencane (*Panicum hemitomon*), Cut-throat Panicgrass (*Panicum abscissum*), *Hypericum edisonianum*, and *Andropogon brachystachyus*.....
- .....**Central Florida Herbaceous Pondshore (CES203.890)**
- 5b. Non-tidal marsh vegetation in former lake basins and in zones around existing natural lakes, with mostly herbaceous plant communities that may be referred to as marshes, meadows, and prairies.....
- .....**Floridian Highlands Freshwater Marsh (CES203.077)**

**KEY C - Isolated Wetland Types of the East and Upper East Gulf Coastal Plains**

- 1a. Oak (*Quercus* spp.) dominated non-alluvial wetland forest, which occupies broad flats underlain by fragipans in the Jackson Purchase region of western Kentucky and nearby Tennessee.....
- .....**South-Central Interior / Upper Coastal Plain Wet Flatwoods (CES203.480)**
- 1b. Wetland occurring further south on the East Gulf Coastal Plain..... 2
- 2a. Associated with coastal dunes and barrier islands along the Gulf of Mexico..... 3
- 2b. Not associated with coastal dunes and barrier islands along the Gulf of Mexico..... 4
- 3a. Herbaceous and shrub wetland on barrier islands and other near-coastal areas where salt spray, saltwater overwash, and sand movement are important ecological forces; apparently flooded only intermittently. Occurs in only NW Florida, coastal Alabama and SE Mississippi.....

- ..... **East Gulf Coastal Plain Dune and Coastal Grassland (CES203.500)**
- 3b. Herbaceous and shrub wetland; apparently flooded on permanent or semi-permanent basis.....  
 ..... **Southeastern Coastal Plain Interdunal Wetland (CES203.258)**
- 4a. Seepage wetlands, found in small patches on slopes in dissected terrain, found near the Fall-line in Georgia..... **Atlantic Coastal Plain Sandhill Seep (CES203.253)**
- 4b. Wetlands found on flat areas rather than on seepage slopes ..... 5
- 5a. Deep sinkhole depressions with steep limestone walls.....  
 ..... **Southern Coastal Plain Sinkhole (CES203.495)**
- 5b. Woody or herbaceous wetlands, if in sinks, then not having steep limestone walls..... 6
- 6a. Depressions or sinks on extreme deep sandy soils in the southern portions of the East Gulf Coastal Plain of Florida and Alabama, apparently of karstic origin but without limestone near the surface. The appearance of these pondshores is that of large, inland white sand beach, narrowly endemic plant species may be present such as *Hypericum lissophloeus*, *Rhexia salicifolia*, and *Xyris longisepala*.....  
 ..... **East Gulf Coastal Plain Sandhill Lakeshore Depression (CES203.292)**
- 6b. Other forested or herbaceous wetlands, not having the above combination of characteristics ..... 7
- 7a. Herbaceous depressions, or depressions with scattered trees ..... 8
- 7b. Forested wetlands..... 9
- 8a. Shallow ponds of various geomorphic origin in a variety of substrates (e.g., limesinks, Grady Ponds) which are in the East Gulf Coastal Plain, inland of the Gulf Coast Flatwoods (i.e., EPA Level III Ecoregion 65, not 75 (EPA 2004)).....  
 ..... **East Gulf Coastal Plain Northern Depression Pondshore (CES203.558)**
- 8b. Depressions found in the southern portions of the East Gulf Coastal Plain, mainly in the Gulf Coast Flatwoods region (Ecoregion 75a of EPA (2004)) .....  
 ..... **East Gulf Coastal Plain Southern Depression Pondshore (CES203.504)**
- 9a. Forested wetland which occurs on broad upland flats of southern Alabama and Mississippi, and the Florida Parishes of Louisiana, and likely occurs in other parts of the region as well. A mosaic of open forests dominated by Loblolly Pine (*Pinus taeda*) interspersed with patches of Willow Oak (*Quercus phellos*) and sometimes other tree species. The ground has alternating mounds and swales on Luinn soil series .....  
 ..... **East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods (CES203.557)**
- 9b. Forested depression wetlands, not in broad upland flats..... 10
- 10a. Forested depression wetland dominated by Pond Cypress (*Taxodium ascendens*); which is generally taller in the center of the wetland, and shorter on the edges. Examples occupy poorly drained depressions, mostly in pine flatwoods. .... **Southern Coastal Plain Nonriverine Cypress Dome (CES203.251)**
- 10b. Forested depression wetland dominated by a mixture of wetland trees, this type is found in basins with peaty substrates. Examples are generally forested; the vegetation is characterized by Bald Cypress (*Taxodium distichum*), Swamp Blackgum (*Nyssa biflora*), evergreen "bay" shrubs and/or mixed hardwoods. Emergent Slash Pine (*Pinus elliotii*) may also be present. Some characteristic shrubs include Black Titi (*Cliftonia monophylla*), Titi (*Cyrilla racemiflora*), Shining Fetterbush (*Lyonia lucida*), and Blaspheme-vine (*Smilax laurifolia*).....  
 ..... **Southern Coastal Plain Nonriverine Basin Swamp (CES302.384)**

**KEY D - Isolated Wetland Types of the Atlantic Coastal Plain (Chesapeake Bay to Long Island)**

- 1a. Wetland among coastal dunes from Chesapeake Bay to southern Maine.....  
..... **Atlantic Coastal Plain Northern Dune and Maritime Grassland (CES203.264)**
- 1b. Wetlands not associated with coastal dune systems ..... 2
- 2a. Wetlands primarily herbaceous vegetation or dominated by shrubs or dwarf-shrubs ..... 3
- 2b. Wetlands primarily forested..... 4
- 3a. Saturated peatland characterized by *Sphagnum* moss mat and low shrubs, usually *Chamaedaphne calyculata* (leatherleaf); trees may be scattered but generally is not forested .....  
..... **Atlantic Coastal Plain Northern Bog (CES203.893)**
- 3b. Wetland surrounding ponds or in isolated basins; vegetation of small basins may be dominated by *Cephalanthus occidentalis* (buttonbush), especially in portions of the Delmarva peninsula; standing water may be present, or basin may be dry by late in growing season; where shrubs are not dominant or form a margin around the basin, zonation is usually evident, dominated by low delicate herbs and graminoids including *Rhynchospora* spp., *Cyperus* spp., *Juncus pelocarpus*, *Fimbristylis* spp., *Panicum longifolium*, *Gratiola aurea*, *Rhexia virginica*, and many others.....  
..... **Atlantic Coastal Plain Northern Pondshore (CES203.518)**
- 4a. Broadleaf deciduous swamp of Cape Cod south to Virginia characterized by *Acer rubrum*, *Nyssa sylvatica*, and, in examples south of Long Island, New York, *Liquidambar styraciflua*.....  
..... **Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest (CES203.520)**
- 4b. Swamp forests characterized by needle-leaved trees ..... 5
- 5a. *Chamaecyparis thyoides* (Atlantic white cedar) dominant, or co-dominant with *Acer rubrum* (red maple); dwarf-shrub bog vegetation may be interspersed; deep peat mat with hummock and hollow microtopography evident ..... **Atlantic Coastal Plain Northern Basin Peat Swamp (CES203.522)**
- 5b. *Pinus rigida* usually dominant; *Acer rubrum* often present; deep peat mat usually not present except in small boggy pockets; shallow organic layer usually typical over sand; ericaceous shrubs abundant, including *Gaylussacia baccata*, *Vaccinium corymbosum*, *Leucothoe racemosa*, and others; restricted to pine barrens landscapes of Cape Cod and southern New Jersey .....  
..... **Atlantic Coastal Plain Northern Pitch Pine Lowland (CES203.374)**

**KEY E - Isolated Wetland Types of the Atlantic Coastal Plain (SE Virginia to N Florida)**

- 1a. Coastal wet dune swales and basins on barrier islands .....  
..... **Southeastern Coastal Plain Interdunal Wetland (CES203.258)**
- 1b. Non-coastal wetlands ..... 2
- 2a. Seepage wetlands, found in small patches on slopes in dissected terrain. This type most commonly occurs in the Fall-line Sandhills region of the Carolinas and Georgia.  
..... **Atlantic Coastal Plain Sandhill Seep (CES203.253)**
- 2b. Large or small depression wetlands ..... 3
- 3a. Wetlands associated with ovoid, shallow depressions with nearly flat bottoms called Carolina bays. These are most numerous and extensive in South Carolina .....  
..... **Atlantic Coastal Plain Clay-Based Carolina Bay Wetland (CES203.245)**
- 3b. Wetlands not in Carolina Bays..... 4

- 4a. Herbaceous wetlands (or with scattered trees) in small basins in unconsolidated sediments, most formed by subsidence of surface sediments caused by solution in underlying limestone. Others may be formed as swales in mainland eolian sands, or natural blockage of small drainages by sediment movement. ....  
.....**Atlantic Coastal Plain Southern Depression Pondshore (CES203.262)**
- 4b. Forested wetlands..... 5
- 5a. Forested wetland dominated by Pond Cypress (*Taxodium ascendens*); which is generally taller in the center of the wetland, and shorter on the edges. Examples occupy poorly drained depressions, mostly in pine flatwoods .....  
..... **Southern Coastal Plain Nonriverine Cypress Dome (CES203.251)**
- 5b. Forested wetland dominated by a mixture of wetland trees, found in basins with peaty substrates. Examples are generally forested; the vegetation is characterized by Bald Cypress (*Taxodium distichum*), Swamp Blackgum (*Nyssa biflora*), evergreen "bay" shrubs and/or mixed hardwoods. Emergent Slash Pine (*Pinus elliotii*) may also be present. Some characteristic shrubs include, Titi (*Cyrilla racemiflora*), Shining Fetterbush (*Lyonia lucida*), Blaspheme-vine (*Smilax laurifolia*), and south of the Savannah River, Black Titi (*Cliftonia monophylla*).....**Southern Coastal Plain Nonriverine Basin Swamp (CES302.384)**

## Key to Isolated Wetland Types of the North American Pacific Maritime Division (204)

- 1a. Peatland soils that include a thick, saturated organic layer (varying from muck to fiber-rich plant material) over mineral soils, occurring with *Sphagnum* mosses ..... 2
- 1b. Soils are mineral, a thin layer of organic material may occur on surface, soils not a thick layer of sphagnum moss ..... 5
- 2a. Wetland is dominated by low ericaceous shrubs (*Kalmia* spp., *Ledum* spp., *Betula* spp., *Myrica* spp., *Empetrum* spp., or *Chamaedaphne* spp.), and with patches of graminoids and bryophyte lawns. *Sphagnum* species including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic. Conifer trees sometimes codominate the shrub layer .....  
..... **Boreal Depressional Bog (CES103.871)**
- 2b. Wetland not as above ..... 3
- 3a. Wetland a mix of conifer-dominated swamp, shrub swamp, and open sphagnum or sedge mire, often with small lakes and ponds interspersed. Vegetation includes many species common to boreal continental bogs and fens but is characterized by coastal species including *Chamaecyparis nootkatensis*, *Pinus contorta* var. *contorta*, *Picea sitchensis*, *Tsuga heterophylla*, *Ledum glandulosum*, *Thuja plicata*, *Gaultheria shallon*, *Spiraea douglasii*, *Carex aquatilis* var. *dives*, *Carex lyngbyei*, *Carex obnupta*, *Carex pluriflora*, *Darlingtonia californica*, *Sphagnum pacificum*, *S. henryense* and *S. mendocinum* .....  
..... **North Pacific Bog and Fen (CES204.063) NOT ISOLATED**
- 3b. Wetland dominated by herbaceous plants..... 4
- 4a. Wetland of emergent plants, permanently flooded. Soil may be muck or mineral. Water often > 2 meters deep, although some marshes may be shallower. Dominant plants are species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris*.....  
..... **Temperate Pacific Freshwater Emergent Marsh (CES200.877) NOT ISOLATED**
- 4b. Wetland of herbaceous plants on organic soils .....  
..... **North Pacific Bog and Fen (CES204.063) NOT ISOLATED**

- 5a. Wetlands of mineral soils, dominated by herbaceous forbs and graminoids, often in concentric rings around seasonally wet, shallow ephemeral water bodies found in very small depressions. Occur only on hardpans or on small depressions in volcanic bedrock that retain water for short periods (vernal pools).... 6
- 5b. Wetlands of mineral or organic soil, dominated by graminoids and lesser amounts of forbs and woody plants, typically not forming concentric ring patterns, soils seasonally wet, generally drying out by end of season..... 8
- 6a. Vernal pools with *Downingia elegans*, *Isoetes orcuttii*, *Pilularia americana*, *Triteleia hyacinthina*, *Eleocharis* spp., *Eryngium petiolatum*, *Plagiobothrys figuratus*, *Plagiobothrys scouleri*, *Grindelia nana*, *Veronica peregrina*, *Deschampsia danthonioides*, and/or *Callitriche* spp. Typically have hummocky micro-relief, are acidic wetlands. Found throughout intermountain valleys of California, Oregon and the Gulf and San Juan islands of Washington and British Columbia. ....  
 ..... **North Pacific Hardpan Vernal Pool (CES204.859)**
- 6b. Vernal Pools not as above..... 7
- 7a. Vernal Pools on volcanic substrates with flashy inundations (fill and evaporate rapidly, several times during the wet season) and have *Lasthenia californica*, *Downingia bicornuta*, *Psathyrotes* spp., and *Sedella* spp. (= *Parvisedum* spp.) often present. Pools with longer inundation periods have *Eryngium constancei* and *Eleocharis acicularis*. ....  
 ..... **Northern California Volcanic Vernal Pool (CES206.949)**
- 7b. Vernal pools are located on top of massive basalt flows where soils are very thin over solid bedrock. Characteristic species include *Blennosperma nanum*, *Epilobium densiflorum* (= *Boisduvalia densiflora*), *Callitriche marginata*, *Cicendia quadrangularis*, *Eryngium vaseyi*, *Psilocarphus brevissimus*, and *Sedella pumila* (= *Parvisedum pumilum*). *Artemisia cana* ssp. *bolanderi* can occur on better developed soils.....  
 ..... **Modoc Basalt Flow Vernal Pool (CES204.996)**
- 8a. Wetland of high-nutrient soils that are temporarily to seasonally flooded. Vegetation is dominated by *Deschampsia caespitosa*, *Camassia quamash*, *Carex densa*, and *Carex unilateralis*. Rare, known only from the Willamette Valley of Oregon and Washington .....  
 ..... **Willamette Valley Wet Prairie (CES204.874)**
- 8b. Not as above..... 9
- 9a. Wetlands in coastal interdunal swales among active or partially vegetated coastal barrier islands, spits and coastal dunes, ranging from SE Alaska through the Aleutian Islands. Wetlands are typically dominated by *Equisetum variegatum*, *Salix communtata*, *S. sitchensis*, or *Myrica gale*. Organic mats can develop .....  
 ..... **North Pacific Coastal Interdunal Wetland (CES204.NEW)**
- 9b. Physical setting and vegetation not in combinations as above..... **NOT IN KEY**

## Key to Isolated Wetland Types of the Eastern Great Plains Division (205)

- 1a. Wetland characterized by closed basin with apparently little to no groundwater influence; i.e., on relatively impermeable substrates..... 2
- 1b. Wetland characterized by open basin and apparently influenced by groundwater; i.e., on permeable substrates..... 3
- 2a. Playa lake or rainwater basins characterized by the presence of an impermeable layer such as a dense clay. *Eleocharis* spp., *Hordeum jubatum*, *Coreopsis tinctoria*, *Symphyotrichum subulatum* (= *Aster subulatus*), and *Polygonum pensylvanicum* (= *Polygonum bicornne*) are common vegetation in the wetter and deeper depression, while *Pascopyrum smithii* and *Buchloe dactyloides* are more common in shallow

- depressions in rangeland. Found mostly in western Great Plains, but occasionally can occur in eastern tallgrass plains..... **Western Great Plains Closed Depression Wetland (CES303.666)**
- 2b. Prairie potholes found primarily in glaciated northern Great Plains. Includes elements of emergent marshes and wet, sedge meadows that develop into a pattern of concentric rings. ....  
.....**Great Plains Prairie Pothole (CES303.661)**
- 3a. Wetland is dominated by *Spartina pectinata*, *Tripsacum dactyloides*, numerous large sedges, such as *Carex frankii* and *Carex hyalinolepis*, and in wetter areas, *Eleocharis* spp. Other emergent marsh species such as *Typha* spp. can be associated with this system. Forbs can include *Helianthus grosseserratus*, *Vernonia fasciculata*, and *Physostegia virginiana*. Dominant open basin wetland system found in the eastern Great Plains.....  
.....**Eastern Great Plains Wet Meadow, Prairie, and Marsh (CES205.687)**
- 3b. Wetland typically occurs as lowland depressions or along lake borders that have a permanent water source through most of the year. A variety of species are part of this system, including *Typha* spp. and *Schoenoplectus* spp. The system includes submergent and emergent marshes, and associated wet meadows and wet prairies. Occurs throughout western Great Plains .....  
.....**Western Great Plains Open Freshwater Depression Wetland (CES303.675)**

## Key to Isolated Wetland Types of Mediterranean California Division (206)

- 1a. Wetlands of playa lakes or marshes, often with alkaline or saline characteristics, or freshwater..... 2
- 1b. Wetlands of vernal pools, fens or sand dunes, ..... 4
- 2a. Marsh and Playa that are generally dominated by salt tolerant plants such as *Distichlis spicata*, *Salicornia* spp., In wet years, degree of salinity may be diluted. .... 3
- 2b. Wetland of emergent plants, permanently flooded. Soil may be muck or mineral. ....  
..... **Temperate Pacific Freshwater Emergent Marsh (CES200.877) NOT ISOLATED**
- 3a. Saline/Playa depressions dominated by *Allenrolfea occidentalis*, *Suaeda moquinii*, *Distichlis spicata*, and *Salicornia rubra*. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils of some of examples of this system which may allow for less salt-tolerant species to occur. .... **California Central Valley Alkali Sink (CES206.954)**
- 3b. Old lake beds or in floodplains of major river systems where seasonal water inputs are limited dominated by *Distichlis spicata*, *Juncus balticus*, *Anemopsis californica*, *Schoenoplectus americanus* (= *Scirpus americanus*), *Atriplex* spp., *Triglochin maritima*, and *Cirsium* spp.,.....  
..... **Mediterranean California Alkali Marsh (CES206.947)**
- 4a. Interdunal wetlands dominated by *Argentina anserina* (= *Potentilla anserina*), *Hydrocotyle umbellata*, *Euthamia occidentalis*, *Juncus* spp., *Carex obnupta*, and *Sparganium* spp.....  
..... **Mediterranean California Coastal Interdunal Wetland (CES206.951)**
- 4b. Not as above..... 5
- 5a. Wetlands on serpentine soils, fed by groundwater seeps, have substantial *Sphagnum* accumulation. Characteristic species present include *Darlingtonia californica*, *Drosera rotundifolia*, *Eleocharis quinqueflora*, *Eriophorum crinigerum*, *Carex californica*, and *Deschampsia caespitosa*. ....  
..... **Mediterranean California Serpentine Fen (CES206.953) NOT ISOLATED**
- 5b. Wetlands not of serpentine soils or fed by groundwater seeps. Wetlands receive only precipitation, and water accumulates on site due to impermeable layer such as a bedrock or hard clay layer, vegetation dominated by forbs, sites dry out completely every year..... 6



*spinus*, *Prunus fasciculata*, *Rhus microphylla*, *Salazaria mexicana*, or *Sarcobatus vermiculatus*. Herbaceous vegetation such as perennial grasses or herbs may present. Wetland vegetation may be concentrated near occasional seeps/springs or tanks in drainage where water is perennial.....  
 .....**North American Warm Desert Wash (CES302.755) NOT ISOLATED**

3a. Wetlands occur in small (usually less than 0.1 ha) interdunal swales in wind deflation areas within active or partially vegetated dunes or sand sheets, where sand is scoured down to the water table. These wetlands areas are typically dominated by emergent herbaceous species like *Eleocharis* spp., *Juncus* spp or *Schoenoplectus* spp. Other characteristic species may include *Dasyochloa pulchella*, *Ephedra californica*, *Ericameria linearifolia*, *Eriogonum deserticola*, *Heliotropium convolvulaceum*, *Poliomintha incana*, *Prosopis glandulosa*, *Pleuraphis rigida*, *Psoralidium lanceolatum*, *Psorothamnus polydenius*, *Psorothamnus scoparius*, and *Psorothamnus spinosus*. ....  
 .....**North American Warm Desert Interdunal Swale Wetland (CES302.039)**

3b. Basin wetlands are not associated with active or partially vegetated dunes or sand sheets..... 4

4a. Sparsely vegetated, intermittently flooded wetland restricted to playas that are dry most of the year. During wet periods vegetation may become dense. However, desert playas are typically sparsely vegetated (generally less than 10% cover) depending on time since last flooding and degree of salinity. Salt crusts are common throughout, often with small saltgrass beds in depressions and sparse shrubs around the margins. Subsoils often include an impermeable layer of clay or *caliche*. Large desert playas often form vegetation rings formed in response to salinity. Characteristic species include *Allenrolfea occidentalis*, *Suaeda* spp., *Distichlis spicata*, *Eleocharis palustris*, *Sporobolus* spp., *Tiquilia* spp., or *Atriplex* spp. Ephemeral herbaceous species may have high cover periodically. **North American Warm Desert Playa (CES302.751)**

4b. Wetland NOT typically with sparse vegetation; and/or restricted to intermittently flooded playas..... 5

5a. Wetland occurs in depressions on broad mesas and plains, and valley bottoms that receive runoff from adjacent uplands where water generally infiltrates or drains off relatively quickly and lacks defining wetland soil characteristics. Vegetation is typically dominated by lush swards of *Pleuraphis mutica* (tobosa swales) or other mesic graminoids such as *Pascopyrum smithii*, *Panicum obtusum*, *Sporobolus airoides*, or *Sporobolus wrightii* that contrast sharply with surrounding desert scrub or shortgrass steppe ..... **Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (CES302.746)**

5b. Not as above. Vegetation is typically dominated by emergent herbaceous species..... 6

6a. Herbaceous wetlands among alkaline springs at low elevation (<1000 m) and at mid-elevation (1000-2000 m) among semi-desert grasslands and Madrean evergreen woodlands. Evaporation often creates saline conditions especially on the margins as evidenced by salt-tolerant species such as *Distichlis spicata* and *Sporobolus airoides*. Typically, low-elevation examples are too warm to accumulate a deep organic layer. Vegetation mosaics respond to water depth. In shallow margins, emergent plants typical of riparian vegetation are present including species of *Carex*, *Juncus*, and *Schoenoplectus*. In adjacent deeper waters, emergent marsh can be characteristic.. ... **North American Warm Desert Cienega (CES302.747) NOT ISOLATED**

6b. Herbaceous wetland that occur in depressions (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Marshes are frequently or continually inundated, with water depths up to 2 m or greater. Soil may be muck or mineral. Common emergent and floating vegetation includes species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris*. This system may also include areas of relatively deep water (>2 m) with floating-leaved plants .....  
 .....**North American Arid West Emergent Marsh (CES300.729) NOT ISOLATED**



## Key to Isolated Wetland Types of the Western Great Plains Division (303)

- 1a. Wetland over shallow soils or on bedrock surface; typically found among upland forest, woodlands, and glades; exclusively in the Edward’s Plateau of Texas and into Oklahoma..... 2
- 1b. Wetland found throughout the western Great Plains. .... 3
  
- 2a. Wetland is small (up to 16 meters in diameter) in shallow depressions that hold rainwater and support wetland flora, including the Texas endemic, *Isoetes lithophila*. Found on granite outcrops of the Llano Uplift in Texas .....  
 ..... **Llano Uplift Granitic Forest, Woodland and Glade (CES303.657)**
- 2b. Wetland is small (up to 16 meters in diameter) shallow depression that holds rainwater and support wetland flora. Primarily restricted to limestone soils within the Edwards Plateau and dissected Pennsylvanian limestone formations within Texas and north into Oklahoma..... **Edwards Plateau Limestone Forest, Woodland and Glade (CES303.660) NOT ISOLATED WETLAND**
  
- 3a. Wetland characterized by moderate to strongly saline soils. Halophytic, salt tolerant species such as *Distichlis spicata* and *Hordeum jubatum* dominate. .... 4
- 3b. Wetland characterized by neutral to slightly alkaline soils. Little to no halophytic species present ..... 5
  
- 4a. Wetland characterized by open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*. The herbaceous layer, if present, is usually dominated by graminoids.....  
 ..... **Inter-Mountain Basins Greasewood Flat (CES304.780)**
- 4b. Wetland dominated by herbaceous species such as *Distichlis spicata*, *Sporobolus airoides*, and *Hordeum jubatum*. Salt encrustations can occur on the surface in some examples. Occurs throughout the western Great Plains..... **Western Great Plains Saline Depression Wetland (CES303.669)**
  
- 5a. Wetland characterized by closed basin with apparently little to no groundwater influence; i.e., on relatively impermeable substrates..... 6
- 5b. Wetland characterized by open basin and apparently influenced by groundwater; i.e., on permeable substrates..... 7
  
- 6a. Playa lake or rainwater basins characterized by an impermeable soil layer such as dense clay. *Eleocharis* spp., *Hordeum jubatum*, *Coreopsis tinctoria*, *Symphyotrichum subulatum* (= *Aster subulatus*), and *Polygonum pensylvanicum* (= *Polygonum bicorne*) are common vegetation in the wetter and deeper depression, while *Pascopyrum smithii* and *Buchloe dactyloides* are more common in shallow depressions in rangeland. Found mostly in western Great Plains, but occasionally can occur in eastern tallgrass plains as well .....  
 ..... **Western Great Plains Closed Depression Wetland (CES303.666)**
- 6b. Prairie potholes found primarily in glaciated northern Great Plains. This system is typified by elements of emergent marshes and wet, sedge meadows that develop into a pattern of concentric rings. ....  
 ..... **Great Plains Prairie Pothole (CES303.661)**
  
- 7a. Wetland occurs throughout the northern Chihuahuan Desert, Sky Islands and Sonoran Desert, as well as limited areas of the southern Great Plains and Edwards Plateau on broad mesas, plains and valley bottoms. Vegetation is typically dominated by *Pleuraphis mutica* (tobosa swales) or other mesic graminoids such as *Pascopyrum smithii*, *Panicum obtusum*, *Sporobolus airoides*, or *Sporobolus wrightii*.  
 ..... **Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (CES302.746)**

- 7b. Wetland typically occurs as lowland depressions or along lake borders that have a permanent water source through most of the year. A variety of species are part of this system, including *Typha* spp. and *Schoenoplectus* spp. The system includes submergent and emergent marshes, and associated wet meadows and wet prairies. Occurs throughout western Great Plains and just reaches into tallgrass regions.  
 ..... **Western Great Plains Open Freshwater Depression Wetland (CES303.675)**

## Key to Isolated Wetland Types of the Intermountain Basin Division (304)

- 1a. Seepage wetlands restricted to wet pockets or draped across wet cliff faces of canyon walls or other steep rock outcrops; typically dominated by herbaceous vegetation. Species of *Adiantum*, *Aquilegia*, *Mimulus* are typically present to dominant. .... **Colorado Plateau Hanging Garden (CES304.764)**
- 1b. Wetlands restricted to drainages or basins ..... 2
- 2a. Wetlands are restricted to intermittently flowing drainages and include a variety of sparse or patchy vegetation including *Sarcobatus vermiculatus*, *Ericameria nauseosa*, *Fallugia paradoxa*, *Artemisia cana* ssp. *cana* or *Grayia spinosa*. Herbaceous vegetation such as perennial grasses, *Distichlis spicata* or *Sporobolus airoides*, may also dominate. Wetland vegetation may concentrated near seeps/springs or tanks in drainages where standing water is perennial. ....  
 ..... **Inter-Mountain Basins Wash (CES304.781) NOT ISOLATED**
- 2b. Wetlands restricted to basins..... 3
- 3a. Wetlands occur in a small (usually less than 0.1 ha) interdunal swales that occur in wind deflation areas within active or partially vegetated dunes or sand sheets, often where sand is scoured down to the water table. These wetlands areas are typically dominated by emergent herbaceous vegetation such as species of *Eleocharis*, *Juncus* or *Schoenoplectus*, is active or partially vegetated dunes or sand sheets ..... 4
- 3b. Wetlands are not associated with active or partially vegetated dunes or sand sheets ..... 5
- 4a. Small interdunal wetland occurring within the transitional areas between the Great Basin and the Mojave Desert in southern Nevada. ....  
 ..... **North American Warm Desert Interdunal Swale Wetland (CES302.039)**
- 4b. Small interdunal wetlands occurring within the intermountain western US from the South-central New Mexico and Southern Colorado Plateau (including the San Luis Valley in Southern Colorado) north to the Columbia Basin, Snake River Plains, Centennial Valley of southwestern Montana and western Wyoming. These wetland areas are typically dominated by emergent herbaceous vegetation, such as species of *Eleocharis*, *Juncus*, and *Schoenoplectus*. Occasionally wetlands are dominated by trees and shrubs, such as *Populus fremontii* and *Baccharis salicifolia*.  
 ..... **Inter-Mountain Basins Interdunal Swale Wetland (CES304.059)**
- 5a. Soils are organic, thick layers of peat >40 cm deep (often *Sphagnum* moss) ..... 6
- 5b. Soils are mineral, a thin layer of organic material may occur on surface, lacking significant accumulation of *Sphagnum* moss ..... 7
- 6a. Wetland is dominated by low ericaceous shrubs (*Kalmia* spp., *Ledum* spp., *Myrica* spp., *Empetrum* spp., or *Chamaedaphne* spp.), and with patches of graminoids and bryophyte lawns. *Sphagnum* species including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic. Conifer trees sometimes codominate the shrub layer. These wetlands are found at higher temperate and boreal latitudes of Canada, extending south into the Pacific Maritime, Rocky Mountain Divisions and to a limited extent the Intermountain Basin Division where it is restricted to depressional habitats higher elevation mountains. ...  
 ..... **Boreal Depressional Bog (CES103.871)**

- 6b. Wetland not as above. These subalpine-montane fens are confined to specific environments defined by groundwater discharge, soil chemistry, and peat accumulation of at least 40 cm. Typically dominated by *Carex aquatilis*, *Carex limosa*, *Carex lasiocarpa*, *Betula nana*, *Kobresia myosuroides*, *Kobresia simpliciuscula*, and *Trichophorum pumilum* (= *Scirpus pumilus*). .....  
 ..... **Rocky Mountain Subalpine-Montane Fen (CES306.831) NOT ISOLATED**
- 7a. Wetlands on exposed basalt scablands of the Columbia Plateau in Washington and Oregon. .... 8  
 7b. Wetlands occurring throughout the intermountain western US. .... 9
- 8a. Wetlands that occur in small depressions in channeled basalt scablands of the Columbia Plateau in Washington's eastern Columbia River Gorge. They typically occupy the bottom of a basalt cliff (1-20+ m tall) lined circular or linear depression. Vegetation varies from emergent marsh, deeper water floating-leaved plants with trees and shrubs present adjacent to more northerly potholes.....  
 ..... **Northern Columbia Plateau Basalt Pothole Ponds (CES304.058)**
- 8b. Wetlands of mineral soils, dominated by herbaceous plants, often in concentric rings around seasonally wet, shallow ephemeral water bodies found in very small depressions (1600 square m average) throughout the exposed basalt scablands of the Columbia Plateau in Washington and Oregon.....  
 ..... **Columbia Plateau Vernal Pool (CES304.057)**
- 9a. Intermittently flooded wetlands restricted to playas that are dry most of the year. During wet periods vegetation may be relatively lush. However, playas are typically sparsely vegetated to barren (generally less than 10% cover) depending on time since last flooding and degree of salinity. Playas form with intermittent flooding, followed by evaporation, leaving behind a saline residue. Salt crusts are common throughout, often with small saltgrass beds in depressions and sparse shrubs around the margins. Subsoils often include an impermeable layer of clay or *caliche*. Large playas tend to be defined by vegetation rings formed in response to salinity. Characteristic species include *Allenrolfea occidentalis*, *Sarcobatus vermiculatus*, *Grayia spinosa*, *Puccinellia lemmonii*, *Leymus cinereus*, *Distichlis spicata*, and/or *Atriplex* spp. .... **Inter-Mountain Basins Playa (CES304.786)**
- 9b. Wetland not typically sparsely vegetated, or restricted to intermittently flooded playas ..... 10
- 10a. Wetlands dominated by herbaceous vegetation ..... 11  
 10b. Wetlands dominated by woody vegetation. .... 12
- 11a. Herbaceous wetlands typically found along the margins of perennial lakes, or in closed basins. Sites are seasonally to semi-permanently flooded, usually retaining water into the growing season and drying completely only in drought years. Many are associated with hot and cold springs, located in basins with internal drainage. Soils are alkaline to saline clays with hardpans. Seasonal drying exposes mudflats colonized by annual wetland vegetation. Salt encrustations can occur on the surface in some examples of this system, and the soils are severely affected and have poor structure. Species that typify this system are salt-tolerant and halophytic species such as *Distichlis spicata*, *Puccinellia lemmonii*, *Poa secunda*, *Muhlenbergia* spp., *Leymus triticoides* (= *Elymus triticoides*), *Schoenoplectus maritimus*, *Schoenoplectus americanus*, *Triglochin maritima*, and *Salicornia* spp.....  
 ..... **Inter-Mountain Basins Alkaline Closed Depression (CES304.998)**
- 11b. Herbaceous wetland that occurs in depressions in the landscape (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Frequently or continually inundated, with water depths up to 2 m. Soil may be muck or mineral. Emergent and floating vegetation includes species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris*. ....  
 ..... **North American Arid West Emergent Marsh (CES300.729) NOT ISOLATED**

- 12a. Shrubland or steppe occurring along drainages in Great Basin mountain ranges and in lowland depressional wetlands or non-alkaline playas in the northern Great Basin and Columbia Basin that is dominated by *Artemisia cana* ssp. *bolanderi* or *A. cana* ssp. *viscidula*. *Artemisia tridentata* ssp. *tridentatata*, *A. tridentata* ssp. *wyomingensis* or *A. tridentata* ssp. *viscidula* are occasionally co-dominant. The herbaceous layer generally has 25% or more cover of perennials, typically graminoids with *Poa secunda* (= *P. nevadensis*), *P. cusickii*, *Mulhenbergia filiformis*, *M. richardsonis*, and *Leymus cinereus* dominant at the drier sites, *Eleocharis palustris*, *Deschampsia caespitosa* and *Carex* species at the wetter or higher elevation sites. ....  
 ..... **Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe (CES304.084)**  
**NOT ISOLATED**
- 12b. Open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*, *Atriplex canescens*, *Atriplex confertifolia*, or *Krascheninnikovia lanata*. There may be patches of *Distichlis spicata* grassland. Sites typically have saline soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. ....  
 ..... **Inter-Mountain Basins Greasewood Flat (CES304.780)**

### Key to Isolated Wetland Types of the Rocky Mountains Division (306)

- 1a. Soils are organic peat; includes thick layers of *Sphagnum* moss ..... 2
- 1b. Soils are mineral, a thin layer of organic material may occur on surface; lacking a thick layer of *Sphagnum* moss ..... 3
- 2a. Peatland has very to moderately acidic substrates, little groundwater influence. Vegetation is dominated by low ericaceous shrubs (*Kalmia* spp., *Ledum* spp., *Betula* spp., *Myrica* spp., *Empetrum* spp., or *Chamaedaphne* spp.), and with patches of graminoids and bryophytes. *Sphagnum* species including *S. magellanicum*, *S. fuscum*, and *S. cuspidatum* may be characteristic. Conifer trees sometimes codominate the tree and shrub layers. .... **Boreal Depressional Bog (CES103.871)**
- 2b. Peatland has slightly acidic to alkaline substrates, with apparent ground water influence. Characteristic graminoid species include *Carex aquatilis*, *Carex limosa*, *Carex lasiocarpa*, *Betula nana*, *Kobresia myosuroides*, *Kobresia simpliciuscula*, and *Trichophorum pumilum* (= *Scirpus pumilus*) .....  
 ..... **Rocky Mountain Subalpine-Montane Fen (CES306.831) NOT ISOLATED**
- 3a. Wetland dominated by herbaceous vegetation ..... 4
- 3b. Wetland dominated by woody vegetation ..... 5
- 4a. Herbaceous wetlands typically found along the margins of perennial lakes, or in closed basins. Sites are seasonally to semi-permanently flooded, usually retaining water into the growing season and drying completely only in drought years. Many are associated with hot and cold springs, located in basins with internal drainage. Soils are alkaline to saline clays with hardpans. Seasonal drying exposes mudflats colonized by annual wetland vegetation. Salt encrustations can occur on the surface in some examples of this system, and the soils are severely affected and have poor structure. Species that typify this system are salt-tolerant and halophytic species such as *Distichlis spicata*, *Puccinellia lemmonii*, *Poa secunda*, *Muhlenbergia* spp., *Leymus triticoides* (= *Elymus triticoides*), *Schoenoplectus maritimus*, *Schoenoplectus americanus*, *Triglochin maritima*, and *Salicornia* spp. ....  
 ..... **Inter-Mountain Basins Alkaline Closed Depression (CES304.998)**
- 4b. Herbaceous wetland that occur in depressions, as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Frequently or continually inundated, with water depths up to 2 m. Soil may be muck or mineral. Common emergent and floating vegetation

includes species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris*. ..... **North American Arid West Emergent Marsh (CES300.729) NOT ISOLATED**

- 5a. Wetland shrubland or steppe occurring along drainages in Great Basin mountain ranges and in lowland depressional wetlands or non-alkaline playas in the northern Great Basin and Columbia Basin Vegetation dominated by *Artemisia cana* ssp. *bolanderi* or *A. cana* ssp. *viscidula*. *Artemisia tridentata* ssp. *tridentata*, *A. tridentata* ssp. *wyomingensis* or *A. tridentata* ssp. *viscidula* are occasionally co-dominant. The herbaceous layer generally has 25% or more cover of perennials, typically graminoids with *Poa secunda* (= *P. nevadensis*), *P. cusickii*, *Mulhenbergia filiformis*, *M. richardsonis*, and *Leymus cinereus* dominant at the drier sites, *Eleocharis palustris*, *Deschampsia caespitosa* and *Carex* species at the wetter or higher elevation sites. ....  
 ..... **Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe (CES304.084) NOT ISOLATED**
- 5b. Open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*, *Atriplex canescens*, *Atriplex confertifolia*, or *Krascheninnikovia lanata*. There may be patches of *Distichlis spicata* grassland. Sites typically have saline soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. .... **Inter-Mountain Basins Greasewood Flat (CES304.780)**

**Key to Isolated Wetland Types of Tropical Florida Division (411)**

- 1a. Coastal interdunal swales and basins on barrier islands .....  
 ..... **Southeastern Coastal Plain Interdunal Wetland (CES203.258)**
- 1b. Non-coastal wetlands ..... 2
- 2a. Forested wetlands in poorly drained depressions found primarily in the Everglades and Big Cypress regions, dominated by Pond Cypress (*Taxodium ascendens*) .....  
 ..... **South Florida Cypress Dome (CES411.365)**
- 2b. Herbaceous wetlands in southern Florida, including seasonal ponds and solution holes .....  
 ..... **South Florida Depression Pondshore (CES411.054)**

**Key to Isolated Wetland Types of Northern Polynesia Division (412)**

- 1a. Wetland dominated by herbaceous plants. May appear dry for part of the year, or never wet for several years during droughts. In wet years the wetland is characterized by the dominance of the fern species: *Marsilea villosa*. During dry periods the fern becomes a dormant rhizomatous mat, and the area appears to be a weedy dryland of grasses and forbs, including *Amaranthus spinosus*, *Xanthium strumarium*, *Setaria verticillata*, *Cynodon dactylon*, *Chloris barbata*, and *Merremia aegyptia*.  
 ..... **Hawai'i 'Ihi'ihiluakea Vernal Pool (CES412.223)**
- 1b. Wetland codominated by herbaceous and woody plants. The vegetation is an uneven hummocky matrix of sedges and grasses, including *Rhynchospora rugosa* ssp. *lavarum* (= *Rhynchospora lavarum*), *Oreobolus furcatus*, *Dichantheium*, *Panicum*, and *Deschampsia*, imbedded in moss (*Racomitrium lanuginosum*, *Sphagnum* spp.). Dwarfed woody plants can occur as scattered individuals, in clumps, or as a continuous layer and include *Metrosideros polymorpha*, *Cheirodendron* spp., and *Vaccinium* spp. ....  
 ..... **Hawai'i Montane Bog (CES412.216)**

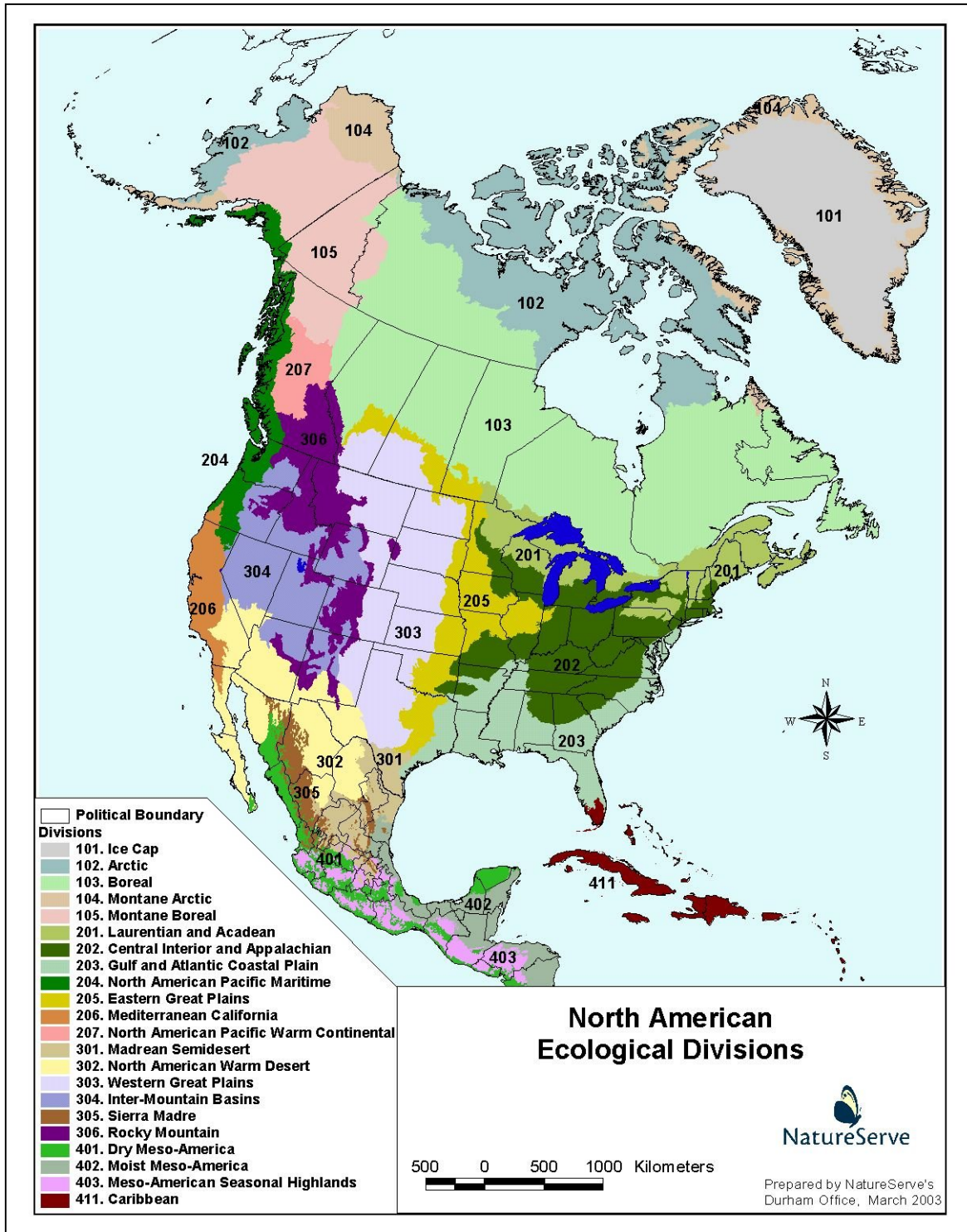
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**Ecological Divisions of North America for NatureServe Ecological Systems.**





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**CES103.581 BOREAL-LAURENTIAN BOG**

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**Primary Division:** Boreal (103)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Organic Peat (>40 cm); Dwarf-Shrub; Graminoid; Oligotrophic Water

**Concept Summary:** These peatlands are found at the higher temperate and near-boreal latitudes of the northeastern and north-central United States and adjacent Canada, where climate allows the rate of peat accumulation to exceed its decomposition, resulting in acidic peatlands. Most are ombrotrophic, at least over part of their area, though some examples may be weakly minerotrophic (poor fen), especially around the margins. The surface morphology of the bog may be more-or-less level, domed, or eccentric, but typically is over the water table. The vegetation is either semi-treed and dominated by low ericaceous shrubs (including *Kalmia angustifolia*, *Kalmia polifolia*, *Ledum groenlandicum*, and *Chamaedaphne calyculata*), with patches of conifers, graminoids and bryophyte lawns, or more open forest, where trees form a partial to moderate cover over parts of the peatland. In the latter situation, stunted *Picea mariana* and *Larix laricina* are the dominant trees, and dwarf-shrubs (*Chamaedaphne calyculata*, *Ledum groenlandicum*) and sedges are common in the understory.

Secondary bog pools (schlenke) may be present. While the raised portion defines these bogs, fen vegetation is often present along the perimeter.

This broadly defined peatland system can be subdivided based on the geomorphology of the peatland. A variety of approaches have been taken - in Maine, see Davis and Anderson (2001); in Canada, see National Wetlands Working Group (1988), and in Minnesota see Glaser (1992). In Canada, bog and fen peatlands each have their own set of forms. In Minnesota, Glaser treats bogs and fens together as part of larger patterned peatland complexes (mire complexes).

**Comments:** This system corresponds to Glaser and Janssens' (1986) forested and "semi-forested continental bogs," but this system is somewhat broader in scope as it includes both the raised bogs and the flat bogs in the system type. Thus it extends further southward into the central Great Lakes and northeastern United States. Eastward, it extends roughly to the Acadian region, where it is replaced by Acadian Maritime Bog (CES201.580). Northwestward in northern Ontario, continental non-forested bogs are common (Glaser and Janssens 1986, fig. 2).

These bogs may overlap in common terminology with that of "muskeg," a flat bog peatland with scattered trees and a fairly dense shrub layer on hummocky peat. But muskeg could include poor fens and acid swamps as well as bogs.

#### DISTRIBUTION

**Range:** Central and eastern Canada, extending into northern New England and the Great Lakes region, particularly in northern Minnesota. Very few examples occur south of the Laurentian-Acadian Division.

**Divisions:** 103:C, 201:C, 202:C

**TNC Ecoregions:** 47:C, 48:C, 61:C, 63:C

**Subnations:** MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI

#### Associations:

- *Alnus incana* ssp. *rugosa* - *Nemopanthus mucronatus* / *Sphagnum* spp. Shrubland (CEGL006158, G5)
  - *Carex (oligosperma, exilis)* - *Chamaedaphne calyculata* Shrub Herbaceous Vegetation (CEGL006524, GNR)
  - *Carex lasiocarpa* - *Rhynchospora alba* - *Scheuchzeria palustris* Herbaceous Vegetation (CEGL002501, G2?)
  - *Carex oligosperma* - *Carex pauciflora* - *Eriophorum vaginatum* / *Sphagnum* spp. Herbaceous Vegetation (CEGL005256, G4G5)
  - *Chamaedaphne calyculata* - *Ledum groenlandicum* - *Kalmia polifolia* Bog Dwarf-shrubland (CEGL005278, G5)
  - *Chamaedaphne calyculata* / *Carex oligosperma* / *Sphagnum* spp. Poor Fen Dwarf-shrubland (CEGL005277, G5)
  - *Kalmia angustifolia* - *Chamaedaphne calyculata* - (*Picea mariana*) / *Cladina* spp. Dwarf-shrubland (CEGL006225, G5)
  - *Picea mariana* - (*Larix laricina*) / *Ledum groenlandicum* / *Sphagnum* spp. Forest (CEGL005271, G5)
  - *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Woodland (CEGL006098, G3G5)
  - *Picea mariana* / *Chamaedaphne calyculata* / *Sphagnum* spp. Dwarf-shrubland (CEGL005218, G4G5)
  - *Picea mariana* / *Ledum groenlandicum* / *Carex trisperma* / *Sphagnum* spp. Forest (CEGL002485, G5)
- High-ranked species:** *Callophrys lanoraieensis* (G3G4), *Carex heleonastes* ssp. *heleonastes* (G4T3T4)

## SOURCES

**References:** Comer et al. 2003, Damman and French 1987, Davis and Anderson 2001, Glaser 1992a, Glaser and Janssens 1986, Harris et al. 1996, National Wetlands Working Group 1988

**Version:** 04 Mar 2004

**Stakeholders:** Canada, East, Midwest

**Concept Author:** S.C. Gawler and D. Faber-Langendoen

**LeadResp:** East

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### CES103.724 BOREAL-LAURENTIAN CONIFER ACID SWAMP

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**Primary Division:** Boreal (103)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This is a forested peatland where the trees form a partial to full cover over most or all of the peatland. Stunted to well-developed *Picea mariana* and *Larix laricina* are the dominant trees. The system is primarily weakly to moderately minerotrophic (poor fen), though some stands may approach ombrotrophic (bog) conditions. Heaths and sedges are common in the understory, but the dwarf-shrub layer is less well-developed than in open acidic peatlands, though it may be prominent in more open parts of the system. *Chamaedaphne calyculata* and *Ledum groenlandicum* are the dominant dwarf-shrubs.

**Comments:** This forested system is most common in poorly drained basins, with some minerotrophic influence. It is sometimes referred to as "muskeg," a flat bog peatland with scattered trees and a fairly dense shrub layer on mounded or hummocky peat, though this system is not, technically, an ombrotrophic bog [see Boreal-Laurentian Bog (CES103.581)]. Muskeg is probably a complex of bogs and acid swamps. There appears to be no need for a true Boreal alkaline swamp system (sub-boreal-Laurentian acid swamps are described in Laurentian-Acadian Conifer-Hardwood Acid Swamp (CES201.574)), but further review is needed. In Acadia and the Northern Appalachian region, this system is replaced by Laurentian-Acadian Conifer-Hardwood Acid Swamp (CES201.574).

## DISTRIBUTION

**Range:** Central and eastern Canada, extending into northern New England and the Great Lakes region, particularly in northern Minnesota.

**Divisions:** 103:C, 201:C

**TNC Ecoregions:** 47:C, 48:C, 63:C

**Subnations:** MB, ME, MI, MN, NB, NH?, NS, NY, ON, PE?, WI

### Associations:

- *Carex lasiocarpa* - *Carex oligosperma* / *Sphagnum* spp. Herbaceous Vegetation (CEGL002265, G3G4)
- *Chamaedaphne calyculata* / *Carex oligosperma* / *Sphagnum* spp. Poor Fen Dwarf-shrubland (CEGL005277, G5)
- *Larix laricina* / *Chamaedaphne calyculata* / *Carex lasiocarpa* Shrubland (CEGL005226, G4G5)
- *Picea mariana* - (*Larix laricina*) / *Ledum groenlandicum* / *Sphagnum* spp. Forest (CEGL005271, G5)
- *Picea mariana* / *Alnus incana* / *Sphagnum* spp. Forest (CEGL002452, G5)
- *Pinus banksiana* - (*Picea mariana*) - Mixed Hardwoods / *Sphagnum* spp. Forest (CEGL005166, GNRQ)

**High-ranked species:** *Callophrys lanoraieensis* (G3G4)

## SOURCES

**References:** Comer et al. 2003, Glaser and Janssens 1986, Harris et al. 1996

**Version:** 04 Mar 2004

**Stakeholders:** Canada, East, Midwest

**Concept Author:** D. Faber-Langendoen

**LeadResp:** Midwest

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### CES103.871 BOREAL DEPRESSIONAL BOG

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**Primary Division:** Boreal (103)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Shrubland (Shrub-dominated); Depressional [Lakeshore, Sinkhole]; Organic Peat (>40 cm); *Sphagnum* spp.

**Concept Summary:** These wetlands are found at higher temperate and boreal latitudes of Canada, extending south into the Pacific Maritime and Rocky Mountain Divisions. They form where the rate of sphagnum peat accumulation exceeds its decomposition, resulting in ombrotrophic and acidic peatlands in which the bog surface is raised above the water table. These peatlands are typically formed as lake-filled basins or depressions. The surface morphology of the peatland may be more-or-less level, domed, or eccentric. The vegetation is dominated by low ericaceous shrubs (including *Kalmia polifolia*, *Ledum groenlandicum*, *Betula nana* (= *Betula glandulosa*), *Myrica gale*, *Empetrum nigrum*, and *Chamaedaphne calyculata*), and with patches of graminoids and bryophyte lawns. *Sphagnum* species, including *Sphagnum magellanicum*, *Sphagnum fuscum*, and *Sphagnum cuspidatum* may be characteristic. Conifer trees sometimes codominate, especially late in succession. Secondary bog pools may be present. While the raised portion defines these bogs, boreal fen systems may occupy some portion of the same basin, due to localized groundwater input. Soils are saturated throughout the growing season from groundwater upwelling.

#### DISTRIBUTION

**Range:** Found at higher temperate and boreal latitudes of Canada, extending south into the Pacific Maritime and Rocky Mountain divisions, but not west of the coastal mountain ranges of Alaska, British Columbia and Washington.

**Divisions:** 103:C, 104:C, 105:C, 204:P

**TNC Ecoregions:** 71:C, 72:C, 74:C

**Subnations:** AK, BC, ID, MT?, OR, WA

#### Associations:

- *Carex exsiccata* Herbaceous Vegetation [Provisional] (CEGL003312, G2G3)
- *Dulichium arundinaceum* Seasonally Flooded Herbaceous Vegetation (CEGL001831, G3)
- *Eriophorum chamissonis* / *Sphagnum* spp. Herbaceous Vegetation (CEGL003333, G4)
- *Kalmia microphylla* - *Ledum groenlandicum* / *Xerophyllum tenax* Shrubland (CEGL003359, G1)
- *Ledum groenlandicum* - *Kalmia microphylla* / *Sphagnum* spp. Shrubland (CEGL003414, G4)
- *Ledum groenlandicum* - *Myrica gale* / *Sphagnum* spp. Shrubland (CEGL003335, G2)
- *Malus fusca* Shrubland (CEGL003385, G3)
- *Pinus contorta* - (*Chamaecyparis nootkatensis*) / *Gaultheria shallon* Woodland (CEGL003205, G4G5)
- *Pinus contorta* / *Carex aquatilis* var. *dives* Woodland (CEGL003203, G3)
- *Pinus contorta* / *Empetrum nigrum* Woodland (CEGL003202, G5)
- *Pinus contorta* / *Trichophorum caespitosum* Woodland (CEGL003204, G4G5)
- *Pinus contorta* / *Vaccinium ovalifolium* Woodland (CEGL003206, G3)
- *Pinus contorta* var. *contorta* / *Ledum groenlandicum* / *Sphagnum* spp. Woodland (CEGL003337, G3)
- *Pinus monticola* / *Ledum groenlandicum* / *Sphagnum* spp. Woodland (CEGL003360, G1)
- *Rhynchospora alba* - (*Vaccinium oxycoccos*) / *Sphagnum tenellum* Herbaceous Vegetation [Provisional] (CEGL003338, G3)
- *Spiraea douglasii* / *Sphagnum* spp. Shrubland (CEGL003416, G3)
- *Tsuga heterophylla* - (*Thuja plicata*) / *Ledum groenlandicum* / *Sphagnum* spp. Forest (CEGL003339, G3)
- *Tsuga heterophylla* - (*Thuja plicata*) / *Sphagnum* spp. Forest (CEGL003417, G1)

**High-ranked species:** *Parnassia californica* (G3G4), *Phalacroseris bolanderi* (G3G4), *Phalacroseris bolanderi* var. *bolanderi* (G3G4T3?), *Phalacroseris bolanderi* var. *coronata* (G3G4T2T3), *Rana cascadae* (G3G4)

#### SOURCES

**References:** Banner et al. 1993, Bursik and Moseley 1995, Comer et al. 2003, Green and Klinka 1994, Viereck et al. 1992

**Version:** 21 Nov 2003

**Stakeholders:** Canada, West

**Concept Author:** G. Kittel and P. Comer

**LeadResp:** West

#### CES201.576 ACADIAN-APPALACHIAN CONIFER SEEPAGE FOREST

**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Seepage-Fed Sloping; *Picea* (*glauca*, *mariana*, *rubens*) - *Abies*; *Thuja occidentalis* - *Fraxinus nigra*; Mesotrophic Water

**Concept Summary:** These forests occur as large-patch landscape features near the southern periphery of the boreal forest in the northeastern U.S. and adjacent Canada. They are found on gentle to moderate slopes in the colder regions of the northern

Appalachians, often adjacent to (but above) drainage channels, in settings where groundwater seepage provides constant moisture. *Thuja occidentalis* and *Picea rubens* are the typical dominants; some areas may have a prominent deciduous component. The herbaceous and bryophyte flora is typically extensive. Because of their setting, these are often not mapped as wetlands.

**Comments:** This system may have application in other parts of the Laurentian-Acadian Division, depending on how the break is made between "wet-mesic" lowland white-cedar forests (with subsurface gleyed soils) and the white-cedar seepage forests described here.

#### DISTRIBUTION

**Range:** Northernmost parts of New England, north and east into Canada.

**Divisions:** 201:C

**TNC Ecoregions:** 63:C

**Subnations:** ME, NB, NH, NY, QC, VT

#### Associations:

- *Thuja occidentalis* - (*Picea rubens*) / *Tiarella cordifolia* Forest (CEGL006175, GNR)

#### SOURCES

**References:** Comer et al. 2003

**Version:** 09 Jan 2003

**Concept Author:** S.C. Gawler

**Stakeholders:** Canada, East

**LeadResp:** East

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### CES201.583 BOREAL-LAURENTIAN-ACADIAN ACIDIC BASIN FEN

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**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Organic Peat (>40 cm); Broad-Leaved Shrub; Dwarf-Shrub; Graminoid; *Picea mariana* - *Larix laricina*; Acidic Water

**Concept Summary:** This peatland system ranges over a broad geographic area across the glaciated Northeast to the Great Lakes and upper Midwest. The fens have developed in open or closed, relatively shallow basins with nutrient-poor and acidic conditions. Many occur in association with larger lakes or streams. The substrate is *Sphagnum*, and vegetation typically includes areas of graminoid dominance and dwarf-shrub dominance. *Chamaedaphne calyculata* is usually present and often dominant. Scattered stunted trees may be present. These fens often develop adjacent to open water.

Particularly distinctive are the ribbed bogs or fens in which a pattern of narrow (2-3 m wide) low (less than 1 m deep) ridges are oriented at right angles to the direction of the drainage (National Wetlands Working Group 1988). Wet pools or depressions occur between the ridges. These patterned peatlands may include string bog, Atlantic ribbed fen, or northern ribbed fen (National Wetlands Working Group 1988). They develop almost entirely north of 46 degrees N latitude in east-central Canada and the adjacent U.S. They are minerotrophic peatlands in which the vegetation has developed into a pattern of strings (raised, usually linear features) and flarks (wet depressions separating the strings). The substrate chemistry is entirely acidic in some peatlands; in others, where bedrock or other substrate influence creates circumneutral to calcareous conditions, peatland chemistry may be entirely calcareous or vary from acidic to calcareous within the same peatland. In acidic portions, typical bog heaths predominate, mixed with sedges. *Dasiphora fruticosa ssp. floribunda* is diagnostic of circumneutral to calcareous conditions. These peatlands usually develop in open basins and flat plains, and the patterned portion may occupy only a fraction of the entire peatland. The edge of the basin may be shallow to deep peat over a sloping substrate, where seepage waters provide nutrients.

**Comments:** Need to clarify the conceptual boundaries between this and the boreal fens in central and eastern Canada.

#### DISTRIBUTION

**Range:** New England and adjacent Canada west to the Great Lakes and Minnesota, north of the glacial boundary.

**Divisions:** 103:C, 201:C, 202:C

**TNC Ecoregions:** 47:C, 48:P, 61:C, 63:C

**Subnations:** MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI

**Associations:**

- *Betula pumila* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* - *Trichophorum alpinum* Shrubland (CEGL002495, G3G5)
- *Betula pumila* / *Chamaedaphne calyculata* / *Carex lasiocarpa* Shrubland (CEGL002494, G4G5)
- *Carex (oligosperma, exilis)* - *Chamaedaphne calyculata* Shrub Herbaceous Vegetation (CEGL006524, GNR)
- *Carex lasiocarpa* - *Carex oligosperma* / *Sphagnum* spp. Herbaceous Vegetation (CEGL002265, G3G4)
- *Chamaedaphne calyculata* / *Carex oligosperma* / *Sphagnum* spp. Poor Fen Dwarf-shrubland (CEGL005277, G5)
- *Larix laricina* / *Chamaedaphne calyculata* / *Carex lasiocarpa* Shrubland (CEGL005226, G4G5)
- *Myrica gale* - *Chamaedaphne calyculata* / *Carex (lasiocarpa, utriculata)* - *Utricularia* spp. Shrub Herbaceous Vegetation (CEGL006302, G4G5)
- *Myrica gale* - *Spiraea alba* - *Chamaedaphne calyculata* Shrubland (CEGL006512, GNR)
- *Thuja occidentalis* - *Abies balsamea* / *Ledum groenlandicum* / *Carex trisperma* Woodland (CEGL006507, GNR)
- *Vaccinium corymbosum* / *Sphagnum* spp. Shrubland (CEGL006190, G3G5)

**High-ranked species:** *Carex heleonastes* ssp. *heleonastes* (G4T3T4), *Carex wiegandii* (G3), *Lycopodiella margueritiae* (G2), *Lycopodiella subappressa* (G2)

**SOURCES**

**References:** Comer et al. 2003, Damman and French 1987

**Version:** 04 Mar 2004

**Stakeholders:** Canada, East, Midwest

**Concept Author:** S.C. Gawler

**LeadResp:** East

**CES201.574 LAURENTIAN-ACADIAN CONIFER-HARDWOOD ACID SWAMP**

**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Extensive Wet Flat; *Picea (rubens, mariana)* - *Acer rubrum*; Acidic Water

**Concept Summary:** These forested wetlands are found in temperate northeastern and north-central U.S., primarily in glaciated regions in the eastern Laurentian-Acadian region. They occur on mineral soils that are nutrient-poor; there may be an organic epipedon, but the substrate is generally not deep peat. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. *Acer rubrum*, *Fraxinus* spp., *Picea rubens* (rarely *Picea mariana*), and *Abies balsamea* are the most typical trees. The herbaceous and shrub layers tend to be fairly species-poor. *Nemopanthus mucronatus* and *Osmunda* spp. are typical shrub and herb species.

**Comments:** Acadian Near-Boreal Spruce Flat (CES201.562) is related but is more northern and occurs on imperfectly drained but not persistently saturated soils. *Picea rubens* in the East versus *Picea mariana* in the West and North might be a split in future with more careful scrutiny, but that distinction may already be involved in distinguishing between this type and the more boreal acidic swamp, Boreal-Laurentian Conifer Acid Swamp (CES103.724). At this time, it is thought that this type is more common in the Acadian and Northern Appalachian region of the U.S. and Canada, whereas Boreal-Laurentian Conifer Acid Swamp is more common in the Upper Great Lakes region and into Canada. In the Upper Great Lakes region, the most likely association to fit this system is *Acer rubrum* - *Fraxinus* spp. - *Betula papyrifera* / *Cornus canadensis* Forest (CEGL002071), but it is treated as more typically part of Laurentian-Acadian Alkaline Conifer-Hardwood Swamp (CES201.575) (Eric Epstein pers. comm. 2004).

**DISTRIBUTION**

**Range:** New England and adjacent Canada west to the Great Lakes and northern Minnesota.

**Divisions:** 201:C

**TNC Ecoregions:** 47:P, 48:C, 60:P, 63:C

**Subnations:** ME, MI, MN, NB?, NH, NY, ON, VT, WI

**Associations:**

- *Acer rubrum* / *Carex stricta* - *Onoclea sensibilis* Woodland (CEGL006119, G3G5)
- *Acer rubrum* / *Nemopanthus mucronatus* - *Vaccinium corymbosum* Forest (CEGL006220, GNR)
- *Betula alleghaniensis* - *Acer rubrum* - (*Tsuga canadensis*, *Abies balsamea*) / *Osmunda cinnamomea* Forest (CEGL006380, G4?)

- *Picea mariana* - (*Larix laricina*) / *Ledum groenlandicum* / *Sphagnum* spp. Forest (CEGL005271, G5)
- *Picea mariana* / *Alnus incana* / *Sphagnum* spp. Forest (CEGL002452, G5)
- *Picea rubens* - *Abies balsamea* / *Gaultheria hispidula* / *Osmunda cinnamomea* / *Sphagnum* spp. Forest (CEGL006312, GNR)
- *Picea rubens* - *Acer rubrum* / *Nemopanthus mucronatus* Forest (CEGL006198, GNR)

**High-ranked species:** *Carex wiegandii* (G3), *Poa paludigena* (G3)

#### SOURCES

**References:** Comer and Albert 1997, Comer et al. 1995a, Comer et al. 1998, Comer et al. 2003, Epstein pers. comm.

**Version:** 04 Mar 2004

**Stakeholders:** Canada, East, Midwest

**Concept Author:** S.C. Gawler and D. Faber-Langendoen

**LeadResp:** East

### CES201.034 NORTHERN GREAT LAKES INTERDUNAL WETLAND

**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Mineral: W/ A-Horizon <10 cm; Intermittent Flooding; Coastal Dune Mosaic

**Concept Summary:** This system occurs in scattered location along the northern Great Lakes shoreline where coastal dunes are low and support swales close to lake water levels. The swale immediately behind the foredune is influenced by short-term variation in lake levels and can be partially or occasionally completely filled by dune sands following major storm events. Species common to this first swale include *Juncus balticus*, *Juncus pelocarpus*, *Juncus nodosus*, *Eleocharis acicularis*, species of *Solidago* such as *Oligoneuron houghtonii* (= *Solidago houghtonii*), and *Schoenoplectus americanus* (= *Scirpus americanus*). Occasionally, such swales may contain lake-influenced, calcareous sands, and the shallow swale may contain moderately alkaline indicators, such as *Cladium mariscoides*, *Myrica gale*, *Dasiphora fruticosa* ssp. *floribunda* (= *Pentaphylloides floribunda*), and others.

**Comments:** While this type is most commonly described from the northern Great Lakes region, there are likely more occurrences across the southern half of the Great Lakes that may vary in floristic composition from the type described here.

#### DISTRIBUTION

**Range:** Occurs in scattered location along the northern Great Lakes shoreline.

**Divisions:** 201:C, 202:?

**TNC Ecoregions:** 48:C

**Subnations:** MI, MN, NY, ON, WI

#### Associations:

- *Dasiphora fruticosa* ssp. *floribunda* / *Cladium mariscoides* - *Juncus balticus* - (*Rhynchospora capillacea*) Herbaceous Vegetation (CEGL005105, G3?)

**High-ranked species:** *Oligoneuron houghtonii* (G3)

#### SPATIAL CHARACTERISTICS

**Spatial Summary:** small, sometimes linear patches

**Size:** <0.5 up to 10s of acres

**Adjacent Ecological System Comments:** Open dunes

#### SOURCES

**References:** Comer and Albert 1993, Comer and Albert 1997, Comer et al. 2003

**Version:** 26 Mar 2003

**Stakeholders:** Canada, East, Midwest

**Concept Author:** P. Comer

**LeadResp:** Midwest

### CES201.562 ACADIAN NEAR-BOREAL SPRUCE FLAT

**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Lowland; Forest and Woodland (Treed); Toeslope/Valley Bottom; Glaciated; *Picea* (*glauca*, *mariana*, *rubens*) - *Abies*

**Concept Summary:** These spruce-fir forests are found in the colder regions of the northern Appalachians-Acadian region, in areas of imperfectly drained soils where they often form extensive flats along valley bottoms. The nutrient-poor acidic soils are typically saturated at snowmelt but are moderately well-drained for much of the growing season and may be reasonably dry at the soil surface. The mostly closed-canopy forests have *Picea rubens*, *Picea mariana*, and *Abies balsamea* as the dominant trees; other conifers are often present. Bryophytes are abundant in the ground layer; other layers are typically rather sparse. Many occurrences may be jurisdictional wetlands due to seasonal saturation, but the vegetation is primarily made up of upland or facultative species. The distribution in the Laurentian-Acadian Division is mostly Canadian.

**Comments:** This might be considered as a component of Acadian Low-Elevation Spruce-Fir-Hardwood Forest (CES201.565) but differs from that type *sensu stricto* in its hydrology (wetland vs. upland) and in that its range is somewhat more boreal. Alternatively, it shares some characteristics with Laurentian-Acadian Conifer-Hardwood Acid Swamp (CES201.574) but is more boreal in nature and appears to be typically not on consistently saturated soils. Information from Quebec and New Brunswick would be helpful in assessing its placement.

#### DISTRIBUTION

**Range:** This system is found in the northernmost parts of New England, north and east into Canada.

**Divisions:** 103:C, 201:C

**TNC Ecoregions:** 63:C

**Subnations:** ME, NB, NH, NY, QC, VT

#### Associations:

- *Picea mariana* - *Picea rubens* / *Pleurozium schreberi* Forest (CEGL006361, GNR)

#### SOURCES

**References:** Comer et al. 2003

**Version:** 05 Oct 2004

**Concept Author:** S.C. Gawler

**Stakeholders:** Canada, East

**LeadResp:** East

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#### CES201.726 GREAT LAKES DUNE AND SWALE

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**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Forest and Woodland (Treed); Dune (Substrate); Glaciated; Sand Soil Texture; 30-180-day hydroperiod; Coastal Dune Mosaic

**Concept Summary:** This system is found in nearly 100 occurrences throughout the Great Lakes shorelines of the United States and Canada. The system consists of a foredune, followed by a series of low to high dunes (uplands) and swales (wetlands). The system is often best developed where post-glacial streams entered an embayment and provide a dependable sand source. The combination of along-shore currents, waves, and winds form foredunes along the shoreline.

The foredunes of most dune-and-swale complexes are commonly 1-2 m high, with *Ammophila breviligulata*, *Calamovilfa longifolia*, *Salix serissima*, *Salix cordata*, and *Populus balsamifera* most common. The swale immediately behind the foredune is influenced by short-term variation in lake levels and can be partially or occasionally completely filled by dune sands following major storm events. Species common to this first swale include *Juncus balticus*, *Juncus pelocarpus*, *Juncus nodosus*, *Eleocharis acicularis*, and *Schoenoplectus americanus* (= *Scirpus americanus*). Occasionally, such swales may contain lake-influenced, calcareous sands and may contain moderately alkaline indicators.

A low dune field with more advanced plant succession often follows the first open dunes and swales. *Pinus banksiana*, *Pinus strobus*, and *Pinus resinosa* often form a scattered overstory canopy, while *Juniperus communis*, *Juniperus horizontalis*, *Arctostaphylos uva-ursi*, and *Koeleria macrantha* form a scattered ground layer.

Following the dune-field zone, both dunes and swales are typically forested. Moist swales are often forested, and soil organic material has often begun to accumulate. *Thuja occidentalis*, *Alnus incana*, *Salix* spp., and *Acer rubrum* dominate the partial

overstory canopy and understory. In contrast to the dry or moist swales, wetter swales (where standing water is present through most of the year) may be dominated by Carices, such as *Carex aquatilis* and *Carex stricta*. Forested beach ridges, with soils of medium to coarse sand, tend to be dominated by species common to dry-mesic and mesic northern forest. Complexes located in embayments protected from prevailing winds tend to be formed entirely of low, water-lain beach ridges. As a result, even the beach ridges within these complexes support wetland vegetation.

Five major subtypes of Great Lakes Dune and Swale were described for Michigan, including the Lake Superior high dune type, the Lake Superior low dune type, the North Lake Michigan high dune type, Northern Lake Huron-Lake Michigan low dune type, and the Southern Lake Huron type. These subtypes represent patterns of floristic variation resulting from latitude and sand dune/beach ridge characteristics that constrain floristic and structural attributes. High dune types may support predominantly upland vegetation, while low dune types may support predominantly wetland vegetation

**Comments:** Five major subtypes of Great Lakes Dune and Swale were described for Michigan, including the Lake Superior high dune type, the Lake Superior low dune type, the North Lake Michigan high dune type, Northern Lake Huron-Lake Michigan low dune type, and the Southern Lake Huron type. These subtypes represent patterns of floristic variation resulting from latitude and sand dune/beach ridge characteristics that constrain floristic and structural attributes.

This system has rather strong variation between northern and southern Great Lakes examples (north and south of Bailey's 210-220 division line). Those occurring along the southern Lake Michigan shoreline of Indiana and Illinois have been altered significantly, but likely reflect a distinct ecological system type with oak woodland and savanna on beach ridges and wet prairie in swales. Additional classification and inventory of this system type on Lakes Erie and Ontario may suggest definition of another southern Great Lakes dune and swale system type.

#### DISTRIBUTION

**Range:** Throughout the Great Lakes shorelines of the United States and Canada.

**Divisions:** 201:C, 202:C

**TNC Ecoregions:** 48:C

**Subnations:** IL, IN, MI, MN, OH, ON, PA, WI

#### Associations:

- *Ammophila breviligulata* - (*Schizachyrium scoparium*) Herbaceous Vegetation (CEGL005098, G3G5)
- *Chamaedaphne calyculata* - *Myrica gale* / *Carex lasiocarpa* Dwarf-shrubland (CEGL005228, G4G5)
- *Dasiphora fruticosa* ssp. *floribunda* / *Cladium mariscoides* - *Juncus balticus* - (*Rhynchospora capillacea*) Herbaceous Vegetation (CEGL005105, G3?)
- *Juniperus horizontalis* - *Arctostaphylos uva-ursi* - *Juniperus communis* Dune Dwarf-shrubland (CEGL005064, G3G4)
- *Pinus banksiana* - (*Pinus resinosa*) - *Pinus strobus* / *Juniperus horizontalis* Wooded Herbaceous Vegetation (CEGL005125, G2)
- *Pinus banksiana* - *Pinus resinosa* - *Pinus strobus* Dune Forest (CEGL002589, G3Q)
- *Populus deltoides* - (*Juniperus virginiana*) Dune Woodland (CEGL005119, G1G2)
- *Prunus pumila* - (*Ptelea trifoliata*) Dune Shrubland (CEGL005075, G2Q)
- *Thuja occidentalis* - (*Picea mariana*, *Abies balsamea*) / *Alnus incana* Forest (CEGL002456, G4)
- *Thuja occidentalis* - *Fraxinus nigra* Forest (CEGL005165, GNR)

**High-ranked species:** *Iris lacustris* (G3), *Lycopodiella margueritiae* (G2), *Lycopodiella subappressa* (G2), *Oligoneuron houghtonii* (G3)

**Environment:** The system consists of a foredune, followed by a series of low to high dunes (uplands) and swales (wetlands). The system is often best developed where post-glacial streams entered an embayment and provide a dependable sand source. The combination of along-shore currents, waves, and winds form foredunes along the shoreline. With gradual long-term drops in water level, combined with post-glacial uplifting of the earth's crust, these low dunes gradually rise above the direct influence of the lakes, and new foredunes replace them. Over several thousand years, a series of ridges and swales is created. For most complexes, the flow of surface streams and groundwater maintain the wet conditions in the swales. With time, plant succession has proceeded to the point where the beach ridges are now forested while the wet swales are either forested or open wetlands. Along the Lake Superior shoreline, where post-glacial uplift is greatest, many of the complexes consist primarily of dry, forested swales. The dunes and swales differs depending on fetch and the amount of sediment available. The influence of Great Lakes water-level fluctuations is probably limited to the first few swales inland from the shoreline. For most of the complexes, the water occupying the swales comes from streams flowing from the adjacent uplands or from groundwater seepage.



**Vegetation:** The foredunes of most dune-and-swale complexes are commonly 1-2 m high, with *Ammophila breviligulata*, *Calamovilfa longifolia*, *Salix serissima*, *Salix cordata*, and *Populus balsamifera* most common. The swale immediately behind the foredune is influenced by short-term variation in lake levels and can be partially or occasionally completely filled by dune sands following major storm events. Species common to this first swale include *Juncus balticus*, *Juncus pelocarpus*, *Juncus nodosus*, *Eleocharis acicularis*, and *Schoenoplectus americanus* (= *Scirpus americanus*). Occasionally, such swales may contain lake-influenced, calcareous sands, and the shallow swale may contain moderately alkaline indicators, such as *Cladium mariscoides*, *Myrica gale*, *Dasiphora fruticosa ssp. floribunda* (= *Pentaphylloides floribunda*), and others.

A low dune field with more advanced plant succession often follows the first open dunes and swales. *Pinus banksiana*, *Pinus strobus*, and *Pinus resinosa* often form a scattered overstory canopy, while *Juniperus communis*, *Juniperus horizontalis*, *Arctostaphylos uva-ursi*, and *Koeleria macrantha* form a scattered ground layer.

Following the dune-field zone, both dunes and swales are typically forested. Moist swales are often forested, and soil organic material has often begun to accumulate. *Thuja occidentalis*, *Alnus incana*, *Salix* spp., and *Acer rubrum* dominate the partial overstory canopy and understory. In contrast to the dry or moist swales, wetter swales (where standing water is present through most of the year) may be dominated by Carices, such as *Carex aquatilis* and *Carex stricta*.

Forested beach ridges, with soils of medium to coarse sand, tend to be dominated by species common to dry-mesic and mesic northern forest. Soil moisture conditions appear to change dramatically with slight elevational changes and are reflected in the development of soil organic material and changing plant species. On higher, drier ridges, soils often have less than 3 cm of organic material. *Pinus resinosa*, *Pinus strobus*, and *Quercus rubra* are often codominant, while *Betula papyrifera*, *Populus grandidentata*, *Abies balsamea*, and *Acer rubrum* are subdominant or understory species. *Pteridium aquilinum*, *Gaylussacia baccata*, *Vaccinium myrtilloides*, *Cornus canadensis*, and *Gaultheria procumbens* occur in the shrub and ground layers.

Complexes located in embayments protected from prevailing winds tend to be formed entirely of low, water-lain beach ridges. As a result, even the beach ridges within these complexes support wetland vegetation.

**Dynamics:** Foredune and immediate back dune areas are influenced by active dune processes of wind-caused "blowouts" and subsequent restabilization. Forested beach ridges may support fire regimes characteristic of similar upland forest systems outside of these complexes. Due to lakeshore proximity, heavy winds and resultant windthrow are common in forested ridges. Great Lakes water-level fluctuations likely influence water levels in swales closest to the shoreline, if at all. The hydrology of interdunal swales is driven largely by lateral flow through the porous beach ridges. Older swales (farthest from current lakeshores) in larger complexes support peat-forming bogs.

#### SOURCES

**References:** Comer and Albert 1993, Comer et al. 2003, Lichter 1998, MNFI 1999

**Version:** 05 Mar 2003

**Concept Author:** P. Comer and D. Albert

**Stakeholders:** Canada, East, Midwest

**LeadResp:** Midwest

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#### CES201.721 GREAT LAKES ALVAR

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**Primary Division:** Laurentian-Acadian (201)

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.); Upland; Wetland

**Concept Summary:** Alvars are natural systems of humid and subhumid climates, centered around areas of glaciated horizontal limestone/dolomite (dolostone) bedrock pavement with a discontinuous thin soil mantle. These communities are characterized by distinctive flora and fauna with less than 60% tree cover that is maintained by associated geologic, hydrologic, and other landscape processes. In particular, all forms of alvar tend to flood each spring, then experience moderate to severe drought in summer months. They include open pavement, grassland, and shrubland/woodland types. Alvar communities occur in an ecological matrix with similar bedrock and hydrologically influenced communities. Almost all of North America's alvars occur within the Great Lakes basin, primarily in an arc along the Niagaran Escarpment from northern Lake Michigan across northern Lake Huron and eastern Ontario and northwestern New York state.

#### DISTRIBUTION

**Divisions:** 201:C

**TNC Ecoregions:** 48:C

**Subnations:** MI, NY, OH, ON, WI

**Associations:**

- *Acer saccharum* - *Ostrya virginiana* - *Carya ovata* - *Quercus rubra* Limestone Woodland (CEGL005059, G3G4)
- *Carya ovata* / *Zanthoxylum americanum* / *Panicum philadelphicum* - *Carex pensylvanica* Wooded Herbaceous Vegetation (CEGL005230, GNR)
- *Danthonia spicata* - *Poa compressa* - (*Schizachyrium scoparium*) Herbaceous Vegetation (CEGL005100, G2?)
- *Deschampsia caespitosa* - (*Sporobolus heterolepis*, *Schizachyrium scoparium*) - *Carex crawei* - *Packera paupercula* Herbaceous Vegetation (CEGL005110, G2)
- *Juniperus communis* - (*Juniperus virginiana*) - *Rhus aromatica* - *Viburnum rafinesquianum* / *Oligoneuron album* Shrubland (CEGL005212, G3)
- *Juniperus horizontalis* - *Dasiphora fruticosa* ssp. *floribunda* / *Schizachyrium scoparium* - *Carex richardsonii* Dwarf-shrubland (CEGL005236, G2)
- *Juniperus virginiana* / *Ranunculus fascicularis* Woodland (CEGL005122, G3?)
- *Picea glauca* - *Thuja occidentalis* - *Juniperus communis* / *Iris lacustris* - *Carex eburnea* Shrubland (CEGL005211, G1G2)
- *Pinus banksiana* - *Thuja occidentalis* - *Picea glauca* / *Juniperus communis* Woodland (CEGL005126, G2?)
- *Sporobolus heterolepis* - *Schizachyrium scoparium* - (*Carex scirpoidea*) / (*Juniperus horizontalis*) Herbaceous Vegetation (CEGL005234, G2)
- *Sporobolus neglectus* - *Sporobolus vaginiflorus* - *Isanthus brachiatus* - *Panicum philadelphicum* - (*Poa compressa*) Herbaceous Vegetation (CEGL005235, G2)
- *Thuja occidentalis* - *Pinus banksiana* / *Dasiphora fruticosa* ssp. *floribunda* / *Clinopodium arkansanum* Wooded Herbaceous Vegetation (CEGL005132, G1G2)
- *Tortella tortuosa* - *Cladonia pocillum* - *Placynthium* spp. Sparse Vegetation (CEGL005192, G2)

**High-ranked species:** *Iris lacustris* (G3)

**SOURCES**

**References:** Albert 1990, Comer et al. 2003, Reschke et al. 1998

**Version:** 05 Mar 2003

**Stakeholders:** Canada, East, Midwest

**Concept Author:** C. Reschke

**LeadResp:** Midwest

**CES202.018 CENTRAL INTERIOR HIGHLANDS AND APPALACHIAN SINKHOLE AND DEPRESSION POND**

**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Lowland [Lowland]; Depressional [Pond, Sinkhole]; Muck; Mineral: W/ A-Horizon >10 cm

**Concept Summary:** This system of ponds and wetlands is found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau regions, ranging north from the southern and central Appalachians to the Northern Piedmont regions. Stands occur in basins of sinkholes or other isolated depressions on uplands. Soils are very poorly drained, and surface water may be present for extended periods of time, rarely becoming dry. Water depth may vary greatly on a seasonal basis, and may be a meter deep or more in the winter. Some examples become dry in the summer. Soils may be deep (100 cm or more), consisting of peat or muck, with parent material of peat, muck or alluvium. Ponds vary from open water to herb-, shrub-, or tree-dominated systems. Tree-dominated examples typically contain *Quercus* species, *Platanus occidentalis*, *Fraxinus pennsylvanica*, *Acer saccharinum* or *Nyssa* species, or a combination of these. In addition, *Liquidambar styraciflua* may be present in southern examples. *Cephalanthus occidentalis* is a typical shrub component. The herbaceous layer is widely variable depending on geography.

**Comments:** Many of these ponds have their geologic origin as a more-or-less complete karst collapse feature. Some of them may display this geologic origin in a more explicit manner, with definite walls and exposed limestone or dolomite at the surface ("sinkholes"). Others are more subtle, and exist as more gentle depressions, with no exposed surface geology ("depression ponds").

This includes the "sagponds" of northwestern Georgia and adjacent Alabama. More information is available from Jon Ambrose. It also includes sinkhole ponds of northern New Jersey (K. Strakosch-Walz pers. comm.) and ponds of the Ridge and Valley in Pennsylvania. These are very similar to Shenandoah sinkhole ponds of Virginia and are in Maryland as well (L. Sneddon pers. comm.).

## DISTRIBUTION

**Range:** This system is found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau regions, ranging north from the southern and central Appalachians to the northern Piedmont regions, and south to the Ridge and Valley of Georgia and Alabama.

**Divisions:** 202:C

**TNC Ecoregions:** 38:C, 39:C, 44:C, 50:C, 59:C, 61:C

**Subnations:** AL, AR, GA, IL, IN, KY, MD, MO, NC, NJ, PA, TN, VA, WV

### Associations:

- *Brasenia schreberi* Herbaceous Vegetation (CEGL004527, G4?)
- *Carex aquatilis* - *Dulichium arundinaceum* Herbaceous Vegetation (CEGL008542, G1?)
- *Carex barrattii* Herbaceous Vegetation (CEGL007857, G1)
- *Carex comosa* - *Carex decomposita* - *Dulichium arundinaceum* - *Lycopus rubellus* Herbaceous Vegetation (CEGL002413, G3G4)
- *Cephalanthus occidentalis* - (*Salix nigra*, *Quercus lyrata*) Karst Depression Shrubland (CEGL008439, G1Q)
- *Cephalanthus occidentalis* / *Dulichium arundinaceum* Shrubland (CEGL007854, G1)
- *Cephalanthus occidentalis* / *Hibiscus moscheutos* ssp. *moscheutos* Depression Pond Shrubland (CEGL004742, G3?)
- *Cephalanthus occidentalis* / *Torreyochloa pallida* Shrubland (CEGL007855, G1?)
- *Ceratophyllum demersum* Herbaceous Vegetation (CEGL004528, GNR)
- *Dasiphora fruticosa* ssp. *floribunda* / *Rhynchospora capillacea* - *Scleria verticillata* Shrub Herbaceous Vegetation (CEGL006356, G1)
- *Fraxinus pennsylvanica* - *Acer saccharinum* - *Quercus bicolor* / *Boehmeria cylindrica* Forest (CEGL006634, GNR)
- *Leersia oryzoides* - *Boehmeria cylindrica* - *Ranunculus flabellaris* Herbaceous Vegetation (CEGL006903, GNR)
- *Liquidambar styraciflua* - *Acer rubrum* / *Carex* spp. - *Sphagnum* spp. Forest (CEGL007388, G2Q)
- *Ludwigia peploides* Herbaceous Vegetation (CEGL007835, G4G5)
- *Nelumbo lutea* Herbaceous Vegetation (CEGL004323, G4?)
- *Nuphar lutea* ssp. *advena* - *Nymphaea odorata* Herbaceous Vegetation (CEGL002386, G4G5)
- *Nyssa aquatica* / *Cephalanthus occidentalis* Pond Forest (CEGL004712, G1?)
- *Nyssa biflora* / *Cephalanthus occidentalis* - *Lyonia lucida* Sagpond Forest (CEGL004116, G1G2)
- *Orontium aquaticum* - *Schoenoplectus subterminalis* - *Eriocaulon aquaticum* Herbaceous Vegetation (CEGL007859, G1)
- *Panicum hemitomon* - *Dulichium arundinaceum* Herbaceous Vegetation (CEGL004126, G1)
- *Phalaris arundinacea* Eastern Herbaceous Vegetation (CEGL006044, GNA)
- *Platanus occidentalis* - *Fraxinus pennsylvanica* - *Ulmus americana* / *Cornus sericea* Forest (CEGL006901, G2G3)
- *Pontederia cordata* - *Sagittaria graminea* - *Sagittaria latifolia* Semipermanently Flooded Herbaceous Vegetation (CEGL004986, G1G2Q)
- *Quercus alba* - *Nyssa sylvatica* Sandstone Ridgetop Depression Forest (CEGL008440, G2Q)
- *Quercus alba* - *Nyssa sylvatica* Seasonally Flooded Forest [Provisional] (CEGL008473, GNR)
- *Quercus bicolor* - *Fraxinus pennsylvanica* / *Carex* spp. Forest (CEGL004422, G1G2)
- *Quercus lyrata* - *Quercus (palustris, phellos)* - *Liquidambar styraciflua* - (*Populus heterophylla*) Forest (CEGL004421, G2G3)
- *Quercus lyrata* / *Betula nigra* / *Pleopeltis polypodioides* ssp. *michauxiana* Forest (CEGL004975, G1)
- *Quercus lyrata* Pond Forest (CEGL004642, G1G3)
- *Quercus palustris* - (*Quercus bicolor*) / *Carex crinita* / *Sphagnum* spp. Forest (CEGL002406, G3?)
- *Quercus palustris* / *Panicum rigidulum* var. *rigidulum* - *Panicum verrucosum* - *Eleocharis acicularis* Herbaceous Vegetation (CEGL007858, G1)
- *Quercus palustris* Pond Forest (CEGL007809, G2)
- *Quercus phellos* - *Liquidambar styraciflua* / *Chasmanthium laxum* Cumberland Plateau Forest (CEGL008441, G3)
- *Quercus phellos* Seasonally Flooded Ozark Pond Forest [Provisional] (CEGL007402, GNR)
- *Scirpus cyperinus* - *Dulichium arundinaceum* / *Sphagnum* spp. Herbaceous Vegetation (CEGL004134, G1Q)
- *Scirpus cyperinus* - *Panicum rigidulum* - *Rhynchospora corniculata* - (*Dulichium arundinaceum*) Herbaceous Vegetation (CEGL004719, G2G3)
- *Sparganium americanum* - *Epilobium leptophyllum* Herbaceous Vegetation (CEGL004510, G2G3)
- *Typha latifolia* Southern Herbaceous Vegetation (CEGL004150, G5)
- *Vaccinium macrocarpon* / *Pogonia ophioglossoides* Dwarf-shrubland (CEGL007856, G1Q)

**High-ranked species:** *Boltonia* sp. 1 (G2?), *Carex decomposita* (G3), *Fimbristylis perpusilla* (G2), *Helenium virginicum* (G2), *Isoetes virginica* (G1), *Muhlenbergia torreyana* (G3), *Platanthera leucophaea* (G3), *Schoenoplectus hallii* (G2), *Scirpus ancistrochaetus* (G3)

**Vegetation:** Ponds vary from open water to herb-, shrub-, or tree-dominated systems. Tree-dominated examples typically contain *Quercus* species, *Platanus occidentalis*, *Fraxinus pennsylvanica*, *Acer saccharinum*, or *Nyssa* species, or a combination of these. In addition, *Liquidambar styraciflua* may be present in southern examples. *Cephalanthus occidentalis* is a typical shrub component. The herbaceous layer is widely variable depending on geography.

**Dynamics:** Water depth may vary greatly on a seasonal basis, and may be a meter deep or more in the winter. Some examples become dry in the summer.

#### SOURCES

**References:** Comer et al. 2003

**Version:** 18 Apr 2005

**Concept Author:** M. Pyne, S. Menard, D. Faber-Langendoen

**Stakeholders:** East, Midwest, Southeast

**LeadResp:** Midwest

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#### CES202.702 NORTH-CENTRAL INTERIOR SHRUB-GRAMINOID ALKALINE FEN

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This fen system is found in the glaciated portions of the Midwest and southern Canada. Examples of this system can be located on level to sloping seepage areas, in pitted outwash or in kettle lakes associated with kettle-kame-moraine topography. Groundwater flows through marls and shallow peat soils typically minerotrophic and slightly alkaline. Examples of this system contain a core fen area of graminoids surrounded by shrubs and tall-shrubs with a fairly continuous sphagnum moss. Herbaceous and shrub cover is variable with little to no tree cover. Characteristic species include prairie grasses such as *Andropogon gerardii* and *Spartina pectinata* with prairie forbs and sedges, *Carex* spp. Common shrub species include *Dasiphora fruticosa* ssp. *floribunda*, *Cornus* spp., and *Salix* spp. Alterations in wetland hydrology and agricultural development can threaten examples of this system.

#### DISTRIBUTION

**Range:** This system is found in the northern Midwest and southern Canada.

**Divisions:** 201:C, 202:C

**TNC Ecoregions:** 35:C, 36:C, 45:C, 46:C, 47:C, 48:C, 49:P

**Subnations:** IA, IL, IN, MI, MN, ND, OH, ON, SD, WI

#### Associations:

- *Carex lasiocarpa* - *Carex oligosperma* / *Sphagnum* spp. Herbaceous Vegetation (CEGL002265, G3G4)
- *Cornus amomum* - *Salix* spp. - *Toxicodendron vernix* - *Rhamnus lanceolata* Fen Shrubland (CEGL005087, G2G3)
- *Cornus racemosa* / *Carex (sterilis, aquatilis, lacustris)* Shrub Herbaceous Vegetation (CEGL006123, G2G3)
- *Cornus* spp. - *Salix* spp. - *Vaccinium corymbosum* - *Rhamnus alnifolia* - *Toxicodendron vernix* Shrubland (CEGL005083, G4?)
- *Dasiphora fruticosa* ssp. *floribunda* / *Carex interior* - *Carex flava* - *Sarracenia purpurea* Shrub Herbaceous Vegetation (CEGL005140, G3)
- *Dasiphora fruticosa* ssp. *floribunda* / *Carex sterilis* - *Andropogon gerardii* - *Arnoglossum plantagineum* Shrub Herbaceous Vegetation (CEGL005139, G3G4)
- *Symplocarpus foetidus* Herbaceous Vegetation (CEGL002385, G4?)
- *Vaccinium corymbosum* - *Gaylussacia baccata* - *Photinia melanocarpa* / *Calla palustris* Shrubland (CEGL005085, G2G3)

**High-ranked species:** *Calephelis muticum* (G3), *Clonophis kirtlandii* (G2), *Hypericum adpressum* (G3), *Oecanthus laricis* (G1G2), *Poa paludigena* (G3), *Valeriana edulis* var. *ciliata* (G5T3)

#### SOURCES

**References:** Comer et al. 2003, MNNHP 1993

**Version:** 10 Mar 2003

**Concept Author:** S. Menard

**Stakeholders:** Canada, Midwest

**LeadResp:** Midwest

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**CES202.700 NORTH-CENTRAL INTERIOR WET FLATWOODS**

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This small-patch system is found throughout the northern glaciated Midwest ranging east into Lower New England. It usually occurs on poorly drained uplands or in depressions associated with glacial features such as tillplains, lakeplains or outwash plains. Soils often have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding common during wetter seasons, and drought possible during the summer and autumn months. These fluctuating moisture levels can lead to complexes of forest upland and wetland species occurring within this system. *Quercus palustris* typically dominates and is often associated with *Quercus bicolor* and *Acer rubrum*. *Liquidambar styraciflua* and *Nyssa sylvatica* are also common associates. Some examples in Michigan, Indiana, Ohio, and southern Ontario are dominated by *Fagus grandifolia* associated with oak (*Quercus* spp.) and maple species (*Acer* spp.). Understory herbaceous and shrub species present in examples of this system can vary. Some common species include *Carex* spp., *Osmunda cinnamomea*, *Cephalanthus occidentalis*, *Alnus* spp., and *Ilex* spp. Flooding, drought and fire can influence this system.

**Comments:** These are mostly north of the glacial line, but one association is in the Interior Low Plateau and that placement may need to be reviewed.

#### DISTRIBUTION

**Range:** This system is found in the northern Midwest, southern Ontario, and southern portions of the northeastern U.S.

**Divisions:** 201:P, 202:C

**TNC Ecoregions:** 36:C, 44:C, 45:C, 47:?, 48:C, 49:P, 59:P, 60:P, 61:C

**Subnations:** CT, IN, MA, MI, MN, NY, OH, ON, PA, WI

#### Associations:

- *Cephalanthus occidentalis* / *Carex* spp. Northern Shrubland (CEGL002190, G4)
- *Fagus grandifolia* - *Acer saccharum* - *Quercus bicolor* - *Acer rubrum* Flatwoods Forest (CEGL005173, G2G3)
- *Fagus grandifolia* - *Quercus alba* - (*Quercus michauxii*) - *Acer rubrum* Flatwoods Forest (CEGL005015, G3)
- *Quercus falcata* Flatwoods Forest (CEGL004412, G2?)
- *Quercus palustris* - (*Quercus bicolor*) - *Acer rubrum* / *Osmunda cinnamomea* Forest (CEGL006240, GNR)
- *Quercus palustris* - (*Quercus stellata*) - *Quercus pagoda* / *Isoetes* spp. Forest (CEGL002101, G2G3)
- *Quercus palustris* - *Quercus bicolor* - (*Liquidambar styraciflua*) Mixed Hardwood Forest (CEGL002432, G3G4)
- *Quercus palustris* - *Quercus bicolor* - *Acer rubrum* Flatwoods Forest (CEGL005037, G2G3)
- *Quercus palustris* - *Quercus bicolor* - *Nyssa sylvatica* - *Acer rubrum* Sand Flatwoods Forest (CEGL002100, G2?)

**High-ranked species:** *Euphyes dukesi* (G3)

#### SOURCES

**References:** Comer et al. 2003

**Version:** 05 Mar 2003

**Concept Author:** S. Menard

**Stakeholders:** Canada, East, Midwest, Southeast

**LeadResp:** Midwest

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**CES202.701 NORTH-CENTRAL INTERIOR WET MEADOW-SHRUB SWAMP**

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional [Lakeshore]; Broad-Leaved Shrub; Graminoid

**Concept Summary:** This system is found throughout the northern Midwest ranging into southern Canada. It is typically found on glacial potholes, river valleys, ponds, channels in glacial outwash and on lakeplains. This system contains a deep to shallow area of freshwater marsh dominated by emergent species surrounded by a zone of wet meadow. The emergent marsh zone within this system contains hydric soils flooded by water ranging from several centimeters to over 1 meter for most of the growing season. Emergent marsh species such as *Typha* spp. and *Schoenoplectus* spp. dominate the core of this system. Wet meadows can surround the emergent marsh core along wet mineral soils or shallow peat with the water table typically just below the surface for most of the growing season. The vegetation in this zone of the system is dominated by sedges

(*Carex* spp.) and grasses such as *Calamagrostis canadensis*. This system also can contain a zone of wet prairie species such as *Spartina pectinata*. Shrub swamps can also be associated with the wet meadows within this system. Typical shrub species include *Cornus* spp., *Salix* spp., and/or *Cephalanthus occidentalis*. Trees are generally absent and, if present, are scattered. Fire originating in adjacent uplands, as well as hydrology, can influence this system. In the absence of fire, drought and/or ditching can increase the proportion of shrubs compared to the wet meadow. In the absence of fire, drought and/or ditching can increase the proportion of shrubs compared to the wet meadow or prairie species.

**Comments:** If examples of these associations are found within an immediate medium to large floodplain, those should be considered part of North-Central Interior Floodplain (CES202.694). The freshwater marsh component was removed from this system to create a new system, North-Central Interior Freshwater Marsh (CES202.899).

#### DISTRIBUTION

**Range:** This system is found in the northern Midwest and southern Canada.

**Divisions:** 201:C, 202:C

**TNC Ecoregions:** 35:C, 36:C, 45:C, 46:C, 47:C, 48:C, 49:?

**Subnations:** IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI

#### Associations:

- *Calamagrostis canadensis* - *Phalaris arundinacea* Herbaceous Vegetation (CEGL005174, G4G5)
- *Carex aquatilis* - *Carex* spp. Herbaceous Vegetation (CEGL002262, G4?)
- *Carex atherodes* Herbaceous Vegetation (CEGL002220, G3G5)
- *Carex lacustris* Herbaceous Vegetation (CEGL002256, G4G5)
- *Carex rostrata* - *Carex lacustris* - (*Carex vesicaria*) Herbaceous Vegetation (CEGL002257, G4G5)
- *Carex stricta* - *Carex* spp. Herbaceous Vegetation (CEGL002258, G4?)
- *Cephalanthus occidentalis* / *Carex* spp. Northern Shrubland (CEGL002190, G4)
- *Cornus sericea* - *Salix* (*bebbiana*, *discolor*, *petiolaris*) / *Calamagrostis stricta* Shrubland (CEGL002187, G3G4)
- *Cornus sericea* - *Salix* spp. - (*Rosa palustris*) Shrubland (CEGL002186, G5)
- *Spartina pectinata* - *Calamagrostis stricta* - *Carex* spp. Herbaceous Vegetation (CEGL002027, G3?)
- *Spartina pectinata* - *Carex* spp. - *Calamagrostis canadensis* - *Lythrum alatum* - (*Oxypolis rigidior*) Herbaceous Vegetation (CEGL002224, G3?)
- *Spartina pectinata* - *Carex* spp. - *Calamagrostis canadensis* Sand Herbaceous Vegetation (CEGL005178, G3?)
- *Spiraea tomentosa* - *Salix humilis* / *Andropogon gerardii* - *Panicum virgatum* Shrubland (CEGL005069, G1Q)

**High-ranked species:** *Calephelis muticum* (G3), *Clonophis kirtlandii* (G2), *Eleocharis nitida* (G3G4), *Eleocharis wolfii* (G3G4), *Platanthera leucophaea* (G3), *Schoenoplectus hallii* (G2), *Scirpus ancistrochaetus* (G3), *Valeriana edulis* var. *ciliata* (G5T3)

#### SOURCES

**References:** Comer and Albert 1997, Comer et al. 2003

**Version:** 16 Apr 2004

**Concept Author:** S. Menard

**Stakeholders:** Canada, Midwest

**LeadResp:** Midwest

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### CES202.606 NORTH-CENTRAL INTERIOR AND APPALACHIAN ACID PEATLAND

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Shrubland (Shrub-dominated); Organic Peat (>40 cm); Acidic Water; >180-day hydroperiod

**Concept Summary:** These *Sphagnum* and shrub peatlands occur in basins south of the Laurentian-Acadian region down to near the glacial boundary in the northeastern and north-central U.S. They are found in colder regions of the division, mostly in areas where glacial stagnation left coarse deposits and glacial depressions (many are "kettleholes"). The basins are generally closed, i.e., without inlets or outlets of surface water. The nutrient-poor substrate and the reduced throughflow of water create oligotrophic conditions fostering the development of *Sphagnum* peat and the growth of peatland vegetation. In deeper basins, the vascular vegetation grows on a *Sphagnum* mat over water, with no mineral soil development. Ericaceous shrubs and dwarf-shrubs (e.g., *Chamaedaphne calyculata*) dominate, with patches of graminoid dominance. Some peatlands may have a sparse tree layer. Although these are often called bogs, in most cases they are technically fens (albeit nutrient-poor ones), as the vegetation remains in contact with the groundwater.

**Comments:** This system occurs south of the Laurentian-Acadian region, and these acidic peatlands are distinctive and discrete elements of the landscape. They are related to Laurentian-Acadian Conifer-Hardwood Acid Swamp (CES201.574). There are enough differences in landscape setting and more temperate floristic elements to distinguish them. They include treed, shrub, and graminoid associations. In the Midwest, it may be necessary to split off the shrub/graminoid acid peatland (poor fen) types.

#### DISTRIBUTION

**Range:** Central New England to the Great Lakes and south-central Minnesota southward, generally associated with the glacial terminus or stagnation zones.

**Divisions:** 202:C

**TNC Ecoregions:** 45:P, 46:P, 48:P, 49:P, 59:?, 60:P, 61:C, 62:C, 64:P

**Subnations:** CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI

#### Associations:

- *Carex lasiocarpa* - *Carex oligosperma* - (*Lysimachia terrestris*) / *Sphagnum* spp. / *Spiraea tomentosa* Herbaceous Vegetation (CEGL005279, G3G4)
- *Carex oligosperma* - *Carex pauciflora* - *Eriophorum vaginatum* / *Sphagnum* spp. Herbaceous Vegetation (CEGL005256, G4G5)
- *Chamaecyparis thyoides* / *Chamaedaphne calyculata* Woodland (CEGL006321, G3G4)
- *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) - *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (CEGL006008, G5)
- *Chamaedaphne calyculata* / *Carex oligosperma* - *Eriophorum virginicum* Dwarf-shrubland (CEGL005092, G3G4)
- *Larix laricina* / *Photinia melanocarpa* / *Sphagnum* spp. Forest (CEGL002472, G4?)
- *Myrica gale* - *Chamaedaphne calyculata* / *Carex (lasiocarpa, utriculata)* - *Utricularia* spp. Shrub Herbaceous Vegetation (CEGL006302, G4G5)
- *Myrica gale* - *Chamaedaphne calyculata* / *Carex exilis* Shrub Herbaceous Vegetation (CEGL006392, GNR)
- *Myrica gale* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* - *Cladium mariscoides* Shrub Herbaceous Vegetation (CEGL006068, G2G3)
- *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Woodland (CEGL006098, G3G5)
- *Pinus rigida* / *Chamaedaphne calyculata* / *Sphagnum* spp. Woodland (CEGL006194, G3G5)
- *Sphagnum (cuspidatum, torreyanum)* - *Vaccinium macrocarpon* Nonvascular Vegetation (CEGL006394, GNR)
- *Vaccinium corymbosum* - *Gaylussacia baccata* - *Photinia melanocarpa* / *Calla palustris* Shrubland (CEGL005085, G2G3)
- *Vaccinium corymbosum* / *Sphagnum* spp. Shrubland (CEGL006190, G3G5)

**High-ranked species:** *Caenestheriella gynecia* (G2G3), *Platanthera leucophaea* (G3)

#### SOURCES

**References:** Comer et al. 2003, Damman and French 1987

**Version:** 23 Mar 2003

**Stakeholders:** Canada, East, Midwest, Southeast

**Concept Author:** S.C. Gawler

**LeadResp:** East

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### CES202.336 SOUTHERN PIEDMONT / RIDGE AND VALLEY UPLAND DEPRESSION SWAMP

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional

**Concept Summary:** This system represents isolated wetlands primarily of the Piedmont in small, shallow basins in upland settings where water pools due to limited soil drainage. Also for now are related wetlands of the adjacent Ridge and Valley and Southern Blue Ridge (both extremely rare and small-patch examples). Most known examples occur on mafic rocks. The typical hydrology is seasonally flooded. Most examples consist of forests of wetland oaks, but a few are treeless or open-canopied ponds. Vegetation is zoned with an outer ring of trees, a more interior ring of shrubs, herbs and vines, and a central area with or without standing water year round depending on precipitation. A few examples occur in the adjacent Southern Blue Ridge and Ridge and Valley ecoregions. This system also includes the wet hardwood forests ("Iredell Flatwoods" or

"Gabbro Glades") which occur on gently sloping terrain or shallowly depressed upland flats over gabbro-derived clays in the Piedmont of Georgia and South Carolina.

**Comments:** This system is distinct from all other Piedmont systems in its ponded wetland hydrology in upland settings. The vegetation is generally also distinct from all other Piedmont systems. Though apparently quite different, Southern Piedmont Mafic Hardpan Woodland (CES202.268) is closely related by the importance of an impermeable clay hardpan, and some intermediate gradations occur. A few examples of Southern Piedmont / Ridge and Valley Upland Depression Swamp (CES202.336) appear to be closely related to Coastal Plain depressional wetlands, sharing some flora, but most are more distinct. The system has significant variation in vegetation and environment. The forested swamps and open pools represent well-marked subtypes. There is a more subtle distinction between the basic and acidic soil swamps. There is substantial variation among the pools, related to substrate, basin morphology, and geographic location. A few disjunct examples may occur in the Southern Blue Ridge because of similarity in topographic setting and general structure. They do, however, occur on different substrates (quartzite and sandstone) than any examples in the Piedmont. Their vegetation is different from other examples but not in having more montane flora. Their vegetation is no more different than most other pools are from each other.

### DISTRIBUTION

**Range:** Ranges throughout the Piedmont, from Virginia to Alabama. A few examples attributable to this system are found in the Southern Blue Ridge and Ridge and Valley ecoregions.

**Divisions:** 202:C

**TNC Ecoregions:** 50:C, 51:C, 52:C, 59:?

**Subnations:** AL, GA, NC, SC, VA

### Associations:

- *Cephalanthus occidentalis* - (*Leucothoe racemosa*) / *Carex jorii* Shrubland (CEGL004075, G1)
- *Leucothoe racemosa* - *Vaccinium fuscatum* - *Smilax walteri* Shrubland (CEGL004533, G1?)
- *Liquidambar styraciflua* - *Acer rubrum* / *Carex* spp. - *Sphagnum* spp. Forest (CEGL007388, G2Q)
- *Nyssa biflora* / *Cephalanthus occidentalis* - *Leucothoe racemosa* Forest (CEGL004550, G1)
- *Quercus* (*pagoda*, *phellos*, *shumardii*) - *Celtis laevigata* / *Cornus foemina* / *Podophyllum peltatum* - *Hymenocallis occidentalis* Flatwoods Forest (CEGL003880, G2?)
- *Quercus palustris* - *Quercus bicolor* / *Carex* spp. Forest (CEGL004643, G1G3)
- *Quercus phellos* - *Quercus* (*michauxii*, *shumardii*) - *Fraxinus americana* / (*Quercus oglethorpensis*) / *Zephyranthes atamasca* Gabbro Upland Depression Forest (CEGL008484, G2?)
- *Quercus phellos* / *Carex* (*albolutescens*, *intumescens*, *joorii*) - *Chasmanthium laxum* / *Sphagnum lescurii* Forest (CEGL007403, G2G3)
- *Scirpus cyperinus* - *Dulichium arundinaceum* / *Sphagnum* spp. Herbaceous Vegetation (CEGL004134, G1Q)

**High-ranked species:** *Boltonia* sp. 1 (G2?), *Carex decomposita* (G3), *Isoetes piedmontana* (G3), *Isoetes virginica* (G1), *Trillium pusillum* var. *virginianum* (G3T2)

**Environment:** Occurs in small, shallow basins or gentle swales on flat to rolling upland sites, occasionally in depressions on narrow, steeper ridgetops. Soils have a dense clay hardpan or some other impermeable layer that limits internal drainage. Rainwater accumulates in the basins and persists through the wet season, occasionally persisting all year. Only a few kinds of rock are known to form these depressions. Most examples occur on mafic rocks such as gabbro or diabase, but a few occur on slates or on mafic to felsic tuffs where a dense clay hardpan has formed. A few occur over bedrock of other kinds. Rock chemistry affects soil chemistry and influences variation in vegetation, but hydroperiod is a more important influence. Rare examples in the Ridge and Valley of Georgia (Coosa Valley) are included here. These occur on limestones or dolomites of the Chickamauga group.

**Vegetation:** Vegetation consists either of swamps dominated by wetland oaks, or of more open-canopy pools with sparse trees and with substantial shrub or herbaceous vegetation. Swamps are most often dominated by *Quercus phellos*, with a substantial minority dominated by *Quercus lyrata* and a few having *Quercus bicolor*, *Quercus michauxii*, or other species. Examples that have been logged or cleared may be dominated by *Acer rubrum* or *Liquidambar styraciflua*. Lower strata are generally sparse in the swamps, often just a few shrubs such as *Vaccinium* spp., patches of *Smilax*, and a few wetland herbs. Open ponds may have the same canopy species on the edges, but a few have *Nyssa sylvatica* or other wetland species. The lower strata are better developed in the open pools, with *Cephalanthus occidentalis*, *Leucothoe racemosa*, *Vaccinium* spp., or other wetland species occurring as thickets along the edge or scattered in the interior. Large *Smilax* tangles sometimes occur. Herbs are usually still sparse or patchy, but may include dense beds of various graminoids or ferns, as well as scattered clumps. *Sphagnum* is sometimes extensive in parts of the pools. These isolated seasonal wetlands are often important breeding sites for amphibians.



**Dynamics:** The dynamics of water levels are the most important factor in these systems, differentiating them from the surrounding uplands and differentiating the various communities within the system. Most basins have almost no watershed, so water comes largely from rainfall. Variation in rainfall patterns will drive variation in duration of flooding, though most basins have an outlet that limits water depth. Fire is presumably naturally rare in these systems. Though they would naturally be exposed to fires in the surrounding uplands, standing water and lack of continuous fuel would limit fires to the edges, expect perhaps in early fall. Presumably important as a dynamic process is the migration of amphibians, which concentrate in these systems for breeding. Ecosystem dynamics may be strongly affected by the suitability of surrounding uplands for amphibian adult habitat.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small-patch system, occurring as isolated bodies surrounded by upland systems. Open pools are usually less than one acre, while swamps may be up to several acres in size.

**Size:** Occurs as small patches. Pools are usually less than one acre, and may be substantially smaller. Swamps range up to several acres, a few to ten or more acres. Most examples occur as isolated patches, but a few occur as small groups. Extensive mafic rock areas may support a number of swamps, but most are probably not close enough together to be treated as single occurrences. Most remaining examples are of natural size.

**Heterogeneity:** Most occurrences are single patches. Within the system, most examples will have only a single association. The open pools often have variation in vegetation physiognomy on a very fine scale, which is best treated within a single association.

**Adjacent Ecological System Comments:** Most examples are surrounded by Southern Piedmont Dry Oak-(Pine) Forest (CES202.339) or Southern Piedmont Mafic Hardpan Woodland (CES202.268).

### SOURCES

**References:** Comer et al. 2003

**Version:** 12 Dec 2002

**Concept Author:** M. Schafale

**Stakeholders:** East, Southeast

**LeadResp:** Southeast

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### CES202.607 NORTH-CENTRAL APPALACHIAN SEEPAGE FEN

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Herbaceous; Seepage-Fed Sloping; Organic Peat (>40 cm)

**Concept Summary:** This system is found in scattered locations in the central Appalachians and eastern Great Lakes regions. Mostly non-forested, these open fens develop on shallow to deep peat over a sloping substrate, where seepage waters provide nutrients. Conditions are often circumneutral to alkaline. Sedges are the major dominants. *Packera aurea*, *Symplocarpus foetidus*, and *Lobelia kalmii* are among the characteristic forbs. Some of these areas are kept open by grazing, and succession to shrublands may occur in the absence of disturbance.

### DISTRIBUTION

**Range:** Scattered locations from central New England and New York west to Lake Erie and south to Virginia.

**Divisions:** 202:C

**TNC Ecoregions:** 45:P, 48:P, 49:C, 59:C, 60:P, 61:C

**Subnations:** CT, MA, MD, NJ, NY, PA, VA, VT, WV?

### Associations:

- *Alnus serrulata* - *Lindera benzoin* / *Osmunda regalis* var. *spectabilis* - *Carex tetanica* Shrubland (CEGL008408, G1?)
- *Carex atlantica* - *Solidago patula* var. *patula* - *Lilium grayi* / *Sphagnum bartlettianum* Herbaceous Vegetation (CEGL004158, G1)
- *Cornus amomum* - *Salix candida* / *Dasiphora fruticosa* ssp. *floribunda* / *Carex stricta* Shrubland (CEGL006359, G3?)
- *Cornus racemosa* / *Carex (sterilis, aquatilis, lacustris)* Shrub Herbaceous Vegetation (CEGL006123, G2G3)
- *Dasiphora fruticosa* ssp. *floribunda* / *Carex (sterilis, hystericina, flava)* Shrub Herbaceous Vegetation (CEGL006326, G2)
- *Dasiphora fruticosa* ssp. *floribunda* / *Carex interior* - *Carex flava* - *Sarracenia purpurea* Shrub Herbaceous Vegetation (CEGL005140, G3)

- *Dasiphora fruticosa* ssp. *floribunda* / *Rhynchospora capillacea* - *Scleria verticillata* Shrub Herbaceous Vegetation (CEGL006356, G1)
- *Juniperus virginiana* / *Betula pumila* / *Carex sterilis* - *Oligoneuron rigidum* Shrub Herbaceous Vegetation (CEGL006367, G1Q)
- *Juniperus virginiana* / *Dasiphora fruticosa* ssp. *floribunda* / *Carex flava* - *Carex tetanica* Shrub Herbaceous Vegetation (CEGL006357, G1G2)
- *Morella pensylvanica* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex sterilis* - *Carex flava* Shrub Herbaceous Vegetation (CEGL006103, G2)
- *Symplocarpus foetidus* Herbaceous Vegetation (CEGL002385, G4?)

**High-ranked species:** *Carex schweinitzii* (G3G4), *Carex* sp. 2 (G1), *Chelone cuthbertii* (G3), *Glyptemys muhlenbergii* (G3), *Neonympha mitchellii* (G1G2), *Parnassia grandifolia* (G3), *Poa paludigena* (G3)

## SOURCES

**References:** Comer et al. 2003

**Version:** 09 Jan 2003

**Concept Author:** S.C. Gawler

**Stakeholders:** East, Midwest, Southeast

**LeadResp:** East

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## CES202.899 NORTH-CENTRAL INTERIOR FRESHWATER MARSH

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional [Lakeshore]; Graminoid; Shallow (<15 cm) Water; >180-day hydroperiod

**Concept Summary:** This system is found throughout the northern Midwest ranging into southern Canada. It is typically found on glacial potholes, along small streams, ponds, channels in glacial outwash and on lakeplains. This system contains a deep to shallow area of freshwater marsh dominated by emergent and submergent species. Stands may be open ponds with floating or rooted aquatics, or deep marsh with bulrush or cattails, and range from fairly small to several acres. It contains hydric soils flooded by water ranging from several centimeters to over 1 meter for most of the growing season. Emergent marsh species such as *Typha* spp. and *Schoenoplectus* spp. dominate this system with an occasional scattering of tall *Carex* spp. and forbs that can vary from dense to open cover. Trees are generally absent and, if present, are scattered. Submergent wetlands include a variety of macrophytes.

**Comments:** Some of the specific communities will also be found in the floodplain system and should not be considered a separate system in that case [see North-Central Interior Floodplain (CES202.694)]. Many of these marshes also may have a border of shrubby wet-meadow species similar to North-Central Interior Wet Meadow-Shrub Swamp (CES202.701), but only those areas with a relatively narrow border (<5-10 m) should included with this system.

## DISTRIBUTION

**Range:** This system is found in the northern Midwest and southern Canada.

**Divisions:** 201:C, 202:C

**TNC Ecoregions:** 35:C, 36:C, 45:C, 46:C, 47:C, 48:C, 49:?

**Subnations:** IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI

### Associations:

- *Nelumbo lutea* Herbaceous Vegetation (CEGL004323, G4?)
- *Nuphar lutea* ssp. *advena* - *Nymphaea odorata* Herbaceous Vegetation (CEGL002386, G4G5)
- *Phragmites australis* Eastern North America Temperate Semi-natural Herbaceous Vegetation (CEGL004141, GNA)
- *Polygonum* spp. - Mixed Forbs Herbaceous Vegetation (CEGL002430, G4G5)
- *Potamogeton* spp. - *Ceratophyllum* spp. Midwest Herbaceous Vegetation (CEGL002282, G5)
- *Schoenoplectus acutus* - (*Schoenoplectus fluviatilis*) Freshwater Herbaceous Vegetation (CEGL002225, G4G5)
- *Schoenoplectus fluviatilis* - *Schoenoplectus* spp. Herbaceous Vegetation (CEGL002221, G3G4)
- *Typha* spp. - *Schoenoplectus acutus* - Mixed Herbs Midwest Herbaceous Vegetation (CEGL002229, G4?)
- *Typha* spp. - *Schoenoplectus* spp. - Mixed Herbs Great Plains Herbaceous Vegetation (CEGL002228, G4G5)
- *Typha* spp. Midwest Herbaceous Vegetation (CEGL002233, G5)
- *Zizania (aquatica, palustris)* Herbaceous Vegetation (CEGL002382, G3G4)

## SOURCES

**References:** Comer and Albert 1997, Midwestern Ecology Working Group n.d.

**Version:** 14 Dec 2004

**Concept Author:** S. Menard

**Stakeholders:** Canada, Midwest

**LeadResp:** Midwest

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### CES202.052 OZARK-OUACHITA FEN

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This fen system is found in the Ozarks region of the United States. Stands occur on the sideslopes of hills in narrow valleys, bases of bluffs, rock ledges, and terraces of streams and rivers, where the soil or substrate is saturated by calcareous groundwater seepage. Soils are moist to wet, mucky peat or mineral, with pH above 6.5, and vary from shallow (0-40 cm) to moderately deep (40-100 cm), depending on natural disturbance and slope. The parent material is a mixture of gravel and dolomite with fragments of deeply weathered bedrock present, or colluvium over bedrock. The bedrock strata are exposed, especially in hanging fens where the slope is greater than 35 degrees. Hydrophytic plants dominate the fen, which varies from mixed grass or sedge fen with complex zonation to more tallgrass prairie species mixed with calciphiles. Fires are possible in some of the larger prairie fens.

**Comments:** Some fens are typically associated with riparian vegetation. Seeps in the Ozarks are typically acidic to circumneutral and differ substantially in floristics and groundwater chemistry from these alkaline fens.

## DISTRIBUTION

**Range:** This fen community type is found in the Ozarks region of the United States.

**Divisions:** 202:C

**TNC Ecoregions:** 38:C

**Subnations:** MO

### Associations:

- (*Carex interior*, *Carex lurida*) - *Carex leptalea* - *Parnassia grandifolia* - *Rhynchospora capillacea* Herbaceous Vegetation (CEGL002404, G2G3)
- *Carex interior* - *Carex lurida* - *Andropogon gerardii* - *Parnassia grandifolia* Herbaceous Vegetation (CEGL002416, G1G2)

**Vegetation:** Stands of this small-scale system are typically dominated by primarily wetland obligate species of sedges (*Carex* spp.), ferns (*Osmunda* spp.), and other herbaceous species such as *Impatiens capensis* and *Parnassia grandifolia*.

## SOURCES

**References:** Comer et al. 2003, Nelson 1985

**Version:** 14 Dec 2004

**Concept Author:** D. Faber-Langendoen

**Stakeholders:** Midwest, Southeast

**LeadResp:** Midwest

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### CES202.317 SOUTHERN APPALACHIAN SEEPAGE WETLAND

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Seepage-Fed Sloping

**Concept Summary:** This system consists of seepage-fed wetlands in the southern Appalachians on gentle slopes, with substantial seepage flow. Vegetation is variable, both within and among examples, but lacks vegetation characteristic of bogs or floodplains. This is a small-patch system occurring over a wide elevational range, nearly to the highest peaks, but is generally lacking from flat valley bottoms.

**Comments:** This system is fairly heterogeneous, covering a broad range of environments and vegetation, but without apparent breaks. At one extreme, the system contains rich, low-elevation, forb-dominated seeps closely related floristically to cove forests; at the other extreme, it contains acidic, sedge- and moss-dominated, bog-like, high-elevation seeps. This system

is distinguished from Southern and Central Appalachian Bog and Fen (CES202.300) by occurrence in sloping settings rather than flat valley bottoms, with more rapid flow of water, and by lack of dominance by the characteristic bog or fen flora (though some of it may be present). The only other systems with wetland systems within its range, floodplains and upland pools, are more distinct floristically as well as associated with very different landforms.

### DISTRIBUTION

**Range:** Ranges throughout the Southern Appalachians, from northern Georgia and South Carolina north through Virginia, and westward into Tennessee, Kentucky?, and West Virginia.

**Divisions:** 202:C

**TNC Ecoregions:** 51:C, 59:?

**Subnations:** AL?, GA, KY?, NC, SC, TN, VA, WV?

### Associations:

- *Alnus serrulata* - *Lindera benzoin* / *Scutellaria lateriflora* - *Thelypteris noveboracensis* Shrubland (CEGL003909, G2?)
- *Calamagrostis cainii* - *Carex ruthii* - *Parnassia asarifolia* / *Sphagnum* spp. Herbaceous Vegetation (CEGL007877, G1Q)
- *Carex gynandra* - *Platanthera clavellata* - *Drosera rotundifolia* - *Carex ruthii* - *Carex atlantica* / *Sphagnum* spp. Herbaceous Vegetation (CEGL007697, G2)
- *Diphylleia cymosa* - *Saxifraga micranthidifolia* - *Laportea canadensis* Herbaceous Vegetation (CEGL004296, G3)
- *Glyceria striata* - *Carex gynandra* - *Chelone glabra* - *Symphytotrichum puniceum* / *Sphagnum* spp. Herbaceous Vegetation (CEGL008438, G2G3)
- *Impatiens (capensis, pallida)* - *Monarda didyma* - *Rudbeckia laciniata* var. *humilis* Herbaceous Vegetation (CEGL004293, G3)
- *Schoenoplectus robustus* - *Juncus gerardii* - *Hordeum jubatum* - *Atriplex patula* Herbaceous Vegetation (CEGL006234, G1)

**High-ranked species:** *Cardamine clematitidis* (G2G3), *Carex mitchelliana* (G3G4), *Chelone cuthbertii* (G3), *Danthonia epilis* (G3G4), *Desmognathus aeneus* (G3G4), *Desmognathus imitator* (G3G4), *Desmognathus santeetlah* (G3G4Q), *Desmognathus wrightii* (G3G4), *Eurycea junaluska* (G3), *Glyceria nubigena* (G2), *Rhynchospora thornei* (G3), *Rudbeckia laciniata* var. *humilis* (G5T3?), *Sarracenia oreophila* (G2), *Saxifraga caroliniana* (G2), *Xyris tennesseensis* (G2)

**Environment:** Occurs in small patches where seepage creates saturated soil conditions permanently or seasonally. Wetness may vary substantially over short distances in response to amounts of seepage, flow, and pooling by topography or impermeable substrate. The system occurs over a wide elevational range, nearly to the highest peaks. Landforms are usually concave slopes, but may be on convex slopes or even in ridgetop gaps. This system is almost never on flat valley bottoms, though it may be on the edge of them. Soils may be muck or coarse boulders, but are usually saturated mineral soil. They may be residual or colluvial, and deep or shallow. The most extensive and wettest examples occur at elevations above 5000 feet, where cool temperatures and high rainfall make more water available.

**Vegetation:** Vegetation consists of a series of forested and open associations united by presence of wetland flora but lack of floodplain species and most bog species. Vegetation consists of a series of forested and open associations united by presence of wetland flora but lack of floodplain species and most bog species. Some tree cover by mesophytic species is usually present, but often only by trees rooted on the edge of adjacent systems. Shrubs may be sparse, or may form dense zones around the edge. Shrub species are mostly mesophytic rather than obligate wetland species. The herb layer is generally well-developed, and is usually dominated either by characteristic forbs such as *Impatiens capensis*, *Impatiens pallida*, *Monarda didyma*, *Chelone* spp., and *Rudbeckia triloba*, or by *Carex* spp. *Sphagnum* may occur in a minority of examples.

**Dynamics:** The presence of seepage is the primary determinant of this system. Long-term droughts that affect seepage flow presumably have an effect, but this has not been documented. Canopy dynamics are not well known and potentially may vary substantially over short distances in response to wetness. Wetness may limit recruitment of most tree and shrub seedlings to drier microsites, making canopy gaps persist longer than in adjacent forests and creating a more open canopy. Fire may penetrate from the adjacent forest systems, but only in the driest conditions are they likely to be intense enough to have much effect within this system. Seeps are fairly permanent features of the landscape, but may potentially be created, destroyed, or changed in extent because of changes in groundwater flow, stream entrenchment or headward erosion, mass movement on slopes, or long-term climatic cycles. Examples are often left undisturbed when surrounding forests are logged. Effects of logging on water infiltration or surface flow may have significant indirect effects.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small-patch system, from less than one to no more than several acres in size, potentially surrounded by a number of different systems.

**Size:** Occurs as small patches, most less than one acre in size. The largest patches at high elevations are several acres. Patches occasionally occur in complexes but more often occur singly.

**Heterogeneity:** Most patches are contiguous and contain only a single association. Vegetation is often very heterogeneous within single associations.

**Adjacent Ecological System Comments:** May be embedded in a variety of other systems. Most common are Southern Appalachian Northern Hardwood Forest (CES202.029) and Southern and Central Appalachian Cove Forest (CES202.373).

#### SOURCES

**References:** Comer et al. 2003

**Version:** 02 Feb 2005

**Concept Author:** M. Schafale and R. Evans

**Stakeholders:** East, Southeast

**LeadResp:** Southeast

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#### CES202.027 GREAT LAKES WET-MESIC LAKEPLAIN PRAIRIE

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Concept Summary:** This system is found on the lakeplain near the southern central Great Lakes of the United States and Canada. Stands occur on level, sandy glacial outwash, sandy glacial lakeplains, and deposits of dune sand in silty/clayey glacial lakeplains. The soils are sands and sandy loams, loams with poor to moderate water-retaining capacity, typically occurring over less permeable silty clays. There is often temporary inundations after heavy rains or in the spring, followed by dry conditions throughout much of the remaining growing season. The vegetation of this community is dominated by tallgrass species typically 1-2 m high. Trees and shrubs are very rare. There is very little bare ground. *Andropogon gerardii*, *Calamagrostis canadensis*, *Carex* spp. (*Carex aquatilis*, *Carex bicknellii*, *Carex buxbaumii*, *Carex pellita* (= *Carex lanuginosa*)), *Panicum virgatum*, *Spartina pectinata*, *Schizachyrium scoparium*, and *Sorghastrum nutans* are the most abundant graminoid species.

#### DISTRIBUTION

**Range:** This system is found near the southern central Great Lakes of the United States and Canada, from southeastern Wisconsin and northeastern Illinois to southern Michigan and southwestern Ontario.

**Divisions:** 202:C

**TNC Ecoregions:** 48:C

**Subnations:** IL, IN, MI, OH, ON, WI

#### Associations:

- *Andropogon gerardii* - *Calamagrostis canadensis* - *Pycnanthemum virginianum* - *Oligoneuron ohioense* Herbaceous Vegetation (CEGL005095, G2)
- *Andropogon gerardii* - *Sorghastrum nutans* - *Schizachyrium scoparium* - *Aletris farinosa* Herbaceous Vegetation (CEGL005096, G2)
- *Quercus alba* - *Quercus velutina* - *Quercus palustris* / *Carex pensylvanica* Woodland (CEGL005054, G2)
- *Spartina pectinata* - *Carex* spp. - *Calamagrostis canadensis* Lakeplain Herbaceous Vegetation (CEGL005109, G2G3)

**High-ranked species:** *Clonophis kirtlandii* (G2), *Eleocharis wolfii* (G3G4), *Platanthera leucophaea* (G3)

#### SOURCES

**References:** Chapman 1984, Chapman 1986, Comer et al. 1995b, Comer et al. 2003, Faber-Langendoen and Maycock 1987, Faber-Langendoen and Maycock 1994

**Version:** 25 Mar 2003

**Concept Author:** K. Chapman, D. Faber-Langendoen, P. Comer

**Stakeholders:** Canada, Midwest

**LeadResp:** Midwest

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#### CES202.329 SOUTHERN PIEDMONT GRANITE FLATROCK

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**Primary Division:** Central Interior and Appalachian (202)

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Rock Outcrops/Barrens/Glades

**Concept Summary:** This system consists of smooth, exfoliated outcrops of massive granite and related rocks in the eastern and central Piedmont of the southeastern United States, and rarely in the adjacent Atlantic Coastal Plain (confined to the Fall-Line where erosion has exposed underlying rocks). Examples occur from Virginia south to Alabama, but are found most abundantly in the upper Piedmont of Georgia. Depending upon the location, examples may rise above the surrounding landscape by as much as 200 m, or lie flush with the surrounding land surface. The vegetation is a complex of small-patch communities of different species and structure occupying different microhabitats present on the outcrops, ranging from moss and lichens to herbs to shrubs and trees. In some areas, these microhabitats include solution pits or depressions that retain water and form a distinctive wetland community. This outcrop system supports a relatively high degree of endemic plants.

**Comments:** Granitic domes are clearly related to other rock outcrop systems in the Piedmont but are distinct in their flora and vegetation mat succession. The smooth rock surface is crucial to their development. More fractured granitic rocks do not form this distinct system. In contrast, Southern Piedmont Cliff (CES202.386) have vertically oriented rock outcrops that tend to have fractures and ledges. Southern Piedmont Glade and Barrens (CES202.328) are similarly horizontally oriented, but have denser vegetation and rather different flora. Southern Appalachian Rocky Summit (CES202.327), which barely overlap the range of this system, has fractured rock and occurs in topographically high settings in rugged topography.

This system is closely related to Southern Appalachian Granitic Dome (CES202.297), with which it shares the distinctive structure and vegetation mat dynamics of exfoliated outcrops. The flat orientation of the flatrocks makes pools more important in them. Climatic and biogeographic differences lead to floristic differences between the two systems.

### DISTRIBUTION

**Range:** This system is found scattered in the eastern and central Piedmont, from Alabama to Virginia. Rare examples occur in the upper Piedmont. A few, occurring surrounded by Tertiary sediments in the Fall Zone, may be considered to be in the Coastal Plain.

**Divisions:** 202:C

**TNC Ecoregions:** 52:C, 57:C

**Subnations:** AL, GA, NC, SC, VA

### Associations:

- *Amphianthus pusillus* - *Isoetes melanospora* - *Isoetes tegetiformans* Herbaceous Vegetation (CEGL004342, G1)
- *Diamorpha smallii* - *Minuartia glabra* - *Minuartia uniflora* - *Cyperus granitophilus* Herbaceous Vegetation (CEGL004344, G3)
- *Packera tomentosa* - *Croton willdenowii* - *Schizachyrium scoparium* - (*Selaginella rupestris*) Herbaceous Vegetation (CEGL004298, G3)
- *Talinum teretifolium* - *Minuartia glabra* - *Diodia teres* - *Croton willdenowii* Herbaceous Vegetation (CEGL003857, G2G3)

**High-ranked species:** *Amphianthus pusillus* (G2), *Cyperus granitophilus* (G3Q), *Eriocaulon koernickianum* (G2), *Isoetes melanospora* (G1), *Isoetes piedmontana* (G3), *Isoetes tegetiformans* (G1), *Rhynchospora saxicola* (G3Q), *Sedum pusillum* (G3)

**Environment:** Occurs on exfoliated granitic outcrops; these are Precambrian metamorphic rocks generally found in the Piedmont Plateau (McVaugh 1943). Outcrops are level or gently sloped occurring as low domes up to 200 m above the surrounding landscape or as flat rocks varying considerably in size (Shure 1999). Smooth rock without crevices is the primary factor in the distinctive ecological character of this system. Granite, granitic gneiss, and related rocks without many internal joints tend to fracture in thin sheets parallel to the surface, forming outcrops with smooth surfaces largely lacking crevices. The outcrop surface is largely bare rock but has thin soil mats around the edge and in patches throughout. Mats vary in depth with age and level of development. Distinct microenvironments are created by small irregularities in the rock surface and by areas of seepage at the edge. Some examples (e.g., in central Georgia) may have prominent seepage-related features, where areas of perennial herbaceous vegetation are very wet in the winter and spring. In these cases, the only vegetated areas on the granite outcrop are seepage-related. One possible substrate is the Lilesville granite.

**Vegetation:** Most of the rock surface is bare or has only crustose or foliose lichen cover. Vegetation occurs as a series of small patches in the thin soil mats, or seasonal pools, with the community type dependent on the nature of the depression and depth of the soil mat (if any). Bare rock may have moss patches. The thinnest soils usually have a set of fine forbs, many of them annual. Slightly deeper soils often have grasses dominating. Deeper soils support shrubs or small trees. A distinctive woodland of pines or pines and oaks occurs on the continuous shallow soils surrounding the outcrop. The flora shares some species with other rock outcrops of the Piedmont, but has some distinctive species and different dominance of species.

**Dynamics:** Large numbers of soil island depression may be scattered across the surface of granite outcrops and occasional pools of shallow water may stand in certain depressions which trap rainfall (McVaugh 1943, Shure 1999). Where soil

accumulates in depressions formed by exfoliating surface rock, a distinctive and fairly predictable pattern of successional changes occurs [see references in Shure (1999)]. Soil mats appear and deepen over time in a process that links vegetational and soil development, but are eventually destroyed by wind throw, drought, other natural disturbances. The result is a mosaic with mats of different levels of development at any given time. Mat dynamics are different in different parts of the rock, with older mats and more permanent patterns near the edges and sparser and younger mats in the interior. The dynamics are further modified by microtopography and the presence of seepage. The larger vegetation patterns such the relative amount of different stages likely respond to climatic cycles and natural disturbance events. The thin soils make these communities sensitive to drought, especially the long-lived woody species. Fire is probably rare in the interior, given the sparse fuel, but may be important in determining the size of the open area and may affect the dynamics of the bordering woodlands.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small-patch system, most examples covering one to a relatively few acres.

**Size:** Most examples naturally cover one to a few acres, some less than one acre. A few examples exceed 10 acres. Most examples occur in a few clusters where geology is particularly suitable, such as central Georgia and northeastern North Carolina. A few examples are more isolated. Individual flatrocks may occur in complexes, separated by small patches of forest.

**Heterogeneity:** Examples may be a single patch or a complex embedded in upland forest. Within the system, vegetation is very heterogeneous on a fine scale. It is not yet definitively determined how much of this variation will be placed in separate associations.

**Adjacent Ecological System Comments:** Surrounded by forest systems on deeper soils less influenced by bedrock, most typically Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

### SOURCES

**References:** Baker 1956, Coffey 1964, Comer et al. 2003, McVaugh 1943, Nelson 1986, Quarterman et al. 1993, Shure 1999

**Version:** 12 Dec 2002

**Concept Author:** M. Schafale and R. Evans

**Stakeholders:** East, Southeast

**LeadResp:** Southeast

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## CES203.245 ATLANTIC COASTAL PLAIN CLAY-BASED CAROLINA BAY WETLAND

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Forest and Woodland (Treed); Depressional; Graminoid

**Concept Summary:** This system consists of wetlands associated with ovoid, shallow depressions with nearly flat bottoms in parts of the Atlantic Coastal Plain. Often called Carolina bays, these areas are most numerous and extensive in South Carolina but are also present in the Inner Coastal Plain of North Carolina. The depressions have mineral soils with clay hardpans that trap and retain water from a combination of rainfall and exposure of a high regional water table. Some examples are essentially permanently flooded, while others support water levels that vary substantially from year to year and over longer climatic cycles. Vegetation includes a series of primarily herbaceous and woodland associations. The wettest sites have open water and floating-leaved aquatic vegetation, or marsh vegetation of tall graminoids. Drier sites often have an open canopy of *Taxodium ascendens*, with a dense, often fairly species-rich herbaceous layer beneath. A few occurrences are shrubby, but none contain the dense shrub layers of characteristic pocosin species that occur in the bays with organic soils. Vegetational composition often varies substantially from year to year, in response to differences in water levels and drawdown times. Variation in hydroperiod is the most important dynamic, causing rapid major changes in the herbaceous vegetation. Unlike the steeper-sided solution depressions, where many different hydroperiods are present within a short distance and vegetation zones simply shift, the flat-bottomed Carolina bays experience drastic yearly changes in hydroperiod over most of their extent. Fire periodically spreads into the bays from adjacent uplands when conditions are dry, helps prevent invasion by less water-tolerant trees during dry periods, and interacts with flooding to affect vegetational composition. Where fire is removed, *Pinus taeda* often invades the bays. Fire may also be important in preventing buildup of organic matter on the soil surface.

**Comments:** The distinction between the central concepts of this system and Atlantic Coastal Plain Southern Depression Pondshore (CES203.262) is well marked, with basin morphology, geographic range, and prevailing communities differing. However, there is a common set of plant species, including some rare ones, that occur in both systems. Thus, there may be difficulty in defining the local boundary, and some atypical depressions may have to be placed in one system or the other based on the preponderance of evidence. This system is related to Atlantic Coastal Plain Northern Pondshore (CES203.518)

which occurs farther north in the Coastal Plain and to some of the flat-bottomed basin wetlands of Florida which occur outside the range of this system to the south.

### DISTRIBUTION

**Range:** Inner to Middle Coastal Plain, from southern North Carolina, through South Carolina, perhaps into Georgia. Most numerous and extensive in South Carolina.

**Divisions:** 203:C

**TNC Ecoregions:** 56:C, 57:C

**Subnations:** GA?, NC, SC

#### Associations:

- *Taxodium ascendens* / *Cyrilla racemiflora* - *Zenobia pulverulenta* Woodland (CEGL003734, G2)
- *Taxodium ascendens* / *Panicum hemitomon* - *Polygala cymosa* Woodland (CEGL003733, G2G3)

**High-ranked species:** *Andropogon gyrans* var. *stenophyllus* (G5T3T4), *Carex striata* var. *striata* (G4T3T4), *Carex verrucosa* (G3G4), *Echinodorus parvulus* (G3Q), *Euphyes dukesi* (G3), *Lindera melissifolia* (G2), *Litsea aestivalis* (G3), *Lobelia boykinii* (G2G3), *Ludwigia spathulata* (G2G3), *Myriophyllum laxum* (G3), *Oxypolis canbyi* (G2), *Panicum hirstii* (G1), *Polygonum hirsutum* (G3G4), *Rana capito* (G3), *Rhexia aristosa* (G3), *Rhynchospora inundata* (G3G4)

**Environment:** Occurs in Carolina bays with mineral soils and with seasonal to permanent standing water. Carolina bays are oriented, oval, shallow depressions with nearly flat bottoms, which range from North Carolina through South Carolina. Most Carolina bays in the Outer Coastal Plain occur in sandy sediments and are filled with peat, while most Carolina bays in the Inner Coastal Plain occur in loamy sediments and have mineral soils with clay hardpans. These depressions hold water, due to a combination of rainfall and exposure of a high regional water table. Some are essentially permanently flooded. Others contain water well into the growing season in most years, but water levels vary substantially from year to year and over longer climatic cycles. Fire is an important natural influence in dry times.

**Vegetation:** Vegetation includes a series of primarily herbaceous and woodland associations. The wettest sites have open water and floating-leaved aquatic vegetation, or marsh vegetation of tall graminoids. Drier sites often have an open canopy of *Taxodium ascendens*, with a dense, often fairly species-rich herbaceous layer beneath. A large number of annual species are present. Some sites have similar herbaceous vegetation without trees. A few occurrences are shrubby, but none contain the dense shrub layers of characteristic pocosin species that occur in the bays with organic soils. Vegetational composition often varies substantially from year to year, in response to differences in water levels and drawdown times. Seed banking plays an important role in component communities. The system is also important as amphibian breeding habitat and may support a distinctive aquatic invertebrate community.

**Dynamics:** Variation in hydroperiod is the most important dynamic, causing rapid major changes in the herbaceous vegetation. Unlike the steeper-sided solution depressions, where many different hydroperiods are present within a short distance and vegetation zones simply shift, the flat-bottomed Carolina bays experience drastic yearly changes in hydroperiod over most of their extent. Many plants persist in seed banks for periods of years when conditions are not suitable. Fire is also an important process, spreading into the bays from adjacent uplands when conditions are dry. Fire prevents invasion by less water-tolerant trees during dry periods, and interacts with flooding to affect vegetational composition. Where fire is removed, *Pinus taeda* often invades the bays. Fire may also be important in preventing buildup of organic matter on the soil surface.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small-patch system, occurring alone or in closely associated complexes.

**Size:** Most clay-based Carolina bays are ½ mile or less long. Some are isolated, while in places several bays may be close enough together to be considered part of the same occurrence.

**Heterogeneity:** This system is contiguous within individual Carolina bays. Complexes of several bays will be set in a matrix of upland systems. Within a bay, single associations usually cover a large area, and a given bay may contain one or a few associations. A complex of bays may have more different associations represented.

**Adjacent Ecological System Comments:** Most occurrences were naturally associated with or embedded within Atlantic Coastal Plain Northern Wet Longleaf Pine Savanna and Flatwoods (CES203.265) and Atlantic Coastal Plain Upland Longleaf Pine Woodland (CES203.281). Most are now surrounded by heavily altered systems.

### SOURCES

**References:** Comer et al. 2003, Sharitz 2003

**Version:** 23 Sep 2002

**Concept Author:** M. Schafale and R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast



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**CES203.522 ATLANTIC COASTAL PLAIN NORTHERN BASIN PEAT SWAMP**

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system is comprised of acidic peat swamps formed in basins of various sizes, predominantly Atlantic white-cedar swamps, occurring on the northern portion of the Atlantic Coastal Plain from Massachusetts south to Virginia. The hydrology is saturated, as evidenced by *Sphagnum*-dominated hummock-and-hollow microtopography. *Chamaecyparis thyoides* is characteristic and often dominant. *Acer rubrum* may also be an important species, especially after logging.

#### DISTRIBUTION

**Range:** This system occurs on the northern portion of the Atlantic Coastal Plain from Massachusetts south to Virginia.

**Divisions:** 203:C

**TNC Ecoregions:** 58:C, 60:P, 62:?

**Subnations:** CT, DE, MA, MD, NJ, NY, VA

#### Associations:

- *Acer rubrum* - *Nyssa sylvatica* - *Magnolia virginiana* / *Viburnum nudum* var. *nudum* / *Osmunda cinnamomea* - *Woodwardia areolata* Forest (CEGL006238, G3?)
- *Acer rubrum* / *Rhododendron maximum* Forest (CEGL006396, GNR)
- *Chamaecyparis thyoides* - *Acer rubrum* - *Magnolia virginiana* Forest (CEGL006078, GNR)
- *Chamaecyparis thyoides* - *Acer rubrum* / *Lycopus* spp. Forest (CEGL006364, GNR)
- *Chamaecyparis thyoides* / *Alnus maritima* Woodland (CEGL006307, GNR)
- *Chamaecyparis thyoides* / *Ilex glabra* - *Rhododendron viscosum* Forest (CEGL006188, G3)
- *Chamaecyparis thyoides* / *Rhododendron maximum* Forest (CEGL006355, G2G3)
- *Vaccinium corymbosum* - *Rhododendron viscosum* - *Clethra alnifolia* Shrubland (CEGL006371, GNR)

**High-ranked species:** *Callophrys hesseli* (G3G4), *Gentiana autumnalis* (G3), *Helonias bullata* (G3), *Narthecium americanum* (G2), *Scirpus longii* (G2G3)

#### SOURCES

**References:** Comer et al. 2003

**Version:** 12 Oct 2004

**Concept Author:** R. Evans

**Stakeholders:** East, Southeast

**LeadResp:** East

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**CES203.520 ATLANTIC COASTAL PLAIN NORTHERN BASIN SWAMP AND WET HARDWOOD FOREST**

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Forest and Woodland (Treed); Seepage-Fed Sloping; North Atlantic Coastal Plain

**Concept Summary:** This system is comprised of hardwood swamps of seasonally flooded habitats, including relatively shallow groundwater-influenced depressions, stream headwaters and other topographic depressions. It ranges from Long Island, New York, south to Virginia. Although supporting some seepage indicators, they are also affected by overland flow. The substrate is mineral soil overlain by a variable organic but non-peaty layer. Characteristic tree species include *Acer rubrum*, *Liquidambar styraciflua*, *Nyssa sylvatica*, *Quercus phellos*, and *Fraxinus pennsylvanica*. *Pinus taeda* is not uncommon south of Delaware Bay.

#### DISTRIBUTION

**Range:** It ranges from Long Island, New York, south to Virginia.

**Divisions:** 203:C

**TNC Ecoregions:** 58:C, 62:C

**Subnations:** DE, MD, NJ, NY, VA

**Associations:**

- *Acer rubrum* - *Fraxinus (pennsylvanica, americana)* / *Lindera benzoin* / *Symplocarpus foetidus* Forest (CEGL006406, G4G5)
- *Acer rubrum* - *Fraxinus pennsylvanica* / *Bidens laevis* - *Pilea fontana* Forest (CEGL006413, GNR)
- *Acer rubrum* - *Fraxinus pennsylvanica* / *Saururus cernuus* Forest (CEGL006606, GNR)
- *Acer rubrum* - *Nyssa sylvatica* - *Liquidambar styraciflua* - *Populus heterophylla* Forest (CEGL006013, G1)
- *Acer rubrum* - *Nyssa sylvatica* - *Magnolia virginiana* / *Viburnum nudum* var. *nudum* / *Osmunda cinnamomea* - *Woodwardia areolata* Forest (CEGL006238, G3?)
- *Liquidambar styraciflua* - *Acer rubrum* - *Nyssa biflora* / *Carex jorii* Forest (CEGL006223, G1G2)
- *Liquidambar styraciflua* - *Acer rubrum* - *Quercus phellos* / *Leucothoe racemosa* Forest (CEGL006110, GNR)
- *Pinus taeda* / *Morella cerifera* / *Osmunda regalis* var. *spectabilis* Forest (CEGL006137, G3)

**High-ranked species:** *Carex schweinitzii* (G3G4), *Helonias bullata* (G3), *Hydrochus spangleri* (G1), *Juncus caesariensis* (G2), *Narthecium americanum* (G2), *Scirpus longii* (G2G3), *Trillium pusillum* var. *virginianum* (G3T2)

**Vegetation:** Characteristic tree species include *Acer rubrum*, *Liquidambar styraciflua*, *Nyssa sylvatica*, *Quercus phellos*, and *Fraxinus pennsylvanica*. *Pinus taeda* is not uncommon south of Delaware Bay.

**SOURCES**

**References:** Comer et al. 2003

**Version:** 12 Oct 2004

**Concept Author:** R. Evans

**Stakeholders:** East, Southeast

**LeadResp:** East

**CES203.893 ATLANTIC COASTAL PLAIN NORTHERN BOG**

**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system is comprised of dwarf-shrub sphagnum bogs dominated by *Chamaedaphne calyculata* occurring on Cape Cod, Massachusetts; Long Island, New York; and the Coastal Plain of New Jersey. North of the glacial border, this system typically occurs in isolated glacial kettleholes and in New Jersey in similar isolated basins. This system occurs in regions of deep sands supporting a pine barrens landscape. The system is characterized by acidic, tannic water supporting a floating or grounded *Sphagnum* mat over which *Chamaedaphne calyculata*, *Gaylussacia dumosa*, and other dwarf-shrubs have rooted. Taller shrubs such as *Vaccinium corymbosum* may occur at the periphery of the bog, and *Decodon verticillatus* often forms a distinct zone adjacent to open water. Rooted hydromorphic plants such as *Nymphaea odorata* occur in open water.

**DISTRIBUTION**

**Range:** This system occurs on Cape Cod, Massachusetts; Long Island, New York; and the Coastal Plain of New Jersey.

**Divisions:** 203:C

**TNC Ecoregions:** 62:C

**Subnations:** MA, NJ, NY

**Associations:**

- *Chamaecyparis thyoides* / *Ilex glabra* - *Rhododendron viscosum* Forest (CEGL006188, G3)
- *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) - *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (CEGL006008, G5)
- *Chamaedaphne calyculata* / *Carex striata* Dwarf-shrubland (CEGL006208, GNR)
- *Nuphar lutea* ssp. *advena* - *Nymphaea odorata* Herbaceous Vegetation (CEGL002386, G4G5)
- *Pinus rigida* / *Chamaedaphne calyculata* / *Sphagnum* spp. Woodland (CEGL006194, G3G5)
- *Sphagnum cuspidatum* Nonvascular Vegetation (CEGL004384, G2?)

**High-ranked species:** *Eupatorium resinosum* (G3), *Papaipema sulphurata* (G2), *Scirpus longii* (G2G3)

**SOURCES**

**References:** Comer et al. 2003

**Version:** 09 Sep 2004

**Stakeholders:** East

**CES203.262 ATLANTIC COASTAL PLAIN SOUTHERN DEPRESSION POND SHORE****Primary Division:** Gulf and Atlantic Coastal Plain (203)**Land Cover Class:** Woody Wetland**Spatial Scale & Pattern:** Small patch**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)**Diagnostic Classifiers:** Woody-Herbaceous; Coastal plain; Depressional [Pond]

**Concept Summary:** This system consists of wetlands in small basins formed in unconsolidated sediments of the Atlantic Coastal Plain, from southeastern Virginia to Florida. Most basins are formed by subsidence of surface sediments caused by solution in underlying limestone. Others may be formed as swales in mainland eolian sands, natural blockage of small drainages by sediment movement, and more obscure causes. Soils are generally sandy, with mucky surfaces in the wettest areas. Vegetation is often zonal in response to variation in duration of flooding in different parts of the depression pond. Vegetation usually ranges from open water or floating-leaved aquatics in the center of the deepest basins, to emergent marsh zones in semipermanent water, to drawdown zones with diverse small graminoid and forb vegetation, to dense shrub or woodland edges. A smaller number of basins may have emergent trees throughout their extent. Hydroperiod can vary substantially from year to year, and vegetation can similarly vary significantly in aspect and dominants. Besides flooding and its variation, fire is an important natural force in the outer drier portions.

**Comments:** The boundary of this system with adjacent upland or wetland systems occurs where vegetation begins to reflect the influence of regular flooding and basin hydrology. This system shares much of its character with Atlantic Coastal Plain Clay-Based Carolina Bay Wetland (CES203.245) but generally accommodates all "limesink depressions" as opposed to mineral soil Carolina bay wetlands. Other basins, especially broad, gently sloped basins on the Outer Coastal Plain and steep-sided depressions farther inland, will need to be placed based on the preponderance of evidence. The northern and southern range limits of this system are not well known. It is tentatively placed at the mouth of Chesapeake Bay and in south Georgia. Atlantic Coastal Plain Northern Pondshore (CES203.518) of Virginia and Maryland and the wet prairies of north-central Florida are closely related systems.

**DISTRIBUTION**

**Range:** This system is found from southeastern Virginia to Florida, primarily in the Outer Coastal Plain, but occasional depressions in the Inner Coastal Plain and Sandhills could be included.

**Divisions:** 203:C**TNC Ecoregions:** 56:C, 57:C**Subnations:** FL, GA, NC, SC, VA**Associations:**

- *Carex hyalinolepis* Seasonally Flooded Herbaceous Vegetation (CEGL004724, G1G3)
- *Carex striata* var. *striata* - *Xyris fimbriata* - *Lachnanthes carolina* Herbaceous Vegetation (CEGL007718, G2G3)
- *Cyrilla racemiflora* - *Lyonia lucida* Shrubland (CEGL003844, G3?)
- *Dichanthelium wrightianum* - *Dichanthelium erectifolium* Herbaceous Vegetation (CEGL004105, G2G3)
- *Nymphaea odorata* - *Nuphar lutea* ssp. *advena* - (*Nymphoides aquatica*, *Xyris smalliana*) Herbaceous Vegetation (CEGL004326, G3?)
- *Nyssa biflora* / *Itea virginica* - *Cephalanthus occidentalis* Depression Forest (CEGL007434, G3G4)
- *Nyssa ogeche* / *Ilex myrtifolia* / *Carex turgescens* - *Carex striata* Forest (CEGL004641, G2?)
- *Panicum hemitomon* - *Eleocharis equisetoides* - *Rhynchospora inundata* Herbaceous Vegetation (CEGL004127, G3)
- *Panicum virgatum* - *Andropogon (capillipes, glaucopsis)* - *Aristida palustris* Herbaceous Vegetation (CEGL004100, G2?)
- *Pinus serotina* / *Cyrilla racemiflora* - *Lyonia lucida* - *Vaccinium fuscatum* Woodland (CEGL004434, G2G3)
- *Quercus phellos* - *Nyssa biflora* / *Panicum hemitomon* - *Carex* spp. - *Woodwardia virginica* Forest [Provisional] (CEGL004104, G2G3)
- *Rhynchospora (careyana, inundata)* Seasonally Flooded Herbaceous Vegetation (CEGL004132, G3?)
- *Rhynchospora alba* Saturated Herbaceous Vegetation (CEGL004463, G1?)
- *Rhynchospora filifolia* - *Juncus abortivus* Herbaceous Vegetation (CEGL004131, G2?)
- *Saccharum baldwinii* - *Carex glaucescens* - *Rhynchospora corniculata* Herbaceous Vegetation (CEGL007745, G2G3)
- *Spartina bakeri* - *Woodwardia virginica* - *Saccharum giganteum* Herbaceous Vegetation (CEGL007713, G3?)
- *Sphagnum cuspidatum* Nonvascular Vegetation (CEGL004384, G2?)

- *Taxodium ascendens* / (*Nyssa biflora*) / *Leucothoe racemosa* - *Lyonia lucida* - *Morella cerifera* Depression Forest (CEGL007420, G3)
- *Taxodium ascendens* / *Cyrilla racemiflora* - *Zenobia pulverulenta* Woodland (CEGL003734, G2)
- *Taxodium ascendens* / *Ilex myrtifolia* Depression Forest (CEGL007418, G3?)
- *Vaccinium formosum* - *Vaccinium fuscatum* / *Sphagnum cuspidatum* Shrubland (CEGL003907, G3?)
- *Woodwardia virginica* / *Sphagnum cuspidatum* Herbaceous Vegetation (CEGL004475, G2?)

**High-ranked species:** *Amaranthus floridanus* (G3), *Ambystoma cingulatum* (G2G3), *Carex decomposita* (G3), *Carex striata* var. *striata* (G4T3T4), *Carex verrucosa* (G3G4), *Coreopsis rosea* (G3), *Fimbristylis perpusilla* (G2), *Hypericum adpressum* (G3), *Iris tridentata* (G3G4), *Lachnocaulon minus* (G3G4), *Lindera melissifolia* (G2), *Linum westii* (G2), *Litsea aestivalis* (G3), *Lobelia boykinii* (G2G3), *Ludwigia curtissii* (G3G4), *Ludwigia spathulata* (G2G3), *Lythrum flagellare* (G2), *Myriophyllum laxum* (G3), *Notophthalmus perstriatus* (G2G3), *Oxypolis canbyi* (G2), *Panicum hirstii* (G1), *Pieris phillyreifolia* (G3), *Polygonum hirsutum* (G3G4), *Rana capito* (G3), *Rhexia aristosa* (G3), *Rhynchospora globularis* var. *pinetorum* (G5?T3?), *Rhynchospora inundata* (G3G4), *Rhynchospora pleiantha* (G3), *Rhynchospora thornei* (G3), *Sabatia brevifolia* (G3G4), *Sagittaria graminea* var. *chapmanii* (G5T3?), *Xyris serotina* (G3G4), *Xyris stricta* (G3G4)

**Environment:** This system occurs in small basins, primarily in sandy terrain of the Atlantic Coastal Plain, from southeastern Virginia to Florida. Most basins are formed by subsidence of surface sediments caused by solution in underlying limestone. Others may be formed as dune swales in mainland eolian sands, natural blockage of small drainages by sediment movement, and more obscure causes. Basins often occur in complexes of a few to dozens, which vary in size, depth, and steepness of sides. Most or all of these basins are considered groundwater windows, with water levels matching the level of the local water table. Rainfall is probably also a substantial contributor. The water is acidic and is apparently not influenced by the underlying limestone or deeper groundwater. Hydroperiods vary substantially, with the deepest ponds having permanent water in the center, and the shallowest normally holding water only in the winter and spring. However, water levels can fluctuate substantially over the course of a year and from year to year in response to rainfall and longer term droughts. Soils have a mucky surface in the centers of basins that hold water most or all of the year and are generally sandy in smaller basins and in the outer drawdown zones that are exposed more of the time. Fire is potentially an important, if infrequent, influence in the system, penetrating the portions that are dry when adjacent communities burn. Its northern range limit is generally consistent with the northern limit of longleaf pine (*Pinus palustris*), although this species is not a component.

**Vegetation:** This system consists of wetland vegetation that is often strongly zoned within single basins and may vary substantially among basins even in close proximity. Most of the associations are herbaceous, but woody associations may be present. The center of the deepest basins generally is open water or floating-leaved aquatics. Semipermanently flooded zones may have marsh vegetation of medium to large emergents. Outer, mineral soil drawdown zones often have a species-rich flora of small to medium graminoids and forbs. These include a number of specialized species that are rare in states, some that are globally rare, and some that are widespread but nowhere common. The aspect of this vegetation may vary substantially from year to year depending on when water level drops. Some basins have a dense shrubby edge zone. Some trees or shrubs tolerant of standing water, especially bald-cypress (*Taxodium distichum*), pond-cypress (*Taxodium ascendens*) or swamp blackgum (*Nyssa biflora*), may grow within the basins, either as scattered individuals, as a distinct zone, or forming an open canopy over the whole basin. Because the basins are isolated from larger water bodies and most dry out at least occasionally, their aquatic fauna does not include fish unless fish have been artificially introduced. These systems are well known as important breeding sites for amphibians, and may support important aquatic invertebrate communities as well.

**Dynamics:** Flooding hydrology is the most important dynamic process. Standing water excludes plants not characteristic of the system. Variation in hydroperiod and drawdown drive vegetation changes from year to year. Because ponds are connected to the local water table, hydroperiods respond to seasonal and long-term cycles in rainfall as much as, perhaps more than, single rainfall events. They may also be affected by regional drainage that lowers the water table.

Fire is also an important dynamic process in the drier portions of this system. Fire may be important for preventing invasion of trees such as loblolly pine (*Pinus taeda*) during long-running droughts, as well as for driving variation in herbaceous species.

### SPATIAL CHARACTERISTICS

**Size:** Depressions often occur in complexes, in a matrix of upland or saturated wetland systems. Individual depressions range from about 100 square meters to a hectare or two. Complexes may occupy several hectares within the space of several square kilometers.

**Heterogeneity:** This system occurs as small patches in a matrix of strongly contrasting upland or wetland systems. Often the small patches are clustered in complexes of a few to dozens. Individual basins often have two to four associations in them,

forming concentric zones, though some may have only one. Complexes may have more associations represented due to variation in depth and steepness of basins.

**Adjacent Ecological System Comments:** Most often associated with Atlantic Coastal Plain Upland Longleaf Pine Woodland (CES203.281), but any upland or saturated wetland system can potentially surround them.

## SOURCES

**References:** Comer et al. 2003

**Version:** 26 Sep 2003

**Concept Author:** M. Schafale and R. Evans

**Stakeholders:** East, Midwest, Southeast

**LeadResp:** Southeast

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### CES203.557 EAST GULF COASTAL PLAIN SOUTHERN LOBLOLLY-HARDWOOD FLATWOODS

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Forest and Woodland (Treed); Extensive Wet Flat

**Concept Summary:** This forested system occurs on broad upland flats in the East Gulf Coastal Plain of Alabama and Mississippi, as well as western parts of the lower terraces of the East Gulf Coastal Plain ("Florida Parishes") of Louisiana, and likely occurs in other parts of the region as well. Known examples in the Alabama/Mississippi parts of the range include a mosaic of open forests dominated by *Pinus taeda* interspersed with patches of *Quercus phellos* and sometimes other tree species. The ground surface displays an evident microtopography of alternating mounds and swales occurring in a tight local mosaic. These mounds are most likely "gilgai" (R. Wieland pers. comm.) resulting from vertic or shrink-swell properties of the Luinn soil series. Known examples display a range of moisture conditions from dry to wet. The wettest examples trap significant moisture from local rainfall events. These areas have ponded water for a minimum of several days at an interval and potentially for long periods of the year, especially when evapotranspiration is lowest. The vegetation of this system supports a relatively low vascular plant diversity and thus may appear floristically similar to other pine-hardwood vegetation of the region. The dry portion of this vegetational mosaic is dominated by grassy ground cover (*Chasmanthium sessiliflorum*) with scattered emergent greenbriars (*Smilax* spp.) underneath a nearly pure *Pinus taeda* overstory. The historical composition of this type is unknown, but it seems likely that *Pinus taeda* was a natural and even dominant component of this system, as it is in related systems in the West Gulf Coastal Plain (R. Evans pers. obs., T. Foti pers. comm.). Wetter areas are dominated by an overstory of *Quercus phellos* with an abundance of *Sabal minor* in the understory. Although the specific role of fire in this system is unknown, low-intensity ground fires may have been ecologically important. Such fires could have originated in the surrounding East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest (CES203.506).

In the western parts of the lower terraces of the East Gulf Coastal Plain ("Florida Parishes") of Louisiana, the flatwoods vegetation tends to be dominated primarily by hardwoods in the most western portion, and a mixture of *Pinus glabra* and *Pinus taeda* in the intermediate portion to the east of this. In this "Louisiana Florida Parishes Spruce Pine Flatwoods Forest" some characteristic species include *Pinus glabra*, *Quercus laurifolia*, *Quercus michauxii*, *Quercus nigra*, *Quercus pagoda*, *Quercus virginiana*, *Pinus taeda*, and *Magnolia grandiflora*. Some important understory trees and shrubs include *Crataegus opaca*, *Sabal minor* (which may often be very abundant or dominant), and *Arundinaria gigantea* ssp. *tecta*.

**Comments:** The description of associations in the NVC for this system is undoubtedly incomplete. Classification work is in progress, but more information is needed.

## DISTRIBUTION

**Range:** This forested system occurs on broad upland flats in the East Gulf Coastal Plain of Alabama and Mississippi, as well as western parts of the lower terraces of the East Gulf Coastal Plain ("Florida Parishes") in Louisiana, and likely occurs in other parts of the region as well. It is also found in the Mississippi River Alluvial Plain of Louisiana (P. Faulkner pers. comm.). The complete and detailed range of this system is being developed and is not completely understood.

**Divisions:** 203:C

**TNC Ecoregions:** 42:C, 43:C, 53:P

**Subnations:** AL, FL?, GA?, LA, MS

### Associations:

- (*Quercus laurifolia*) / *Crataegus opaca* - *Crataegus viridis* Forest (CEGL007386, G1)
- *Pinus glabra* - *Quercus laurifolia* / *Crataegus opaca* / *Sabal minor* Forest (CEGL004534, G1G2)

- *Quercus michauxii* - *Quercus (nigra, pagoda)* - *Liquidambar styraciflua* - *Pinus taeda* Forest (CEGL007715, G2G3)

**High-ranked species:** *Polygala hookeri* (G3), *Spiranthes brevilabris* (G3G4), *Spiranthes brevilabris* var. *floridana* (G3G4T1), *Xyris scabrifolia* (G3), *Xyris stricta* (G3G4)

**Environment:** In the Alabama/Mississippi parts of this system's range, the ground surface displays an evident microtopography of alternating mounds and swales occurring in a tight local mosaic.

**Vegetation:** Known examples of this system in the Alabama/Mississippi parts of its range include a mosaic of open forests dominated by *Pinus taeda* interspersed with patches of *Quercus phellos* and sometimes other tree species. The vegetation of this system supports a relatively low vascular plant diversity and thus may appear floristically similar to other pine-hardwood vegetation of the region. The dry portion of this vegetational mosaic is dominated by grassy ground cover (e.g., *Chasmanthium sessiliflorum*) with scattered emergent greenbriars (*Smilax* spp.) underneath a nearly pure *Pinus taeda* overstory. The historical composition of this type is unknown, but it seems likely that *Pinus taeda* was a natural and even dominant component of this system, as it is in related systems in the West Gulf Coastal Plain (R. Evans pers. obs., T. Foti pers. comm.). Wetter areas are dominated by an overstory of *Quercus phellos* with an abundance of *Sabal minor* in the understory.

In the western parts of the lower terraces of the East Gulf Coastal Plain ("Florida Parishes") of Louisiana, the flatwoods vegetation tends to be dominated primarily by hardwoods in the most western portion, and a mixture of *Pinus glabra* and *Pinus taeda* in the intermediate portion to the east of this. In this "Louisiana Florida Parishes Spruce Pine Flatwoods Forest" stands contain *Pinus glabra*, *Quercus laurifolia*, *Quercus phellos*, *Quercus michauxii*, *Quercus nigra*, *Quercus pagoda*, *Quercus virginiana*, *Pinus taeda*, *Nyssa biflora*, *Nyssa sylvatica*, *Magnolia grandiflora*, *Salix nigra*, *Liquidambar styraciflua*, *Carya glabra*, *Acer rubrum*, and *Fraxinus pennsylvanica*. Understory trees and shrubs include *Crataegus opaca* and *Sabal minor* (which may often be very abundant or dominant), as well as *Arundinaria gigantea* ssp. *tecta*, *Cephalanthus occidentalis*, *Diospyros virginiana*, *Cornus foemina*, *Crataegus viridis*, *Ilex opaca* var. *opaca*, *Ilex decidua*, *Itea virginica*, *Morella cerifera* (= *Myrica cerifera*), *Sambucus canadensis*, *Styrax americanus*, and *Viburnum dentatum* (Smith 1996b).

#### SPATIAL CHARACTERISTICS

**Other Comments:** This should be the "Flatwoods" portion of the "Flatwoods/Blackland Prairie Margins" (Ecoregion 65b) of Omernik (EPA 2004).

#### SOURCES

**References:** Comer et al. 2003, Smith 1996b

**Version:** 14 Mar 2005

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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### CES203.480 SOUTH-CENTRAL INTERIOR / UPPER COASTAL PLAIN WET FLATWOODS

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Forest and Woodland (Treed); Extensive Wet Flat; Broad-Leaved Deciduous Tree

**Concept Summary:** This system represents predominately wet flatwoods of limited areas of the most inland portions of the East Gulf Coastal Plain in western Kentucky, as well as related broad, flat areas of the western Interior Low Plateau. This part of the Coastal Plain is referred to as the Jackson Purchase or "Jackson Plain." Flatwoods have long been recognized as a distinctive subdivision within this region (Davis 1923, Bryant and Martin 1988). Examples in the Pennyroyal Plain (of the western Interior Low Plateau) have been referred to as "pondywoods" or "crawfishy land" (Chester et al. 1995), and have been known for many years. They tend to be confined to relatively small areas near the eastern flank of the region where loess deposits thin out. Unlike South-Central Interior / Upper Coastal Plain Flatwoods (CES203.479) of the same general region (which are typified by complex microtopography), this system occupies broad flats underlain by fragipans. These fragipans impede the downward migration of water resulting in wet conditions for portions of the year. Fire was an important natural process in this system, probably maintaining relatively open-canopied stands (M. Evans pers. comm.). Stands are dominated by hardwood trees, including *Quercus* spp., *Liquidambar styraciflua*, *Carya* spp., and *Acer rubrum* (Chester et al. 1995).

**Comments:** The primary range of this system is limited areas of the "Jackson Purchase" or "Jackson Plain" of Kentucky and possibly related areas in adjacent western Tennessee, as well as related broad, flat areas of the western Interior Low Plateau. According to Bryant and Martin (1988) the "Flatwoods" portion of the Jackson Purchase (which is primarily where the "Wet

Flatwoods" are located in that area) occupies less than 2% of the total area, but localized occurrences could have been present in other parts of the region.

#### DISTRIBUTION

**Range:** The primary range of this system is limited areas of the "Jackson Purchase" or "Jackson Plain" of Kentucky and possibly related areas in adjacent western Tennessee, as well as related broad, flat areas of the western Interior Low Plateau.

**Divisions:** 203:C

**TNC Ecoregions:** 43:C, 44:C

**Subnations:** IL?, IN?, KY, TN

#### Associations:

- *Quercus falcata* Flatwoods Forest (CEGL004412, G2?)
- *Quercus palustris* - (*Quercus stellata*) - *Quercus pagoda* / *Isoetes* spp. Forest (CEGL002101, G2G3)
- *Quercus phellos* - (*Quercus lyrata*) / *Carex* spp. - *Leersia* spp. Forest (CEGL002102, G3G4Q)

**Environment:** These flatwoods have long been recognized as the primary vegetation type of a distinctive subdivision within the Upper East Gulf Coastal Plain region (Davis 1923, Bryant and Martin 1988), as well as related areas of the western Interior Low Plateau. Within the "Jackson Plain" portion of the Upper East Gulf Coastal Plain, these flatwoods tend to be confined to relatively small areas near the eastern flank of the "Jackson Plain" region where the loess deposits thin out. Unlike drier Post Oak Flatwoods of these areas (which are typified by microtopographic variation), this system occupies broad flats underlain by fragipans. These fragipans impede the downward migration of water resulting in wet conditions for portions of the year. Fire is probably relatively infrequent in this system (M. Evans pers. comm.). In the Pennyroyal Plain, this system occurs on upland flats and depressions with poor drainage, underlain by limestone; soils include Robertsville silt loam (Chester et al. 1995) and Henry silt loam (M. Evans pers. comm.).

**Vegetation:** Stands are typically dominated by *Quercus pagoda*, *Quercus palustris*, *Quercus michauxii*, *Quercus alba*, *Liquidambar styraciflua*, *Carya* spp., *Acer rubrum*, and *Nyssa sylvatica*. Most stands of this system have been severely altered or destroyed, and the characteristic herbs are poorly known. *Campsis radicans* may be found. *Quercus phellos* and/or *Quercus lyrata* may also be present in stands of this system (M. Evans pers. comm.).

**Dynamics:** Most historic occurrences have been cleared, drained and tiled, and remaining sites are small and degraded. Fire was an important natural process in this system probably maintaining relatively open-canopied stands (M. Evans pers. comm.).

#### SPATIAL CHARACTERISTICS

**Heterogeneity:** Stands of this system are more uniform than the related "regular" flatwoods type of the same general area (CES203.479)

**Other Comments:** Most stands of this system have been severely altered or destroyed.

#### SOURCES

**References:** Bryant and Martin 1988, Chester et al. 1995, Comer et al. 2003, Davis 1923, Evans 1991, Evans pers. comm., Hendricks et al. 1991, NatureServe Ecology - Southeastern U.S. unpubl. data

**Version:** 25 Aug 2003

**Stakeholders:** Midwest, Southeast

**Concept Author:** R. Evans and M. Evans, mod. M. Pyne

**LeadResp:** Southeast

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### CES203.384 SOUTHERN COASTAL PLAIN NONRIVERINE BASIN SWAMP

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Forest and Woodland (Treed); Depressional

**Concept Summary:** This system occupies large, seasonally inundated basins with peaty substrates in the southern and outermost portions of the Coastal Plain of the southeastern United States. These basins are nonriverine and do not receive overbank flooding. The southern range of this system extends into central Florida especially along the Atlantic Coast in Volusia and Brevard counties (A. Johnson pers. comm.). Examples are generally forested; the vegetation is characterized by *Taxodium distichum*, *Nyssa biflora*, evergreen "bay" shrubs and/or mixed hardwoods. Emergent *Pinus elliottii* may also be present. Some characteristic shrubs include *Cliftonia monophylla*, *Cyrilla racemiflora*, *Lyonia lucida*, and *Smilax laurifolia*.

**Comments:** Manifestations of this in the Atlantic and Gulf coastal plains are not differentiated at this time. There may be some minor floristic differences, particularly between the northernmost and southernmost examples, but these are not thought to warrant any subdivision of the type. Examples of this system differ from Southern Coastal Plain Hydric Hammock (CES203.501) by the absence of oaks (especially swamp laurel oak and live oak) and other less flood-tolerant species such as sweetgum (A. Johnson pers. comm.). In addition, this type is found in basins with peaty substrates as opposed to limestone-influenced substrates.

## DISTRIBUTION

**Range:** East Gulf Coastal Plain.

**Divisions:** 203:C

**TNC Ecoregions:** 53:C, 55:C, 56:C, 57:C

**Subnations:** AL, FL, GA, LA?, MS, SC

### Associations:

- *Cliftonia monophylla* / *Lyonia lucida* - *Smilax laurifolia* Forest (CEGL007042, G4)
- *Nyssa biflora* / *Ilex myrtifolia* / *Carex glaucescens* - *Eriocaulon compressum* Forest (CEGL004720, G2G3)
- *Pinus serotina* - *Pinus elliotii* var. *elliotii* / *Cliftonia monophylla* - *Cyrilla racemiflora* Woodland (CEGL003674, G3?Q)
- *Pinus serotina* / *Lyonia lucida* - *Ilex glabra* - (*Cyrilla racemiflora*) Shrubland (CEGL003846, G3)

**High-ranked species:** *Coreopsis nudata* (G3?), *Euphyes dukesi* (G3), *Hymenocallis henryae* (G2), *Kalmia cuneata* (G3), *Peltandra sagittifolia* (G3G4), *Pieris phillyreifolia* (G3), *Rhexia parviflora* (G2)

**Environment:** This system occupies large, seasonally inundated basins with peaty substrates. These basins are nonriverine and do not receive overbank flooding.

**Vegetation:** Examples are generally forested; the vegetation is characterized by *Taxodium distichum*, *Nyssa biflora*, evergreen "bay" shrubs and/or mixed hardwoods (FNAI 1997). Emergent *Pinus elliotii* may also be present. Some characteristic shrubs include *Cliftonia monophylla*, *Cyrilla racemiflora*, *Lyonia lucida*, and *Smilax laurifolia*.

## SPATIAL CHARACTERISTICS

**Adjacent Ecological System Comments:** Southern Coastal Plain Hydric Hammock (CES203.501) may occur upslope.

## SOURCES

**References:** Comer et al. 2003, FNAI 1997

**Version:** 14 Mar 2005

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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## CES203.251 SOUTHERN COASTAL PLAIN NONRIVERINE CYPRESS DOME

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Forest and Woodland (Treed); Depressional; Needle-Leaved Tree

**Concept Summary:** This system consists of small forested wetlands, typically dominated by *Taxodium ascendens*, with a characteristic and unique dome-shaped appearance in which trees in the center are higher than those around the sides (Monk and Brown 1965). Examples are known from the Southern Coastal Plain (Omernik Ecoregion 75) (EPA 2004) of Florida and Georgia. Examples occupy poorly drained depressions which are most often embedded in a matrix of pine flatwoods. The oldest and largest individual trees typically occupy the center of these domed wetlands, with smaller and younger individuals around the margins. Pools of stagnant, highly acidic water may stand in the center of these depressions ranging from 1-4 feet in depth, but becoming increasingly shallow along the margins. These sites are underlain by an impervious clay pan which impedes drainage and traps precipitation. Some examples may have thick (50-100 cm) organic layers. In addition to *Taxodium ascendens*, other woody species may include *Nyssa biflora*, *Cephalanthus occidentalis*, *Liquidambar styraciflua*, *Clethra alnifolia*, *Lyonia lucida*, and *Styrax americanus*.

**Comments:** The original range of this system was thought to include only the East Gulf Coastal Plain (TNC Ecoregion 53) and was named accordingly. Examples were later confirmed in central Florida (TNC Ecoregion 55) and the South Atlantic Coastal Plain portion of Florida (A. Johnson pers. comm.) (TNC Ecoregion 56), whereupon the name was broadened to Southern Coastal Plain Nonriverine Cypress Dome. Cypress "strangers" are included here as well; these are more-or-less



linear features that are parts of disconnected drainageways that arise in a pine flatwoods landscape (e.g., CEGL007419). The vegetation of the "stringers" is somewhat analogous to that of the edges of the true "dome swamps."

#### DISTRIBUTION

**Range:** This system is apparently restricted to Florida and adjacent areas of Georgia.

**Divisions:** 203:C

**TNC Ecoregions:** 53:C, 55:C, 56:C

**Subnations:** AL, FL, GA, MS

#### Associations:

- *Hypericum chapmanii* - *Ilex myrtifolia* - (*Nyssa ursina*) Shrubland (CEGL003867, G1)
- *Taxodium ascendens* / (*Nyssa biflora*) / *Leucothoe racemosa* - *Lyonia lucida* - *Morella cerifera* Depression Forest (CEGL007420, G3)
- *Taxodium ascendens* / *Ilex myrtifolia* / *Carex (striata, turgescens)* Stringer Forest (CEGL007419, G3?Q)
- *Taxodium ascendens* / *Ilex myrtifolia* / *Hypericum myrtifolium* / *Lobelia floridana* - *Polygala cymosa* Woodland (CEGL004959, G3)
- *Taxodium ascendens* / *Ilex myrtifolia* Depression Forest (CEGL007418, G3?)

**High-ranked species:** *Ambystoma cingulatum* (G2G3), *Carex striata* var. *striata* (G4T3T4), *Carex verrucosa* (G3G4), *Coreopsis nudata* (G3?), *Croton elliotii* (G2G3), *Euphyes dukesi* (G3), *Fuirena longa* (G3G4), *Lindera melissifolia* (G2), *Litsea aestivalis* (G3), *Pieris phillyreifolia* (G3), *Pinguicula planifolia* (G3?), *Polygonum hirsutum* (G3G4), *Rana capito* (G3), *Rhexia parviflora* (G2), *Rhynchospora inundata* (G3G4), *Sabatia brevifolia* (G3G4), *Schoenolirion albiflorum* (G3)

**Environment:** This system occurs in areas of low relief, occupying poorly drained to permanently wet depressions in uplands such as pine flatwoods. Pools of stagnant, highly acidic water may stand in the center of these depressions ranging from 1-4 feet in depth, but becoming increasingly shallow along the margins (Monk and Brown 1965). Some examples may have thick (50-100 cm) organic layers (Drew et al. 1998).

**Vegetation:** According to Drew et al. (1998) dominant plant taxa include *Taxodium ascendens*, *Nyssa biflora*, *Cephalanthus occidentalis*, *Liquidambar styraciflua*, *Clethra alnifolia*, *Lyonia lucida*, and *Styrax americanus*. A few less typical upland depression ponds in Florida dominated by *Nyssa sylvatica* are also accommodated in this system for now (A. Johnson pers. comm.).

#### SOURCES

**References:** Comer et al. 2003, Drew et al. 1998, EPA 2004, Johnson pers. comm., Monk and Brown 1965

**Version:** 23 Sep 2002

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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#### CES203.547 WEST GULF COASTAL PLAIN FLATWOODS POND

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Graminoid

**Concept Summary:** This system represents predominately graminoid-dominated flatwoods ponds of the West Gulf Coastal Plain of eastern Texas and western Louisiana. These ponds are generally circular or elliptical, flat-bottomed depressions on flat terraces in the Outer Coastal Plain. The slowly permeable soils trap local runoff and precipitation resulting in higher water tables than surrounding areas. Water depth may be 3-5 feet in the winter and even deeper toward the center of some examples (Bridges 1988, Bridges and Orzell 1989a). Examples range from shallow to several meters in depth; the large and deeper examples may exhibit distinct vegetation zonation. Most examples have a layer of tall wetland grasses and sedges above a layer of semi-aquatic herbs. Many lack a significant woody layer due in part to periodic fires originating in the pine savanna matrix. However, scattered, often stunted *Nyssa biflora* and stems of *Cephalanthus occidentalis* may be present. The following species are characteristic of this type: *Eriocaulon compressum*, *Xyris fimbriata*, *Eleocharis equisetoides*, *Eleocharis quadrangulata*, as well as two additional species, *Carex verrucosa* and *Rhynchospora cephalantha*, which are more frequent in other pond types. Some other species frequently found in this type include *Eriocaulon compressum*, *Rhynchospora corniculata*, *Panicum hemitomon*, *Ludwigia sphaerocarpa*, *Xyris laxifolia* var. *iridifolia* (= *Xyris iridifolia*), and *Sagittaria graminea*. Other herbaceous species may include *Gratiola brevifolia*, *Hydrolea ovata*, *Proserpinaca pectinata*, *Pluchea rosea*, *Ludwigia pilosa*, *Bacopa caroliniana*, *Xyris* sp., and *Rhynchospora capitellata*.

## DISTRIBUTION

**Range:** West Gulf Coastal Plain of eastern Texas and western Louisiana.

**Divisions:** 203:C

**TNC Ecoregions:** 31:?, 40:C, 41:C

**Subnations:** LA, TX

### Associations:

- *Aristida palustris* - *Panicum virgatum* - *Eriocaulon compressum* - *Eleocharis equisetoides* Herbaceous Vegetation (CEGL004577, G2G3)
- *Aristida palustris* - *Panicum virgatum* - *Eriocaulon decangulare* var. *decangulare* - *Rhynchospora elliottii* Herbaceous Vegetation (CEGL004576, G2G3)
- *Nymphoides aquatica* - *Nymphaea odorata* - *Gratiola brevifolia* Herbaceous Vegetation (CEGL004601, G3?)
- *Nyssa biflora* - *Crataegus opaca* - (*Fraxinus caroliniana*) / *Rhynchospora mixta* Woodland (CEGL007873, G2?)
- *Nyssa biflora* / *Panicum hemitomon* - *Woodwardia virginica* Woodland (CEGL004586, G3?)
- *Panicum hemitomon* - *Eriocaulon compressum* - *Rhynchospora corniculata* Herbaceous Vegetation (CEGL004578, G2)

**High-ranked species:** *Bufo houstonensis* (G1), *Carex decomposita* (G3), *Echinodorus parvulus* (G3Q), *Euphyes dukesi* (G3), *Fuirena longa* (G3G4)

**Environment:** This system tends to occur as inclusions within wetland pine savannas in depression ponds or ancient stream channels and sloughs. Local runoff and rainfall collect in these depressions with slowly permeable soils. Resulting water tables persist for long periods after rain, at higher levels than surrounding parts of the landscape. Water in this pond type is often 3-5 feet deep in winter, and even deeper areas (with floating aquatic vegetation) may occur in the center of some sites (Bridges 1988, Bridges and Orzell 1989a). They tend to occur as inclusions within wetland pine savannas, but may also be bordered by upland depression swamps.

**Vegetation:** Plant species dominance varies greatly depending upon water depth and the spread of colonial, rhizomatous species, and may also be related to geographic isolation of individual ponds and variations in local fire regimes. Most examples have a layer of tall wetland grasses and sedges above a layer of semi-aquatic herbs. Scattered woody plants, especially *Nyssa biflora*, may be present. In some instances woody stems may develop sufficient density to be classified as woodlands.

**Dynamics:** Water table fluctuations are probably the most important factor affecting examples of this system (Bridges and Orzell 1989a). Water collects in these depressions after rainfall events but generally not as a result of overbank flooding. Water tends to be deepest during the winter time when precipitation is concentrated (although other factors may also be important, such as the amount of evapotranspiration). Standing water may be evident from approximately November through May, and sporadically afterwards.

Most examples of this system were also likely affected by fires originating in the surrounding longleaf pine savanna vegetation. Given the moisture relationships generally outlined above, the primary season when fires could burn through these ponds occurs roughly between after May and before November when water levels typically rise. During season drought periods fires could burn across the entire surface of a given pond. In the absence of fire, hardwoods may become more abundant and dominant eventually altering both the hydrological regime and fire dynamics.

## SPATIAL CHARACTERISTICS

**Size:** Most are quite small features; although specific data are not available, most are believed to be less than 1 acre in size.

## SOURCES

**References:** Bridges 1988, Bridges and Orzell 1989a, Comer et al. 2003

**Version:** 19 May 2004

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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## CES203.548 WEST GULF COASTAL PLAIN NONRIVERINE WET HARDWOOD FLATWOODS

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Forest and Woodland (Treed); Depressional

**Concept Summary:** This system represents predominately wet hardwood flatwoods of the West Gulf Coastal Plain of southern Arkansas, eastern Texas, and western Louisiana. Examples may be somewhat more common in the inland portions of the region but are also found in the Outer Coastal Plain as well. These areas are usually found on nonriverine, Pleistocene high terraces. Soils are fine-textured, and hardpans may be present in the subsurface. The limited permeability of these soils contributes to perched water tables during fairly substantial portions of the year (when precipitation is greatest and evapotranspiration is lowest). Saturation occurs not from overbank flooding but typically whenever precipitation events occur. The local landscape is often a complex of ridges and swales, usually occurring in close proximity. There is vegetation variability related to soil texture and moisture and disturbance history. Most examples support hardwood forests or swamps, which are often heavily oak-dominated. Important species are tolerant of inundation. They include *Quercus michauxii*, *Quercus phellos*, *Quercus laurifolia*, and *Liquidambar styraciflua*, with sparse coverage of wetland herbs such as *Carex glaucescens*. Some swales support unusual pockets of *Fraxinus caroliniana* and *Crataegus* spp. Some examples can contain *Pinus taeda*.

**Comments:** This system may grade upslope into West Gulf Coastal Plain Pine-Hardwood Flatwoods (CES203.278) and West Gulf Coastal Plain Flatwoods Pond (CES203.547).

### DISTRIBUTION

**Range:** This system is found in the West Gulf Coastal Plain, Upper West Gulf Coastal Plain, and Mississippi River Alluvial Plain (P. Faulkner pers. comm.).

**Divisions:** 203:C

**TNC Ecoregions:** 31:?, 40:C, 41:C, 42:C

**Subnations:** AR, LA, OK?, TX

### Associations:

- (*Quercus laurifolia*) / *Crataegus opaca* - *Crataegus viridis* Forest (CEGL007386, G1)
- *Fraxinus caroliniana* Seasonally Flooded Forest (CEGL004753, G2G3)
- *Nyssa biflora* - *Quercus laurifolia* / *Sphagnum* spp. Depression Forest (CEGL007390, G3?)
- *Quercus laurifolia* - *Liquidambar styraciflua* - *Nyssa biflora* - *Acer rubrum* / *Sabal minor* Forest (CEGL007804, G3?)
- *Quercus laurifolia* - *Quercus phellos* - *Quercus nigra* / *Viburnum dentatum* - (*Sebastiania fruticosa*) / *Carex glaucescens* Upper West Gulf Flatwoods Forest (CEGL007961, G2G3)
- *Quercus lyrata* - *Quercus phellos* - *Ulmus americana* / *Rhynchospora* spp. Forest (CEGL007549, G2G3)
- *Quercus phellos* - *Quercus similis* / *Crataegus marshallii* - *Crataegus spathulata* / *Chasmanthium laxum* Forest (CEGL007363, G3?)
- *Quercus phellos* / *Chasmanthium laxum* - *Carex (flaccosperma, intumescens)* - *Hymenocallis liriosme* Flatwoods Forest (CEGL007371, G3G4)
- *Quercus phellos* / *Chasmanthium laxum* Forest (CEGL008576, G3?)
- *Taxodium distichum* - *Nyssa biflora* - *Magnolia virginiana* - *Acer rubrum* Forest (CEGL007902, G2?)

**Environment:** This system is found on the wettest inclusions of Pleistocene terraces in the West Gulf Coastal Plain of southern Arkansas, eastern Texas, and western Louisiana.

**Vegetation:** Stands are typically dominated by hardwoods, including *Quercus michauxii*. Important species are tolerant of inundation. They include *Quercus michauxii*, *Quercus phellos*, *Quercus laurifolia*, and *Liquidambar styraciflua*, with sparse coverage of wetland herbs such as *Carex glaucescens*. Some swales support unusual pockets of *Fraxinus caroliniana* and *Crataegus* spp. Some examples can contain *Pinus taeda*.

**Dynamics:** The predominant ecological processes affecting this system are related to soil texture and moisture and disturbance history. These are wetlands that hold standing water for variable periods during the year after rainfall events. The wettest examples were likely not affected to a large degree by fires, however, they are often embedded in pyrogenic landscapes which did burn frequently (R. Evans pers. obs., T. Foti pers. comm.).

### SOURCES

**References:** Comer et al. 2003, Evans pers. comm., Foti pers. comm., Marks and Harcombe 1981

**Version:** 31 Jan 2005

**Stakeholders:** Midwest, Southeast

**Concept Author:** R. Evans

**LeadResp:** Southeast

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## CES203.518 ATLANTIC COASTAL PLAIN NORTHERN PONDSHORE

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system includes vegetation of groundwater-flooded depressions characterized by a flora generally restricted to the Coastal Plain from the southern portion of the Delmarva peninsula to Cape Cod, Massachusetts. Ponds may contain permanent water, such as the deep glacial kettleholes of Cape Cod and Long Island, New York, or may be shallow basins where groundwater drops below the surface late in the growing season. This system occurs on sandy deposits such as outwash plains of the glaciated region (Long Island and Cape Cod), on the deep sands of the New Jersey Pine Barrens, or on finer sediments of the Coastal Plain of Cape May, New Jersey, the Delmarva peninsula, and the Chesapeake Bay region. The vegetation of steeper-sided basins (generally those containing permanent water) are characterized by strong zonation, with a border of tall shrubs, such as *Vaccinium corymbosum*, and several essentially concentric bands or zones dominated by different associations, depending on geography. Characteristic species in Massachusetts and Long Island include *Rhexia virginica*, *Cyperus dentatus*, *Gratiola aurea*, *Panicum verrucosum*, *Euthamia caroliniana* (= *Euthamia tenuifolia*), *Carex striata*, *Juncus pelocarpus*, *Rhynchospora capillacea*, *Rhynchospora macrostachya*, *Xyris difformis*, *Fimbristylis autumnalis*, *Scleria reticularis*, *Sabatia kennedyana*, *Drosera filiformis*, *Juncus militaris*, and many others.

Ponds of the New Jersey Pine Barrens share many of these species, with others including *Juncus repens*, *Muhlenbergia torreyi*, *Rhynchospora oligantha*, *Rhynchospora cephalantha*, *Rhynchospora chalarocephala*, and many others. In shallow basins, such strong zonation is generally lacking but still remains evident in some cases. On Cape Cod, Long Island, and New Jersey, this system most often occurs within the pitch pine barrens.

From Cape May and south, the system occurs within an upland matrix of mixed hardwood forests and generally supports a seasonally flooded swamp forest characterized by *Liquidambar styraciflua*, *Acer rubrum*, wetland oaks such as *Quercus phellos*, and in Virginia and scattered locations on the Inner Coastal Plain of Maryland *Nyssa biflora*. The vegetation is characterized by many of the species from New England, New York and New Jersey and also includes *Juncus repens*, *Boltonia asteroides*, *Fimbristylis perpusilla*, *Coelorachis rugosa*, *Dichanthelium spretum*, *Saccharum giganteum*, *Eleocharis quadrangulata*, and others. *Cephalanthus occidentalis* often occurs as scattered individuals or as a shrub swamp with less diversity and cover of Coastal Plain flora.

**Comments:** In some cases, these are locally known as "Delmarva bays."

#### DISTRIBUTION

**Range:** Ranges from the southern portion of the Delmarva peninsula to Cape Cod, Massachusetts, and also in limited, highly disjunct occurrences on sand lakeplain near southern Lake Michigan.

**Divisions:** 202:C, 203:C

**TNC Ecoregions:** 48:C, 58:C, 62:C

**Subnations:** DE, MA, MD, MI, NJ, NY, VA

#### Associations:

- *Calamagrostis canadensis* - *Dichanthelium meridionale* - (Mixed Shrub) Herbaceous Vegetation (CEGL006243, GNR)
- *Carex striata* var. *brevis* Herbaceous Vegetation (CEGL004120, GNR)
- *Cephalanthus occidentalis* / *Polygonum hydropiperoides* - *Panicum verrucosum* Shrubland (CEGL006242, G3?)
- *Ceratophyllum demersum* - *Utricularia macrorhiza* - *Nymphaea odorata* Herbaceous Vegetation (CEGL004661, G3?)
- *Cladium mariscoides* - *Coelorachis rugosa* Herbaceous Vegetation (CEGL006332, G1)
- *Cladium mariscoides* - *Eleocharis equisetoides* Herbaceous Vegetation (CEGL006016, GNR)
- *Decodon verticillatus* / *Triadenum virginicum* Shrubland (CEGL006087, GNR)
- *Dulichium arundinaceum* - *Juncus canadensis* - *Juncus pelocarpus* Herbaceous Vegetation (CEGL006415, GNR)
- *Eleocharis (obtusata, flavescens)* - *Eriocaulon aquaticum* Herbaceous Vegetation (CEGL006261, G3G5)
- *Eleocharis flavescens* - *Xyris difformis* Herbaceous Vegetation (CEGL006400, GNR)
- *Eragrostis hypnoides* - *Ludwigia sphaerocarpa* - *Polygonum hydropiperoides* Herbaceous Vegetation (CEGL006608, GNR)
- *Eriocaulon aquaticum* - *Lobelia dortmanna* Herbaceous Vegetation (CEGL006346, GNR)
- *Juncus militaris* - *Eriocaulon aquaticum* Herbaceous Vegetation (CEGL006345, GNR)
- *Juncus repens* - *Boltonia asteroides* Herbaceous Vegetation (CEGL006610, GNR)
- *Leersia hexandra* - (*Panicum verrucosum*, *Scleria reticularis*) Herbaceous Vegetation [Provisional] (CEGL004047, G2G3)
- *Liquidambar styraciflua* - *Acer rubrum* - *Nyssa biflora* / *Carex jorii* Forest (CEGL006223, G1G2)
- *Liquidambar styraciflua* - *Acer rubrum* - *Quercus phellos* / *Leucothoe racemosa* Forest (CEGL006110, GNR)

- *Lysimachia terrestris* - *Dulichium arundinaceum* - *Rhexia virginica* Herbaceous Vegetation (CEGL006035, G2G3)
- *Nuphar lutea* ssp. *sagittifolia* Herbaceous Vegetation (CEGL004328, G3?)
- *Nymphaea odorata* - *Eleocharis robbinsii* Herbaceous Vegetation (CEGL006086, G2)
- *Panicum hemitomon* - *Panicum verrucosum* Herbaceous Vegetation (CEGL006338, GNR)
- *Quercus phellos* / *Carex striata* var. *brevis* Forest (CEGL004644, G2?)
- *Rhexia virginica* - *Crotalaria sagittalis* Herbaceous Vegetation (CEGL006300, G2)
- *Rhexia virginica* - *Panicum verrucosum* Herbaceous Vegetation (CEGL006264, G2G3)
- *Rhynchospora capitellata* - *Cyperus dentatus* - *Rhexia virginica* - *Xyris difformis* Herbaceous Vegetation (CEGL006210, G2)
- *Rhynchospora capitellata* - *Rhexia virginica* - *Rhynchospora scirpoides* - *Schoenoplectus hallii* Herbaceous Vegetation (CEGL005108, G2?)
- *Saccharum giganteum* - (*Dichanthelium spretum*, *Panicum verrucosum*) Herbaceous Vegetation (CEGL006609, G1G2)
- *Spartina pectinata* North Atlantic Coast Herbaceous Vegetation (CEGL006095, GNR)
- *Taxodium distichum* - *Nyssa biflora* Chesapeake Bay Forest (CEGL006214, GNR)
- *Taxodium distichum* - *Taxodium ascendens* / *Panicum hemitomon* - *Sclerolepis uniflora* Woodland (CEGL004465, G1)
- *Taxodium distichum* - *Taxodium ascendens* / *Panicum hemitomon* Woodland (CEGL004466, G3?)
- *Vaccinium corymbosum* - *Rhododendron viscosum* - *Clethra alnifolia* Shrubland (CEGL006371, GNR)

**High-ranked species:** *Clonophis kirtlandii* (G2), *Coreopsis rosea* (G3), *Eulimnadia agassizii* (G1G2), *Eupatorium leucolepis* var. *novae-angliae* (G5T1), *Eupatorium resinosum* (G3), *Euthamia galetorum* (G3), *Fimbristylis perpusilla* (G2), *Helenium virginicum* (G2), *Hypericum adpressum* (G3), *Lobelia boykinii* (G2G3), *Lycopodiella margueritiae* (G2), *Lycopodiella subappressa* (G2), *Oxypolis canbyi* (G2), *Panicum hirstii* (G1), *Papaipema sulphurata* (G2), *Rhexia aristosa* (G3), *Rhynchospora inundata* (G3G4), *Sabatia kennedyana* (G3), *Sagittaria teres* (G3), *Schoenoplectus etuberculatus* (G3G4), *Scirpus ancistrochaetus* (G3)

## SOURCES

**References:** Comer et al. 2003

**Version:** 01 Oct 2004

**Concept Author:** SC. Gawler, R. Evans, L. Sneddon, M. Pyne

**Stakeholders:** East, Midwest, Southeast

**LeadResp:** East

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## CES203.890 CENTRAL FLORIDA HERBACEOUS PONDSHORE

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Herbaceous; Depressional; Graminoid

**Concept Summary:** This system includes a variety of seasonal depression ponds in central Florida, especially along the Lake Wales Ridge. Examples are rounded or irregularly shaped, shallow depressions from tens to hundreds of meters in diameter (Abrahamson et al. 1984). Extensive variation is present based on the variety of soils and resultant hydroperiods. Most examples exhibit some zonation in vegetation and nearly all are ringed by *Serenoa repens*. Characteristic or dominant species associated with the interior of the ponds include *Panicum hemitomon*, *Panicum abscissum*, *Hypericum edisonianum*, and *Andropogon brachystachyus*.

**Comments:** Compare to East Gulf Coastal Plain Southern Depression Pondshore (CES203.504), found to the north.

## DISTRIBUTION

**Range:** Endemic to central Florida.

**Divisions:** 203:C

**TNC Ecoregions:** 55:C

**Subnations:** FL

### Associations:

- *Amphicarpum muehlenbergianum* - (*Panicum hemitomon*) Herbaceous Vegetation (CEGL008588, G2G3)
- *Andropogon (capillipes, glaucopsis)* - *Rhynchospora fascicularis* var. *fascicularis* - *Rhexia mariana* Herbaceous Vegetation (CEGL004460, G2?)
- *Hypericum brachyphyllum* Dwarf-shrubland (CEGL003955, G3?)
- *Panicum hemitomon* - *Pluchea (camphorata, rosea)* - *Ludwigia* spp. Herbaceous Vegetation (CEGL007792, G3)

- *Panicum hemitomon* - *Pontederia cordata* Herbaceous Vegetation (CEGL004461, G3G4)
- *Rhynchospora (careyana, inundata)* Seasonally Flooded Herbaceous Vegetation (CEGL004132, G3?)
- *Woodwardia virginica* / *Sphagnum cuspidatum* Herbaceous Vegetation (CEGL004475, G2?)

**High-ranked species:** *Amaranthus floridanus* (G3), *Campanula robinsiae* (G1), *Carex verrucosa* (G3G4), *Coelorachis tuberculosa* (G3), *Cucurbita okeechobeensis* (G1), *Echinochloa paludigena* (G3Q), *Echinodorus parvulus* (G3Q), *Hypericum edisonianum* (G2), *Litsea aestivalis* (G3), *Ludwigia curtissii* (G3G4), *Lythrum flagellare* (G2), *Najas filifolia* (G1), *Neofiber alleni* (G3), *Rana capito* (G3), *Rhynchospora fernaldii* (G3G4), *Zephyranthes simpsonii* (G2G3)

**Environment:** Most examples are known from the Lake Wales Ridge area of central Florida. These are shallow depressions found on a variety of different soils with different hydroperiods (Abrahamson et al. 1984).

**Vegetation:** Most depression ponds accommodated in this system display distinct vegetational zonation. At least four vegetational zones can be readily distinguished (Abrahamson et al. 1984); the community types need to be further reconciled into associations.

### SPATIAL CHARACTERISTICS

**Adjacent Ecological System Comments:** May grade into Central Florida Wet Prairie and Herbaceous Seep (CES203.491). Surrounding matrix vegetation can include Central Florida Pine Flatwoods (CES203.382) and Florida Dry Prairie (CES203.380).

### SOURCES

**References:** Abrahamson et al. 1984, Comer et al. 2003

**Version:** 25 Mar 2004

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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### CES203.558 EAST GULF COASTAL PLAIN NORTHERN DEPRESSION POND SHORE

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system consists of a variety of upland depression pondshores of the northern East Gulf Coastal Plain. Included here are shallow ponds of various geomorphic origin in a variety of substrates (e.g., limesinks, Grady Ponds) which are not separately distinguished as systems. These are generally in isolated upland situations, and are not part of a stream system, although they may serve as the origin of a stream system in a general way, releasing water gradually into the stream drainage system during periods of wet weather. In some examples, a distinct zonation of vegetation is present, in others the zones are not distinct or the differing associations are present in a complex mosaic. Most seasonal depression ponds are usually composed of mosaics of several plant associations. The vegetation includes various zones which become exposed as water levels decline, as well as emergent (rising out of the water) or submergent/floating plants. Some typical associations include ones dominated by species such as *Dichantherium wrightianum*, *Dichantherium erectifolium*, *Eleocharis equisetoides*, *Eleocharis microcarpa*, *Juncus effusus*, *Juncus repens*, *Rhynchospora corniculata*, *Rhynchospora inundata*, *Panicum hemitomon*, *Proserpinaca* spp., *Pluchea* spp., *Ludwigia* spp., *Saccharum* spp., *Panicum verrucosum*, *Rhexia* spp., and *Sabatia angularis*. In addition, associations dominated by *Polygonum* spp., *Leersia* spp., and *Typha* spp. may be present but are not characteristic.

### DISTRIBUTION

**Range:** This system is found in the northern part of the East Gulf Coastal Plain, inland of the Gulf Coast Flatwoods (i.e., EPA Level III Ecoregion 65, not 75 (EPA 2004)).

**Divisions:** 203:C

**TNC Ecoregions:** 43:C, 53:C

**Subnations:** AL, GA, MS

### Associations:

- *Alnus serrulata* Saturated Southern Shrubland (CEGL003912, G4)
- *Alnus serrulata* Southeastern Seasonally Flooded Shrubland (CEGL008474, G4)
- *Cephalanthus occidentalis* / *Hibiscus moscheutos* ssp. *moscheutos* Depression Pond Shrubland (CEGL004742, G3?)
- *Dichantherium wrightianum* - *Dichantherium erectifolium* Herbaceous Vegetation (CEGL004105, G2G3)

- *Eleocharis microcarpa* - *Juncus repens* - *Rhynchospora corniculata* - (*Mecardonia acuminata*, *Proserpinaca* spp.) Herbaceous Vegetation (CEGL004748, G2G3)
- *Juncus effusus* Seasonally Flooded Herbaceous Vegetation (CEGL004112, G5)
- *Nyssa biflora* / *Itea virginica* - *Cephalanthus occidentalis* Depression Forest (CEGL007434, G3G4)
- *Panicum hemitomom* - *Eleocharis equisetoides* - *Rhynchospora inundata* Herbaceous Vegetation (CEGL004127, G3)
- *Panicum hemitomom* - *Pluchea (camphorata, rosea)* - *Ludwigia* spp. Herbaceous Vegetation (CEGL007792, G3)
- *Polygonum (hydropiperoides, punctatum)* - *Leersia (lenticularis, virginica)* Herbaceous Vegetation (CEGL004290, G4?)
- *Polygonum amphibium* - (*Polygonum hydropiperoides*) Seasonally Flooded Herbaceous Vegetation (CEGL004699, G4G5)
- *Polygonum densiflorum* - (*Saccharum giganteum*) Herbaceous Vegetation (CEGL004966, G4G5)
- *Saccharum* spp. - *Panicum verrucosum* - (*Rhexia* spp., *Sabatia* spp.) Herbaceous Vegetation (CEGL004752, G2G3)
- *Salix nigra* / *Cephalanthus occidentalis* Forest (CEGL004773, G4)
- *Taxodium ascendens* / *Ilex myrtifolia* Depression Forest (CEGL007418, G3?)
- *Taxodium distichum* East Gulf Coastal Plain Pondshore Woodland (CEGL004046, G3)
- *Typha latifolia* Southern Herbaceous Vegetation (CEGL004150, G5)

**High-ranked species:** *Ambystoma cingulatum* (G2G3), *Carex decomposita* (G3), *Coelorachis tuberculosa* (G3), *Croton elliotii* (G2G3), *Echinodorus parvulus* (G3Q), *Hypericum adpressum* (G3), *Lindera melissifolia* (G2), *Litsea aestivalis* (G3), *Lobelia boykinii* (G2G3), *Ludwigia spathulata* (G2G3), *Myriophyllum laxum* (G3), *Notophthalmus perstriatus* (G2G3), *Oxypolis canbyi* (G2), *Polygonum hirsutum* (G3G4), *Rana capito* (G3), *Rhexia aristosa* (G3), *Rhexia parviflora* (G2), *Rhexia salicifolia* (G2), *Rhynchospora inundata* (G3G4), *Schoenoplectus hallii* (G2), *Xyris longispala* (G2)

**Vegetation:** Most seasonal depression ponds are usually composed of mosaics of several plant associations. The vegetation includes various zones which become exposed as water levels decline, as well as emergent (rising out of the water) or submergent/floating plants. Some typical dominant species in component associations include *Dichantheium wrightianum*, *Dichantheium erectifolium*, *Eleocharis microcarpa*, *Juncus repens*, *Rhynchospora corniculata*, *Proserpinaca* spp., *Juncus effusus*, *Panicum hemitomom*, *Eleocharis equisetoides*, *Rhynchospora inundata*, *Pluchea* spp., *Ludwigia* spp., *Saccharum* spp., *Panicum verrucosum*, *Rhexia* spp., and *Sabatia angularis*. In addition, associations dominated by *Polygonum* spp., *Leersia* spp., and *Typha* spp. may be present but are not characteristic. Other characteristic species include *Rhexia cubensis*, *Panicum rigidulum*, *Panicum verrucosum*, *Carex striata*, *Lachnanthes caroliana*, *Bartonia verna*, *Lachnocaulon minus*, and *Centella erecta*. Woody plants which may be present (particularly on margins) include *Cephalanthus occidentalis*, *Hibiscus* spp., and *Hypericum* spp.

**Dynamics:** The seasonal fluctuation in the water levels in these ponds controls both the overall vegetation composition as well as the composition of the zones of the vegetation, which may be quite distinct from one another. The evident species in a zone may fluctuate from year to year with differing length of hydroperiod.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small patch

**Heterogeneity:** This system contains a wide variety of ecologically related associations which exhibit some physiognomic variation, being variously dominated by graminoids or by shrubs, (e.g., *Cephalanthus occidentalis*, *Hypericum* spp.).

**Other Comments:** Seasonal depression ponds are a small-patch system confined to specific environments (depressions) defined primarily by a seasonally flooded hydrology. Water levels may fluctuate 1 m or more over the course of the growing season. These communities typically occur in depressions in the landscape (limesink ponds). Soils have characteristics that result from long periods of anaerobic conditions (e.g., gleyed soils, high organic content, redoximorphic features). Seasonal depression ponds are typically characterized by zones or patches of herbaceous vegetation adapted to wetland soil conditions. Primary threats to this system include changes in water quality and quantity, diversions, mining, logging, and invasive species.

### SOURCES

**References:** Comer et al. 2003, EPA 2004

**Version:** 26 Feb 2003

**Concept Author:** M. Pyne

**Stakeholders:** Southeast

**LeadResp:** Southeast

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### CES203.292 EAST GULF COASTAL PLAIN SANDHILL LAKESHORE DEPRESSION

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional [Vernal Pool]; Graminoid

**Concept Summary:** This small-patch wetland system occupies upland depressions on deep sandy soils in the southern portions of the East Gulf Coastal Plain of Florida and Alabama. These depressions are apparently of karstic origin but exhibit no evidence of calcareous conditions or evidence of limestone. Limestone is buried 50 or more feet below the surface under coarse sandy soils that cover the margins and, in some cases, the entire surface extent of these depressions (A. Johnson pers. comm.). The resulting appearance of these pondshores is that of large, inland white sand beach (at least in dry years). In the drier margins they even support some plant species found on coastal beaches of the region, such as *Lupinus westianus*, *Hypericum reductum*, and *Chrysoma pauciflosculosa*. The aspect of the vegetation ranges from shrublands to herbaceous-dominated with local variability. Several narrowly endemic plant species may be present such as *Hypericum lissophloeus*, *Rhexia salicifolia*, and *Xyris longisepala*. Examples may be periodically flooded to depths of as much as 1.5 m deep, but they dry down regularly. Some are fairly large, steep-sided depressions with as much as a 30-m elevation change from rim (sandhill) to center, while others form much more gradual depressions. Fire may be an important natural force in some examples.

**Comments:** This system has karstic origins in common with Southern Coastal Plain Sinkhole (CES203.495) but lacks exposed limestone and steep vertical, limestone walls. Other upland depressions of the East Gulf Coastal Plain (that may or may not have karstic origins) on less extreme sandy soils are accommodated by East Gulf Coastal Plain Southern Depression Pondshore (CES203.504).

This system was formerly covered by East Gulf Coastal Plain Southern Depression Pondshore, but this type was split out and recognized as distinct in February 2004.

#### DISTRIBUTION

**Range:** This system is found in the Florida panhandle and adjacent portions of Alabama (possibly confined to a single site) (A. Johnson pers. comm.).

**Divisions:** 203:C

**TNC Ecoregions:** 53:C

**Subnations:** AL, FL

#### Associations:

- *Hypericum lissophloeus* Shrubland (CEGL003870, G1)
- *Hypericum reductum* / *Syngonanthus flavidulus* - *Rhexia salicifolia* - (*Xyris longisepala*) Dwarf-shrubland (CEGL004998, G1G2)

**High-ranked species:** *Hypericum lissophloeus* (G2), *Paronychia chartacea* ssp. *minima* (G3T1), *Rhexia salicifolia* (G2), *Xyris isoetifolia* (G1)

**Environment:** Examples occur in the near-coastal flatlands (*sensu* Peet and Allard 1993) or the Gulf Coastal Plain Flatwoods region (*sensu* EPA 2004).

**Vegetation:** *Hypericum lissophloeus*, *Rhexia salicifolia*, and *Xyris longisepala* are some of the more unusual species associated with this system (A. Johnson pers comm.).

#### SOURCES

**References:** EPA 2004, Johnson pers. comm., Peet and Allard 1993, Southeastern Ecology Working Group n.d.

**Version:** 11 Mar 2004

**Stakeholders:** Southeast

**Concept Author:** R.E. Evans and A. Johnson

**LeadResp:** Southeast

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#### CES203.504 EAST GULF COASTAL PLAIN SOUTHERN DEPRESSION PONDSHORE

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional [Vernal Pool]; Graminoid

**Concept Summary:** This small-patch wetland system occupies upland depressions in the southern portions of the East Gulf Coastal Plain. Most examples occur in the near-coastal flatlands (*sensu* Peet and Allard 1993) or the Gulf Coastal Plain Flatwoods region (Ecoregion 75a of EPA (2004)). Coastal dune lakes and related wetlands of barrier islands are covered by another system Southeastern Coastal Plain Interdunal Wetland (CES203.258). This system only includes ponds and pondshores in upland settings not those in riparian or floodplain environments. no explicit distinction is intended for wooded



versus herbaceous ponds. These tend to occupy basins that were formed by subsidence of surface sediments caused by solution in underlying limestone or as swales in eolian sand deposits. However, sinkholes with steep, vertical, exposed limestone walls are accommodated by another ecological system, as are sandhill ponds that develop on extreme sandy sites in the East Gulf Coastal Plain of Florida and adjacent Alabama. Examples of this system are relatively shallow depressions or basins with some surface soils present. Hydroperiod can vary substantially from year to year, and vegetation can similarly vary significantly in aspect and dominants. Fire is an important natural force in the outer, drier portions of many examples, and periodic fires may sweep through the interior of many examples during dry periods. Vegetation may exhibit distinct zonation in response to variation in duration of flooding. Communities can range from floating aquatic types (in the centers of the deepest basins) to emergent herbaceous zones (in semipermanent water drawdown zones) to sparse, yet diverse, small graminoid and forb herbaceous vegetation to bald-cypress woodland edges. Some examples may have emergent trees throughout their extent.

**Comments:** In Mississippi this system is apparently confined to the Pamlico Plain where it is very rare and small scale in occurrence (R. Wieland pers. comm.). It is unknown how distinct these depressions are from so-called Grady Ponds (e.g., Cottonmouth Savanna site). This system is closely related to Atlantic Coastal Plain Southern Depression Pondshore (CES203.262) of the Atlantic Coastal Plain and East Gulf Coastal Plain Northern Depression Pondshore (CES203.558) of more interior portions of the East Gulf Coastal Plain. This system also has karstic origins in common with Southern Coastal Plain Sinkhole (CES203.495) but occupies comparatively much shallower depressions and lacks exposed limestone. Compare to Central Florida Herbaceous Pondshore (CES203.890) to the south.

### DISTRIBUTION

**Range:** This system is found in the southern portions of the East Gulf Coastal Plain and related parts of the Mississippi Valley Alluvial Plain, being restricted to the "Gulf Coast Flatwoods" (Ecoregion 75a of EPA (2004)).

**Divisions:** 203:C

**TNC Ecoregions:** 42:C, 53:C

**Subnations:** AL, FL, GA, LA?, MS

### Associations:

- *Crataegus rufula* Forest (CEGL007783, G2G3)
- *Dichantherium wrightianum* - *Dichantherium erectifolium* Herbaceous Vegetation (CEGL004105, G2G3)
- *Eleocharis (elongata, equisetoides)* - *Rhynchospora tracyi* Semipermanently Flooded Herbaceous Vegetation (CEGL004960, G3?)
- *Fraxinus pennsylvanica* - *Populus heterophylla* - *Ulmus americana* - (*Quercus texana*) Forest (CEGL004694, G2?)
- *Fuirena scirpoidea* - *Rhynchospora tracyi* Herbaceous Vegetation (CEGL004123, G3G4)
- *Hypericum chapmanii* - *Ilex myrtifolia* - (*Nyssa ursina*) Shrubland (CEGL003867, G1)
- *Hypericum fasciculatum* / *Rhynchospora (chapmanii, harperi)* Shrubland (CEGL003869, G2G3)
- *Panicum virgatum* - *Andropogon (capillipes, glaucopsis)* - *Aristida palustris* Herbaceous Vegetation (CEGL004100, G2?)
- *Rhynchospora filifolia* - *Juncus abortivus* Herbaceous Vegetation (CEGL004131, G2?)
- *Taxodium distichum* East Gulf Coastal Plain Pondshore Woodland (CEGL004046, G3)

**High-ranked species:** *Ambystoma cingulatum* (G2G3), *Carex striata* var. *striata* (G4T3T4), *Carex verrucosa* (G3G4), *Coelorachis tuberculosa* (G3), *Coreopsis nudata* (G3?), *Croton elliotii* (G2G3), *Echinodorus parvulus* (G3Q), *Fuirena longa* (G3G4), *Hypericum chapmanii* (G3), *Lindera melissifolia* (G2), *Litsea aestivalis* (G3), *Lobelia boykinii* (G2G3), *Ludwigia spathulata* (G2G3), *Mirophyllum laxum* (G3), *Najas filifolia* (G1), *Notophthalmus perstriatus* (G2G3), *Parnassia grandifolia* (G3), *Pinckneya bracteata* (G3G4), *Pinguicula planifolia* (G3?), *Polygonum hirsutum* (G3G4), *Procamburus econfinae* (G1), *Rana capito* (G3), *Rana sevosia* (G1), *Rhexia parviflora* (G2), *Rhexia salicifolia* (G2), *Rhynchospora fernaldii* (G3G4), *Rhynchospora globularis* var. *pinetorum* (G5?T3?), *Rhynchospora inundata* (G3G4), *Rhynchospora macra* (G3), *Rhynchospora pleiantha* (G3), *Sabatia brevifolia* (G3G4), *Schwalbea americana* (G2), *Xyris longispala* (G2)

**Vegetation:** Many examples are herb-dominated, with a variety of zones and variants recognized as associations. Some characteristic species include *Dichantherium wrightianum*, *Dichantherium erectifolium*, *Eleocharis elongata*, *Eleocharis equisetoides*, *Rhynchospora tracyi*, *Fuirena scirpoidea*, *Rhynchospora tracyi*, *Aristida palustris*, *Rhynchospora chapmanii*, *Rhynchospora harperi*, *Rhynchospora filifolia*, and *Juncus abortivus*. Some stands with trees contain *Fraxinus pennsylvanica*, *Populus heterophylla*, *Ulmus americana*, and *Quercus texana*. Shrubs in stands may contain *Hypericum chapmanii*, *Hypericum fasciculatum*, *Hypericum reductum*, *Ilex myrtifolia*, and *Nyssa ursina*.

**Dynamics:** Hydroperiod can vary substantially from year to year, and vegetation can similarly vary significantly in aspect and dominants. Fire is an important natural force in the outer, drier portions of many examples, and periodic fires may sweep through the interior during dry periods.

## SPATIAL CHARACTERISTICS

**Other Comments:** Upland depressions included in East Gulf Coastal Plain Sandhill Lakeshore Depression (CES203.292) were formerly accommodated here.

### SOURCES

**References:** Comer et al. 2003, EPA 2004, Peet and Allard 1993

**Version:** 25 Mar 2004

**Concept Author:** R. Evans and M. Pyne

**Stakeholders:** Southeast

**LeadResp:** Southeast

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### CES203.077 FLORIDIAN HIGHLANDS FRESHWATER MARSH

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional [Sinkhole]; Graminoid

**Concept Summary:** This system represents non-tidal marsh vegetation in the peninsula of Florida. These highland marshes occupy different types of depressions such as former lake basins, shallow peat-filled valleys, and zones around existing natural lakes (Kushlan 1990). The marshes and the basins they occur within are unstable over time due to subsurface subsidence and drainage pattern changes. In some examples, surface waterflow is generally lacking due to the presence of limestone near the surface, but water levels have fluctuated greatly over time (Patton and Judd 1986). Soils range from mucky surfaces to sandy loams or sands, but slowly permeable subsoils contribute to the presence of standing water for much of the year. The vegetation mosaic includes a range of mostly herbaceous plant communities that may be referred to as marshes, meadows, and prairies, collectively comprising a relatively diverse number of associations. Permanent water bodies support a range of submerged and floating aquatic species. Areas with approximately a meter of standing water tend to support dense stands of emergent herbaceous perennials, often in monospecific stands; species include *Typha latifolia*, *Pontederia cordata*, *Nelumbo lutea*, and others. Where there is less water (usually present only during wet season), more graminoid vegetation is present, with species such as *Panicum hemitomon*, *Leersia hexandra*, and other species. With historic water level fluctuations, the vegetation mosaic has also changed, sometimes quite rapidly.

**Comments:** This system was originally intended to cover Paynes Prairie only, but the concept was greatly expanded to include other non-tidal marsh vegetation of Florida, including that around natural lakes, as well as the large Kissimmee and St. Johns River marshes. The Kissimmee and St. Johns River marshes occur within floodplains and are influenced by somewhat different processes than typical highland marshes. These are now considered a distinct ecological system, Florida Rivers Freshwater Marsh (CES203.198).

### DISTRIBUTION

**Range:** Peninsula of Florida.

**Divisions:** 203:C

**TNC Ecoregions:** 55:C

**Subnations:** FL

#### Associations:

- *Cephalanthus occidentalis* / *Limnobium spongia* - *Salvinia minima* Shrubland (CEGL004457, G3?)
- *Nelumbo lutea* - *Pontederia cordata* - *Schoenoplectus tabernaemontani* Herbaceous Vegetation (CEGL004470, G2G3)
- *Osmunda regalis* var. *spectabilis* - *Peltandra virginica* - *Sagittaria lancifolia* Herbaceous Vegetation (CEGL004471, G2?)
- *Panicum hemitomon* - *Pontederia cordata* Herbaceous Vegetation (CEGL004461, G3G4)
- *Salix caroliniana* / *Decodon verticillatus* / *Typha latifolia* Forest (CEGL004423, G2G3)
- *Salix caroliniana* Temporarily Flooded Shrubland (CEGL003899, G4?)
- *Typha latifolia* - *Pontederia cordata* Herbaceous Vegetation (CEGL004462, G3?)

**High-ranked species:** *Neofiber alleni* (G3)

**Vegetation:** A relatively diverse assemblage of vegetation is present, ranging from open water communities to emergent and graminoid marshes, and scattered shrublands. Placing all component associations is difficult due to a number of factors; the current list (12-02) is incomplete.

### SOURCES

**References:** Comer et al. 2003, Kushlan 1990, Patton and Judd 1986

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## CES203.258 SOUTHEASTERN COASTAL PLAIN INTERDUNAL WETLAND

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Coast; Depressional

**Concept Summary:** This system encompasses the wettest dune swales and basins on barrier islands and coastal areas, supporting pond or marsh-like vegetation, from the Coastal Plain of Texas to Virginia. Most examples are permanently or semipermanently flooded with freshwater but are affected by salt spray or overwash during periodic storm events. It is broadly defined in terms of floristic composition and is wide-ranging throughout the southeastern Coastal Plain of the United States.

**Comments:** This system is currently defined with a much broader geographic range than most other coastal systems in the Southeast. The extreme variability within even a limited geographic range limits the ability to find broader vegetational patterns. Examples may vary regionally with regard to the amount of wind or salt spray and the texture of the sand. The northern end of the range is not clearly defined.

### DISTRIBUTION

**Range:** Ranges along the Atlantic and Gulf coasts, from southern Texas to central Virginia. It ranges into central and southern Florida as well.

**Divisions:** 203:C

**TNC Ecoregions:** 31:C, 53:C, 54:?, 55:?, 56:C, 57:C

**Subnations:** AL, FL, GA, LA, MS, NC, SC, TX, VA

### Associations:

- (*Morella cerifera*) - *Panicum virgatum* - *Spartina patens* Herbaceous Vegetation (CEGL004129, GNR)
- (*Stillingia aquatica*) / *Panicum tenerum* - *Dichantherium erectifolium* Herbaceous Vegetation (CEGL004954, G2?)
- *Carex hyalinolepis* Seasonally Flooded Herbaceous Vegetation (CEGL004724, G1G3)
- *Cladium mariscus* ssp. *jamaicense* - *Woodwardia virginica* Herbaceous Vegetation (CEGL004949, G2?)
- *Decodon verticillatus* Semipermanently Flooded Shrubland (CEGL005089, GNR)
- *Eleocharis elongata* - *Panicum tenerum* - *Nymphaea odorata* Herbaceous Vegetation (CEGL004961, G2?)
- *Fimbristylis castanea* - *Paspalum distichum* Herbaceous Vegetation (CEGL004110, G3)
- *Fimbristylis castanea* - *Schoenoplectus pungens* Seasonally Flooded Herbaceous Vegetation (CEGL003790, GNR)
- *Fuirena scirpoidea* - *Fuirena longa* - *Rhynchospora microcarpa* - *Rhynchospora divergens* Herbaceous Vegetation (CEGL004952, G2)
- *Hypericum reductum* - *Licania michauxii* / *Andropogon capillipes* - *Polygonella gracilis* - *Xyris caroliniana* Dwarf-shrubland (CEGL003953, G2)
- *Morella cerifera* - *Vaccinium corymbosum* Shrubland (CEGL003906, GNR)
- *Panicum hemitomon* - (*Cladium mariscus* ssp. *jamaicense*, *Muhlenbergia filipes*) Herbaceous Vegetation (CEGL007716, G2G3)
- *Paspalum vaginatum* Herbaceous Vegetation (CEGL004114, G3G4)
- *Phragmites australis* Eastern North America Temperate Semi-natural Herbaceous Vegetation (CEGL004141, GNA)
- *Spartina bakeri* - *Muhlenbergia filipes* - *Andropogon glomeratus* - *Rhynchospora colorata* Herbaceous Vegetation (CEGL004511, G3?)
- *Spartina patens* - *Fimbristylis (caroliniana, castanea)* - (*Panicum virgatum*) Herbaceous Vegetation (CEGL007836, G2G3)
- *Typha domingensis* - *Setaria magna* Herbaceous Vegetation (CEGL004138, G2G3)
- *Typha domingensis* Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation (CEGL004137, G3?)

**High-ranked species:** *Eupatorium mikanioides* (G3?), *Fuirena longa* (G3G4), *Lachnocaulon engleri* (G3), *Lachnocaulon minus* (G3G4), *Ludwigia lanceolata* (G3)

**Environment:** Occurs on barrier islands and similar immediate coastal areas, in dune swales or other basins. The ponds have standing water well into the growing season, and most are permanently flooded. The water is from rainfall or the local

water table and is fresh, except perhaps during storm events that produce overwash. Soils are sand, sometimes with a thin layer of muck accumulated in the pond.

**Vegetation:** Vegetation is characterized by emergent or drawdown wetland plants, often tall graminoids. Vegetation varies substantially from one example to the next.

**Dynamics:** This system occurs in a geologically dynamic environment, where wind and waves may change landforms quickly. However, ponds usually occur in stable portions of islands, where they may last for decades. Salt spray, salt overwash, and heavy rainfall from storms may affect component communities, limiting vegetation to species that are somewhat salt-tolerant.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small patch.

**Size:** Occurs as small patches, with most individual ponds an acre or less in size. Often ponds will occur in complexes of up to a dozen.

**Heterogeneity:** Occurrences may be either single patches or complexes with several patches set in a matrix of other systems. Most individual patches are homogeneous, consisting of a single association.

**Adjacent Ecological System Comments:** Surrounded by maritime forest or maritime grassland systems.

**Other Comments:** Given the variability of the vegetation in ponds, other associations probably need to be defined.

### SOURCES

**References:** Comer et al. 2003

**Version:** 23 Sep 2002

**Concept Author:** M. Schafale and R. Evans

**Stakeholders:** East, Southeast

**LeadResp:** Southeast

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### CES203.541 TEXAS-LOUISIANA COASTAL PRAIRIE POND SHORE

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Graminoid

**Concept Summary:** This system includes small to moderately large ponds and swales in the coastal prairie of southeastern Texas and Louisiana. These wetlands contain surface water during much of the year, desiccating only in the driest summer months. They are often fed by water runoff but may result from percolation from adjacent sandy areas. Soils in the basins are finer-textured than surrounding areas and may be underlain by pans that enhance perched water tables in the winter. These wetlands occur within the coastal prairie matrix of southeastern Texas and Louisiana and are wetter than wet prairie dominated by *Tripsacum dactyloides* and *Panicum virgatum*. These wetlands may be dominated by *Eleocharis quadrangulata*. Other species that may be present include *Sagittaria papillosa*, *Sagittaria longiloba*, *Steinchisma hians*, *Panicum virgatum*, *Cyperus haspan*, *Cyperus virens*, *Ludwigia glandulosa*, *Ludwigia linearis*, *Fuirena squarrosa*, *Xyris jupicai*, *Leersia hexandra*, *Centella erecta* (= *Centella asiatica*), *Symphotrichum subulatum* (= *Aster subulatus*), *Sesbania* spp., and *Rhynchospora* spp. Open areas in the ponds may contain floating and submersed aquatic vegetation, including *Stuckenia pectinata*, *Ceratophyllum demersum*, *Brasenia schreberi*, *Nymphoides aquatica*, *Nuphar lutea*, and *Nelumbo lutea*.

### DISTRIBUTION

**Range:** This system is restricted to the coastal prairie of southeastern Texas and Louisiana.

**Divisions:** 203:C

**TNC Ecoregions:** 31:C

**Subnations:** LA, TX

### Associations:

- *Brasenia schreberi* Herbaceous Vegetation (CEGL004527, G4?)
- *Eleocharis quadrangulata* - *Sagittaria* spp. Herbaceous Vegetation (CEGL007929, G3?)
- *Nelumbo lutea* Herbaceous Vegetation (CEGL004323, G4?)
- *Nuphar lutea* ssp. *advena* - *Nymphaea odorata* Herbaceous Vegetation (CEGL002386, G4G5)
- *Potamogeton nodosus* Herbaceous Vegetation (CEGL004529, GNR)
- *Stuckenia pectinata* - *Ceratophyllum demersum* Herbaceous Vegetation (CEGL002281, GNR)

**Environment:** Examples of this system are often fed by water runoff but may result from percolation from adjacent sandy areas. Soils in the basins are finer-textured than surrounding areas and may be underlain by pans that enhance perched water tables in the winter.

**Vegetation:** Examples of this system are typically dominated by *Eleocharis quadrangulata*. Other species that may be present include *Sagittaria papillosa*, *Sagittaria longiloba*, *Steinchisma hians*, *Panicum virgatum*, *Cyperus haspan*, *Cyperus virens*, *Ludwigia glandulosa*, *Ludwigia linearis*, *Fuirena squarrosa*, *Xyris jupicai*, *Leersia hexandra*, *Centella erecta* (= *Centella asiatica*), *Symphotrichum subulatum* (= *Aster subulatus*), *Sesbania* spp., and *Rhynchospora* spp. Open areas in the ponds may contain floating and submersed aquatic vegetation, including *Stuckenia pectinata*, *Ceratophyllum demersum*, *Brasenia schreberi*, *Nymphoides aquatica*, *Nuphar lutea*, and *Nelumbo lutea*.

## SOURCES

**References:** Comer et al. 2003

**Version:** 18 Apr 2005

**Concept Author:** J. Teague

**Stakeholders:** Southeast

**LeadResp:** Southeast

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## CES203.264 ATLANTIC COASTAL PLAIN NORTHERN DUNE AND MARITIME GRASSLAND

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Coast; Beach (Substrate); Graminoid; North Atlantic Coastal Plain

**Concept Summary:** This system consists of vegetation of barrier islands and other coastal areas, ranging from northern North Carolina northward to southern Maine, where extensive sandy coastlines are replaced by rocky coasts. A range of plant communities may be present, but natural vegetation is predominately herbaceous. Shrublands resulting from succession from grasslands may occur in limited areas, but they are generally not natural components of this system in the southern part of this system's range (M. Schafale pers. comm.). Both upland and non-flooded wetland vegetation are also included in this system. Small patches of natural woodland may also be present in limited areas, especially in the northern range of this system. Dominant ecological processes are those associated with the maritime environment, including frequent salt spray, saltwater overwash, and sand movement.

**Comments:** This system was separated from Atlantic Coastal Plain Southern Dune and Maritime Grassland (CES203.273) to parallel broad-scale biogeographic and climatic differences believed to be important in this environment. This system occupies the northern part of this broad transition which was labeled by Cowardin et al. (1979) as the Virginian Province, although the demarcated boundary differs somewhat from that used here. A useful vegetation indicator of this transition is the shift in herbaceous dominance on the dunes from *Uniola paniculata* in the south to *Ammophila breviligulata* in the north. Although the location of this shift itself is somewhat imprecise because of widespread planting of both species on artificially enhanced dunes, this boundary appears to be well approximated by Omernik Ecoregion 63g vs. 63d (EPA 2004). Along the northern boundary, there is extensive turnover of associations in TNC Ecoregion 58 with very little overlap southward.

This system is distinguished from Atlantic Coastal Plain Northern Maritime Forest (CES203.302) by the lack of dominant woody vegetation. This distinction becomes blurred where dunes have been artificially enhanced and an unnatural succession to woody vegetation is occurring. The boundary at the northern end is the end of extensive sandy coastlines and the beginning of rocky coasts.

Southeastern Coastal Plain Interdunal Wetland (CES203.258) is distinguished from this system by the presence of standing water for a significant part of the growing season. This corresponds to a break between open-water and tall-graminoid marsh vegetation in the ponds and low-graminoid- or forb-dominated vegetation in the grasslands.

## DISTRIBUTION

**Range:** This system ranges from northern North Carolina (Omernik ecoregion 63d) and southeastern Virginia to southern Maine. The southern limit is a transition zone from around Kitty Hawk, North Carolina, to the Virginia-North Carolina border. The northern limit is Merrymeeting Bay, Maine.

**Divisions:** 203:C

**TNC Ecoregions:** 57:C, 62:C, 63:C

**Subnations:** CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA

**Associations:**

- (*Morella cerifera*) - *Panicum virgatum* - *Spartina patens* Herbaceous Vegetation (CEGL004129, GNR)
- *Ammophila breviligulata* - *Lathyrus japonicus* Herbaceous Vegetation (CEGL006274, G4?)
- *Ammophila breviligulata* - *Panicum amarum* var. *amarum* Herbaceous Vegetation (CEGL004043, G2)
- *Cladium mariscoides* / *Vaccinium macrocarpon* - *Morella pensylvanica* Dwarf-shrubland (CEGL006141, G2)
- *Hudsonia tomentosa* - *Arctostaphylos uva-ursi* Dwarf-shrubland (CEGL006143, G2)
- *Hudsonia tomentosa* / *Panicum amarum* var. *amarulum* Dwarf-shrubland (CEGL003950, G2)
- *Juncus (dichotomus, scirpoides)* - *Drosera intermedia* Herbaceous Vegetation (CEGL004111, GNR)
- *Juniperus virginiana* var. *virginiana* / *Morella pensylvanica* Woodland (CEGL006212, G2)
- *Morella (pensylvanica, cerifera)* / *Schizachyrium littorale* - *Eupatorium hyssopifolium* Shrub Herbaceous Vegetation (CEGL004240, G2)
- *Morella cerifera* / *Hydrocotyle verticillata* Shrubland (CEGL003840, GNR)
- *Morella cerifera* / *Spartina patens* Shrubland (CEGL003839, G3G4)
- *Morella pensylvanica* - *Prunus maritima* Shrubland (CEGL006295, G4)
- *Morella pensylvanica* / *Diodia teres* Shrubland (CEGL003881, G2)
- *Morella pensylvanica* / *Schizachyrium littorale* - *Danthonia spicata* Shrub Herbaceous Vegetation (CEGL006067, G2)
- *Myrica gale* - *Morella pensylvanica* Saturated Shrubland (CEGL006339, GNR)
- *Pinus rigida* / *Hudsonia tomentosa* Woodland (CEGL006117, G2)
- *Pinus taeda* / *Hudsonia tomentosa* Woodland (CEGL006052, G1G2)
- *Prunus serotina* / *Morella cerifera* / *Smilax rotundifolia* Scrub Forest (CEGL006319, G1G2)
- *Quercus virginiana* - (*Ilex vomitoria*) Shrubland (CEGL003833, G3)
- *Schoenoplectus pungens* - *Fimbristylis (castanea, caroliniana)* Herbaceous Vegetation (CEGL004117, GNR)
- *Smilax glauca* - *Toxicodendron radicans* Vine-Shrubland (CEGL003886, GNR)
- *Spartina patens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006342, GNR)
- *Spartina patens* - *Schoenoplectus pungens* - *Solidago sempervirens* Herbaceous Vegetation (CEGL004097, G2G3)
- *Vaccinium corymbosum* - *Rhododendron viscosum* - *Clethra alnifolia* Shrubland (CEGL006371, GNR)
- *Vitis rotundifolia* / *Triplasis purpurea* - *Panicum amarum* - *Schizachyrium littorale* Mid-Atlantic Coastal Medaño Sparse Vegetation (CEGL004397, G1)

**High-ranked species:** *Schizaea pusilla* (G3G4)

**Environment:** Occurs on barrier islands and similar coastal strands, on sand dunes and sand flats. Strong salt spray is an important influence on vegetation in many parts. Overwash by sea water during storms is important on sand flats not protected by continuous dunes. On dunes, present or recent sand movement is an important factor. The combination of these factors prevents the dominance of woody vegetation. Sites may be either dry or saturated by freshwater from rainfall and local water table. Areas connected to tidal influence and areas with ponded freshwater are placed in other systems. Soils are sandy, with little organic matter and little or no horizon development. Soils may be excessively drained on the higher dunes. Soils are low in nutrient-holding capacity, but aerosol input of sea salt provides a continuous source of nutrients.

**Vegetation:** Vegetation consists of a set of grassland and herbaceous to shrubby associations. *Ammophila breviligulata* is the characteristic dominant on the youngest dunes and those most exposed to salt spray. These communities tend to be low in plant species richness, but have a characteristic set of forbs and occasional low shrubs associated with them. Wetter sand flats and dune swales may be dominated by a variety of herbs and sometimes have fairly high species richness.

**Dynamics:** The environment of this system is one of the most dynamic in existence for terrestrial vegetation. Reworking of sand by storms or by slower eolian processes may completely change the local environment in a short time, changing one association to another or changing this system into a different system. Many of these sites are fairly early in the process of primary succession on recent surfaces. Chronic salt spray is an ongoing stress. Overwash and extreme salt spray in storms are frequent disturbances. Vegetation interacts strongly with geologic processes; the presence of grass is an important factor in the development of new dunes. Alteration of dynamic processes, such as artificial enhancement of dunes by planting or sand fencing, can have drastic effects on this system, causing large areas to succeed to woody vegetation. Fire is probably not a major natural factor in this system, but may have been important locally. Most vegetation is too sparse to carry fire well.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Occurs as a large-patch or local matrix system.

**Size:** Occurs in narrow to broad bands, up to several miles wide, extending along the length of barrier islands. Individual patches may cover a thousand or more acres. However, some of the best remnants are naturally small, occurring on smaller islands.

**Heterogeneity:** May occur as contiguous patches over large areas, or may be interspersed with maritime forests, salt and brackish tidal marshes, and interdune ponds.

#### SOURCES

**References:** Comer et al. 2003, Cowardin et al. 1979, EPA 2004, Schafale pers. comm.

**Version:** 26 Sep 2003

**Concept Author:** R. Evans

**Stakeholders:** East, Southeast

**LeadResp:** East

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#### CES203.465 CENTRAL AND UPPER TEXAS COAST DUNE AND COASTAL GRASSLAND

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Matrix

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Concept Summary:** This system consists of wetland and upland herbaceous and shrubland vegetation of barrier islands and near-coastal areas in the northern Gulf of Mexico along the upper Texas coast. Plant communities of primary and secondary dunes, interdunal swales and adjacent mainland are included. Salt spray, saltwater overwash, and sand movement are important ecological forces.

#### DISTRIBUTION

**Range:** Northern Gulf of Mexico along the upper Texas coast.

**Divisions:** 203:C

**TNC Ecoregions:** 31:C

**Subnations:** TX

#### Associations:

- *Eleocharis quadrangulata* - *Sagittaria* spp. Herbaceous Vegetation (CEGL007929, G3?)
- *Fuirena scirpoidea* - *Fuirena longa* - *Rhynchospora microcarpa* - *Rhynchospora divergens* Herbaceous Vegetation (CEGL004952, G2)
- *Panicum amarum* - *Paspalum monostachyum* Herbaceous Vegetation (CEGL004970, G3?)
- *Schizachyrium littorale* - *Paspalum monostachyum* Herbaceous Vegetation (CEGL002207, G3?)
- *Spartina patens* - *Panicum amarum* - *Hydrocotyle bonariensis* Herbaceous Vegetation (CEGL004971, G2?)
- *Uniola paniculata* - (*Panicum amarum*) - *Croton punctatus* Herbaceous Vegetation (CEGL002218, G3?)

#### SOURCES

**References:** Comer et al. 2003

**Version:** 13 Jan 2003

**Concept Author:** R. Evans and J. Teague

**Stakeholders:** Southeast

**LeadResp:** Southeast

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#### CES203.500 EAST GULF COASTAL PLAIN DUNE AND COASTAL GRASSLAND

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Concept Summary:** This system includes vegetation of coastal dunes along the northern Gulf of Mexico, including the northwestern panhandle of Florida, southern Alabama, and southeastern Mississippi. The vegetation consists largely of herbaceous and embedded shrublands on barrier islands and other near-coastal areas where salt spray, saltwater overwash, and sand movement are important ecological forces. This vegetation differs from that of other regions of the Gulf, and this region forms a natural unit with similar climate and substrate (Johnson 1997). There are a number of diagnostic and endemic plant species which characterize this system, including *Ceratiola ericoides*, *Chrysoma pauciflosculosa*, *Schizachyrium maritimum*, *Paronychia erecta*, and *Helianthemum arenicola* (Johnson and Barbour 1990).

#### DISTRIBUTION

**Range:** Coastal dunes along the northern Gulf of Mexico, including the northwestern panhandle of Florida, southern Alabama, and southeastern Mississippi.

**Divisions:** 203:C  
**TNC Ecoregions:** 53:C  
**Subnations:** AL, FL, MS

**Associations:**

- (*Iva imbricata*) / *Sporobolus virginicus* - *Spartina patens* - (*Paspalum distichum*, *Sesuvium portulacastrum*) Herbaceous Vegetation (CEGL007839, G3?)
- *Fuirena scirpoidea* - *Panicum tenerum* - *Dichanthelium wrightianum* - *Andropogon capillipes* Herbaceous Vegetation (CEGL004953, G2?)
- *Schizachyrium maritimum* - (*Heterotheca subaxillaris*) Herbaceous Vegetation (CEGL004057, G2)
- *Spartina patens* - *Schizachyrium maritimum* - *Solidago sempervirens* Herbaceous Vegetation (CEGL008445, G3?)

**High-ranked species:** *Rhexia salicifolia* (G2)

**SOURCES**

**References:** Comer et al. 2003, Johnson 1997, Johnson and Barbour 1990

**Version:** 06 Feb 2003

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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**CES203.550 TEXAS-LOUISIANA COASTAL PRAIRIE**

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Matrix

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Herbaceous; Deep Soil; Graminoid

**Concept Summary:** This system encompasses non-saline tallgrass prairie vegetation ranging along the coast of Louisiana and Texas. This vegetation is found on Vertisols and Alfisols which developed over Pleistocene terraces flanking the Gulf Coast. It is often characterized by a ridge-and-swale or mound-and-intermound microtopography and encompasses both upland and wetland plant communities. Upland dominants include *Schizachyrium scoparium*, *Paspalum plicatulum*, *Sorghastrum nutans*, and *Andropogon gerardii*. Wetland dominants in undisturbed occurrences include *Panicum virgatum* and *Tripsacum dactyloides*; disturbed occurrences may be dominated by *Andropogon glomeratus*. Some estimates state that 99% of coastal prairie has been lost through conversion to other uses and environmental degradation due to the interruption of important ecological processes, such as fire, needed to maintain this system. In the absence of regular fire, this system will be invaded by woody shrubs and trees.

**DISTRIBUTION**

**Range:** Along the coast of Louisiana and Texas

**Divisions:** 203:C

**TNC Ecoregions:** 31:C

**Subnations:** LA, TX

**Associations:**

- *Andropogon gerardii* - *Panicum virgatum* - *Schizachyrium scoparium* - *Schizachyrium tenerum* - *Helianthus mollis* Herbaceous Vegetation (CEGL007938, G1)
- *Andropogon glomeratus* var. *pumilus* Herbaceous Vegetation (CEGL004099, GNA)
- *Andropogon virginicus* var. *virginicus* Herbaceous Vegetation (CEGL004044, GNA)
- *Baccharis halimifolia* Successional Shrubland (CEGL004657, GNA)
- *Euthamia leptcephala* - *Helianthus angustifolius* - *Boltonia asteroides* - *Spartina patens* Herbaceous Vegetation (CEGL007936, G1)
- *Panicum virgatum* - *Tripsacum dactyloides* - (*Panicum hemitomon*) Herbaceous Vegetation (CEGL007937, G1)
- *Schizachyrium scoparium* - *Paspalum plicatulum* - *Sorghastrum nutans* - *Dichanthelium oligoanthos* - *Paspalum setaceum* - *Symphytotrichum pratense* Alfisol Herbaceous Vegetation (CEGL002208, G1)
- *Schizachyrium scoparium* - *Sorghastrum nutans* - *Paspalum plicatulum* - *Carex microdonta* - *Neptunia lutea* Vertisol Herbaceous Vegetation (CEGL004519, G1)



- *Schizachyrium scoparium* - *Triplasis purpurea* - *Eriogonum multiflorum* - *Liatris elegans* var. *carizzana* Herbaceous Vegetation (CEGL008483, G1)

**High-ranked species:** *Eleocharis wolfii* (G3G4)

### SPATIAL CHARACTERISTICS

**Adjacent Ecological System Comments:** In Louisiana, this system grades coastward into marshes of the chenier plain and inland into West Gulf Coastal Plain Wet Longleaf Pine Savanna and Flatwoods (CES203.191). In Texas this system generally grades coastward into a saline prairie or salt marsh system and inland into West Gulf Coastal Plain Wet Longleaf Pine Savanna and Flatwoods (CES203.191), or oak woodland vegetation. Degraded examples are often dominated by the invasive exotic *Triadica sebifera*. Relatively undisturbed natural depressions (potholes) occurring within the upland matrix units of this system are included in Texas-Louisiana Coastal Prairie Pondshore (CES203.541).

### SOURCES

**References:** Comer et al. 2003

**Version:** 06 Feb 2003

**Concept Author:** J. Teague

**Stakeholders:** Southeast

**LeadResp:** Southeast

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## CES203.278 WEST GULF COASTAL PLAIN PINE-HARDWOOD FLATWOODS

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Forest and Woodland (Treed); Pimple mounds; Extensive Wet Flat; Needle-Leaved Tree; Broad-Leaved Deciduous Tree

**Concept Summary:** This system represents predominately dry flatwoods of limited areas of inland portions of the West Gulf Coastal Plain. These areas are usually found on nonriverine, Pleistocene high terraces. Soils are fine-textured and hardpans may be present in the subsurface. The limited permeability of these soils contributes to shallowly perched water tables during portions of the year when precipitation is greatest and evapotranspiration is lowest. Soil moisture fluctuates widely throughout the growing season, from saturated to very dry, a condition sometimes referred to elsewhere as xerohydric. Saturation occurs not from overbank flooding but typically whenever precipitation events occur. Local topography is a complex of ridges and swales, often in close proximity to one another. Ridges tend to be much drier than swales, which may hold water for varying periods of time. Within both ridges and swales there is vegetation variability relating to soil texture and moisture and disturbance history. Driest ridges support *Pinus taeda* and *Quercus stellata*; more mesic ridges have *Pinus taeda* with *Quercus alba* and species such as *Symplocos tinctoria* and *Viburnum dentatum*. Fire may have been an important natural process in some examples of this system (T. Foti pers. comm.).

**Comments:** Embedded swales tend to support hardwood forests or swamps, often heavily oak-dominated with species tolerant of some inundation such as *Quercus phellos* and *Quercus laurifolia* with sparse coverage of wetland herbs such as *Carex glaucescens*. Some swales support unusual pockets of *Fraxinus caroliniana* and *Crataegus* spp.

### DISTRIBUTION

**Range:** This system is found in the inland portions of the West Gulf Coastal Plain.

**Divisions:** 203:C

**TNC Ecoregions:** 40:C, 41:C

**Subnations:** AR, LA, OK?, TX

### Associations:

- *Pinus taeda* - *Quercus alba* - (*Fagus grandifolia*) / *Ilex opaca* / *Smilax pumila* - *Mitchella repens* Forest (CEGL007525, G3G4)
- *Pinus taeda* - *Quercus stellata* / *Crataegus* spp. Woodland (CEGL002112, G2G3?)
- *Quercus alba* - *Carya alba* / *Symplocos tinctoria* / *Mitchella repens* Forest (CEGL007980, G3?)
- *Quercus stellata* - *Pinus taeda* Flatwoods Depression Forest (CEGL008587, G2G3)

**High-ranked species:** *Bufo houstonensis* (G1)

**Environment:** Areas occupied by this system are usually found on nonriverine, Pleistocene high terraces. Soils are fine-textured and hardpans may be present in the subsurface. The limited permeability of these soils contributes to shallowly perched water tables during portions of the year when precipitation is greatest and evapotranspiration is lowest. Soil moisture

fluctuates widely throughout the growing season, from saturated to very dry, a condition sometimes referred to elsewhere as xerohydric. Saturation occurs not from overbank flooding but typically whenever precipitation events occur. Local topography is a complex of ridges and swales, often in close proximity to one another. Ridges tend to be much drier than swales, which may hold water for varying periods of time.

## SOURCES

**References:** Comer et al. 2003

**Version:** 31 Mar 2003

**Concept Author:** R. Evans

**Stakeholders:** Midwest, Southeast

**LeadResp:** Southeast

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### CES203.253 ATLANTIC COASTAL PLAIN SANDHILL SEEP

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.)

**Diagnostic Classifiers:** Seepage-Fed Sloping

**Concept Summary:** This sandhill seep system occurs in small patches on slopes in dissected terrain, where a clay lens or other impermeable layer forces groundwater to the surface as seepage. This type occurs largely in the Fall-line Sandhills region of the Carolinas and Georgia but also rarely in other parts of the Atlantic Coastal Plain. Soils are seasonally to permanently saturated by seepage and range from sandy or clayey to mucky. Vegetation is variable and complex in composition and structure, consisting of a mixture of plants of pine savannas and streamhead pocosins, but contrasting with both in structure and proportions. The tree canopy may be open or absent, and patches of dense shrubs, dense grass, ferns, and various mixtures may be present. Fire is a crucial determinant of structure and composition; it tends to occur in a variable and patchy pattern that is driven by both the fire regime of the surrounding system and the wetness of the seep vegetation at the time.

**Comments:** This system is distinguished from Atlantic Coastal Plain Northern Wet Longleaf Pine Savanna and Flatwoods (CES203.265) by having wetland hydrology driven by seepage rather than seasonal high water table, and by vegetational and landscape differences. Occurs rarely in southeastern Georgia in escarpment areas which have greater topography than is locally typical, and perched water tables which flow to the surface in sloping areas.

## DISTRIBUTION

**Range:** This system occurs from east-central North Carolina to central Georgia, primarily in the Fall-line Sandhills region but occasionally occurring in the Outer Coastal Plain. For example, this system occurs in limited parts of southeastern Georgia associated with the topography of old escarpments. It occurs primarily in the Atlantic drainage but is rarely represented in the Gulf drainage (such as at Fort Benning, Georgia).

**Divisions:** 203:C

**TNC Ecoregions:** 53:C, 56:C, 57:C

**Subnations:** GA, NC, SC

### Associations:

- (*Pinus palustris*, *Pinus serotina*) / *Ctenium aromaticum* - *Muhlenbergia expansa* - *Calamovilfa brevipilis* Woodland (CEGL003659, G2)
- *Arundinaria gigantea* ssp. *tecta* Shrubland (CEGL003843, G1)
- *Clethra alnifolia* - *Toxicodendron vernix* / *Aristida stricta* - *Osmunda cinnamomea* - *Sarracenia* spp. Shrub Herbaceous Vegetation (CEGL004467, G2?)
- *Gaylussacia frondosa* - *Clethra alnifolia* - *Arundinaria gigantea* ssp. *tecta* / *Aristida stricta* - *Pteridium aquilinum* var. *pseudocaudatum* Herbaceous Vegetation (CEGL004468, G3?)
- *Ilex coriacea* - *Lyonia lucida* - *Smilax laurifolia* Shrubland (CEGL004666, G3G4)
- *Pinus palustris* - *Pinus serotina* / *Ilex glabra* - *Lyonia lucida* / *Ctenium aromaticum* Woodland (CEGL003860, G3)

**High-ranked species:** *Agalinis aphylla* (G3G4), *Balduina atropurpurea* (G2), *Chelone cuthbertii* (G3), *Cirsium lecontei* (G2G3), *Danthonia epilis* (G3G4), *Dionaea muscipula* (G3), *Eupatorium resinosum* (G3), *Fallicambarus danielae* (G2), *Hartwrightia floridana* (G2), *Helenium brevifolium* (G3G4), *Lachnocaulon beyrichianum* (G3), *Lilium iridollae* (G2), *Lysimachia asperulifolia* (G3), *Lysimachia loomisii* (G3), *Parnassia caroliniana* (G3), *Parnassia grandifolia* (G3), *Platanthera blephariglottis* var. *conspicua* (G4G5T3T4), *Platanthera integra* (G3G4), *Polygala hookeri* (G3), *Rhynchospora macra* (G3),

Rhynchospora pallida (G3), Sarracenia rubra ssp. rubra (G3T3), Solidago verna (G3), Tofieldia glabra (G3), Xyris scabrifolia (G3)

**Environment:** Occurs on gentle to steep slopes of dissected areas in interbedded sand and clay, largely in the Fall-line Sandhills region but rarely in other parts of the Atlantic Coastal Plain. Sites are seasonally to permanently saturated with seeping groundwater, forced to the surface by an impermeable layer such as a clay bed. Soils may be sandy, clayey, or in the wettest sites, mucky. The hydrological connection to adjacent Atlantic Coastal Plain Fall-line Sandhills Longleaf Pine Woodland (CES203.254), whose well-drained sandy soils are the source of seepage water, is crucial. Fire is a crucial natural force, and is also dependent on the adjacent systems.

**Vegetation:** Vegetation is a potentially diverse mixture of plants of wet savannas and pocosins. Vegetation structure may vary widely, with dense shrubs, dense herbs, or mixtures of shrubs and herbs, and with an open tree canopy or absent tree canopy occurring in complexes or in different patches. *Pinus palustris*, *Pinus serotina*, or several hardwood species may dominate the canopy. Characteristic Streamhead Pocosin shrubs such as *Ilex glabra*, *Lyonia lucida*, *Clethra alnifolia*, *Toxicodendron vernix*, *Ilex coriacea*, and *Zenobia pulverulenta* may mix with flatwoods shrubs such as *Gaylussacia frondosa* and *Kalmia carolina*. The herbs are primarily species shared with wet savannas, such *Aristida stricta*, *Calamovilfa brevifolia*, *Ctenium aromaticum*, *Andropogon glomeratus*, and a variety of showy forbs and insectivorous plants, but often occur in very different proportions. Large wetland ferns such as *Osmunda cinnamomea*, *Osmunda regalis*, and *Pteridium aquilinum* also often dominate.

**Dynamics:** Fire is the predominant natural dynamic force in this system, and is critical in determining its structure and even its identity. Fire regime is dominated by the fire regime of the surrounding system, which naturally burned every few years, but is modified by the wetness and flammability of the seep vegetation. Some fires do not penetrate parts of the seeps, creating variable age and vegetation structure. Areas that seldom burn have dense shrubs, while areas that burn frequently are dominated by herbs. With long absence of fire, many seeps become indistinguishable from Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin, and Baygall (CES203.252). Canopy dynamics are probably driven mainly by fire, with hot fires killing the less fire-tolerant trees and creating a fine mosaic or zoned complex of older trees, younger regeneration, and treeless areas. Shrubs and herbs readily sprout after fires, but relative proportions are controlled by frequency of fire.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small patch, with occurrences ranging from a fraction of an acre to several acres. Patches sometimes occur in complexes in close proximity, but as often are isolated. Some seeps are linear bodies stretching across slopes, some are linear running downslope, and some are small oval bodies.

**Heterogeneity:** Patches of this system are small and are usually homogeneous. Occasionally they will contain small patches of Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin, and Baygall (CES203.252) or Atlantic Coastal Plain Fall-line Sandhills Longleaf Pine Woodland (CES203.254). Within the system, most occurrences will contain only one association and few will contain more than two.

**Adjacent Ecological System Comments:** Generally surrounded by Atlantic Coastal Plain Fall-line Sandhills Longleaf Pine Woodland (CES203.254). Sometimes interspersed or grading to Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin, and Baygall (CES203.252) on one side.

### SOURCES

**References:** Comer et al. 2003

**Version:** 23 Sep 2002

**Concept Author:** M. Schafale and R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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## CES203.495 SOUTHERN COASTAL PLAIN SINKHOLE

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**Primary Division:** Gulf and Atlantic Coastal Plain (203)

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Rock Outcrops/Barrens/Glades

**Concept Summary:** This system consists of deep sinkhole depressions with steep vertical walls of exposed limestone in the Gulf Coastal Plain of Florida and Georgia (other depressions formed in karstic regions that are shallow and lacking in steep vertical walls with exposed rock are accommodated by other systems). These cylindrical- or conical-shaped depressions form in karstic environments where cavities have been eroded in underlying limestone. As cavities enlarge, cavern roofs eventually collapse forming these steep-sided depressions. Some examples drain readily and contain standing water for short periods of time, while others contain permanent lakes. The steep-sided limestone walls are typically sparsely vegetated with

mosses, liverworts, and ferns, with occasional herbs and shrubs in crevices where organic soils have developed (FNAI 1990). The steepness and depth of these depressions help create a generally moist microclimate which is often enhanced by seepage from surrounding uplands, and the presence of standing water.

**Comments:** Excluded from this system are sinkholes of extreme southern Florida and the Mid-Atlantic Coastal Plain of the Carolinas which do not develop such extreme depth and microclimatic features.

#### DISTRIBUTION

**Range:** Gulf Coastal Plain of Florida and Georgia.

**Divisions:** 203:C

**TNC Ecoregions:** 53:C, 55:C

**Subnations:** FL, GA

#### Associations:

- *Adiantum capillus-veneris* - *Thelypteris kunthii* / *Dumortiera hirsuta* Herbaceous Vegetation (CEGL004717, G3?)
- *Adiantum tenerum* - *Parietaria praetermissa* - *Arenaria lanuginosa* Herbaceous Vegetation (CEGL004469, G2?)

#### SOURCES

**References:** Comer et al. 2003, FNAI 1990

**Version:** 14 Dec 2004

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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### CES411.365 SOUTH FLORIDA CYPRESS DOME

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**Primary Division:** Caribbean (411)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional

**Concept Summary:** This system is found primarily in the Everglades and Big Cypress regions. This system consists of small forested wetlands in poorly drained depressions which are underlain by an impervious layer that impedes drainage and traps precipitation. They receive their common name from the unique dome-shaped appearance in which trees in the center are higher than those around the sides (Monk and Brown 1965). *Taxodium ascendens* is the dominant tree, with the oldest and largest individuals characteristically occupying the center, and smaller and younger individuals around the margins. Pools of stagnant, highly acid water may stand in the center of these depressions ranging from 1-4 feet in depth, but becoming increasingly shallow along the margins. The understory flora is typified by species with tropical affinities.

#### DISTRIBUTION

**Range:** Endemic to south Florida.

**Divisions:** 411:C

**TNC Ecoregions:** 54:C

**Subnations:** FL

#### Associations:

- *Taxodium ascendens* / *Annona glabra* / *Bacopa caroliniana* Forest (CEGL007414, G2?)
- *Taxodium ascendens* / *Chrysobalanus icaco* - *Ficus aurea* - *Persea palustris* Forest (CEGL007416, G2?)

**High-ranked species:** *Aeschynomene pratensis* (G1), *Encyclia cochleata* var. *triandra* (G4G5T2), *Lythrum flagellare* (G2), *Polyradicion lindenii* (G2G4)

**Environment:** This system occurs in areas of low relief, occupying poorly drained to permanently wet depressions. Pools of stagnant, highly acid water may stand in the center of these depressions ranging from 1-4 feet in depth, but becoming increasingly shallow along the margins.

#### SOURCES

**References:** Comer et al. 2003, Monk and Brown 1965

**Version:** 16 Dec 2002

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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**CES411.054 SOUTH FLORIDA DEPRESSION PONDSHORE**

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**Primary Division:** Caribbean (411)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system occupies shallow depressional wetlands in southern and south-central Florida. As currently defined, this system includes a variety of wetlands occupying somewhat different environments. Included for now in this concept are isolated drainages or seasonal ponds as well as solution holes (may have only subsurface or historic water presence), and possibly the shores of large natural lakes. Examples found in these different environments tend to have obviously different landscape contexts, and often different floristics. For instance, examples embedded in Florida Dry Prairie (CES203.380) and/or South Florida Pine Flatwoods (CES411.381) tend to display distinct vegetation zones (Winchester et al. 1985, Huffman and Judd 1988). In contrast, solution holes embedded in South Florida Pine Rockland (CES411.367) and/or South Florida Hardwood Hammock (CES411.287) are small (may be less than 1 to 15 m across and less than 1 to 3+ m deep) and therefore tend to lack zonal vegetation (M. Fellows pers. comm.). More detailed information is needed on the range of vegetation present across this system. Huffman and Judd (1988) provide information on some examples of this system in southwestern Florida.

**Comments:** Examples of South Florida Freshwater Slough and Gator Hole (CES411.485) are generally larger and deeper water wetlands, usually connected with distinct drainageways.

#### DISTRIBUTION

**Range:** Endemic to south Florida.

**Divisions:** 411:C

**TNC Ecoregions:** 54:C

**Subnations:** FL

#### Associations:

- *Eleocharis interstincta* - *Pontederia cordata* - *Crinum americanum* Herbaceous Vegetation (CEGL003975, G2G3)
- *Panicum hemitomom* Tropical Herbaceous Vegetation (CEGL003980, G3?)
- *Schoenoplectus tabernaemontani* Tropical Herbaceous Vegetation (CEGL003986, G3G5)
- *Typha domingensis* - *Pontederia cordata* Herbaceous Vegetation (CEGL003988, G3?)
- *Zizaniopsis miliacea* Subtropical Herbaceous Vegetation (CEGL003989, G2G4Q)

**High-ranked species:** *Echinochloa paludigena* (G3Q), *Ludwigia curtissii* (G3G4), *Neofiber alleni* (G3), *Selaginella eatonii* (G2G3), *Tectaria coriandrifolia* (G2G4)

**Vegetation:** According to Huffman and Judd (1998) some examples of this system tend to display distinct vegetation zones (see also Winchester et al. 1985). In these cases, *Aristida palustris* is characteristic and possibly *Hypericum fasciculatum* depending upon fire history. A large number of other wetland species may be present, such as *Xyris jupicai*, *Rhexia cubensis*, *Rhynchospora filifolia*, and others. Deeper zones dominated by *Pontederia cordata*; as well as "heads" of woody species (*Cephalanthus occidentalis*, *Salix caroliniana*, *Persea palustris*) also may be present. More floristic information is needed from examples of this system found in other parts of south Florida.

#### SPATIAL CHARACTERISTICS

**Adjacent Ecological System Comments:** May be embedded in Florida Dry Prairie (CES203.380), South Florida Pine Flatwoods (CES411.381), South Florida Pine Rockland (CES411.367) and/or South Florida Hardwood Hammock (CES411.287).

#### SOURCES

**References:** Comer et al. 2003, Fellows pers. comm., Huffman and Judd 1998

**Version:** 25 Aug 2003

**Concept Author:** R. Evans

**Stakeholders:** Southeast

**LeadResp:** Southeast

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**CES205.687 EASTERN GREAT PLAINS WET MEADOW, PRAIRIE, AND MARSH**

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**Primary Division:** Eastern Great Plains (205)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system is found along creeks and streams from Nebraska and Iowa to Illinois, and from Minnesota to Texas. It is also found along lake borders, especially in the northern extension of its range into Minnesota. It is often adjacent to a floodplain system, but is devoid of trees and riparian vegetation. It is also distinct from upland prairie systems by having more hydrology, especially associated with silty, dense clay soils that are often hydric soils, classified as Vertic Haplaquolls. The landform is usually floodplain or poorly drained, relatively level land. The vegetation is dominated by *Spartina pectinata*, *Tripsacum dactyloides*, numerous large sedges, such as *Carex frankii* and *Carex hyalinolepis*, and in wetter areas, *Eleocharis* spp. Other emergent marsh species such as *Typha* spp. can be associated with this system. Forbs can include *Helianthus grosseserratus*, *Vernonia fasciculata*, and *Physostegia virginiana*. Fire has had the primary influence on keeping these wet areas free of trees. Other dynamic processes include grazing and flooding (often in the late spring). Many areas have been converted to agricultural, but this usually requires some sort of drainage.

### DISTRIBUTION

**Range:** This system is found throughout the northeastern Great Plains ranging from eastern Kansas to western Illinois and north into Minnesota.

**Divisions:** 205:C

**TNC Ecoregions:** 35:C, 36:C, 45:P, 46:P

**Subnations:** IA, IL, KS, MN, MO, ND, NE, SD

### Associations:

- *Calamagrostis canadensis* - *Phalaris arundinacea* Herbaceous Vegetation (CEGL005174, G4G5)
- *Calamagrostis stricta* - *Carex sartwellii* - *Carex praegracilis* - *Plantago eriopoda* Saline Herbaceous Vegetation (CEGL002255, G2G3)
- *Carex aquatilis* - *Carex* spp. Herbaceous Vegetation (CEGL002262, G4?)
- *Carex atherodes* Herbaceous Vegetation (CEGL002220, G3G5)
- *Carex lacustris* Herbaceous Vegetation (CEGL002256, G4G5)
- *Carex pellita* - *Calamagrostis stricta* Herbaceous Vegetation (CEGL002254, G3G5)
- *Carex rostrata* - *Carex lacustris* - (*Carex vesicaria*) Herbaceous Vegetation (CEGL002257, G4G5)
- *Carex stricta* - *Carex* spp. Herbaceous Vegetation (CEGL002258, G4?)
- *Ceratophyllum demersum* Herbaceous Vegetation (CEGL004528, GNR)
- *Cornus sericea* - *Salix* (*bebbiana*, *discolor*, *petiolaris*) / *Calamagrostis stricta* Shrubland (CEGL002187, G3G4)
- *Cornus sericea* - *Salix* spp. - (*Rosa palustris*) Shrubland (CEGL002186, G5)
- *Impatiens pallida* - *Cystopteris bulbifera* - *Adoxa moschatellina* - (*Chrysosplenium iowense*, *Aconitum noveboracense*) Herbaceous Vegetation (CEGL002387, G2)
- *Nuphar lutea* ssp. *advena* - *Nymphaea odorata* Herbaceous Vegetation (CEGL002386, G4G5)
- *Polygonum amphibium* - (*Polygonum hydropiperoides*) Seasonally Flooded Herbaceous Vegetation (CEGL004699, G4G5)
- *Polygonum* spp. - Mixed Forbs Herbaceous Vegetation (CEGL002430, G4G5)
- *Potamogeton nodosus* Herbaceous Vegetation (CEGL004529, GNR)
- *Potamogeton* spp. - *Ceratophyllum* spp. Midwest Herbaceous Vegetation (CEGL002282, G5)
- *Sagittaria latifolia* - *Leersia oryzoides* Herbaceous Vegetation (CEGL005240, GNR)
- *Sagittaria latifolia* - *Sagittaria longiloba* Herbaceous Vegetation (CEGL004525, GNR)
- *Schoenoplectus acutus* - (*Schoenoplectus fluviatilis*) Freshwater Herbaceous Vegetation (CEGL002225, G4G5)
- *Schoenoplectus fluviatilis* - *Schoenoplectus* spp. Herbaceous Vegetation (CEGL002221, G3G4)
- *Schoenoplectus maritimus* - *Atriplex patula* - *Eleocharis parvula* Herbaceous Vegetation (CEGL005111, G1)
- *Schoenoplectus tabernaemontani* - *Typha* spp. - (*Sparganium* spp., *Juncus* spp.) Herbaceous Vegetation (CEGL002026, G4G5)
- *Spartina pectinata* - *Calamagrostis stricta* - *Carex* spp. Herbaceous Vegetation (CEGL002027, G3?)
- *Spartina pectinata* - *Carex* spp. - *Calamagrostis canadensis* - *Lythrum alatum* - (*Oxypolis rigidior*) Herbaceous Vegetation (CEGL002224, G3?)
- *Spartina pectinata* - *Carex* spp. - *Calamagrostis canadensis* Sand Herbaceous Vegetation (CEGL005178, G3?)
- *Spiraea tomentosa* - *Salix humilis* / *Andropogon gerardii* - *Panicum virgatum* Shrubland (CEGL005069, G1Q)
- *Stuckenia pectinata* - *Ceratophyllum demersum* Herbaceous Vegetation (CEGL002281, GNR)
- *Typha* (*angustifolia*, *domingensis*, *latifolia*) - *Schoenoplectus americanus* Herbaceous Vegetation (CEGL002032, G3G4)
- *Typha latifolia* - *Thalia dealbata* Herbaceous Vegetation (CEGL004526, GNR)
- *Typha* spp. - *Schoenoplectus acutus* - Mixed Herbs Midwest Herbaceous Vegetation (CEGL002229, G4?)

- *Typha* spp. Midwest Herbaceous Vegetation (CEGL002233, G5)

**High-ranked species:** *Calephelis muticum* (G3), *Eleocharis wolfii* (G3G4), *Platanthera leucophaea* (G3), *Schoenoplectus hallii* (G2)

**Environment:** This system is found primarily on silty and/or dense clay, hydric soils, usually classified as Vertic Haplaquolls. It is often found within poorly drained, relatively level areas.

**Vegetation:** *Spartina pectinata*, *Tripsacum dactyloides*, numerous large sedges, such as *Carex frankii* and *Carex hyalinolepis* dominate this system. In wetter areas, *Eleocharis* spp. and *Typha* spp. may be significant. Forbs such as *Helianthus grosseserratus*, *Vernonia fasciculata*, and *Physostegia virginiana* also may be common. Shrub species can be present, especially in the northern range of this system, however, they are usually insignificant compared to the prairie and meadow species.

**Dynamics:** Fire is the major dynamic process that helps maintain the herbaceous nature of this system and prevents trees from establishing. Grazing and periodic flooding can also influence this system.

#### SOURCES

**References:** Comer et al. 2003, Lauver et al. 1999, Steinauer and Rolfsmeier 2000

**Version:** 05 Mar 2003

**Concept Author:** S. Menard and K. Kindscher

**Stakeholders:** Canada, Midwest

**LeadResp:** Midwest

### CES301.460 SOUTH TEXAS DUNE AND COASTAL GRASSLAND

**Primary Division:** Madrean Semidesert (301)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Matrix

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Concept Summary:** This system includes non-tidal maritime grasslands occurring on barrier islands and mainland areas near the coast of southern Texas. This includes grasslands of primary and secondary dunes, interdune swales, barrier flats, and the mainland. Some examples of this system naturally occurred as an open matrix of midgrass species within native mesquite - acacia shrublands dominated by *Prosopis glandulosa*, *Acacia farnesiana*, and *Acacia rigidula* but have become shrub-dominated due to the lack of fire. In many areas this system has been virtually eliminated due to conversion to tame pasture, cropland, or due to lack of burning.

#### DISTRIBUTION

**Range:** This system ranges from Matagorda Island south along the northern Gulf of Mexico.

**Divisions:** 301:C

**TNC Ecoregions:** 31:C

**Subnations:** TX

#### Associations:

- *Acacia rigidula* Shrubland (CEGL003874, G4G5)
- *Bothriochloa barbinodis* - *Chloris pluriflora* Herbaceous Vegetation (CEGL002236, G2?)
- *Paspalum vaginatum* Herbaceous Vegetation (CEGL004114, G3G4)
- *Pennisetum ciliare* Herbaceous Vegetation (CEGL004925, GNA)
- *Prosopis glandulosa* var. *glandulosa* - *Celtis pallida* / *Opuntia* spp. - *Xylothamia palmeri* Woodland (CEGL007787, G4G5)
- *Prosopis glandulosa* var. *glandulosa* / (*Celtis pallida*, *Phaulothamnus spinescens*, *Ziziphus obtusifolia* var. *obtusifolia*) Woodland (CEGL002132, G2?)
- *Prosopis glandulosa* var. *glandulosa* / *Celtis pallida* - *Opuntia* spp. Woodland (CEGL007756, GNA)
- *Spartina patens* - *Fimbristylis (caroliniana, castanea)* - (*Panicum virgatum*) Herbaceous Vegetation (CEGL007836, G2G3)
- *Uniola paniculata* - (*Panicum amarum*) - *Croton punctatus* Herbaceous Vegetation (CEGL002218, G3?)

#### SOURCES

**References:** Comer et al. 2003

**Version:** 13 Jan 2003

**Concept Author:** J. Teague

**Stakeholders:** Southeast

**LeadResp:** Southeast

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**CES303.657 EDWARDS PLATEAU GRANITIC FOREST, WOODLAND AND GLADE**

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**Primary Division:** Western Great Plains (303)

**Land Cover Class:** Forest and Woodland

**Spatial Scale & Pattern:** Matrix

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Isolated Wetland [Strictly Isolated]

**Concept Summary:** This upland matrix system occurs primarily on coarse soils derived from the weathering of underlying granites in the Llano Uplift region of Texas. The underlying granitic substrate determines the range of this system. It is comprised of a mosaic of vegetation types, including closed-canopy forests, open woodlands, savannas and sparsely vegetated rock outcrops. Common trees include *Quercus marilandica*, *Quercus fusiformis*, *Quercus stellata*, *Carya texana*, *Ulmus crassifolia*, and *Prosopis glandulosa*. Subcanopy species may include *Diospyros texana*, *Ungnadia speciosa*, *Ziziphus obtusifolia* var. *obtusifolia*, *Eysenhardtia texana*, *Aesculus glabra* var. *arguta*, *Opuntia engelmannii* var. *lindheimeri* (= *Opuntia lindheimeri*), *Yucca elata*, *Nolina texana*, and *Opuntia leptocaulis*. Grasslands may be dominated by *Schizachyrium scoparium*, *Sorghastrum nutans*, *Panicum virgatum*, *Bouteloua hirsuta*, *Bouteloua curtipendula*, *Nassella leucotricha*, *Campanula reverchonii*, and *Plantago wrightiana*. Granitic glades and barrens are sparsely vegetated by crustose and foliose lichens, several ferns and fern allies, and cacti. This system also includes small (up to 16 m in diameter) shallow depressions that hold rainwater and support wetland flora including the Texas endemic, *Isoetes lithophila*.

**Comments:** This ecological system is defined to include a diversity of vegetation occurring on granitic outcrops and on soils that have developed over these outcrops in central Texas. In comparison to other areas of the U.S. where sparsely vegetated glades and barrens may be defined separately from the woodland surrounding them and/or the woodland separately from the forest (e.g., Southern Piedmont Granite Flatrock (CES202.329) just includes the sparsely vegetated barrens), these different vegetation types are included together here because they occur as an ecological complex or mosaic and they share floristic and geologic affinities that set them apart from the surrounding landscape. In the central mineral region of central Texas, granite glades and barrens are surrounded by areas of deeper soils derived from granite that support denser herbaceous or woody vegetation that includes many species found sparsely on the glades. In the eastern U.S. xeric granite outcrops are generally separated from one another by large areas of mesic to dry-mesic forests, whereas the granitic outcrops in central Texas are separated from one another by areas of coarse soils derived from the underlying granite. In addition, the xeric nature of the granite outcrops in the eastern U.S. is a stark contrast to the other vegetation in this humid temperate environment. Whereas, west of the dry line, the moisture availability of the granite outcrops in central Texas is not as starkly contrasted with the surrounding landscape. This has been suggested as a reason why the granite glades of central Texas do not support the degree of endemism that is found on the granite outcrops of the eastern U.S. (Walters and Wyatt 1982). The relationship of this ecological system to the granite glades and woodlands occurring in Oklahoma (currently included in Crosstimbers Oak Forest and Woodland (CES205.682)) needs to be further explored.

### DISTRIBUTION

**Range:** This system is restricted to the Llano Uplift region of Texas.

**Divisions:** 303:C

**TNC Ecoregions:** 29:C

**Subnations:** TX

### Associations:

- *Hilaria belangeri* - *Bouteloua curtipendula* Herbaceous Vegetation (CEGL002238, G3?)
- *Quercus fusiformis* - (*Quercus stellata*) / *Schizachyrium scoparium* Granite Woodland (CEGL004937, G2?)
- *Quercus fusiformis* - *Celtis laevigata* var. *reticulata* Woodland (CEGL002153, G4?)
- *Quercus fusiformis* / *Schizachyrium scoparium* Woodland (CEGL002115, G2G4)
- *Sedum nuttallianum* - *Selaginella peruviana* Granitic Outcrop Sparse Vegetation (CEGL004396, G2)

**High-ranked species:** *Campanula reverchonii* (G2), *Isoetes lithophila* (G2)

**Environment:** This system is restricted to the Llano Uplift, also known as the central mineral region of Texas. Though named as an uplift because it is an intrusion of Precambrian metamorphic rocks and large granitic massifs, this area is generally lower in elevation than the surrounding Edwards Plateau (Walters and Wyatt 1982, Riskind and Diamond 1988). At a regional scale, it is a topographic bowl, though rock outcrops such as Enchanted Rock often produce dramatic increases in elevation at a local scale. Aside from these massif intrusions, topography is generally level to rolling. The substrate of granites, gneisses and schists determines the range of this system in central Texas. Elevation ranges from 251 to 686 m above sea level (825-2250 feet). Rainfall averages about 76 cm (30 inches), peaking in May or June and September. The central mineral region occupies approximately 1.5 million hectares in central Texas (Riskind and Diamond 1988). Mineralogy of the



granitic material varies, with hornblende schist, graphite schist, quartz-feldspar gneiss and quartz-plagioclase-microcline rock common (Riskind and Diamond 1988). Soils are predominantly acidic.

**Vegetation:** This system is typified by a mosaic of mixed oak forests and savannas over coarse soils and sparsely vegetated areas on rock outcrops. Species such as *Quercus marilandica*, *Quercus fusiformis*, *Quercus stellata*, *Carya texana*, *Ulmus crassifolia*, and *Prosopis glandulosa* may dominate the canopy of this system. Some areas are characterized by dense forest patches (mottes) of *Quercus fusiformis*, with various mixtures of other oaks and shrubs surrounded by open grasslands. Subcanopy species may include *Diospyros texana*, *Ungnadia speciosa*, *Ziziphus obtusifolia* var. *obtusifolia*, *Eysenhardtia texana*, *Aesculus glabra* var. *arguta*, *Opuntia lindheimeri*, *Yucca elata*, *Nolina texana*, and *Opuntia leptocaulis*. The ground flora may contain *Schizachyrium scoparium*, *Sorghastrum nutans*, *Panicum virgatum*, *Bouteloua hirsuta*, *Bouteloua curtipendula*, *Nassella leucotricha*, *Campanula reverchonii*, and *Plantago wrightiana*.

In addition to oak woodlands and grasslands, this system also includes granitic glades and barrens. These are sparsely vegetated areas characterized by crustose and foliose lichens, several ferns and fern allies, and cacti, including *Cheilanthes lindheimeri*, *Pellaea ternifolia*, *Selaginella arenicola* ssp. *riddellii*, *Selaginella peruviana*, *Selaginella wrightii*, *Echinocereus reichenbachii*, and *Echinocereus triglochidiatus* (= *Echinocereus coccineus*). Other species that may occur in cracks and crevices or slight depressions with shallow, gravelly soil include *Eriogonum tenellum*, *Lechea san-sabeana*, *Sedum nuttallianum*, *Tripogon spicatus*, *Plantago wrightiana*, *Talinum parviflorum*, *Helenium amarum*, *Campanula reverchonii*, *Aphanostephus skirrhobasis*, and *Hypericum gentianoides*. Small-scale shallow vernal pools formed within barrens by weathering of the granitic surface support *Crassula aquatica*, *Sedum nuttallianum*, *Talinum parviflorum*, *Eleocharis montevidensis*, *Elatine brachysperma*, *Juncus diffusissimus*, *Allium canadense*, *Nothoscordum bivalve*, *Cooperia drummondii*, *Lepuropetalon spathulatum*, *Isoetes melanopoda*, and the Texas endemic *Isoetes lithophila*. Larger pools often exhibit a pattern of zonation of the vegetation as soil accumulates in the center. Crevices in the rock outcrops tend to support scattered, stunted individuals of trees and shrubs found in the adjacent woodland. Endemics or near-endemics occurring within this ecological system include *Isoetes lithophila*, *Campanula reverchonii*, *Eriogonum tenellum* var. *ramosissimum*, *Elatine brachysperma*, and *Tripogon spicatus*.

**Dynamics:** This ecological system is a complex of vegetation types. The different physiognomies are maintained by an interaction between site conditions and disturbance dynamics. The forest patches, woodlands, savannas and grasslands are thought to have been maintained historically by various fire frequencies and intensities. In the absence of natural or prescribed fire, increased cover of woody vegetation has increased in some occurrences. Native grazing may have also played a role in preventing woody encroachment though the rough terrain of much of this system would have limited the extent of native grazers.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** This system is the matrix system of the Llano Uplift area (EPA ecoregion 30D) of central Texas.

**Size:** As a complex, this system covered large areas (>2000 ha), but occurrences of individual physiognomies (forests, woodlands, grasslands, barrens) may occur as large (50-2000 ha) or small (1-50 ha) patches.

**Heterogeneity:** This ecological system is a complex of vegetation types, including forests, woodlands, grasslands and barrens.

**Adjacent Ecological System Comments:** This system is adjacent to Edwards Plateau Limestone Forest, Woodland and Glade (CES303.660), Edwards Plateau Limestone Shrubland (CES303.041), and is dissected by Edwards Plateau Mesic Canyon (CES303.038) and Western Great Plains Floodplain (CES303.678). A common component of Edwards Plateau Limestone Forest, Woodland and Glade (CES303.660), *Quercus buckleyi*, is conspicuously absent from Edwards Plateau Granitic Forest, Woodland and Glade (CES303.657).

### SOURCES

**References:** Riskind and Diamond 1988, Southeastern Ecology Working Group n.d., Walters and Wyatt 1982, Whitehouse 1933

**Version:** 21 Apr 2005

**Concept Author:** J. Teague and L. Elliott

**Stakeholders:** Southeast

**LeadResp:** Southeast

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## CES303.666 WESTERN GREAT PLAINS CLOSED DEPRESSION WETLAND

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**Primary Division:** Western Great Plains (303)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** Communities associated with the playa lakes in the southern areas of this province and the rainwater basins in Nebraska characterize this system. They are primarily upland depressional basins. This hydric system is typified by the presence of an impermeable layer such as a dense clay, hydric soil and is usually recharged by rainwater and nearby runoff. They are rarely linked to outside groundwater sources and do not have an extensive watershed. Ponds and lakes associated with this system can experience periodic drawdowns during drier seasons and years, and are often replenished by spring rains. *Eleocharis* spp., *Hordeum jubatum*, along with common forbs such as *Coreopsis tinctoria*, *Symphyotrichum subulatum* (= *Aster subulatus*), and *Polygonum pensylvanicum* (= *Polygonum bicorne*) are common vegetation in the wetter and deeper depression, while *Pascopyrum smithii* and *Buchloe dactyloides* are more common in shallow depressions in rangeland. Species richness can vary considerably among individual examples of this system and is especially influenced by adjacent land use, which is often agriculture, and may provide nutrient and herbicide runoff. Dynamic processes that affect these depressions are hydrological changes, grazing, and conversion to agricultural use.

**Comments:** Open and emergent marshes may be a separate system from wet meadows and wet prairies.

#### DISTRIBUTION

**Range:** This system can be found throughout the eastern portion of the Western Great Plains Division, however, it is most prevalent in the central states of Nebraska, Kansas and Oklahoma.

**Divisions:** 205:P, 303:C

**TNC Ecoregions:** 27:C, 28:C, 32:P, 33:C

**Subnations:** CO, KS, NE, NM?, OK, TX

#### Associations:

- *Argentina anserina* Herbaceous Vegetation [Provisional] (CEGL005825, GNA)
- *Eleocharis palustris* - (*Eleocharis compressa*) - *Leptochloa fusca* ssp. *fascicularis* Herbaceous Vegetation (CEGL002259, GNR)
- *Eleocharis palustris* Herbaceous Vegetation (CEGL001833, G5)
- *Heteranthera limosa* - *Bacopa rotundifolia* - *Sagittaria latifolia* Herbaceous Vegetation (CEGL002279, GNR)
- *Hordeum jubatum* Herbaceous Vegetation (CEGL001798, G4)
- *Panicum obtusum* - *Buchloe dactyloides* Herbaceous Vegetation (CEGL001573, GNRQ)
- *Panicum obtusum* - *Panicum hallii* Herbaceous Vegetation (CEGL001575, GNR)
- *Pascopyrum smithii* - (*Elymus trachycaulus*) Clay Pan Herbaceous Vegetation (CEGL002239, GNR)
- *Pascopyrum smithii* - *Buchloe dactyloides* - (*Phyla cuneifolia*, *Oenothera canescens*) Herbaceous Vegetation (CEGL002038, G2G3)
- *Pascopyrum smithii* - *Distichlis spicata* Herbaceous Vegetation (CEGL001580, G4)
- *Pascopyrum smithii* - *Eleocharis* spp. Herbaceous Vegetation (CEGL001581, G1)
- *Pascopyrum smithii* - *Hordeum jubatum* Herbaceous Vegetation (CEGL001582, G4)
- *Pleuraphis mutica* - *Panicum obtusum* Herbaceous Vegetation (CEGL001639, G3)
- *Polygonum* spp. - *Echinochloa* spp. - *Distichlis spicata* Playa Lake Herbaceous Vegetation (CEGL002039, G2G4)
- *Sarcobatus vermiculatus* / *Leymus cinereus* Shrubland (CEGL001366, G3)
- *Schoenoplectus americanus* - *Eleocharis* spp. Herbaceous Vegetation (CEGL001586, GNR)
- *Spartina pectinata* - *Eleocharis* spp. - *Carex* spp. Herbaceous Vegetation (CEGL002223, G2G4)

**High-ranked species:** *Ambrosia linearis* (G3), *Branchinecta potassa* (G3), *Eleocharis wolfii* (G3G4)

**Environment:** This system is typified by upland depressional basins with an impermeable layer such as dense clay, hydric soils. Rainwater and runoff primarily recharge this system and it is rarely linked to outside groundwater sources.

**Vegetation:** Species richness varies considerably among individual examples of this system. Commonly, *Eleocharis* spp., *Hordeum jubatum*, along with *Coreopsis tinctoria*, *Symphyotrichum subulatum* (= *Aster subulatus*), and *Polygonum pensylvanicum* (= *Polygonum bicorne*) are found in the wetter and deeper depression. Shallower depressions in rangelands commonly contain *Pascopyrum smithii* and *Buchloe dactyloides*.

**Dynamics:** Hydrological changes, grazing and conversion to agriculture are the primary processes influencing this system.

#### SOURCES

**References:** Comer et al. 2003, Hoagland 2000, Lauver et al. 1999

**Version:** 14 Dec 2004

**Concept Author:** S. Menard and K. Kindscher

**Stakeholders:** Midwest, Southeast, West

**LeadResp:** Midwest

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### CES303.675 WESTERN GREAT PLAINS OPEN FRESHWATER DEPRESSION WETLAND

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**Primary Division:** Western Great Plains (303)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system is composed of lowland depressions and also occurs along lake borders that have more open basins and a permanent water source through most of the year except during exceptional drought years. These areas are distinct from Western Great Plains Closed Depression Wetland (CES303.666) by having a large watershed and/or significant connection to the groundwater table. Some of the specific communities will also be found in the floodplain system and should not be considered a separate system in that case. These types should also not be considered a separate system if they are occurring in lowland areas of the prairie matrix only because of an exceptional wet year. A variety of species are part of this system, including *Typha* spp. and *Schoenoplectus* spp. The system includes submergent and emergent marshes, and associated wet meadows and wet prairies. These types can also drift into stream margins that are more permanently wet and linked directly to basin via groundwater flow from/into the pond or lake.

**Comments:** This system occurs widely throughout the western Great Plains, but in the arid shortgrass region, it is replaced by North American Arid West Emergent Marsh (CES300.729). Open and emergent marshes may be a separate system from wet meadows and wet prairies.

### DISTRIBUTION

**Range:** This system can occur throughout the northwestern Great Plains Division, but not in the arid shortgrass region.

**Divisions:** 205:P, 303:C

**TNC Ecoregions:** 26:C, 33:C, 34:C, 37:?, 66:P, 67:P

**Subnations:** KS, MT, ND, NE, OK, SD, WY

### Associations:

- *Alnus incana* Swamp Shrubland (CEGL002381, G5?)
- *Betula occidentalis* - *Dasiphora fruticosa* ssp. *floribunda* Shrubland (CEGL001083, G2Q)
- *Calamagrostis canadensis* - *Juncus* spp. - *Carex* spp. Sandhills Herbaceous Vegetation (CEGL002028, G3G4)
- *Calamagrostis stricta* - *Carex sartwellii* - *Carex praeegracilis* - *Plantago eriopoda* Saline Herbaceous Vegetation (CEGL002255, G2G3)
- *Carex aquatilis* - *Carex* spp. Herbaceous Vegetation (CEGL002262, G4?)
- *Carex aquatilis* Herbaceous Vegetation (CEGL001802, G5)
- *Carex atherodes* Herbaceous Vegetation (CEGL002220, G3G5)
- *Carex interior* - *Eleocharis elliptica* - *Thelypteris palustris* Herbaceous Vegetation (CEGL002390, G1G2)
- *Carex nebrascensis* Herbaceous Vegetation (CEGL001813, G4)
- *Carex pellita* - *Calamagrostis stricta* Herbaceous Vegetation (CEGL002254, G3G5)
- *Carex prairea* - *Schoenoplectus pungens* - *Rhynchospora capillacea* Herbaceous Vegetation (CEGL002267, G2)
- *Carex rostrata* - *Carex lacustris* - (*Carex vesicaria*) Herbaceous Vegetation (CEGL002257, G4G5)
- *Carex* spp. - *Triglochin maritima* - *Eleocharis quinqueflora* Marl Fen Herbaceous Vegetation (CEGL002268, G1?)
- *Carex stricta* - *Carex* spp. Herbaceous Vegetation (CEGL002258, G4?)
- *Ceratophyllum demersum* Herbaceous Vegetation (CEGL004528, GNR)
- *Cornus sericea* - *Salix* (*bebbiana*, *discolor*, *petiolaris*) / *Calamagrostis stricta* Shrubland (CEGL002187, G3G4)
- *Eleocharis palustris* - (*Eleocharis compressa*) - *Leptochloa fusca* ssp. *fascicularis* Herbaceous Vegetation (CEGL002259, GNR)
- *Eleocharis palustris* Herbaceous Vegetation (CEGL001833, G5)
- *Glyceria borealis* Herbaceous Vegetation (CEGL001569, G4)
- *Juncus balticus* Herbaceous Vegetation (CEGL001838, G5)
- *Panicum virgatum* - (*Pascopyrum smithii*) Herbaceous Vegetation (CEGL001484, G2Q)
- *Phalaris arundinacea* Western Herbaceous Vegetation (CEGL001474, G5)
- *Polygonum amphibium* Permanently Flooded Herbaceous Vegetation [Placeholder] (CEGL002002, G5)
- *Polygonum pensylvanicum* - *Polygonum lapathifolium* Herbaceous Vegetation (CEGL002277, G4?)
- *Polygonum* spp. - *Echinochloa* spp. - *Distichlis spicata* Playa Lake Herbaceous Vegetation (CEGL002039, G2G4)
- *Potamogeton richardsonii* - *Myriophyllum spicatum* Herbaceous Vegetation (CEGL002006, G2Q)
- *Potamogeton* spp. - *Ceratophyllum demersum* Great Plains Herbaceous Vegetation (CEGL002044, G4G5)
- *Sagittaria latifolia* - *Leersia oryzoides* Herbaceous Vegetation (CEGL005240, GNR)
- *Sagittaria latifolia* - *Sagittaria longiloba* Herbaceous Vegetation (CEGL004525, GNR)
- *Schoenoplectus acutus* - (*Schoenoplectus fluviatilis*) Freshwater Herbaceous Vegetation (CEGL002225, G4G5)

- *Schoenoplectus acutus* - *Typha latifolia* - (*Schoenoplectus tabernaemontani*) Sandhills Herbaceous Vegetation (CEGL002030, G4)
- *Schoenoplectus tabernaemontani* - *Typha* spp. - (*Sparganium* spp., *Juncus* spp.) Herbaceous Vegetation (CEGL002026, G4G5)
- *Schoenoplectus tabernaemontani* Temperate Herbaceous Vegetation (CEGL002623, G5)
- *Scolochloa festucacea* Herbaceous Vegetation (CEGL002260, G4G5)
- *Spartina pectinata* - *Calamagrostis stricta* - *Carex* spp. Herbaceous Vegetation (CEGL002027, G3?)
- *Spartina pectinata* - *Carex* spp. Herbaceous Vegetation (CEGL001477, G3?)
- *Spartina pectinata* - *Eleocharis* spp. - *Carex* spp. Herbaceous Vegetation (CEGL002223, G2G4)
- *Spartina pectinata* - *Schoenoplectus pungens* Herbaceous Vegetation (CEGL001478, G3?)
- *Stuckenia pectinata* - *Ceratophyllum demersum* Herbaceous Vegetation (CEGL002281, GNR)
- *Stuckenia pectinata* - *Myriophyllum (sibiricum, spicatum)* Herbaceous Vegetation (CEGL002003, G3G4)
- *Stuckenia pectinata* - *Zannichellia palustris* Herbaceous Vegetation (CEGL002005, G3G4)
- *Typha (angustifolia, domingensis, latifolia)* - *Schoenoplectus americanus* Herbaceous Vegetation (CEGL002032, G3G4)
- *Typha (latifolia, angustifolia)* Western Herbaceous Vegetation (CEGL002010, G5)
- *Typha latifolia* - *Equisetum hyemale* - *Carex (hystericina, pellita)* Seep Herbaceous Vegetation (CEGL002033, G3)
- *Typha* spp. - *Schoenoplectus* spp. - Mixed Herbs Great Plains Herbaceous Vegetation (CEGL002228, G4G5)
- *Typha* spp. Great Plains Herbaceous Vegetation (CEGL002389, G4G5)

**High-ranked species:** *Eleocharis wolfii* (G3G4), *Schoenoplectus hallii* (G2)

**Environment:** This system is found within lowland depressions and along lakes that have more permanent water sources throughout the year. These areas typically have a large watershed and are connected to the groundwater sources. Examples may also drift into stream margins that are more permanently wet and linked to a basin via groundwater flow from/into a pond or lake. Those areas that are found within larger prairie matrix that are only lowland or wet because of an exceptional wet year are not part of this system.

**Vegetation:** Many species can be associated with this system with *Typha* spp. and *Schoenoplectus* spp. being common.

**Dynamics:** Hydrology is the primary process influencing this system. Grazing and conversion to agriculture can significantly impact the hydrology and species composition of this system.

#### SOURCES

**References:** Comer et al. 2003, Hoagland 2000, Lauver et al. 1999, Steinauer and Rolfsmeier 2000

**Version:** 14 Dec 2004

**Stakeholders:** Midwest, Southeast, West

**Concept Author:** S. Menard and K. Kindscher

**LeadResp:** Midwest

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### CES303.669 WESTERN GREAT PLAINS SALINE DEPRESSION WETLAND

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**Primary Division:** Western Great Plains (303)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This ecological system is very similar to Western Great Plains Open Freshwater Depression Wetland (CES303.675) and Western Great Plains Closed Depression Wetland (CES303.666). However, strongly saline soils cause both the shallow lakes and depressions and the surrounding areas to be more brackish. Salt encrustations can occur on the surface in some examples of this system, and the soils are severely affected and have poor structure. Species that typify this system are salt-tolerant and halophytic species such as *Distichlis spicata*, *Sporobolus airoides*, and *Hordeum jubatum*. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils of some examples of this system which may allow for less salt-tolerant species to occur. Communities found within this system may also occur in floodplains (i.e., more open depressions) but probably should not be considered a separate system unless they transition to areas outside the immediate floodplain.

**Comments:** Open and emergent saline marshes may be a separate system from saline wet meadows and prairies.

#### DISTRIBUTION

**Range:** This system can occur throughout the Western Great Plains, but is likely more prevalent in the south-central portions of the division.

**Divisions:** 303:C

**TNC Ecoregions:** 26:?, 27:C, 28:C, 33:C, 34:?

**Subnations:** CO, KS, MT, ND, NE, NM, OK, SD, WY

**Associations:**

- *Calamagrostis stricta* - *Carex sartwellii* - *Carex praeegracilis* - *Plantago eriopoda* Saline Herbaceous Vegetation (CEGL002255, G2G3)
- *Distichlis spicata* - (*Hordeum jubatum*, *Poa arida*, *Sporobolus airoides*) Herbaceous Vegetation (CEGL002042, G3)
- *Distichlis spicata* - *Hordeum jubatum* - (*Poa arida*, *Iva annua*) Herbaceous Vegetation (CEGL002031, G2G3)
- *Distichlis spicata* - *Hordeum jubatum* - *Puccinellia nuttalliana* - *Suaeda calceoliformis* Herbaceous Vegetation (CEGL002273, G2G3)
- *Distichlis spicata* - *Schoenoplectus maritimus* - *Salicornia rubra* Herbaceous Vegetation (CEGL002043, G1G2)
- *Distichlis spicata* - *Spartina* spp. Herbaceous Vegetation (CEGL002275, G4)
- *Distichlis spicata* Herbaceous Vegetation (CEGL001770, G5)
- *Hordeum jubatum* Herbaceous Vegetation (CEGL001798, G4)
- *Pascopyrum smithii* - *Distichlis spicata* Herbaceous Vegetation (CEGL001580, G4)
- *Pascopyrum smithii* - *Hordeum jubatum* Herbaceous Vegetation (CEGL001582, G4)
- *Puccinellia nuttalliana* Herbaceous Vegetation (CEGL001799, G3?)
- *Salicornia rubra* Herbaceous Vegetation (CEGL001999, G2G3)
- *Sarcobatus vermiculatus* / *Distichlis spicata* - (*Puccinellia nuttalliana*) Shrub Herbaceous Vegetation (CEGL002146, GNR)
- *Sarcobatus vermiculatus* / *Pascopyrum smithii* - (*Elymus lanceolatus*) Shrub Herbaceous Vegetation (CEGL001508, G4)
- *Schoenoplectus americanus* - *Carex* spp. Herbaceous Vegetation (CEGL004144, GNR)
- *Schoenoplectus americanus* Great Plains Herbaceous Vegetation (CEGL002226, GNR)
- *Schoenoplectus maritimus* - *Schoenoplectus acutus* - (*Triglochin maritima*) Herbaceous Vegetation (CEGL002227, G3G5)
- *Schoenoplectus maritimus* Herbaceous Vegetation (CEGL001843, G4)
- *Schoenoplectus pungens* - *Suaeda calceoliformis* Alkaline Herbaceous Vegetation (CEGL002040, G3G4)
- *Schoenoplectus pungens* Herbaceous Vegetation (CEGL001587, G3G4)
- *Scolochloa festucacea* Herbaceous Vegetation (CEGL002260, G4G5)
- *Spartina pectinata* - *Schoenoplectus pungens* Herbaceous Vegetation (CEGL001478, G3?)
- *Sporobolus airoides* Monotype Herbaceous Vegetation (CEGL001688, GUQ)
- *Sporobolus airoides* Northern Plains Herbaceous Vegetation (CEGL002274, GNR)
- *Sporobolus airoides* Southern Plains Herbaceous Vegetation (CEGL001685, G3Q)
- *Stuckenia pectinata* - *Ruppia maritima* Herbaceous Vegetation (CEGL002004, G2?)
- *Stuckenia pectinata* - *Zannichellia palustris* Herbaceous Vegetation (CEGL002005, G3G4)
- *Typha* spp. - *Schoenoplectus* spp. - Mixed Herbs Great Plains Herbaceous Vegetation (CEGL002228, G4G5)
- *Typha* spp. Great Plains Herbaceous Vegetation (CEGL002389, G4G5)

**High-ranked species:** *Eleocharis wolfii* (G3G4), *Schoenoplectus hallii* (G2)

**Environment:** This system is distinct from the freshwater depression systems by its brackish nature caused by strongly saline soils. Salt encrustations could occur near the surface in some examples of this system.

**Vegetation:** Salt-tolerant and halophytic species such as *Distichlis spicata*, *Sporobolus airoides*, and *Hordeum jubatum* typify the system.

**Dynamics:** Hydrology processes primarily drive this system. Increases in precipitation and/or runoff can dilute the salt concentration and allow for less salt tolerant species to occur. Conversion to agriculture and pastureland can also impact this system, especially when it alters the hydrology of the system.

**SOURCES**

**References:** Comer et al. 2003, Hoagland 2000, Lauver et al. 1999, Steinauer and Rolfsmeier 2000

**Version:** 14 Dec 2004

**Stakeholders:** Midwest, Southeast, West

**Concept Author:** S. Menard and K. Kindscher

**LeadResp:** Midwest

**CES303.661 GREAT PLAINS PRAIRIE POTHOLE**

**Primary Division:** Western Great Plains (303)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Concept Summary:** The prairie pothole system is found primarily in glaciated northern Great Plains of the United States and Canada, and is dominated by depressional wetlands formed by glaciers scraping the landscape during the Pleistocene era. This system is typified by several classes of wetlands distinguished by changes in topography, soils and hydrology. Many of the basins within this system are closed basins and receive irregular inputs of water from their surroundings (groundwater and precipitation), and export water as groundwater. Hydrology of the potholes is complex. Precipitation and runoff from snowmelt are often the principal water sources, with groundwater inflow secondary. Evapotranspiration is the major water loss, with seepage loss secondary. Most of the wetlands and lakes contain water that is alkaline (pH >7.4). The concentration of dissolved solids in these waters ranges from fresh to extremely saline. The flora and vegetation of this system is a function of the topography, water regime, and salinity. In addition, because of periodic droughts and wet periods, many wetlands within this system may undergo vegetation cycles. This system includes elements of emergent marshes and wet, sedge meadows that develop into a pattern of concentric rings. This system is responsible for a significant percentage of the annual production of many economically important waterfowl in North America and houses more than 50% of North American's migratory waterfowl with several species reliant on this system for breeding and feeding. Much of the original extent of this system has been converted to agriculture and only approximately 40-50% of the system remains undrained.

**Comments:** More data from Canada is needed to really define this system completely.

### DISTRIBUTION

**Range:** This system can be found throughout the northern Great Plains ranging from central Iowa northeast to southern Saskatchewan and Alberta. It encompasses approximately 870,000 km<sup>2</sup> with approximately 80% of its range in southern Canada. It is also prevalent in North Dakota, South Dakota, and northern Minnesota.

**Divisions:** 205:C, 303:C

**TNC Ecoregions:** 34:C, 35:C, 66:P, 67:P

**Subnations:** AB, IA?, MB, MN, ND, SD, SK

### Associations:

- *Carex lasiocarpa* - *Carex oligosperma* / *Sphagnum* spp. Herbaceous Vegetation (CEGL002265, G3G4)
- Northern Prairie Pothole Wetland Complex (CECX005705, G3G5)
- *Schoenoplectus acutus* - (*Schoenoplectus fluviatilis*) Freshwater Herbaceous Vegetation (CEGL002225, G4G5)
- *Schoenoplectus maritimus* - *Schoenoplectus acutus* - (*Triglochin maritima*) Herbaceous Vegetation (CEGL002227, G3G5)
- *Schoenoplectus maritimus* Herbaceous Vegetation (CEGL001843, G4)

**High-ranked species:** *Eleocharis wolfii* (G3G4), *Platanthera leucophaea* (G3)

**Environment:** This system is dominated by closed basins, potholes, that receive irregular inputs of water from the surroundings and export water as groundwater. The climate for the range of this system is characterized by mid-continental temperature and precipitation extremes. Snowmelt in the spring typically fills many of the potholes in examples of this system. The region in the range of this system is distinguished by a thin mantle of glacial drift with overlying stratified sedimentary rocks of the Mesozoic and Cenozoic ages; these form a glacial landscape of end moraines, stagnation moraines, outwash plains and lakeplains. The glacial drift ranges 30 to 120 m thick and forms steep to slight local relief with fine-grained, silty to clayey soils. Limestone, sandstone, and shales predominant, and highly mineralized water can discharge from these rocks. The hydrology of this system is complex with salinity ranging from fresh to saline, and chemical characteristics varying seasonally and annually. Precipitation and snowmelt are the primary water sources with evapotranspiration being the source of major water loss.

**Vegetation:** The vegetation within this system is highly influenced by hydrology, salinity and dynamics. Potholes found within this system can vary in depth and duration, which will determine the local gradient of species. Likewise, plant species found within individual potholes of this system will be strongly influenced by periodic drought and wet periods. Deeper potholes with standing water throughout most of the year have a central zone of submersed aquatic vegetation. Potholes that dry during droughty times can have central zones dominated by either tall emergents or mid-height emergents depending on the depth of the marsh. Wet meadow species such as grasses, forbs and sedges can be found in potholes that are only flooded briefly in the spring. All of these types of potholes can be found within an example of this system. Grazing, draining, and mowing of this system can influence the distribution of these types of potholes and plant species within this system.

**Dynamics:** Flooding is the primary natural dynamic influencing this system. Snowmelt in the spring often floods this system and can cause the prominent potholes within the system to overflow. Greater than normal precipitation can flood out emergent vegetation and/or increase herbivory by animal species such as muskrats. This system can undergo periodic wet and droughty periods that can cause shifts in the vegetation. Vegetation zones are evident around the wet potholes throughout this system, and each zone responds to changing environmental conditions. Draining and conversion to

agriculture can also significantly impact this system. Much of the original extent of this system has been converted to cropland, and many remaining examples are under pressure to be drained.

#### SOURCES

**References:** Comer et al. 2003, Johnson et al. 1987, Kantrud et al. 1989

**Version:** 05 Mar 2003

**Concept Author:** S. Menard

**Stakeholders:** Canada, Midwest

**LeadResp:** Midwest

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#### CES304.060 NORTHERN ROCKY MOUNTAIN WOODED VERNAL POOL

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Woody Wetland

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Isolated Wetland [Strictly Isolated]

**Concept Summary:** Northern Rocky Mountain Wooded Vernal Pools are small shallow circumneutral freshwater wetlands that partially or totally dry up as the growing season progresses. They are known primarily from the Swan Valley in western Montana and from the Snake River Plain in Idaho. These vernal ponds and wetlands are usually filled with water over the fall, winter, and early spring, but then at least partially dry up towards the end of the growing season. Depending on annual patterns of temperature and precipitation the drying of the pond may be complete or partial by the fall. These sites are usually shallow and less than one meter in depth. The pool substrate is a poorly drained often clayey layer with shallow organic sediments. They are surrounded by a variety of tree species; *Populus trichocarpa* is commonly associated and to a lesser extent, *Populus tremuloides* and *Betula papyrifera*. Inflated sedge (*Carex vesicaria*) and reed canary grass (*Phalaris arundinacea*) are common plant associates as are a variety of shrubs.

#### DISTRIBUTION

**Subnations:** ID, MT

**Associations:**

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**High-ranked species:** *Howellia aquatilis* (G3)

#### SPATIAL CHARACTERISTICS

#### SOURCES

**References:** Western Ecology Working Group n.d.

**Concept Author:** Western Ecology Group

**LeadResp:** West

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#### CES304.764 COLORADO PLATEAU HANGING GARDEN

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Montane [Montane, Lower Montane]; Cliff (Landform); Cliff (Substrate); Sedimentary Rock; Temperate [Temperate Xeric]; Seepage-Fed Sloping; Forb; Fern; Graminoid; Saturated Soil

**Concept Summary:** Hanging gardens in the Colorado Plateau region are surrounded by an arid environment and associated with canyon country. These highly localized environments include canyonlands with perennial water sources (seeps) forming pocketed wetlands and draping vegetation across wet cliff faces. Three main garden types exist: alcove, terrace, or windowblind. Each is determined by the nature of the geological formation and the presence or absence of joint systems. They tend to occur at all exposures of the canyon walls, but they are always shaded for much to most of each day. Temperature and humidity are relatively stable compared to the surrounding environment. Most hanging gardens are dominated by herbaceous plants, and a number of these are endemic to this region. Common species include *Adiantum capillus-veneris*, *Adiantum pedatum*, *Mimulus eastwoodiae*, *Mimulus guttatus*, *Sullivantia hapemanii*, *Cirsium rydbergii*, and several species of *Aquilegia*.

#### DISTRIBUTION

**Range:** Colorado Plateau.

**Divisions:** 304:C  
**TNC Ecoregions:** 19:C  
**Subnations:** AZ, CO, UT

**Associations:**

- *Aquilegia micrantha* - *Mimulus eastwoodiae* Herbaceous Vegetation (CEGL002729, G2G3)
- *Aquilegia micrantha* Herbaceous Vegetation [Provisional] (CEGL002762, GNR)
- *Calamagrostis scopulorum* Hanging Garden Herbaceous Vegetation (CEGL002751, GNR)

**High-ranked species:** *Carex specuicola* (G2), *Erigeron kachinensis* (G2), *Mimulus eastwoodiae* (G3), *Platanthera zothecina* (G2)

**Environment:** Hanging gardens in the Colorado Plateau ecoregion are surrounded by an arid environment and associated with canyon country. Annual precipitation is low and varies from 5 to 14 inches. While mean annual temperatures are high, extreme temperatures are probably more important than means to the survival of plants. Summer temperatures greater than 100 degrees F are common. Complexity of the plant community within a hanging garden is a function of the quantity and quality of water, developmental aspects, and accessibility of plant species to it. They tend to occur at all exposures of the canyon walls, but they are always shaded for much to most of each day. Temperature and humidity are relatively stable compared to the surrounding environment. They vary in size, aspect, exposure to the elements, water quantity and quality, number of bedding planes, and amount of light received. Water quality, in some degree, controls the kinds of plants in hanging gardens. Quality of water is dictated by the nature of the formations through which the water passes. Water is often drinkable quality, however, water may be saline or laden with calcium, which results in tufa deposits in the gardens. Generally, however, water from the gardens is potable.

In the Colorado Plateau region, three main garden types exist: alcove, terrace, or windowblind. Each is determined by the nature of the geological formation and the presence or absence of joint systems. In general, the hanging gardens are the result of the ancient swales or valleys in a sand dune-swale system that developed between the Cretaceous and Pennsylvanian periods (65-310 mya). Massive sandstones seem to be best suited for alcove development coincidental with garden formation, some better than others. The formations with greatest development are the Navajo and Entrada, both of them cross-bedded, massive formations composed of wind-blown sand and containing ancient pond bottoms that serve as impervious bedding planes. The Wingate Formation lacks significant hanging gardens. The sands of formations suitable for hanging garden development were deposited mainly on lands, as dunes with interdunal valleys. The interdunal valleys were often the sites of lakes, whose bottoms were made impervious by accumulations of dust and other fine particles. Turned to stone, the ancient lake and pond basins continue to exist within the strata. Water percolating through the porous rock encounters the ancient bedding planes, still impervious and capable of holding water. When filled to overflowing, these bedding planes carry the water downward to the next bedding plane beneath or to another impervious stratum at the base of the formation. Joint systems within the rock act as passageways for water. Where the joint systems are exposed along canyon walls the water flows over the moist surfaces.

In the Utah High Plateaus, the hanging garden ecological system is associated with springs, seeps and waterfalls. The waterfall vegetation grows in the cracks behind and beside the waterfall and is best described as hanging gardens. In the seeps adjacent to waterfalls and in the splash zones at the base of waterfalls, the substrate is saturated during most of the growing season. The vegetation is continually wet, at least near the bases of the plants, and water can very commonly be seen dripping from leaves, exposed roots and old stems. Suitable growing sites are limited on the steep rock walls such that each of the available ledges has an abundance of plants which grow on it. Most of the hanging gardens in the Utah High Plateaus are associated with calcareous shales of the Green River Formation. Although large occurrences of hanging gardens are primarily associated with waterfalls, smaller occurrences occur along cliff seeps above the streams, especially in the Roan Plateau area.

**Vegetation:** The vegetation of hanging gardens is often comprised of few species, although the diversity of vegetation is much greater in the gardens on the Colorado Plateau versus those of the Utah High Plateaus. The vegetation may overlap with the nearby riparian vegetation, but there are a series of species that are unique to hanging gardens (Welsh 1989). Several species of algae are restricted to these hanging gardens. The classic alcove type of hanging garden in the Canyonlands of southeastern Utah consists of an overhanging back wall, a vaulted face wall, a detrital slope, and a plunge basin. The back and face walls support clinging plants of *Adiantum capillus-veneris*, *Primula specuicola*, *Mimulus eastwoodiae*, *Petrophyton caespitosum*, and several other species. The wet, sandy detritus supports *Carex aurea*, *Aquilegia micrantha*, *Calamagrostis scopulorum*, *Epipactis gigantea*, *Perityle specuicola*, *Dichanthelium acuminatum* (= *Panicum acuminatum*), *Cirsium rydbergii*, and *Zigadenus vaginatus*. A fringing margin of *Cercis canadensis* var. *texensis* (= *Cercis occidentalis*), *Celtis laevigata* var. *reticulata* (= *Celtis reticulata*), and *Quercus gambelii* often occurs outward from the



footslope where the plants tend to conceal the alcove base. The outer and drier edges support grasses typical of the prairies and plains of the western U.S. In the Utah High Plateaus gardens, the dominants are usually *Sullivantia hapemanii* var. *purpusii* and *Aquilegia barnebyi* with *Mimulus guttatus* common.

Variation in hanging garden vegetation varies from canyon to canyon as well as separate alcoves within a canyon. The vegetation of hanging gardens generally has some common species that are found at most of the hanging gardens, e.g., *Maianthemum stellatum*, *Adiantum capillus-veneris*, *Adiantum pedatum*, and *Mimulus* spp. But numerous endemics occur of which some may be represented by just one or two sites. The following species are endemic to hanging gardens of the Colorado Plateau region: *Aquilegia micrantha*, *Carex curatorum*, *Cirsium rydbergii*, *Erigeron kachinensis* (one occurrence outside of hanging gardens in the Abajo Mountains), *Erigeron sionis*, *Erigeron zothecinus*, *Platanthera zothecina* (= *Habenaria zothecina*), *Mimulus eastwoodiae*, *Perityle specuicola*, and *Primula specuicola*.

#### SOURCES

**References:** Comer et al. 2003, Keammerer and Keammerer 1978, Malanson 1980, Malanson 1982, Malanson and Kay 1980, Romme et al. 1993, Tuhy et al. 2002, Welsh 1989, Welsh and Toft 1981

**Version:** 14 Dec 2004

**Stakeholders:** West

**Concept Author:** NatureServe Western Ecology Team; R. Rondeau

**LeadResp:** West

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#### CES304.057 COLUMBIA PLATEAU VERNAL POOL

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional [Vernal Pool]; Impermeable Layer; 1-29-day hydroperiod; Vernal Pool Mosaic

**Concept Summary:** This system includes shallow ephemeral water bodies found in very small (3 square meters to 1 acre) to large depressions (1500 square meters to a square mile, average size of vernal pools are 1600 square meters, while average size on non-alkaline playa lakes are 5-10 acres) throughout the exposed volcanic scablands of the Columbia Plateau in Washington, Oregon, and northern Nevada. Most of these pools and lakes are located on massive basalt flows exposed by Pleistocene floods; southward they also occur on andesite or rhyodacite caprock. Inundation is highly irregular, sometimes not occurring for several years. Depressions usually (but not always) fill with water during winter and spring. They are generally dry again within 9 months, though in exceptional times they can remain inundated for two years in a row. Water is from rainfall and snowmelt in relatively small closed basins, on average probably no more than 5-15 times the area of the ponds themselves. Because these pools and playas are perched above the general surrounding landscape, they are not generally subject to runoff from major stream systems. They typically have silty clay soils, sometimes with sandy margins. Pools are often found within a mounded or biscuit-swale topography with *Artemisia* shrub-steppe or rarely *Pinus ponderosa* savanna. In the northern Columbia Plateau, characteristic species are predominantly annual and diverse. Floristically akin to California vernal pool flora (one-third), however, many of the most abundant species are not reported in Californian pools. Characteristic species include *Callitriche marginata*, *Camissonia tanacetifolia*, *Elatine* spp., *Epilobium densiflorum* (= *Boisduvalia densiflora*), *Eryngium vaseyi*, *Juncus uncialis*, *Myosurus X clavicaulis*, *Plagiobothrys* spp., *Polygonum polygaloides* ssp. *confertiflorum*, *Polygonum polygaloides* ssp. *polygaloides*, *Psilocarphus brevissimus*, *Psilocarphus elatior*, *Psilocarphus oregonus*, and *Trifolium cyathiferum*. *Artemisia ludoviciana* ssp. *ludoviciana* can occur on better developed soils. In northern Nevada, most of the species by biomass are perennials and include *Polygonum*, *Rumex*, *Juncus balticus*, *Eleocharis*, *Carex douglasii*, *Muhlenbergia richardsonis*, and *Polycytenium* species, in addition to *Camissonia tanacetifolia* and *Psilocarphus brevissimus*. Endemic plant species *Navarretia leucocephala* ssp. *diffusa* and *Polycytenium williamsiae* may occur.

**Comments:** This includes Bjork (1997) vernal pool annual-dominated, vernal pool perennial-dominated and rain pools.

#### DISTRIBUTION

**Range:** This system is restricted to the northern Columbia Plateau ecoregion commonly called the Columbia Basin and perhaps the Okanagan Valley in British Columbia, and to the western Great Basin.

**Divisions:** 304:C

**TNC Ecoregions:** 6:C, 68:P

**Subnations:** BC?, NV, OR, WA

**Associations:**

•  
**High-ranked species:** *Ivesia pityocharis* (G2), *Juncus uncialis* (G3G4), *Myosurus sessilis* (G2), *Polycytenium williamsiae* (G2Q), *Polygonum polygaloides* ssp. *confertiflorum* (G4G5T3T4)

**Environment:** Winters are colder (coldest average median temperature month in the high 20 degrees F) than California vernal pools and are climatically defined by wet winters (November through January, sporadically so southward) and severe summer drought (July-September), although May or June can be wet. The northernmost vernal pools are adapted to cold spring and long summer days (18 hours).

#### SPATIAL CHARACTERISTICS

**Size:** Depressions (3-4608 square meters to a square mile; average 1600 sq.m to 10 acres), mean depth 0.47 to 1.5 m.

**Adjacent Ecological System Comments:** Primarily Columbia Plateau Scabland Shrubland (CES304.770) or Inter-Mountain Basins Big Sagebrush Steppe (CES304.778) (three-tip sagebrush) rarely into ponderosa pine savanna or pinyon-juniper.

#### SOURCES

**References:** Bjork 1997, Bjork and Dunwiddie n.d., Comer et al. 2003

**Version:** 27 Jun 2005

**Concept Author:** R. Crawford

**Stakeholders:** Canada, West

**LeadResp:** West

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### CES304.998 INTER-MOUNTAIN BASINS ALKALINE CLOSED DEPRESSION

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system is very similar to Western Great Plains Closed Depression Wetland (CES303.666). Sites are seasonally to semipermanently flooded, usually retaining water into the growing season and drying completely only in drought years. Many are associated with hot and cold springs, located in basins with internal drainage. Soils are alkaline to saline clays with hardpans. Seasonal drying exposes mudflats colonized by annual wetland vegetation. Salt encrustations can occur on the surface in some examples of this system, and the soils are severely affected and have poor structure. Species that typify this system are salt-tolerant and halophytic species such as *Distichlis spicata*, *Puccinellia lemmonii*, *Poa secunda*, *Muhlenbergia* spp., *Leymus triticoides* (= *Elymus triticoides*), *Schoenoplectus maritimus*, *Schoenoplectus americanus*, *Triglochin maritima*, and *Salicornia* spp. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils of some examples of this system which may allow for less salt-tolerant species to occur. Communities found within this system may also occur in floodplains (i.e., more open depressions), but probably should not be considered a separate system unless they transition to areas outside the immediate floodplain. Types often occur along the margins of perennial lakes, in alkaline closed basins, with extremely low-gradient shorelines.

#### DISTRIBUTION

**Range:** This system can occur throughout the Columbia Plateau and the northern Great Basin but is most common in eastern Oregon and northern Nevada.

**Divisions:** 304:C

**TNC Ecoregions:** 6:C

**Subnations:** CA, ID, NV, OR

#### Associations:

- *Distichlis spicata* Herbaceous Vegetation (CEGL001770, G5)
- *Eleocharis (montevidensis, palustris, quinqueflora)* Seasonally Flooded Herbaceous Vegetation [Placeholder] (CEGL003050, G5)
- *Eleocharis palustris - Distichlis spicata* Herbaceous Vegetation (CEGL001834, G2G4)
- *Eleocharis palustris - Juncus balticus* Herbaceous Vegetation (CEGL001835, G2G4)
- *Leymus triticoides - Carex* spp. Herbaceous Vegetation (CEGL001571, G4?)
- *Leymus triticoides - Poa secunda* Herbaceous Vegetation (CEGL001572, G2)
- *Poa secunda - Muhlenbergia richardsonis* Herbaceous Vegetation (CEGL002755, GNR)
- *Puccinellia lemmonii - Poa secunda* Seasonally Flooded Herbaceous Vegetation (CEGL001658, G1)
- *Schoenoplectus americanus - Eleocharis palustris* Herbaceous Vegetation (CEGL001585, G4)

**High-ranked species:** *Astragalus applegatei* (G1), *Astragalus diversifolius* (G2), *Astragalus lemmonii* (G3?), *Astragalus phoenix* (G2), *Astragalus pterocarpus* (G3), *Calochortus striatus* (G2), *Castilleja salsuginosa* (G1Q), *Centaurium namophilum* (G2Q), *Cirsium mohavense* (G2G3), *Cordylanthus tecopensis* (G2), *Downingia bicornuta* (G3G4), *Downingia bicornuta* var. *bicornuta* (G3G4T3T4), *Eriogonum ampullaceum* (G3), *Eriogonum argophyllum* (G1), *Goodmania luteola* (G3), *Grindelia fraxinopratisensis* (G2), *Ivesia kingii* (G3), *Ivesia kingii* var. *eremica* (G3T1T2Q), *Juncus kelloggii* (G3?), *Juncus uncialis* (G3G4), *Lepidium davisii* (G3), *Microtus californicus scirpensis* (G5T1), *Phacelia parishii* (G2G3), *Plagiobothrys salsus* (G2G3), *Plagiobothrys stipitatus* var. *micranthus* (G4T3T4), *Pogogyne floribunda* (G3), *Polygonum polygaloides* ssp. *confertiflorum* (G4G5T3T4), *Polygonum polygaloides* ssp. *esotericum* (G4G5T2), *Potentilla basaltica* (G1), *Potentilla newberryi* (G3G4), *Pseudocopaeodes eunus obscurus* (G3G4T1), *Sisyrinchium funereum* (G2G3), *Spiranthes infernalis* (G1), *Thelypodium brachycarpum* (G3), *Thelypodium howellii* ssp. *spectabilis* (G2T1)

**Environment:** This system is distinct from the freshwater depression systems by its brackish nature caused by strongly saline soils. Salt encrustations could occur near the surface in some examples of this system.

**Vegetation:** Salt-tolerant and halophytic species such as *Distichlis spicata* typify the system.

**Dynamics:** Hydrology processes primarily drive this system. Increases in precipitation and/or runoff can dilute the salt concentration and allow for less salt-tolerant species to occur. Conversion to agriculture and pastureland can also impact this system, especially when it alters the hydrology of the system.

## SOURCES

**References:** Western Ecology Working Group n.d.

**Version:** 07 Jun 2004

**Concept Author:** J. Kagan

**Stakeholders:** West

**LeadResp:** West

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## CES304.059 INTER-MOUNTAIN BASINS INTERDUNAL SWALE WETLAND

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Dune (Landform); Dune field; Dune (Substrate); Temperate [Temperate Xeric]; Depressional; Isolated Wetland [Partially Isolated]; Sand Soil Texture; W-Landscape/High Intensity; Graminoid

**Concept Summary:** This ecological system occurs within dune fields in the intermountain western U.S. as small (usually less than 0.1 ha) interdunal wetlands that occur in wind deflation areas, where sands are scoured down to the water table. Small ponds may be associated. Water table may be perched over an impermeable layer of caliche or clay layer or, in the case of the Great Sand Dunes of Colorado, a geologic dike that creates a closed basin that traps water. These wetland areas are typically dominated by common emergent herbaceous vegetation such as species of *Eleocharis*, *Juncus*, and *Schoenoplectus*. Dune field ecological processes distinguish these emergent wetlands from similar non-dune wetlands.

**Comments:** This system was originally included within Inter-Mountain Basins Active and Stabilized Dune (CES304.775). These small-scale wetlands were pulled out into their own system because they are isolated wetlands and support completely different biota than the surrounding dry dunes. Many dune fields in the Great Basin are associated with playas and playa lakes such as Washoe Lake, Great Salt Lake, and Mono Lake. At Great Sand Dunes National Monument, Colorado, isolated interdunal swale wetlands occur where winds scour sand to expose wet sand at the water table, largely on the west side (windward) of the main dune field. The same groundwater source also feeds springs that form intermittent creeks that are not part of this interdunal swale system.

## DISTRIBUTION

**Range:** The system occurs in some dune fields across the intermountain western U.S., including the Great Sand Dunes in southern Colorado and the Pink Coral Dunes in Utah. Interdunal wetlands may also occur in dune fields in northeastern Arizona and the Great Basin as well as in southwestern Wyoming and southern Idaho.

**Divisions:** 304:C, 306:C

**TNC Ecoregions:** 6:?, 10:?, 11:?, 19:?, 20:C

**Subnations:** AZ?, CO, ID?, NV?, UT?, WY?

### Associations:

- *Carex nebrascensis* Herbaceous Vegetation (CEGL001813, G4)
- *Carex utriculata* Herbaceous Vegetation (CEGL001562, G5)
- *Juncus balticus* - *Carex rossii* Herbaceous Vegetation (CEGL001839, G2G4)

- *Juncus balticus* Herbaceous Vegetation (CEGL001838, G5)
- *Salicornia rubra* Herbaceous Vegetation (CEGL001999, G2G3)
- *Schoenoplectus acutus* Herbaceous Vegetation (CEGL001840, G5)
- *Schoenoplectus americanus* - *Carex* spp. Herbaceous Vegetation (CEGL004144, GNR)
- *Schoenoplectus americanus* - *Eleocharis palustris* Herbaceous Vegetation (CEGL001585, G4)
- *Schoenoplectus americanus* - *Eleocharis* spp. Herbaceous Vegetation (CEGL001586, GNR)
- *Schoenoplectus americanus* Western Herbaceous Vegetation (CEGL001841, G3Q)
- *Schoenoplectus maritimus* Herbaceous Vegetation (CEGL001843, G4)
- *Schoenoplectus pungens* Herbaceous Vegetation (CEGL001587, G3G4)
- *Typha* (*latifolia*, *angustifolia*) Western Herbaceous Vegetation (CEGL002010, G5)
- *Typha domingensis* Western Herbaceous Vegetation (CEGL001845, G5?)

**Environment:** Occurs in wet interdunal swales.

**Vegetation:** A variety of emergent herbaceous vegetation may occur including, *Juncus balticus*, *Schoenoplectus pungens*, *Typha* spp., *Cyperus* spp., *Eleocharis* spp., and *Salix exigua*.

**Dynamics:** The dunes are shaped by the wind and continue to change. The size and exact location of the wet swales may change as the sand dunes shift, due to active dune migration. Dune "blowouts" and subsequent stabilization through succession are characteristic processes of the active dunes which surround the interdunal swales.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small patch.

**Adjacent Ecological System Comments:** This wetland system occurs in wet swales within Inter-Mountain Basins Active and Stabilized Dune (CES304.775).

### SOURCES

**References:** Bowers 1982, Bowers 1984, Bowers 1986, Brand and Sanderson 2002, Cooper and Severn 1992, Hammond 1998, Pineada et al. 1999, Pineda 2000, Rondeau 2001, Western Ecology Working Group n.d.

**Version:** 12 May 2005

**Concept Author:** Hammond (1998)

**Stakeholders:** West

**LeadResp:** West

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## CES304.058 NORTHERN COLUMBIA PLATEAU BASALT POTHOLE POND

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Impermeable Layer

**Concept Summary:** This system includes shallow freshwater water bodies found in small depressions gouged into basalt by Pleistocene floods. These are found throughout channeled scablands of the Columbia Plateau in Washington's eastern Columbia River Gorge. They typically occupy the bottom of a basalt cliff (1-20+ m tall) lined circular or linear depression. Characteristic shoreline vegetation lining the aquatic environment is an emergent marsh that includes species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris*. This system may also include areas of relatively deep water with floating-leaved plants (*Lemna*, *Potamogeton*, and *Brasenia*). Woody plants, including *Populus tremuloides*, *Salix exigua*, *Crataegus douglasii*, or *Rosa woodsii*, are present adjacent to more northerly potholes. Ponds are within *Artemisia* shrub-steppe and *Pinus ponderosa* savanna or woodland. The wetland vegetation occupies a narrow zone (0.5-10 m) between open water and upland vegetation.

**Comments:** This may be a subset of North American Arid West Emergent Marsh (CES300.729), or it could be a freshwater aquatic system with primarily zoological species composition (amphibians and invertebrates).

### DISTRIBUTION

**Range:** Restricted to the northern Columbia Plateau ecoregion commonly called the Columbia Basin.

**Divisions:** 304:C

**TNC Ecoregions:** 6:C, 68:P

**Subnations:** OR, WA

### Associations:

- *Carex utriculata* Herbaceous Vegetation (CEGL001562, G5)

- *Carex vesicaria* Herbaceous Vegetation (CEGL002661, G4Q)
- *Juncus balticus* Herbaceous Vegetation (CEGL001838, G5)
- *Lemna* spp. Permanently Flooded Herbaceous Vegetation (CEGL003059, G3?)
- *Nuphar lutea* ssp. *polysepala* Herbaceous Vegetation (CEGL002001, G5)
- *Phalaris arundinacea* Western Herbaceous Vegetation (CEGL001474, G5)
- *Phragmites australis* Western North America Temperate Semi-natural Herbaceous Vegetation (CEGL001475, G5)
- *Schoenoplectus acutus* Herbaceous Vegetation (CEGL001840, G5)
- *Schoenoplectus americanus* Western Herbaceous Vegetation (CEGL001841, G3Q)
- *Schoenoplectus maritimus* Herbaceous Vegetation (CEGL001843, G4)
- *Schoenoplectus tabernaemontani* Temperate Herbaceous Vegetation (CEGL002623, G5)
- *Typha* (*latifolia*, *angustifolia*) Western Herbaceous Vegetation (CEGL002010, G5)

**High-ranked species:** *Howellia aquatilis* (G3), *Ivesia aperta* var. *aperta* (G2T2)

### SPATIAL CHARACTERISTICS

**Size:** Depressions (50-10,000 sq m)

**Adjacent Ecological System Comments:** Primarily Inter-Mountain Basins Big Sagebrush Steppe (CES304.778) and Columbia Plateau Scabland Shrubland (CES304.770).

### SOURCES

**References:** Comer et al. 2003

**Version:** 21 Nov 2003

**Concept Author:** R. Crawford

**Stakeholders:** West

**LeadResp:** West

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## CES304.780 INTER-MOUNTAIN BASINS GREASEWOOD FLAT

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Lowland [Lowland]; Shrubland (Shrub-dominated); Toeslope/Valley Bottom; Alkaline Soil; Deep Soil; Xeromorphic Shrub

**Concept Summary:** This ecological system occurs throughout much of the western U.S. in Intermountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*, *Atriplex canescens*, *Atriplex confertifolia*, or *Krascheninnikovia lanata* may be present to codominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of *Sporobolus airoides*, *Distichlis spicata* (where water remains ponded the longest), or *Eleocharis palustris* herbaceous types.

### DISTRIBUTION

**Range:** Occurs throughout much of the western U.S. in Intermountain basins and extends onto the western Great Plains.

**Divisions:** 303:C, 304:C

**TNC Ecoregions:** 4:C, 6:C, 8:C, 9:C, 10:C, 11:C, 19:C, 20:C, 26:C

**Subnations:** AZ, CA, CO, ID, MT, NV, OR, UT, WA, WY

### Associations:

- *Distichlis spicata* - (*Scirpus nevadensis*) Herbaceous Vegetation (CEGL001773, G4)
- *Distichlis spicata* - *Lepidium perfoliatum* Herbaceous Vegetation (CEGL001772, GNA)
- *Distichlis spicata* Herbaceous Vegetation (CEGL001770, G5)
- *Distichlis spicata* Mixed Herb Herbaceous Vegetation (CEGL001771, G3G5)
- *Eleocharis palustris* Herbaceous Vegetation (CEGL001833, G5)
- *Ericameria nauseosa* / *Sporobolus airoides* Shrubland [Provisional] (CEGL002918, G3Q)
- *Leymus cinereus* - *Distichlis spicata* Herbaceous Vegetation (CEGL001481, G3)
- *Leymus cinereus* Bottomland Herbaceous Vegetation (CEGL001480, G1)

- *Leymus cinereus* Herbaceous Vegetation (CEGL001479, G2G3Q)
  - *Puccinellia nuttalliana* Herbaceous Vegetation (CEGL001799, G3?)
  - *Salicornia rubra* Herbaceous Vegetation (CEGL001999, G2G3)
  - *Sarcobatus vermiculatus* - *Atriplex parryi* / *Distichlis spicata* Shrubland (CEGL002764, GNR)
  - *Sarcobatus vermiculatus* - *Psoralea polydenius* Shrubland (CEGL002763, GNR)
  - *Sarcobatus vermiculatus* / *Achnatherum hymenoides* Shrubland (CEGL001373, G4)
  - *Sarcobatus vermiculatus* / *Artemisia tridentata* Shrubland (CEGL001359, G4)
  - *Sarcobatus vermiculatus* / *Atriplex confertifolia* - (*Picrothamnus desertorum*, *Suaeda moquinii*) Shrubland (CEGL001371, G5?)
  - *Sarcobatus vermiculatus* / *Atriplex gardneri* Shrubland (CEGL001360, G4?)
  - *Sarcobatus vermiculatus* / *Bouteloua gracilis* Shrubland (CEGL001361, G1Q)
  - *Sarcobatus vermiculatus* / *Distichlis spicata* Shrubland (CEGL001363, G4)
  - *Sarcobatus vermiculatus* / *Elymus elymoides* - *Pascopyrum smithii* Shrubland (CEGL001365, G2?)
  - *Sarcobatus vermiculatus* / *Elymus elymoides* Shrubland (CEGL001372, G4)
  - *Sarcobatus vermiculatus* / *Juncus balticus* Sparse Vegetation (CEGL002919, G3?)
  - *Sarcobatus vermiculatus* / *Leymus cinereus* Shrubland (CEGL001366, G3)
  - *Sarcobatus vermiculatus* / *Nitrophila occidentalis* - *Suaeda moquinii* Shrubland (CEGL001369, G5?)
  - *Sarcobatus vermiculatus* / *Pascopyrum smithii* - (*Elymus lanceolatus*) Shrub Herbaceous Vegetation (CEGL001508, G4)
  - *Sarcobatus vermiculatus* / *Pseudoroegneria spicata* Shrubland (CEGL001367, G3)
  - *Sarcobatus vermiculatus* / *Sporobolus airoides* Sparse Vegetation (CEGL001368, G3?)
  - *Sarcobatus vermiculatus* / *Suaeda moquinii* Shrubland (CEGL001370, GUQ)
  - *Sarcobatus vermiculatus* Shrubland (CEGL001357, G5)
  - *Sporobolus airoides* - *Distichlis spicata* Herbaceous Vegetation (CEGL001687, G4?)
  - *Sporobolus airoides* Southern Plains Herbaceous Vegetation (CEGL001685, G3Q)
- High-ranked species:** *Astragalus pterocarpus* (G3), *Atriplex bonnevillensis* (G2G3Q), *Phacelia parishii* (G2G3), *Pseudocopaeodes eunus* (G3G4), *Puccinellia simplex* (G3G4)

#### SOURCES

**References:** Comer et al. 2003, Knight 1994, West 1983b

**Version:** 20 Feb 2003

**Concept Author:** NatureServe Western Ecology Team

**Stakeholders:** Midwest, West

**LeadResp:** West

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### CES304.786 INTER-MOUNTAIN BASINS PLAYA

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**Primary Division:** Inter-Mountain Basins (304)

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Lowland [Lowland]; Playa; Temperate [Temperate Xeric]; Depressional; Alkaline Soil; Saline Substrate Chemistry; Aridic; Alkaline Water; Saline Water Chemistry; Caliche Layer; Impermeable Layer; Intermittent Flooding

**Concept Summary:** This ecological system is composed of barren and sparsely vegetated playas (generally <10% plant cover) found in the intermountain western U.S. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil subhorizon and is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species may include *Allenrolfea occidentalis*, *Sarcobatus vermiculatus*, *Grayia spinosa*, *Puccinellia lemmonii*, *Leymus cinereus*, *Distichlis spicata*, and/or *Atriplex* spp.

**Comments:** Bjork (1997) refers to these as vernal lakes in Washington; his one example was ditched and may be artificial. There might have been these in Grand Coulee prior to Columbia Basin irrigation project.

#### DISTRIBUTION

**Range:** This system occurs throughout the Intermountain western U.S., extending east into the southwestern Great Plains.

**Divisions:** 304:C

**TNC Ecoregions:** 6:C, 10:C, 11:C, 19:C

**Subnations:** CA, CO, ID, NV, OR, UT, WA?, WY

**Associations:**

- (*Sarcocornia utahensis*) - (*Arthrocnemum subterminale*) Seasonally Flooded Herbaceous Vegetation [Placeholder] (CEGL003120, GNR)
- *Allenrolfea occidentalis* / *Atriplex gardneri* Shrubland (CEGL000989, G4?)
- *Allenrolfea occidentalis* Shrubland (CEGL000988, G3)
- *Artemisia papposa* / *Danthonia californica* - *Festuca idahoensis* Shrubland (CEGL002991, GNR)
- *Atriplex spinifera* Shrubland [Placeholder] (CEGL003015, G3?)
- *Chrysothamnus albidus* / *Puccinellia nuttalliana* Shrubland (CEGL001328, G3)
- *Distichlis spicata* - (*Scirpus nevadensis*) Herbaceous Vegetation (CEGL001773, G4)
- *Distichlis spicata* - *Lepidium perfoliatum* Herbaceous Vegetation (CEGL001772, GNA)
- *Distichlis spicata* Herbaceous Vegetation (CEGL001770, G5)
- *Distichlis spicata* Mixed Herb Herbaceous Vegetation (CEGL001771, G3G5)
- *Hordeum jubatum* Herbaceous Vegetation (CEGL001798, G4)
- *Krascheninnikovia lanata* / *Poa secunda* Dwarf-shrubland (CEGL001326, G3)
- *Leymus cinereus* - *Distichlis spicata* Herbaceous Vegetation (CEGL001481, G3)
- *Leymus cinereus* - *Pascopyrum smithii* Herbaceous Vegetation (CEGL001483, G3Q)
- *Leymus cinereus* Bottomland Herbaceous Vegetation (CEGL001480, G1)
- *Leymus triticoides* - *Carex* spp. Herbaceous Vegetation (CEGL001571, G4?)
- *Leymus triticoides* - *Poa secunda* Herbaceous Vegetation (CEGL001572, G2)
- *Pluchea sericea* Seasonally Flooded Shrubland [Placeholder] (CEGL003080, G3?)
- *Poa secunda* - *Muhlenbergia richardsonis* Herbaceous Vegetation (CEGL002755, GNR)
- *Puccinellia lemmonii* - *Poa secunda* Seasonally Flooded Herbaceous Vegetation (CEGL001658, G1)
- *Sarcobatus vermiculatus* - *Atriplex parryi* / *Distichlis spicata* Shrubland (CEGL002764, GNR)
- *Sarcobatus vermiculatus* - *Psoralea polydenius* Shrubland (CEGL002763, GNR)
- *Sarcobatus vermiculatus* / *Achnatherum hymenoides* Shrubland (CEGL001373, G4)
- *Sarcobatus vermiculatus* / *Artemisia tridentata* Shrubland (CEGL001359, G4)
- *Sarcobatus vermiculatus* / *Atriplex confertifolia* - (*Picrothamnus desertorum*, *Suaeda moquinii*) Shrubland (CEGL001371, G5?)
- *Sarcobatus vermiculatus* / *Distichlis spicata* Shrubland (CEGL001363, G4)
- *Sarcobatus vermiculatus* / *Elymus elymoides* - *Pascopyrum smithii* Shrubland (CEGL001365, G2?)
- *Sarcobatus vermiculatus* / *Elymus elymoides* Shrubland (CEGL001372, G4)
- *Sarcobatus vermiculatus* / *Ericameria nauseosa* Shrubland (CEGL001362, G5)
- *Sarcobatus vermiculatus* / *Leymus cinereus* Shrubland (CEGL001366, G3)
- *Sarcobatus vermiculatus* / *Nitrophila occidentalis* - *Suaeda moquinii* Shrubland (CEGL001369, G5?)
- *Sarcobatus vermiculatus* / *Pascopyrum smithii* - (*Elymus lanceolatus*) Shrub Herbaceous Vegetation (CEGL001508, G4)
- *Sarcobatus vermiculatus* / *Sporobolus airoides* Sparse Vegetation (CEGL001368, G3?)
- *Sarcobatus vermiculatus* Shrubland (CEGL001357, G5)
- *Spartina gracilis* Herbaceous Vegetation (CEGL001588, GU)
- *Sporobolus airoides* - *Distichlis spicata* Herbaceous Vegetation (CEGL001687, G4?)
- *Suaeda moquinii* Shrubland (CEGL001991, G5)

**High-ranked species:** *Atriplex spinifera* (G3?), *Gratiola heterosepala* (G3), *Lepidium davisii* (G3), *Phacelia inundata* (G2), *Phacelia parishii* (G2G3), *Pseudocopaesodes eunus* (G3G4), *Rorippa calycina* (G3), *Sidalcea covillei* (G2), *Sisyrinchium funereum* (G2G3)

**SOURCES**

**References:** Bjork 1997, Comer et al. 2003, Knight 1994, Nachlinger et al. 2001

**Version:** 14 Dec 2004

**Concept Author:** NatureServe Western Ecology Team

**Stakeholders:** West

**LeadResp:** West

**CES302.039 NORTH AMERICAN WARM DESERT INTERDUNAL SWALE WETLAND**

**Primary Division:** North American Warm Desert (302)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Dune (Landform); Dune field; Dune (Substrate); Temperate [Temperate Xeric]; Isolated Wetland [Partially Isolated]; Sand Soil Texture; W-Landscape/High Intensity; Graminoid

**Concept Summary:** This interdunal wetland ecological system occurs in dune fields in the Chihuahuan Desert and likely in the Sonoran and Mojave deserts. This isolated or partially isolated wetland system is an occasional component of the more extensive active and stabilized desert dune system. Stands are typically small (usually less than 0.1 ha) interdunal swales that occur in wind deflation areas, where sands are scoured down to the water table. Water table may be perched over an impermeable layer of caliche or clay layer. These wetland areas are typically dominated by common emergent herbaceous vegetation, such as species of *Eleocharis*, *Juncus*, and *Schoenoplectus*, but may include endemic plants or animals. Occasionally wetlands are dominated by trees and shrubs, such as *Populus fremontii* and *Baccharis salicifolia*, which survive both being buried as dunes advance and having their root system exposed when deflation of the dune occurs. The specific dune field ecological processes distinguish these wetlands from non-dune emergent wetlands with similar species composition.

**Comments:** Additional interdunal wetland surveys and classification work are needed at dune systems in the Chihuahuan Desert at Cuatro Ciénegas, Guadalupe Mountains, and Samalayuca dunes as well as dune systems in the Sonoran or Mojave deserts, such as Algodones, Death Valley, Eureka, Gran Desierto, Kelso, Mohawk, and Salton Sea dunes, to clarify the extent of this small-patch ecological system. It may be necessary to restrict the system to the Chihuahuan Desert if that is the extent. Gypsum dunes have species unique to that substrate and may need to be treated differently.

#### DISTRIBUTION

**Range:** This interdunal wetland ecological system occurs in some dune fields in the Chihuahuan Desert and likely occurs in dune fields of the Sonoran and Mojave deserts, but more research is needed to learn the exact extent.

**Divisions:** 302:C

**TNC Ecoregions:** 24:C

**Subnations:** NM, TX

#### Associations:

- *Eleocharis palustris* - *Carex praegracilis* - *Berula erecta* Herbaceous Vegetation (CEGL002634, G2)
- *Populus fremontii* / *Baccharis salicifolia* Woodland (CEGL000941, G2)
- *Schoenoplectus americanus* - *Eleocharis palustris* Herbaceous Vegetation (CEGL001585, G4)
- *Schoenoplectus americanus* - *Eleocharis* spp. Herbaceous Vegetation (CEGL001586, GNR)
- *Schoenoplectus americanus* - *Flaveria chlorifolia* - (*Helianthus paradoxus*) Herbaceous Vegetation (CEGL004592, G1)

**High-ranked species:** *Cyperus onerosus* (G2)

**Environment:** This interdunal wetland ecological system occurs in some dune fields in the Chihuahuan and likely the Sonoran and Mojave deserts. This isolated or partially isolated wetland system is an occasional component of the more extensive active and stabilized desert dune system. Stands are typically small (usually less than 0.1 ha) interdunal swales that occur in wind deflation areas, where sands are scoured down to the water table. Water table may be perched over an impermeable layer of caliche or clay layer. Dune sands may be quartz or gypsum. Gypsum dunes have species unique to that substrate and may need to be treated differently. The specific dune field ecological processes distinguish these wetlands from similar emergent wetlands.

In west Texas these wetlands occur in interdunal swales in Monahan and Kermit quartz sand dunes. These dunes occur northeast of the Pecos River where the prevailing winds from the southwest have blown the sands to the east where they are trapped by the escarpment of the High Plains (Southern Shortgrass Prairie Ecoregion). The ponds are on a perched water table underlain by impermeable caliche layers.

The White Sand Dunes of the Tulerosa Basin in southern New Mexico are a gypsum interdunal/dune system that is moving/semi-stable, and during the rainy season many of the interdunes become ephemeral lakes with wetland indicators.

**Vegetation:** These wetland areas are typically dominated by common emergent herbaceous vegetation, such as species of *Eleocharis*, *Juncus*, and *Schoenoplectus*, but may include endemic plants or animals, especially on gypsum dunes. Occasionally wetlands are dominated by trees and shrubs, such as *Populus fremontii*, *Baccharis salicifolia*, or *Salix* spp., which must survive both being buried as dunes advance and having their root system exposed when deflation of the dune occurs. On occasion, dunes move over a site, leaving only the tops of cottonwood trees as remnants of the buried community (Muldavin et al. 1994b). The specific dune field ecological processes distinguish these wetlands from non-dune emergent wetlands with similar species composition.



In west Texas, stands in the Monahan and Kermit sandsheets wet interdunal swales, ponds and fringing wetlands are vegetated by herbaceous graminoids (generally >10% plant cover) between active dunes in sandsheets derived from quartz sands. Common vegetation is characterized by herbaceous graminoids and *Salix* spp. These interdunal valleys over impermeable substrata (as with the Monahans Sandsheet) may contain seasonal swales or ephemeral ponds supporting *Achnatherum hymenoides* and other grasses, *Schoenoplectus tabernaemontani*, *Juncus* spp., *Cyperus* spp., *Baccharis* spp., *Prosopis glandulosa*, *Salix interior*, *Pluchea odorata* (= *Pluchea purpurascens*), *Xanthium strumarium*, and other weeds (TPWD 1989d). The fringing wetland plants of the more permanent ponds include *Salix* spp., *Scirpus* and/or *Schoenoplectus* spp., *Typha* spp., *Cyperus* spp., *Juncus* spp., *Eleocharis* spp., and others. *Cyperus onerosus* is a rare plant, endemic to this region, also associated with these unusual wetlands (El-Hage and Moulton 1998).

**Dynamics:** The dunes are shaped by the wind and continue to change. The size and exact location of the wet swales may change as the sand dunes shift, due to active dune migration. Dune "blowouts" and subsequent stabilization through succession are characteristic processes of the active dunes which surround this system.

### SPATIAL CHARACTERISTICS

**Spatial Summary:** Small patch.

**Adjacent Ecological System Comments:** This wetland system occurs in wet swales in North American Warm Desert Active and Stabilized Dune (CES302.744).

### SOURCES

**References:** Bezanson 2000, Bowers 1982, Bowers 1984, Bowers 1986, Brown 1982, Carr 1991, Carr 2004, El-Hage and Moulton 1998, Muldavin et al. 1994b, Muldavin et al. 2000a, Muldavin et al. 2000b, Southeastern Ecology Working Group n.d., TPWD 1989d

**Version:** 12 May 2005

**Stakeholders:** Southeast, West

**Concept Author:** El-Hage and Moulton (1998)

**LeadResp:** Southeast

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### CES302.746 CHIHUAHUAN-SONORAN DESERT BOTTOMLAND AND SWALE GRASSLAND

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**Primary Division:** North American Warm Desert (302)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Lowland [Lowland]; Herbaceous; Swale; Toeslope/Valley Bottom; Depressional

**Concept Summary:** This ecological system occurs throughout the northern Chihuahuan Desert and adjacent Sky Islands and Sonoran Desert, as well as limited areas of the southern Great Plains and Edwards Plateau in relatively small depressions on broad mesas, plains and valley bottoms that receive runoff from adjacent areas. Water generally infiltrates relatively quickly. These depressions have deep, fine-textured soils that are neutral to slightly saline/alkaline. Vegetation is typically dominated by *Pleuraphis mutica* (tobosa swales) or other mesic graminoids such as *Pascopyrum smithii*, *Panicum obtusum*, *Sporobolus airoides*, or *Sporobolus wrightii*. With tobosa swales, sand-adapted species such as *Yucca elata* may grow at the swale's edge in the deep sandy alluvium that is deposited there from upland slopes. *Sporobolus airoides* and *Sporobolus wrightii* are more common in alkaline soils.

### DISTRIBUTION

**Range:** Northern Chihuahuan Desert and adjacent Sky Islands and Sonoran Desert, as well as limited areas of the southern Great Plains and Edwards Plateau.

**Divisions:** 302:C, 303:C

**TNC Ecoregions:** 22:C, 23:C, 24:C, 28:C, 29:C

**Subnations:** AZ, MXCH, MXSO, NM, TX

### Associations:

- *Panicum obtusum* - *Helianthus ciliaris* Herbaceous Vegetation (CEGL001574, G1)
- *Panicum obtusum* - *Panicum hirsutum* Herbaceous Vegetation (CEGL001576, GNRQ)
- *Pleuraphis mutica* - *Bouteloua gracilis* Herbaceous Vegetation (CEGL001638, GNRQ)
- *Pleuraphis mutica* - *Buchloe dactyloides* Herbaceous Vegetation (CEGL002272, G4?)
- *Pleuraphis mutica* - *Panicum obtusum* Herbaceous Vegetation (CEGL001639, G3)
- *Pleuraphis mutica* - *Scleropogon brevifolius* Herbaceous Vegetation (CEGL001640, G5)
- *Pleuraphis mutica* Monotype Herbaceous Vegetation (CEGL001637, G5?)

- *Sporobolus airoides* - *Distichlis spicata* Herbaceous Vegetation (CEGL001687, G4?)
- *Sporobolus airoides* - *Scleropogon brevifolius* Herbaceous Vegetation (CEGL001692, G5)
- *Sporobolus airoides* Monotype Herbaceous Vegetation (CEGL001688, GUQ)
- *Sporobolus airoides* Sod Herbaceous Vegetation [Placeholder] (CEGL001791, GNR)
- *Sporobolus airoides* Southern Plains Herbaceous Vegetation (CEGL001685, G3Q)
- *Sporobolus wrightii* - *Panicum hallii* Herbaceous Vegetation (CEGL001485, GNRQ)
- *Sporobolus wrightii* - *Panicum obtusum* Herbaceous Vegetation (CEGL001486, G2)

#### SOURCES

**References:** Brown 1982, Comer et al. 2003, Dick-Peddie 1993, MacMahon and Wagner 1985, Muldavin et al. 2000b

**Version:** 14 Dec 2004

**Stakeholders:** Latin America, Southeast, West

**Concept Author:** NatureServe Western Ecology Team

**LeadResp:** West

#### CES302.759 SONORAN FAN PALM OASIS

**Primary Division:** North American Warm Desert (302)

**Land Cover Class:** Mixed Upland and Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Forest and Woodland (Treed); Tropical/Subtropical [Tropical Xeric]; Temperate [Temperate Xeric]; Seepage-Fed Sloping; Palm or Sabal

**Concept Summary:** This ecological system occurs on highly localized, spring-fed depressions along canyon waterways and tectonic faultlines below 900 m in elevation in the Sonoran and Mojave deserts. Permanent subsurface water is required to maintain *Washingtonia filifera*, a relict species. Salinity is low in the root zone, but increases near the surface where evaporation leaves salt accumulations. These oases woodlands are distinctively dominated by *Washingtonia filifera* with variable understory conditions. Other trees that may be present include *Platanus racemosa*, *Quercus chrysolepis*, *Populus fremontii*, and *Fraxinus velutina*. A subcanopy of *Salix lasiolepis*, *Salix gooddingii*, *Salix exigua*, or *Prosopis glandulosa* is often present. Reproduction of *Washingtonia filifera* is limited by water supply, surface salinity, rainfall, and fire. Fan palms are fire-tolerant, while the understory species are not, and fires open up the understory allowing palm seedlings to establish. Removal of the understory also decreases competition for water. There are currently 24 known occurrences in Arizona, Nevada, and California.

#### DISTRIBUTION

**Range:** Below 900 m in elevation in the Sonoran and Mojave deserts.

**Divisions:** 302:C

**TNC Ecoregions:** 17:C, 23:C

**Subnations:** AZ, CA, MXBC, MXSO, NV

#### Associations:

- *Washingtonia filifera* Woodland (CEGL000001, G3?)

**High-ranked species:** *Batrachoseps major aridus* (G4T1)

#### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Comer et al. 2003, Holland and Keil 1995, MacMahon 1988, Sawyer and Keeler-Wolf 1995, Szaro 1989, Thomas et al. 2004

**Version:** 20 Feb 2003

**Stakeholders:** Latin America, West

**Concept Author:** NatureServe Western Ecology Team

**LeadResp:** West

#### CES302.751 NORTH AMERICAN WARM DESERT PLAYA

**Primary Division:** North American Warm Desert (302)

**Land Cover Class:** Barren

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Unvegetated (<10% vasc.); Upland; Wetland

**Diagnostic Classifiers:** Lowland [Lowland]; Playa; Tropical/Subtropical [Tropical Xeric]; Temperate [Temperate Xeric]; Depressional; Alkaline Soil; Aridic; Alkaline Water; Saline Water Chemistry; Caliche Layer; Impermeable Layer; Intermittent Flooding

**Concept Summary:** This ecological system is composed of barren and sparsely vegetated playas (generally <10% plant cover) found across the warm deserts of North America, extending into the extreme southern end of the San Joaquin Valley in California. Playas form with intermittent flooding, followed by evaporation, leaving behind a saline residue. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. Subsoils often include an impermeable layer of clay or caliche. Large desert playas tend to be defined by vegetation rings formed in response to salinity. Given their common location in windswept desert basins, dune fields often form downwind of large playas. In turn, playas associated with dunes often have a deeper water supply. Species may include *Allenrolfea occidentalis*, *Suaeda* spp., *Distichlis spicata*, *Eleocharis palustris*, *Oryzopsis* spp., *Sporobolus* spp., *Tiquilia* spp., or *Atriplex* spp. Ephemeral herbaceous species may have high cover periodically. Adjacent vegetation is typically Sonora-Mojave Mixed Salt Desert Scrub (CES302.749), Chihuahuan Mixed Salt Desert Scrub (CES302.017), Gulf of California Coastal Mixed Salt Desert Scrub (CES302.015), Baja California del Norte Gulf Coast Ocotillo-Limberbush-Creosotebush Desert Scrub (CES302.014), or Chihuahuan Creosotebush Xeric Basin Desert Scrub (CES302.731).

### DISTRIBUTION

**Range:** Found across the warm deserts of North America, extending into the extreme southern end of the San Joaquin Valley in California.

**Divisions:** 302:C

**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C

**Subnations:** AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX

### Associations:

- (*Sarcocornia utahensis*) - (*Arthrocnemum subterminale*) Seasonally Flooded Herbaceous Vegetation [Placeholder] (CEGL003120, GNR)
- *Allenrolfea occidentalis* Shrubland (CEGL000988, G3)
- *Atriplex (lentiformis, polycarpa)* Shrubland [Placeholder] (CEGL003016, G3)
- *Atriplex polycarpa* / *Pleuraphis mutica* Shrubland (CEGL001319, GU)
- *Atriplex polycarpa* Shrubland (CEGL001318, G5)
- *Atriplex spinifera* Shrubland [Placeholder] (CEGL003015, G3?)
- *Bouteloua breviseta* Sparse Vegetation (CEGL004609, G3?)
- *Sesuvium verrucosum* Sparse Vegetation (CEGL004595, G3?)

**High-ranked species:** *Atriplex griffithsii* (G2G3), *Atriplex spinifera* (G3?), *Branchinella acaciodea* (G2G3), *Branchinella sublettei* (G3), *Goodmania luteola* (G3), *Iva hayesiana* (G3?), *Ivesia kingii* (G3), *Nitrophila mohavensis* (G1), *Phacelia parishii* (G2G3), *Pseudocopaodes eunus* (G3G4), *Puccinellia simplex* (G3G4), *Streptocephalus moorei* (G1G2)

### SPATIAL CHARACTERISTICS

**Adjacent Ecological System Comments:** Adjacent vegetation is typically Sonora-Mojave Mixed Salt Desert Scrub (CES302.749), Chihuahuan Mixed Salt Desert Scrub (CES302.017), Gulf of California Coastal Mixed Salt Desert Scrub (CES302.015), Baja California del Norte Gulf Coast Ocotillo-Limberbush-Creosotebush Desert Scrub (CES302.014), or Chihuahuan Creosotebush Xeric Basin Desert Scrub (CES302.731).

### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Comer et al. 2003, Dick-Peddie 1993, Holland and Keil 1995, Muldavin et al. 2000b, Thomas et al. 2004

**Version:** 14 Dec 2004

**Stakeholders:** Latin America, Southeast, West

**Concept Author:** NatureServe Western Ecology Team

**LeadResp:** West

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## CES206.954 CALIFORNIA CENTRAL VALLEY ALKALI SINK

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**Primary Division:** Mediterranean California (206)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Lowland [Lowland]; Mediterranean [Mediterranean Xeric-Oceanic]; Depressional; Playa Mosaic

**Concept Summary:** These strongly saline/alkaline playa-like depressions are limited to the San Joaquin Valley and typically occur in a matrix of mixed salt desert scrub. These areas are seasonally to intermittently flooded. They are not flooded every year and respond to localized thunderstorms. Soils typically are fine-textured with an impermeable caliche

layer or clay pan. Salt encrustations are often deposited on the surface as the playa dries. Species are salt-tolerant and halophytic species such as *Allenrolfea occidentalis*, *Suaeda moquinii*, *Distichlis spicata*, and *Salicornia rubra*. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils of some of examples of this system which may allow for less salt-tolerant species to occur.

#### DISTRIBUTION

**Range:** Limited to the San Joaquin Valley.

**Divisions:** 206:C

**TNC Ecoregions:** 13:C

**Subnations:** CA

#### Associations:

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**High-ranked species:** *Astragalus tener* var. *ferrisiae* (G1T1), *Astragalus tener* var. *tener* (G1T1), *Atriplex cordulata* (G2?), *Atriplex coronata* var. *coronata* (G4T3), *Atriplex coronata* var. *notatior* (G4T1), *Atriplex joaquiniana* (G2), *Atriplex minuscula* (G1), *Atriplex spinifera* (G3?), *Atriplex tularensis* (G1Q), *Atriplex vallicola* (G1), *Cordylanthus mollis* ssp. *hispidus* (G2T2), *Cordylanthus palmatus* (G1), *Delphinium recurvatum* (G2), *Isocoma arguta* (G1), *Juncus bufonius* var. *congestus* (G5T2T4), *Lasthenia glabrata* ssp. *coulteri* (G4T3), *Layia munzii* (G1), *Leptochloa viscida* (G3G4), *Plagiobothrys glaber* (GH), *Puccinellia simplex* (G3G4)

#### SOURCES

**References:** Barbour and Major 1988, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995

**Version:** 14 Dec 2004

**Concept Author:** P. Comer, T. Keeler-Wolf

**Stakeholders:** West

**LeadResp:** West

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### CES206.947 MEDITERRANEAN CALIFORNIA ALKALI MARSH

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**Primary Division:** Mediterranean California (206)

**Land Cover Class:** Woody Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Mediterranean [Mediterranean Xeric-Oceanic]; Depressional; Alkaline Water; Saline Water Chemistry; Shallow (<15 cm) Water; Caliche Layer

**Concept Summary:** These highly variable systems occur in scattered locations throughout the California Central Valley and along California's south coast extending into Baja Norte, all at elevations below 300 m (1000 feet). They are found in old lake beds or in floodplains of major river systems where seasonal water inputs are limited, and often include some groundwater seepage. High rates of evaporation lead to alkaline water and soil conditions, with layers of salt encrusted soils often accumulating near seeps. These are highly variable in plant composition, but often include *Distichlis spicata*, *Juncus balticus*, *Anemopsis californica*, *Schoenoplectus americanus* (= *Scirpus americanus*), *Atriplex* spp., *Triglochin maritima*, and *Cirsium* spp. Endemic plant species include *Puccinellia howellii*.

#### DISTRIBUTION

**Range:** Scattered locations throughout the California Central Valley and along California's south coast extending into Baja Norte, all at elevations below 300 m (1000 feet).

**Divisions:** 206:C

**TNC Ecoregions:** 13:C, 16:C

**Subnations:** CA, MXBC

#### Associations:

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**High-ranked species:** *Frankenia salina* (G3G4), *Myosurus sessilis* (G2), *Puccinellia parishii* (G2), *Sorex ornatus relictus* (G5T1), *Spergularia macrotheca* var. *longistyla* (G5T3T4)

#### SOURCES

**References:** Barbour and Major 1988, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995

**Version:** 17 Mar 2003

**Stakeholders:** Latin America, West

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**CES206.951 MEDITERRANEAN CALIFORNIA COASTAL INTERDUNAL WETLAND**

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**Primary Division:** Mediterranean California (206)**Land Cover Class:** Herbaceous Wetland**Spatial Scale & Pattern:** Small patch**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)**Diagnostic Classifiers:** Herbaceous; Mediterranean [Mediterranean Xeric-Oceanic]; Depressional [Pond]; Mineral: W/ A-Horizon <10 cm; Graminoid; Shallow (<15 cm) Water; Sand Subsoil Texture; Coastal Dune Mosaic

**Concept Summary:** Coastal interdunal wetlands are common components of larger active and stabilized coastal dune fields, ranging from Coos Bay, Oregon, south to San Luis Obispo County, California. They can be referred to as "slack dune ponds" when associated with larger and deeper water or "coastal dune swales" when water is shallow, and typically occur behind active foredunes, especially where the base of the dunes are at or near groundwater levels. They may result from active dune movement, sometimes when dunes interrupt surface waterflow, or where extensive dune "blowouts" remove sand down to the water table. Common plant species include *Argentina anserina* (= *Potentilla anserina*), *Hydrocotyle umbellata*, *Euthamia occidentalis*, *Juncus* spp., *Carex obnupta*, and *Sparganium* spp.

**DISTRIBUTION****Range:** Coos Bay, Oregon, south to San Luis Obispo County, California.**Divisions:** 206:C**TNC Ecoregions:** 1:P, 14:C, 15:C, 16:P**Subnations:** CA, OR**Associations:**

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**High-ranked species:** *Astragalus pycnostachyus* (G2), *Astragalus pycnostachyus* var. *lanosissimus* (G2T1), *Astragalus pycnostachyus* var. *pycnostachyus* (G2T2), *Branchinecta longiantenna* (G1), *Branchinecta lynchi* (G3), *Cirsium loncholepis* (G2), *Cyzicus californicus* (G2G3), *Isocoma menziesii* var. *vernonioides* (G3G5T2T3)

**SOURCES****References:** Barbour and Major 1988, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995**Version:** 17 Mar 2003**Stakeholders:** West**Concept Author:** P. Comer, T. Keeler-Wolf**LeadResp:** West

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**CES206.948 NORTHERN CALIFORNIA CLAYPAN VERNAL POOL**

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**Primary Division:** Mediterranean California (206)**Land Cover Class:** Herbaceous Wetland**Spatial Scale & Pattern:** Small patch**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)**Diagnostic Classifiers:** Depressional; Forb; Circumneutral Water; Saline Water Chemistry; Impermeable Layer; Vernal Pool Mosaic

**Concept Summary:** These systems are shallow ephemeral water bodies found in depressions (up to several hectares in size) among grasslands and open woodlands throughout the northern Central Valley of California. Northern claypan vernal pools include a clay hardpan that retains water inputs throughout some portion of the spring, but typically the depression dries down entirely into early summer months. They tend to be circumneutral to alkaline and slightly saline wetlands with characteristic plant species including *Downingia bella*, *Downingia insignis*, *Cressa truxillensis*, *Plagiobothrys leptocladus* (= *Allocarya leptoclada*), *Pogogyne douglasii*, *Eryngium aristulatum*, *Veronica peregrina*, *Lasthenia ferrisiae*, *Lasthenia glaberrima*, and *Spergularia salina* (= *Spergularia marina*). Due to draw-down characteristics, vernal pools typically form concentric rings of similar forb-rich vegetation. Given their relative isolation in upland-dominated landscapes, many endemic plant species are common in California vernal pools.

**DISTRIBUTION****Range:** Found in depressions among grasslands and open woodlands throughout the northern Central Valley of California.**Divisions:** 206:C

**TNC Ecoregions:** 13:C  
**Subnations:** CA

**Associations:**

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**High-ranked species:** *Agrostis hendersonii* (G1Q), *Ambystoma californiense* (G2G3), *Boisduvalia cleistogama* (G3G4), *Branchinecta conservatio* (G1), *Branchinecta longiantenna* (G1), *Branchinecta lynchi* (G3), *Branchinecta mesovallensis* (G2), *Callitriche longipedunculata* (G2G3), *Cyzicus californicus* (G2G3), *Cyzicus elongatus* (G2G3Q), *Downingia bella* (G2G3), *Downingia bicornuta* var. *bicornuta* (G3G4T3T4), *Downingia cuspidata* (G3?), *Downingia ornatissima* (G2G3), *Downingia ornatissima* var. *eximia* (G2G3T1T3), *Downingia ornatissima* var. *ornatissima* (G2G3T1T3), *Downingia pulchella* (G3?), *Downingia pusilla* (G3), *Elaphrus viridis* (G1), *Eryngium aristulatum* var. *hooveri* (G5T2), *Gratiola heterosepala* (G3), *Hesperevax caulescens* (G3), *Hordeum intercedens* (G3G4), *Isoetes orcuttii* (G2?), *Ivesia sericoleuca* (G2), *Juncus kelloggii* (G3?), *Juncus leiospermus* (G2), *Juncus leiospermus* var. *ahartii* (G2T1), *Juncus leiospermus* var. *leiospermus* (G2T2), *Lasthenia burkei* (G1), *Lasthenia chrysantha* (G3?), *Lasthenia conjugens* (G1), *Lasthenia ferrisiae* (G3), *Legenere limosa* (G2), *Limnanthes alba* ssp. *versicolor* (G4T3T4), *Limnanthes bakeri* (G1), *Limnanthes douglasii* ssp. *nivea* (G4T3T4), *Limnanthes douglasii* ssp. *rosea* (G4T3T4), *Limnanthes douglasii* ssp. *sulphurea* (G4T1), *Limnanthes floccosa* ssp. *bellingieriana* (G4T2), *Limnanthes floccosa* ssp. *grandiflora* (G4T1), *Limnanthes vinculans* (G2), *Linderiella occidentalis* (G3G4), *Lomatium cookii* (G1), *Myosurus sessilis* (G2), *Navarretia eriocephala* (G3), *Navarretia heterandra* (G3), *Navarretia myersii* (G1), *Navarretia myersii* ssp. *deminuta* (G1T1), *Orcuttia viscida* (G1), *Plagiobothrys hystriculus* (GH), *Plagiobothrys stipitatus* var. *micranthus* (G4T3T4), *Polygonum polygaloides* ssp. *confertiflorum* (G4G5T3T4), *Spea hammondii* (G3), *Tuctoria greenei* (G2), *Tuctoria mucronata* (G1)

**SOURCES**

**References:** Barbour and Major 1988, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995

**Version:** 17 Mar 2003

**Concept Author:** P. Comer, T. Keeler-Wolf

**Stakeholders:** West

**LeadResp:** West

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**CES206.949 NORTHERN CALIFORNIA VOLCANIC VERNAL POOL**

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**Primary Division:** Mediterranean California (206)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Mediterranean [Mediterranean Xeric-Oceanic]; Depressional; Forb; Shallow (<15 cm) Water; Impermeable Layer; Intermittent Flooding; Vernal Pool Mosaic

**Concept Summary:** These systems are shallow ephemeral water bodies found in very small depressions (typically no larger than 50 square meters) throughout foothills of the southern Cascades and Sierra Nevada. They are often on solid volcanic bedrock, but also can be found on volcanic ash flows (lahars) over bedrock. Hydrologically, they vary from flashy to more persistent hydrological regimes, typically due to the amount and periodicity of precipitation received. Where hydrology is flashy, they fill and evaporate rapidly; several times during the wet season. Typically these vernal pools do not support species requiring long inundation periods. Those on volcanic ash flows are less flashy and have pools that are larger and deeper. Where short inundation periods are characteristic, *Lasthenia californica*, *Downingia bicornuta*, *Psathyrotes* spp., and *Sedella* spp. (= *Parvisedum* spp.) are often present. Where longer inundation periods are characteristic, *Eryngium constancei* and *Eleocharis acicularis* may be found.

**DISTRIBUTION**

**Range:** Throughout foothills of the southern Cascades and Sierra Nevada.

**Divisions:** 204:?, 206:C

**TNC Ecoregions:** 4:C, 5:P, 12:C

**Subnations:** CA, OR

**Associations:**

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**High-ranked species:** *Downingia bicornuta* (G3G4), *Downingia bicornuta* var. *bicornuta* (G3G4T3T4), *Eryngium castrense* (G1G2), *Eryngium constancei* (G1), *Eryngium mathiasiae* (G3), *Eryngium pinnatisectum* (G3), *Gratiola heterosepala* (G3),

Limnanthes floccosa ssp. californica (G4T1), Limnanthes floccosa ssp. pumila (G4T1), Limnanthes striata (G3?), Navarretia heterandra (G3), Navarretia leucocephala ssp. pauciflora (G4T1), Navarretia leucocephala ssp. pliantha (G4T1), Paronychia ahartii (G2), Sedella leiocarpa (G1)

#### SOURCES

**References:** Barbour and Major 1988, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995

**Version:** 17 Mar 2003

**Stakeholders:** West

**Concept Author:** P. Comer, T. Keeler-Wolf

**LeadResp:** West

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#### CES206.950 SOUTH COASTAL CALIFORNIA VERNAL POOL

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**Primary Division:** Mediterranean California (206)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Herbaceous; Mediterranean [Mediterranean Xeric-Oceanic]; Forb; Impermeable Layer; 1-29-day hydroperiod; Vernal Pool Mosaic

**Concept Summary:** These systems are shallow ephemeral water bodies found in small depressions that range from Baja Norte, Mexico, north through Santa Barbara County, California. They are found from sea level to 2600 m (7800 feet), and concomitant temperature and moisture ranges, but floristically distinct from more northerly distributed vernal pool types. These vernal pool systems are found on flat-topped marine terraces with Si-Fe cemented hardpans, volcanic bedrock, and acidic intrusive rock underlying thin soils. Characteristic plant species include *Trichostema austromontanum*, *Pogogyne abramsii*, *Eryngium aristulatum*, *Orcuttia californica*, *Pogogyne nudiuscula*, *Navarretia fossalis*, *Hemizonia parryi* ssp. *australis*, and *Lasthenia glabrata* ssp. *coulteri*.

#### DISTRIBUTION

**Range:** Baja Norte, Mexico, north through Santa Barbara County, California.

**Divisions:** 206:C

**TNC Ecoregions:** 16:C

**Subnations:** CA, MXBC

#### Associations:

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**High-ranked species:** *Ambystoma californiense* (G2G3), *Atriplex parishii* (G1G2), *Branchinecta longiantenna* (G1), *Branchinecta lynchi* (G3), *Branchinecta sandiegonensis* (G1), *Brodiaea filifolia* (G2), *Brodiaea orcuttii* (G3), *Cyzicus californicus* (G2G3), *Downingia concolor* var. *brevior* (G4T1), *Eryngium aristulatum* var. *parishii* (G5T2), *Eryngium pendletonensis* (G1), *Isoetes orcuttii* (G2?), *Juncus luciensis* (G3?), *Juncus triformis* (G2G3), *Linderiella occidentalis* (G3G4), *Linderiella santarosae* (G1G2), *Muilla clevelandii* (G2), *Navarretia fossalis* (G2), *Orcuttia californica* (G2), *Pogogyne abramsii* (G2), *Pogogyne nudiuscula* (G1), *Spea hammondii* (G3), *Streptocephalus woottoni* (G2)

#### SOURCES

**References:** Barbour and Major 1988, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995

**Version:** 17 Mar 2003

**Stakeholders:** Latin America, West

**Concept Author:** P. Comer, T. Keeler-Wolf

**LeadResp:** West

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#### CES204.996 MODOC BASALT FLOW VERNAL POOL

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**Primary Division:** North American Pacific Maritime (204)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Impermeable Layer; 1-29-day hydroperiod; Vernal Pool Mosaic

**Concept Summary:** This system includes shallow ephemeral water bodies found in very small depressions (typically no larger than 50 square meters) throughout the Lassen, Klamath, and upper Pit river drainages, as well as the Devils Garden area of northern California, and along the eastern flanks of the Columbia River Gorge along the Oregon-Washington border. These vernal pools are located on top of massive basalt flows where soils are very thin over solid bedrock. Where soils are

better developed, they trend towards Vertisols (freeze-thaw characteristics). Characteristic species include *Blennosperma nanum*, *Epilobium densiflorum* (= *Boisduvalia densiflora*), *Callitriche marginata*, *Cicendia quadrangularis*, *Eryngium vaseyi*, *Psilocarphus brevissimus*, and *Sedella pumila* (= *Parvisedum pumilum*). *Artemisia cana* ssp. *bolanderi* can occur on better developed soils. Endemic plant species *Eryngium mathiasiae*, as well as several species of *Mimulus* and *Pogogyne*, may occur.

#### DISTRIBUTION

**Range:** Throughout the Lassen, Klamath, and upper Pit river drainages, as well as the Devils Garden area of northern California, and along the eastern flanks of the Columbia River Gorge along the Oregon-Washington border.

**Divisions:** 204:C, 206:C

**TNC Ecoregions:** 4:C, 5:P

**Subnations:** CA, OR, WA

#### Associations:

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**High-ranked species:** *Downingia bicornuta* (G3G4), *Downingia bicornuta* var. *bicornuta* (G3G4T3T4), *Gratiola heterosepala* (G3), *Pogogyne floribunda* (G3), *Polygonum polygaloides* ssp. *esotericum* (G4G5T2)

#### SOURCES

**References:** Barbour and Major 1988, Bjork 1997, Comer et al. 2003, Holland and Keil 1995, Sawyer and Keeler-Wolf 1995

**Version:** 21 Nov 2003

**Concept Author:** P. Comer, T. Keeler-Wolf

**Stakeholders:** West

**LeadResp:** West

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### CES204.062 NORTH PACIFIC COASTAL INTERDUNAL WETLAND

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**Primary Division:** North American Pacific Maritime (204)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Herbaceous; Depressional [Pond]; Isolated Wetland [Partially Isolated]; Mineral: W/ A-Horizon <10 cm; Graminoid; Shallow (<15 cm) Water; Sand Subsoil Texture; Coastal Dune Mosaic

**Concept Summary:** Coastal interdunal wetlands are common components of larger active and stabilized coastal barrier islands, spits, and coastal dunes, ranging from southeastern Alaska through the Aleutian Islands. Distinct landform and vegetation patterns are common to these dune systems. Landforms on the ocean side include low-gradient beaches, sparse to unvegetated dunes, slacks dominated by low herbaceous vegetation and back dunes dominated by tall herbaceous, shrub, or forested communities.

The slacks between dunes are colonized by *Equisetum variegatum* (northern horsetail) and other herbaceous species. The sites are elevated by the deposition of wind-blown sand, tectonic uplift and isostatic rebound. This further removes the sites from tidal water and allows shrubs, such as *Salix commutata* (undergreen willow), *Salix sitchensis* (Sitka willow), and *Myrica gale* (sweet gale) to invade. Organic mats also develop. Some slacks may develop into forested sites or peatlands, whereas other slacks may not persist to late succession because of dune encroachment.

The higher portions of dunes are dry and nutritionally poor because of leaching, moving the moisture and nutrients into the dune bases and slacks.

#### DISTRIBUTION

**Range:** This system ranges from southeastern Alaska through the Aleutian Islands.

**Divisions:** 204:C

**Subnations:** AK

#### Associations:

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## SOURCES

**References:** Western Ecology Working Group n.d.

**Version:** 26 May 2005

**Concept Author:** K. Boggs and G. Kittel

**Stakeholders:** West

**LeadResp:** West

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### CES204.859 NORTH PACIFIC HARDPAN VERNAL POOL

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**Primary Division:** North American Pacific Maritime (204)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Herbaceous; Depressional [Vernal Pool]

**Concept Summary:** This system includes shallow ephemeral water bodies found in depressions (up to several hectares in size) among grasslands and open woodlands throughout intermountain valleys of California, Oregon and the Gulf and San Juan islands of Washington and British Columbia. Northern hardpan vernal pools include an indurated clay or cemented (Si or Fe) hardpan that retains water inputs throughout some portion of the spring, but typically the depression dries down entirely into early summer months. In the Sand Juan and Gulf islands, they are created in small depressions in bedrock. This system typically occurs with a hummocky micro-relief. They tend to be acidic wetlands with characteristic plant species including *Downingia elegans*, *Isoetes orcuttii*, *Pilularia americana*, *Triteleia hyacinthina*, *Eleocharis* spp., *Eryngium petiolatum*, *Plagiobothrys figuratus*, *Plagiobothrys scouleri*, *Grindelia nana*, *Veronica peregrina*, *Deschampsia danthonioides*, and *Callitriche* spp. Due to draw-down characteristics, vernal pools typically form concentric rings of similar vegetation. Given their relative isolation in upland-dominated landscapes, many endemic plant species are common in California vernal pools.

**Comments:** This system includes both duripan/hardpan and bedrock types, which are segregated in the California systems. Decided to lump them for this system because both occur intermixed in the geographic area defined.

## DISTRIBUTION

**Range:** Found in depressions among grasslands and open woodlands throughout intermountain valleys of California, Oregon and the Gulf and San Juan islands of Washington.

**Divisions:** 204:C

**TNC Ecoregions:** 2:C

**Subnations:** BC, CA, OR, WA

### Associations:

- *Eryngium petiolatum* - *Grindelia nana* Herbaceous Vegetation (CEGL003345, G1G2)
- *Eryngium petiolatum* - *Lasthenia glaberrima* Herbaceous Vegetation (CEGL003458, G1G2)
- *Plagiobothrys figuratus* Vernal Pool Herbaceous Vegetation (CEGL003346, G1G2)
- *Plagiobothrys scouleri* - *Plantago bigelovii* Herbaceous Vegetation (CEGL003459, G2)

**High-ranked species:** *Blennosperma bakeri* (G1), *Castilleja campestris* ssp. *succulenta* (G4?T2), *Chamaesyce hooveri* (G2), *Downingia concolor* var. *concolor* (G4T3T4), *Downingia concolor* var. *tricolor* (G4T1?), *Eryngium spinosepalum* (G2), *Juncus kelloggii* (G3?), *Mimulus angustatus* (G3G4), *Navarretia leucocephala* ssp. *bakeri* (G4T2), *Navarretia myersii* (G1), *Navarretia myersii* ssp. *myersii* (G1T1), *Navarretia prostrata* (G2?), *Neostapfia colusana* (G3), *Orcuttia inaequalis* (G2), *Orcuttia pilosa* (G2), *Orcuttia tenuis* (G3), *Plagiobothrys bracteatus* var. *aculeolatus* (G4?T1T3Q), *Plagiobothrys chorisianus* var. *hickmanii* (G3T3Q), *Plagiobothrys hirtus* (G1), *Plagiobothrys humistratus* (G2?), *Plagiobothrys strictus* (G1), *Plagiobothrys trachycarpus* (G3G4), *Poa napensis* (G1), *Pogogyne douglasii* ssp. *parviflora* (G4T3Q), *Polygonum polygaloides* ssp. *confertiflorum* (G4G5T3T4), *Psilocarphus brevissimus* var. *multiflorus* (G4T3), *Spergularia macrotheca* var. *leucantha* (G5T3T4), *Trichostema rubisepalum* (G3), *Trifolium jokerstii* (G1)

## SOURCES

**References:** Chappell and Christy 2004, Comer et al. 2003, Holland and Keil 1995

**Version:** 21 Nov 2003

**Concept Author:** C. Chappell

**Stakeholders:** Canada, West

**LeadResp:** West

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### CES204.874 WILLAMETTE VALLEY WET PRAIRIE

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**Primary Division:** North American Pacific Maritime (204)

**Land Cover Class:** Herbaceous Wetland  
**Spatial Scale & Pattern:** Small patch  
**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Concept Summary:** This system is largely restricted to the Willamette Valley of Oregon and adjacent Washington. It is nearly extirpated from the Puget Trough of Washington. These are high-nutrient wetlands that are temporarily to seasonally flooded. They are dominated primarily by graminoids, especially *Deschampsia caespitosa*, *Camassia quamash*, *Carex densa*, and *Carex unilateralis*, and to a lesser degree by forbs (e.g., *Isoetes nuttallii*) or shrubs (e.g., *Rosa nutkana*). Wet prairies historically covered large areas of the Willamette Valley where they were maintained by a combination of wetland soil hydrology and frequent burning. They have been reduced to tiny fragments of their former extent.

#### DISTRIBUTION

**Range:** Restricted to the Willamette Valley of Oregon and adjacent Washington.

**Divisions:** 204:C

**TNC Ecoregions:** 2:C

**Subnations:** OR, WA

#### Associations:

- *Camassia quamash* Wet Prairie Herbaceous Vegetation (CEGL003341, G3)
- *Carex aperta* Herbaceous Vegetation (CEGL001801, G1?)
- *Carex densa* - *Deschampsia caespitosa* Herbaceous Vegetation [Provisional] (CEGL003455, G2)
- *Carex densa* - *Eleocharis palustris* Herbaceous Vegetation [Provisional] (CEGL003456, G3)
- *Deschampsia caespitosa* - *Danthonia californica* Herbaceous Vegetation (CEGL001604, G2)
- *Eleocharis palustris* - *Carex unilateralis* Herbaceous Vegetation (CEGL003411, G2)
- *Eleocharis palustris* Herbaceous Vegetation (CEGL001833, G5)
- *Isoetes nuttallii* Herbaceous Vegetation (CEGL003343, G3)
- *Rosa nutkana* / *Deschampsia caespitosa* Shrubland [Provisional] (CEGL003344, G2)
- *Rosa nutkana* / *Oenanthe sarmentosa* Shrubland [Provisional] (CEGL003457, G1)

**High-ranked species:** *Lomatium bradshawii* (G2), *Perideridia erythrorhiza* (G1), *Rana pretiosa* (G2)

#### SOURCES

**References:** Chappell and Christy 2004, Comer et al. 2003

**Version:** 21 Nov 2003

**Concept Author:** C. Chappell

**Stakeholders:** West

**LeadResp:** West

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#### CES412.223 HAWAI'I 'IHI'IHILUAKEA VERNAL POOL

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**Primary Division:** Northern Polynesia (412)

**Land Cover Class:** Herbaceous

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Depressional; Isolated Wetland [Partially Isolated]; Short (<5 yrs) Flooding Interval [Short interval, Winter Flooding]; Vernal Pool Mosaic

**Concept Summary:** This intermittently wet fern wetland develops in lowland vernal pools and areas that get flooded periodically. It occurs in shallow depressions in clay soil, cinder craters, or lithified sand dunes overlain with alluvial clay common in dry areas of most islands where winter rains create seasonal pools at elevations between 424 and 1032 m (1391-3385 feet). Now restricted to O'ahu and Molokai'i, the wetland is characterized by the dominance of the federally endangered endemic fern *Marsilea villosa*. On Molokai'i, it occurs in rocky areas that never hold standing water but get flushed out annually or less often. On the seasonal floodplain in Lualualei Valley, O'ahu, scattered depressions support *Marsilea* mats under scattered *Prosopis pallida* and among *Sida fallax*. At 'Ihi'ihiilauakea Crater, O'ahu, the crater floor is thickly covered with *Marsilea* when seasonal rains saturate the soil, sometimes submerging the habitat. During dry periods the fern becomes a dormant rhizomatous mat, and the area appears to be a weedy dryland of grasses and forbs, including *Amaranthus spinosus*, *Xanthium strumarium*, *Setaria verticillata*, *Cynodon dactylon*, *Chloris barbata*, and *Merremia aegyptia*. Sexual reproduction of *Marsilea* may occur as infrequently as once every ten or more years, due to the infrequency of sufficiently heavy rains in lowland areas. Historic populations on O'ahu were destroyed by drainage of ponding areas, habitat degradation, competition from alien plants, off-road vehicle use, and development.

## DISTRIBUTION

**Range:** This system occurs at elevations between 424 and 1032 m (1391-3385 feet) on O'ahu and Moloka'i. Historically it also occurred on Ni'ihau.

**Divisions:** 412:C

**TNC Ecoregions:** 65:C

**Subnations:** HI

### Associations:

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**High-ranked species:** *Marsilea villosa* (G1)

## SOURCES

**References:** Palmer 2003, USFWS 1996, USFWS 2003, Wagner et al. 1999, Western Ecology Working Group n.d.

**Version:** 20 Apr 2005

**Stakeholders:** West

**Concept Author:** M. Castillo and G. Kittel

**LeadResp:** West

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### CES412.216 HAWAI'I MONTANE BOG

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**Primary Division:** Northern Polynesia (412)

**Land Cover Class:** Herbaceous Wetland

**Spatial Scale & Pattern:** Small patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.)

**Diagnostic Classifiers:** Peat and mud; Depressional; Isolated Wetland [Strictly Isolated]; Impermeable Layer; Saturated Soil

**Concept Summary:** Hawai'i Upland Bog occurs primarily between 1067 and 1670 m (3500-5500 feet) elevation as isolated small patches on flat or gently sloping topography in high rainfall areas in cloud forests and other wet forests on all of the high islands. They are also known to occur at a subalpine bog at 2270 m (7446 feet) elevation on Maui, and a low elevation bog at 646 m (2120 feet) on Kaua'i. Soils remain saturated on a shallow to deep layer of peat (0.01-5 m), underlain by an impervious basal clay layer that impedes drainage. A few bogs occur on steeper terrain where precipitation is extremely high, such as in North Bog in the Wai'ale'ale summit region of Kaua'i, where soils remain saturated despite adequate drainage. Two bogs are believed to have formed in former small lakes, one along the Wailuku River, Hawai'i (Treeless bog), the other the subalpine bog on East Maui (Flat Top bog). The low-elevation bog on Kaua'i occurs on shallow, poorly drained acidic peat. The vegetation is an uneven hummocky matrix of sedges and grasses, including *Rhynchospora rugosa ssp. lavarum* (= *Rhynchospora lavarum*), *Oreobolus furcatus*, *Dichantherium*, *Panicum*, and *Deschampsia*, imbedded in moss (*Racomitrium lanuginosum*, *Sphagnum* spp.). Dwarfed woody plants can occur as scattered individuals, in clumps, or as a continuous layer and include *Metrosideros polymorpha*, *Cheirodendron* spp., and *Vaccinium* spp. Associated ferns and herbs include *Sadleria* spp., *Polypodium* spp., *Hymenophyllum* spp., *Elaphoglossum* spp., *Athyrium* spp., *Schizaea robusta*, *Selaginella deflexa*, *Plantago* spp., *Astelia* spp., *Viola* spp., *Machaerina* spp., *Lysimachia* spp., and on Kaua'i, the boreal catchfly *Drosera anglica*.

## DISTRIBUTION

**Range:** This system is found at 646 to 2270 m (2120-7446 feet) elevation on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i.

**Divisions:** 412:C

**TNC Ecoregions:** 65:C

**Subnations:** HI

### Associations:

- *Metrosideros polymorpha* / *Rhynchospora* spp. / *Dicranopteris linearis* Mixed Lowland Bog Dwarf-shrubland (CEGL008080, G1)
- *Metrosideros polymorpha* Mixed Montane Bog Dwarf-shrubland (CEGL008081, G2)

**High-ranked species:** *Acaena exigua* (G1), *Argyroxiphium caliginis* (G1), *Argyroxiphium grayanum* (G1), *Astelia waialealae* (G1), *Calamagrostis expansa* (G1), *Calamagrostis hillebrandii* (G1), *Carex montis-eeka* (G2), *Chamaesyce sparsiflora* (G1), *Coprosma elliptica* (G3), *Dichantherium cynodon* (G2G3), *Dichantherium hillebrandianum* (G2G3), *Dichantherium isachnoides* (G2G3), *Dubautia paleata* (G1G2), *Dubautia waialealae* (G1), *Geranium hanaense* (G1), *Geranium humile* (G1), *Geranium kauaiense* (G1), *Isoetes hawaiiensis* (G1), *Keysseria erici* (G1), *Labordia pumila* (G1),

Lagenifera helenae (G1), Lagenifera maviensis (G2), Lobelia gloria-montis (G1G2), Lobelia kauaensis (G2), Lobelia villosa (G1), Lysimachia daphnoides (G1), Melicope waialealae (G2), Myrsine denticulata (G1G2), Myrsine helleri (G1G2), Myrsine vaccinioides (G1), Panicum longivaginatum (G1), Sanicula purpurea (G1), Selaginella deflexa (G1G2), Viola kauaensis (G2), Viola maviensis (G2?)

**Environment:** Clay formation in Hawai'ian bogs is typically a result of basaltic weathering under cool, wet conditions that permits an accumulation of humus. On flat and gently sloping terrain, the clay formation impedes drainage resulting in perched water on top of the clay. In addition, it has now been established that eolian clay mineral deposits accumulated on broad summits and ridges within high rainfall and cloud areas over a 200,000- to 500,000-year time span have also contributed to the formation of clay substrates that support Hawai'ian bogs.

**Dynamics:** All bogs are threatened by feral pig rooting followed by invasion of exotic sedges (*Cyperus* spp.) and colonization by grasses (*Andropogon virginicus*, *Schizachyrium condensatum*). Fencing at a few bogs has been shown to arrest damage, by keeping pigs away.

#### SOURCES

**References:** Mueller-Dombois and Fosberg 1998, Wagner et al. 1999, Western Ecology Working Group n.d., Ziegler 2002

**Version:** 20 Apr 2005

**Stakeholders:** West

**Concept Author:** M. Castillo and G. Kittel

**LeadResp:** West

## Appendix IV: At-Risk Animal Species Closely Tied to Isolated Wetland Ecological Systems

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<b>VERTEBRATES</b>						
<i>Ambystoma cingulatum</i>	Flatwoods Salamander	Obligate	G2G3	LT	AL(S1), FL(S2S3), GA(S2), SC(S1)	Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Batrachoseps major aridus</i>	Desert Slender Salamander	Facultative	G4T1	LE	CA(S1)	Sonoran Fan Palm Oasis
<i>Bufo houstonensis</i>	Houston Toad	Facultative	G1	LE	TX(S1)	West Gulf Coastal Plain Flatwoods Pond
						West Gulf Coastal Plain Pine-Hardwood Flatwoods
<i>Microtus californicus scirpensis</i>	Amargosa Vole	Facultative	G5T1	LE	CA(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Notophthalmus perstriatus</i>	Striped Newt	Obligate	G2G3		FL(S2S3), GA(S2)	Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Rana capito</i>	Carolina Gopher Frog	Obligate	G3		AL(S2), FL(S3), GA(S2S3), NC(S2), SC(S1), TN(S1)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore
						Central Florida Herbaceous Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Rana sevosa</i>	Dusky Gopher Frog	Obligate	G1	LE	AL(SH), LA(SH), MS(S1)	East Gulf Coastal Plain Southern Depression Pondshore

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Sorex ornatus relictus</i>	Buena Vista Lake Shrew	Facultative	G5T1	LE	CA(S1)	Mediterranean California Alkali Marsh
<b>INSECTS</b>						
<i>Elaphrus viridis</i>	Delta Green Ground Beetle	Facultative	G1	LT	CA(S1)	Northern California Claypan Vernal Pool
<i>Hydrochus spangleri</i>	Seth Forest Water Scavenger Beetle	Obligate	G1		DE(SNR), MD(S1)	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest
<i>Oecanthus laricis</i>	Laricis Tree Cricket	Unconfirmed	G1G2		MI(S1S2), OH(SNR)	North-Central Interior Shrub-Graminoid Alkaline Fen
<i>Papaipema sulphurata</i>	Decodon Stem Borer Moth	Unconfirmed	G2		MA(S2)	Atlantic Coastal Plain Northern Bog
						Atlantic Coastal Plain Northern Pondshore
<i>Pseudocopaeodes eunus obscurus</i>	Carson Wandering Skipper	Obligate	G3G4T1	LE	CA(S1), NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<b>CRUSTACEANS</b>						
<i>Branchinecta conservatio</i>	Conservancy Fairy Shrimp	Obligate	G1	LE	CA(S1)	Northern California Claypan Vernal Pool
<i>Branchinecta longiantenna</i>	Longhorn Fairy Shrimp	Obligate	G1	LE	CA(S1)	Mediterranean California Coastal Interdunal Wetland
						Northern California Claypan Vernal Pool
						South Coastal California Vernal Pool
<i>Branchinecta lynchi</i>	Vernal Pool Fairy Shrimp	Obligate	G3	LT	CA(S2S3), OR(S2S3)	Mediterranean California Coastal Interdunal Wetland
						Northern California Claypan Vernal Pool
						South Coastal California Vernal Pool
<i>Branchinecta mesovallensis</i>	Midvalley Fairy Shrimp	Obligate	G2		CA(S2)	Northern California Claypan Vernal Pool
<i>Branchinecta potassa</i>	Potassium Loving Fairy Shrimp	Obligate	G3		NE(SNR)	Western Great Plains Closed Depression Wetland
<i>Branchinecta sandiegonensis</i>	San Diego Fairy Shrimp	Obligate	G1	LE	CA(S1)	South Coastal California Vernal Pool
<i>Branchinella acaciodea</i>	Acacia Fairy Shrimp	Obligate	G2G3		TX(SNR)	North American Warm Desert Playa
<i>Branchinella sublettei</i>	Salt Playa Fairy Shrimp	Obligate	G3		TX(SNR)	North American Warm Desert Playa
<i>Caenestheriella gynecia</i>	Feminine Clam Shrimp	Obligate	G2G3		MA(SNR), OH(SNR), PA(SNR)	North-Central Interior and Appalachian Acid Peatland

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Cyzicus californicus</i>	California Clam Shrimp	Facultative	G2G3		CA(SNR)	Mediterranean California Coastal Interdunal Wetland
						Northern California Claypan Vernal Pool
						South Coastal California Vernal Pool
<i>Cyzicus elongatus</i>	Elongate Clam Shrimp	Facultative	G2G3Q		CA(SNR)	Northern California Claypan Vernal Pool
<i>Eocyclus concavus</i>	Swaybacked Clam Shrimp	Unconfirmed	G1G3		AZ(SNR), NM(SNR), TX(SNR)	unable to assign ecological system; too little known
<i>Eulimnadia agassizii</i>	Agassiz Clam Shrimp	Facultative	G1G2		CT(SH), MA(S1)	Atlantic Coastal Plain Northern Pondshore
<i>Eulimnadia astraova</i>	Star Cyst Clam Shrimp	Facultative	G1G3		LA(SNR)	unable to assign ecological system; too little known
<i>Fallicambarus danielae</i>	Speckled Burrowing Crayfish	Facultative	G2		AL(S1), MS(S2)	Atlantic Coastal Plain Sandhill Seep
<i>Linderiella occidentalis</i>	California Fairy Shrimp	Facultative	G3G4		CA(S2S3)	Northern California Claypan Vernal Pool
						South Coastal California Vernal Pool
<i>Linderiella santarosae</i>	Santa Rosa Plateau Fairy Shrimp	Obligate	G1G2		CA(S1S2)	South Coastal California Vernal Pool
<i>Procambarus econfinae</i>	Panama City Crayfish	Facultative	G1		FL(S1)	East Gulf Coastal Plain Southern Depression Pondshore
<i>Streptocephalus moorei</i>	Spinythumb Fairy Shrimp	Obligate	G1G2		NM(SNR)	North American Warm Desert Playa
<i>Streptocephalus woottoni</i>	Riverside Fairy Shrimp	Obligate	G2	LE	CA(S1)	South Coastal California Vernal Pool

## Appendix V: At-Risk Plant Species Closely Tied to Isolated Wetland Ecological Systems

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Acaena exigua</i>	Liliwai	Obligate	G1	LE	HI(S1)	Hawai'i Montane Bog
<i>Aeschynomene pratensis</i>	Meadow Joint-vetch	Unconfirmed	G1		FL(S1)	South Florida Cypress Dome
<i>Agrostis hendersonii</i>	Henderson's Bentgrass	Facultative	G1Q		CA(S1.1), OR(SH)	Northern California Claypan Vernal Pool
<i>Amaranthus floridanus</i>	Florida Amaranth	Facultative	G3		FL(S3)	Atlantic Coastal Plain Southern Depression Pondshore
						Central Florida Herbaceous Pondshore
<i>Ambrosia linearis</i>	Linear-leaf Bursage	Facultative	G3		CO(S3)	Western Great Plains Closed Depression Wetland
<i>Amphianthus pusillus</i>	Little Amphianthus	Obligate	G2	LT	AL(S1), GA(S2), SC(S1)	Southern Piedmont Granite Flatrock
<i>Argyroxiphium caliginis</i>	Eke Silversword	Obligate	G1		HI(S1.2)	Hawai'i Montane Bog
<i>Argyroxiphium grayanum</i>	Greensword	Facultative	G1		HI(S1)	Hawai'i Montane Bog
<i>Astelia waialealae</i>		Facultative	G1	C	HI(SNR)	Hawai'i Montane Bog
<i>Astragalus applegatei</i>	Applegate's Milk-vetch	Obligate	G1	LE	OR(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Astragalus diversifolius</i>	Mesic Milkvetch	Unconfirmed	G2		ID(S2), NV(S1), UT(S1), WY(SH)	Inter-Mountain Basins Alkaline Closed Depression
<i>Astragalus lemmonii</i>	A Milk-vetch	Facultative	G3?		CA(S2.2), NV(S1), OR(SNR)	Inter-Mountain Basins Alkaline Closed Depression
<i>Astragalus phoenix</i>	Ash Meadows Milk-vetch	Obligate	G2	LT	NV(S2)	Inter-Mountain Basins Alkaline Closed Depression
<i>Astragalus pterocarpus</i>	Winged Milk-vetch	Facultative	G3		NV(S3)	Inter-Mountain Basins Alkaline Closed Depression
						Inter-Mountain Basins Greasewood Flat
<i>Astragalus pycnostachyus</i>	Marsh Milk-vetch	Facultative	G2		CA(SNR)	Mediterranean California Coastal Interdunal Wetland
<i>Astragalus pycnostachyus var. lanosissimus</i>	Ventura Marsh Milkvetch	Facultative	G2T1	LE	CA(S1.1)	Mediterranean California Coastal Interdunal Wetland



Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Atriplex bonnevillensis</i>	Bonneville Saltbush	Facultative	G2G3Q		NV(SNR), UT(S2)	Inter-Mountain Basins Greasewood Flat
<i>Atriplex cordulata</i>	Heart-leaf Saltbush	Facultative	G2?		CA(S2.2?)	California Central Valley Alkali Sink
<i>Atriplex coronata</i> var. <i>notatior</i>	San Jacinto Valley Crownscale	Facultative	G4T1	LE	CA(S1.1)	California Central Valley Alkali Sink
<i>Atriplex griffithsii</i>	Griffith's Saltbush	Obligate	G2G3		AZ(S2S3), NM(S2)	North American Warm Desert Playa
<i>Atriplex joaquiniana</i>	San Joaquin Saltbush	Facultative	G2		CA(S2.1)	California Central Valley Alkali Sink
<i>Atriplex minuscula</i>	Lesser Saltbush	Facultative	G1		CA(S1.1)	California Central Valley Alkali Sink
<i>Atriplex parishii</i>	Parish's Saltbush	Facultative	G1G2		CA(S1.1)	South Coastal California Vernal Pool
<i>Atriplex spinifera</i>	Mojave Saltbush	Facultative	G3?		CA(SNR)	California Central Valley Alkali Sink
						Inter-Mountain Basins Playa
						North American Warm Desert Playa
<i>Atriplex tularensis</i>	Bakersfield Saltbush	Facultative	G1Q		CA(S1.1)	California Central Valley Alkali Sink
<i>Atriplex vallicola</i>	Lost Hills Saltbush	Facultative	G1		CA(S1.1)	California Central Valley Alkali Sink
<i>Blennosperma bakeri</i>	Baker's Blennosperma	Obligate	G1	LE	CA(S1.2)	North Pacific Hardpan Vernal Pool
<i>Boisduvalia cleistogama</i>	Cleistogamous Spike-primrose	Facultative	G3G4		CA(SNR)	Northern California Claypan Vernal Pool
<i>Boltonia</i> sp. 1		Facultative	G2?		NJ(SNR), VA(S1)	Central Interior Highlands and Appalachian Sinkhole and Depression Pond
						Southern Piedmont / Ridge and Valley Upland Depression Swamp
<i>Brodiaea filifolia</i>	Thread-leaved Brodiaea	Facultative	G2	LT	CA(S2.1)	South Coastal California Vernal Pool
<i>Brodiaea orcuttii</i>	Orcutt's Brodiaea	Facultative	G3		CA(S3.1)	South Coastal California Vernal Pool
<i>Calamagrostis expansa</i>		Unconfirmed	G1	C	HI(S1)	Hawai'i Montane Bog
<i>Calamagrostis hillebrandii</i>	Hillebrand's Small-reedgrass	Facultative	G1	C	HI(S1.1)	Hawai'i Montane Bog
<i>Callitriche longipedunculata</i>	Long-stock Water-starwort	Obligate	G2G3		CA(SNR)	Northern California Claypan Vernal Pool
<i>Calochortus striatus</i>	Alkali Mariposa Lily	Obligate	G2		CA(S2.2), NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Campanula robinisiae</i>	Robins' Bellflower	Obligate	G1	LE	FL(S1)	Central Florida Herbaceous Pondshore

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Cardamine clematidis</i>	Mountain Bitter Cress	Unconfirmed	G2G3		AL(SH), NC(S2), SC(SNR), TN(S2), VA(S1S2)	Southern Appalachian Seepage Wetland
<i>Carex decomposita</i>	Cypress-knee Sedge	Unconfirmed	G3		AL(S1), AR(S2), DC(SH), DE(S1), FL(SNR), GA(S2?), IL(S1), IN(S2), KY(S2), LA(S1), MD(S1), MI(SX), MO(S3), MS(S3), NC(S1), NY(SH), OH(S1), OK(SU), SC(SNR), TN(S2), TX(S1), VA(S2)	Atlantic Coastal Plain Southern Depression Pondshore
						Central Interior Highlands and Appalachian Sinkhole and Depression Pond
						East Gulf Coastal Plain Northern Depression Pondshore
						Southern Piedmont / Ridge and Valley Upland Depression Swamp
						West Gulf Coastal Plain Flatwoods Pond
<i>Carex montis-eeka</i>	A Sedge	Facultative	G2		HI(S2)	Hawai'i Montane Bog
<i>Carex sp. 2</i>	Fen Sedge	Facultative	G1		NC(S1), VA(S1)	North-Central Appalachian Seepage Fen
<i>Carex specuicola</i>	Navajo Sedge	Obligate	G2	LT	AZ(S2), UT(S1)	Colorado Plateau Hanging Garden
<i>Carex verrucosa</i>	Warty Sedge	Facultative	G3G4		AL(SNR), FL(SNR), GA(S4?), LA(SNR), MS(S2), NC(S1), SC(SNR), TX(S2S3), VA(SNR)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore
						Central Florida Herbaceous Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Carex wiegandii</i>	Wiegand's Sedge	Facultative	G3		MA(S1), ME(S3), MI(S2), NH(S1S2), NY(S1), PA(S1), VT(S1)	Boreal-Laurentian-Acadian Acidic Basin Fen
						Laurentian-Acadian Conifer-Hardwood Acid Swamp
<i>Castilleja campestris</i> ssp. <i>succulenta</i>	Fleshy Owl's-clover	Facultative	G4?T2	LT	CA(S2.2)	North Pacific Hardpan Vernal Pool
<i>Castilleja salsuginosa</i>	Monte Neva Paintbrush	Obligate	G1Q		NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Centaurium namophilum</i>	Spring-loving Centaury	Obligate	G2Q	LT	NV(S2)	Inter-Mountain Basins Alkaline Closed Depression
<i>Chamaesyce hooveri</i>	Hoover's Broomsurge	Obligate	G2	LT	CA(S2.1)	North Pacific Hardpan Vernal Pool
<i>Chamaesyce sparsiflora</i>		Obligate	G1		HI(S1.1)	Hawai'i Montane Bog
<i>Chelone cuthbertii</i>	Cuthbert's Turtlehead	Facultative	G3		GA(S1), NC(S3?), SC(SNR), VA(S2)	Atlantic Coastal Plain Sandhill Seep
						North-Central Appalachian Seepage Fen
						Southern Appalachian Seepage Wetland
<i>Cirsium loncholepis</i>	La Graciosa Thistle	Facultative	G2	LE	CA(S2.2)	Mediterranean California Coastal Interdunal Wetland
<i>Cirsium mohavense</i>	Mohave Thistle	Facultative	G2G3		AZ(S1), CA(SNR), NV(SNR)	Inter-Mountain Basins Alkaline Closed Depression
<i>Coelorachis tuberculosa</i>	Florida Jointgrass	Facultative	G3		AL(S1), FL(S3)	Central Florida Herbaceous Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Coprosma elliptica</i>	Elliptic Coprosma	Facultative	G3		HI(SNR)	Hawai'i Montane Bog
<i>Cordylanthus palmatus</i>	Palmate-bracted Bird's-beak	Facultative	G1	LE	CA(S1.1)	California Central Valley Alkali Sink
<i>Cordylanthus tecopensis</i>	Tecopa Bird's-beak	Obligate	G2		CA(S1.2), NV(S2)	Inter-Mountain Basins Alkaline Closed Depression

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Coreopsis nudata</i>	Georgia Tickseed	Facultative	G3?		AL(S1), FL(SNR), GA(S3S4), LA(S2), MS(S1S2)	East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Basin Swamp
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Coreopsis rosea</i>	Rose Coreopsis	Facultative	G3		DE(S1), GA(SNR), MA(S3), MD(S1), MS(SNR), NJ(S2), NY(S3), PA(SX), RI(S2), SC(S2)	Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
<i>Croton elliotii</i>	Elliott's Croton	Obligate	G2G3		AL(S1), FL(SH), GA(S2S3), SC(SNR)	East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Cucurbita okeechobeensis</i>	Okeechobee Gourd	Facultative	G1	LE	FL(S1)	Central Florida Herbaceous Pondshore
<i>Cyperus granitophilus</i>	Granite-loving Flatsedge	Obligate	G3Q		AL(S2), GA(S3), NC(S1), SC(SNR), TN(S1), VA(S1)	Southern Piedmont Granite Flatrock
<i>Cyperus onerosus</i>	Dune Flat-sedge	Obligate	G2		TX(S2)	North American Warm Desert Interdunal Swale Wetland
<i>Delphinium recurvatum</i>	Byron Larkspur	Facultative	G2		CA(S2.2)	California Central Valley Alkali Sink
<i>Dichanthelium cynodon</i>	Dog-tooth Witchgrass	Facultative	G2G3		HI(S2S3)	Hawai'i Montane Bog
<i>Dichanthelium hillebrandianum</i>	Hillebrand's Witchgrass	Facultative	G2G3		HI(S2S3)	Hawai'i Montane Bog
<i>Dichanthelium isachnoides</i>		Facultative	G2G3		HI(S2S3)	Hawai'i Montane Bog
<i>Downingia bella</i>	Hoover's Downingia	Obligate	G2G3		CA(SNR)	Northern California Claypan Vernal Pool

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Downingia bicornuta</i>	Double-horn Downingia	Unconfirmed	G3G4		CA(SNR), ID(SNR), NV(SNR), OR(SNR)	Inter-Mountain Basins Alkaline Closed Depression
						Modoc Basalt Flow Vernal Pool
						Northern California Volcanic Vernal Pool
<i>Downingia cuspidata</i>	Cuspidate Downingia	Obligate	G3?		CA(SNR)	Northern California Claypan Vernal Pool
<i>Downingia ornatissima</i>	Sollano Downingia	Obligate	G2G3		CA(SNR)	Northern California Claypan Vernal Pool
<i>Downingia pulchella</i>	Flat-face Downingia	Obligate	G3?		CA(SNR)	Northern California Claypan Vernal Pool
<i>Downingia pusilla</i>	Dwarf Downingia	Obligate	G3		CA(S3.1)	Northern California Claypan Vernal Pool
<i>Dubautia paleata</i>	Naenae Puakea	Facultative	G1G2		HI(S1S2)	Hawai'i Montane Bog
<i>Dubautia waialealae</i>	Na`ena`e	Obligate	G1	C	HI(S1)	Hawai'i Montane Bog
<i>Echinochloa paludigena</i>	Florida Cockspur	Facultative	G3Q		FL(S3)	Central Florida Herbaceous Pondshore
						South Florida Depression Pondshore
<i>Eleocharis nitida</i>	Slender Spikerush	Facultative	G3G4		AK(S1), ME(SNR), MI(S1), MN(S2), NH(SH), VT(SH), WI(S2)	North-Central Interior Wet Meadow-Shrub Swamp
<i>Eleocharis wolfii</i>	Wolf Spikerush	Unconfirmed	G3G4		AL(S1), AR(S2), GA(S1), IA(S1), IL(S1), IN(S2), KS(SH), LA(S1?), MN(S1), MO(S3), MS(SNR), ND(SH), NE(S1), OH(S1), OK(SU), TN(S1), TX(S1), WI(S1)	Eastern Great Plains Wet Meadow, Prairie, and Marsh
						Great Lakes Wet-Mesic Lakeplain Prairie
						Great Plains Prairie Pothole
						North-Central Interior Wet Meadow-Shrub Swamp
						Texas-Louisiana Coastal Prairie
						Western Great Plains Closed Depression Wetland
						Western Great Plains Open Freshwater Depression Wetland

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
						Western Great Plains Saline Depression Wetland
<i>Eriogonum ampullaceum</i>	Mono Buckwheat	Facultative	G3		CA(SNR), NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Eriogonum argophyllum</i>	Ruby Valley Buckwheat	Obligate	G1		NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Eryngium aristulatum</i> var. <i>parishii</i>	San Diego Button Celery	Facultative	G5T2	LE	CA(S2.1)	South Coastal California Vernal Pool
<i>Eryngium castrense</i>		Facultative	G1G2		CA(SNR)	Northern California Volcanic Vernal Pool
<i>Eryngium constancei</i>	Loch Lomond Coyote-thistle	Obligate	G1	LE, PT	CA(S1.1)	Northern California Volcanic Vernal Pool
<i>Eryngium mathiasiae</i>	Mathias' Coyote-thistle	Facultative	G3		CA(SNR)	Northern California Volcanic Vernal Pool
<i>Eryngium pendletonensis</i>		Obligate	G1		CA(S1.1)	South Coastal California Vernal Pool
<i>Eryngium pinnatisectum</i>	Tuolumne Coyote-thistle	Facultative	G3		CA(S3.2)	Northern California Volcanic Vernal Pool
<i>Eryngium spinosepalum</i>	Spiny Sepaled Coyote-thistle	Facultative	G2		CA(S2.2)	North Pacific Hardpan Vernal Pool
<i>Euthamia galetorum</i>	Narrow-leaf Fragrant Golden-rod	Facultative	G3		MA(S1?)	Atlantic Coastal Plain Northern Pondshore
<i>Fimbristylis perpusilla</i>	Harper's Fimbristylis	Facultative	G2		DE(S1), GA(S1), MD(S2), NC(S1), SC(S2), TN(S1), VA(S1)	Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
						Central Interior Highlands and Appalachian Sinkhole and Depression Pond
<i>Frankenia salina</i>	Alkali Heath	Obligate	G3G4		CA(SNR)	Mediterranean California Alkali Marsh
<i>Fuirena longa</i>	Coastal-plain Umbrella-sedge	Unconfirmed	G3G4		AL(SNR), FL(SNR), MS(S3S4), TX(S2)	East Gulf Coastal Plain Southern Depression Pondshore
						Southeastern Coastal Plain Interdunal Wetland
						Southern Coastal Plain Nonriverine Cypress Dome
						West Gulf Coastal Plain Flatwoods Pond

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Geranium hanaense</i>	Nohoanu	Obligate	G1	C	HI(S1)	Hawai'i Montane Bog
<i>Geranium humile</i>	Hinahina	Facultative	G1	C	HI(S1.2)	Hawai'i Montane Bog
<i>Geranium kauaiense</i>		Obligate	G1	C	HI(S1.1)	Hawai'i Montane Bog
<i>Glyceria nubigena</i>	Smoky Mountains Manna-grass	Unconfirmed	G2		NC(S2), TN(S1S2)	Southern Appalachian Seepage Wetland
<i>Goodmania luteola</i>	Yellow Goodmania	Facultative	G3		CA(S3.2), NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
						North American Warm Desert Playa
<i>Gratiola heterosepala</i>	Boggs Lake Hedge-hyssop	Facultative	G3		CA(S3.1), OR(S1)	Inter-Mountain Basins Playa
						Modoc Basalt Flow Vernal Pool
						Northern California Claypan Vernal Pool
						Northern California Volcanic Vernal Pool
<i>Grindelia fraxinoprattensis</i>	Ash Meadows Gumplant	Facultative	G2	LT	CA(S1.2), NV(S2)	Inter-Mountain Basins Alkaline Closed Depression
<i>Hartwrightia floridana</i>	Hartwrightia	Unconfirmed	G2		FL(S2), GA(S1)	Atlantic Coastal Plain Sandhill Seep
<i>Helenium virginicum</i>	Virginia Sneezeweed	Obligate	G2	LT	MO(S3), VA(S2)	Atlantic Coastal Plain Northern Pondshore
						Central Interior Highlands and Appalachian Sinkhole and Depression Pond
<i>Hesperivax caulescens</i>	Involucrate Evax	Facultative	G3		CA(S3.2)	Northern California Claypan Vernal Pool
<i>Hordeum intercedens</i>		Facultative	G3G4		CA(S3S4)	Northern California Claypan Vernal Pool
<i>Howellia aquatilis</i>	Water Howellia	Facultative	G3	LT	CA(S1.2), ID(S1), MT(S2), OR(S1), WA(S2S3)	Northern Columbia Plateau Basalt Pothole Ponds [Provisional]
						Northern Rocky Mountain Wooded Vernal Pool
<i>Hymenocallis henryae</i>	Henry's Spider-lily	Facultative	G2		FL(S2)	Southern Coastal Plain Nonriverine Basin Swamp

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Hypericum adpressum</i>	Creeping St. John's-wort	Facultative	G3		CT(SH), DE(S2), GA(S2?), IL(S1), IN(S1), KY(SH), MA(S2), MD(S1), MO(S1), NC(SH), NJ(S2), NY(S2), PA(SX), RI(S2), SC(S1), TN(S1), VA(S1), WV(SH)	Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						North-Central Interior Shrub-Graminoid Alkaline Fen
<i>Hypericum chapmanii</i>	Chapman's St. John's-wort	Facultative	G3		FL(S3)	East Gulf Coastal Plain Southern Depression Pondshore
<i>Hypericum edisonianum</i>	Edison's Ascyrum	Facultative	G2		FL(S2)	Central Florida Herbaceous Pondshore
<i>Hypericum lissophloeus</i>	Smooth-barked St. John's-wort	Obligate	G2		FL(S2)	East Gulf Coastal Plain Sandhill Lakeshore Depression
<i>Iris lacustris</i>	Dwarf Lake Iris	Facultative	G3	LT	MI(S3), WI(S3)	Great Lakes Alvar
						Great Lakes Dune and Swale
<i>Isocoma arguta</i>	Suisun Goldenbush	Facultative	G1		CA(S1.1)	California Central Valley Alkali Sink
<i>Isoetes hawaiiensis</i>		Unconfirmed	G1		HI(S1.2)	Hawai'i Montane Bog
<i>Isoetes lithophila</i>	Rock Quillwort	Obligate	G2		TX(S2)	Edwards Plateau Granitic Forest, Woodland and Glade
<i>Isoetes melanospora</i>	Black-spored Quillwort	Obligate	G1	LE	GA(S1), SC(S1)	Southern Piedmont Granite Flatrock
<i>Isoetes orcuttii</i>	Orcutt's Quillwort	Obligate	G2?		CA(SNR)	Northern California Claypan Vernal Pool
						South Coastal California Vernal Pool
<i>Isoetes piedmontana</i>	Piedmont Quillwort	Facultative	G3		AL(S2), GA(S3), NC(S1), SC(S2), TX(S1), VA(S1?)	Southern Piedmont / Ridge and Valley Upland Depression Swamp
						Southern Piedmont Granite Flatrock
<i>Isoetes tegetiformans</i>	Merlin's-grass	Obligate	G1	LE	GA(S1)	Southern Piedmont Granite Flatrock



Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Isoetes virginica</i>	Virginia Quillwort	Facultative	G1		NC(S1), VA(S1?)	Central Interior Highlands and Appalachian Sinkhole and Depression Pond
						Southern Piedmont / Ridge and Valley Upland Depression Swamp
<i>Ivesia kingii</i>	King's Ivesia	Facultative	G3		CA(SNR), NV(S3), UT(S1)	Inter-Mountain Basins Alkaline Closed Depression
						North American Warm Desert Playa
<i>Ivesia kingii</i> var. <i>eremica</i>	Ash Meadows Mousetails	Obligate	G3T1T2Q	LT	NV(S1S2)	Inter-Mountain Basins Alkaline Closed Depression
<i>Ivesia pityocharis</i>	Pine Nut Ivesia	Facultative	G2		NV(S2)	Columbia Plateau Vernal Pool
<i>Ivesia sericoleuca</i>	Plumas Ivesia	Facultative	G2		CA(S2.2)	Northern California Claypan Vernal Pool
<i>Juncus caesariensis</i>	New Jersey Rush	Unconfirmed	G2		MD(S1), NC(S1), NJ(S2), VA(S2)	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest
<i>Juncus kelloggii</i>	Kellogg's Rush	Facultative	G3?		CA(SNR), NV(SNR), WA(S1)	Inter-Mountain Basins Alkaline Closed Depression
						North Pacific Hardpan Vernal Pool
						Northern California Claypan Vernal Pool
<i>Juncus leiospermus</i>	Red Bluff Rush	Facultative	G2		CA(S2.2)	Northern California Claypan Vernal Pool
<i>Juncus luciensis</i>		Facultative	G3?		CA(SNR)	South Coastal California Vernal Pool
<i>Juncus triformis</i>	Yosemite Dwarf Rush	Facultative	G2G3		CA(SNR)	South Coastal California Vernal Pool
<i>Juncus uncialis</i>	Inch-high Rush	Facultative	G3G4		CA(SNR), NV(SNR), OR(SNR), WA(S2)	Columbia Plateau Vernal Pool
						Inter-Mountain Basins Alkaline Closed Depression
<i>Keysseria erici</i>		Facultative	G1	C	HI(S1.2)	Hawai'i Montane Bog
<i>Labordia pumila</i>		Facultative	G1	C	HI(S1.2)	Hawai'i Montane Bog
<i>Lachnocaulon engleri</i>	Engler's Bogbutton	Facultative	G3		AL(S1?), FL(S3)	Southeastern Coastal Plain Interdunal Wetland
<i>Lagenifera helenae</i>		Facultative	G1	C	HI(S1.1)	Hawai'i Montane Bog
<i>Lagenifera maviensis</i>	Howaiaulu	Facultative	G2		HI(S2.2)	Hawai'i Montane Bog
<i>Lasthenia burkei</i>	Burke's Goldfields	Facultative	G1	LE	CA(S1.1)	Northern California Claypan Vernal Pool
<i>Lasthenia chrysantha</i>		Facultative	G3?		CA(SNR)	Northern California Claypan Vernal Pool
<i>Lasthenia conjugens</i>	Contra Costa Goldfields	Facultative	G1	LE	CA(S1.1)	Northern California Claypan Vernal Pool

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Lasthenia ferrisiae</i>	Ferris' Goldfields	Facultative	G3		CA(S3.2)	Northern California Claypan Vernal Pool
<i>Layia munzii</i>	Munz's Tidy-tips	Facultative	G1		CA(S1.1)	California Central Valley Alkali Sink
<i>Legenere limosa</i>	Legenere	Obligate	G2		CA(S2.2)	Northern California Claypan Vernal Pool
<i>Lepidium davisii</i>	Davis' Peppercross	Obligate	G3		ID(S3), NV(S1), OR(S1)	Inter-Mountain Basins Alkaline Closed Depression
						Inter-Mountain Basins Playa
<i>Limnanthes bakeri</i>	Baker's Meadowfoam	Obligate	G1		CA(S1.1)	Northern California Claypan Vernal Pool
<i>Limnanthes floccosa</i> <i>ssp. californica</i>	Shippee Meadowfoam	Facultative	G4T1	LE	CA(S1.1)	Northern California Volcanic Vernal Pool
<i>Limnanthes floccosa</i> <i>ssp. grandiflora</i>	Large-flowered Woolly Meadowfoam	Obligate	G4T1	LE	OR(S1)	Northern California Claypan Vernal Pool
<i>Limnanthes striata</i>	Foot-hill Meadow-foam	Facultative	G3?		CA(SNR)	Northern California Volcanic Vernal Pool
<i>Limnanthes vinculans</i>	Sebastopol Meadowfoam	Obligate	G2	LE	CA(S2.1)	Northern California Claypan Vernal Pool
<i>Lindera melissifolia</i>	Pondberry	Facultative	G2	LE	AL(S1), AR(S2), FL(SX), GA(S1), LA(SNR), MO(S1), MS(S2), NC(S1), SC(S1)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Linum westii</i>	West's Flax	Facultative	G2		FL(S2), GA(SH), MS(SNR)	Atlantic Coastal Plain Southern Depression Pondshore
<i>Litsea aestivalis</i>	Pondspice	Obligate	G3		FL(S2), GA(S2), LA(SH), MD(S1), NC(S2), SC(S3), VA(S1)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
						Central Florida Herbaceous Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Lobelia boykinii</i>	Boykin's Lobelia	Obligate	G2G3		AL(S1S2), DE(SX), FL(S1), GA(S2S3), MS(S1), NC(S1), NJ(S1), SC(SNR)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Lobelia gloria-montis</i>	Hawaiian Lobelia	Facultative	G1G2		HI(S1S2)	Hawai'i Montane Bog
<i>Lobelia kauaensis</i>		Facultative	G2		HI(S2)	Hawai'i Montane Bog
<i>Lobelia villosa</i>	Hairy Lobelia	Facultative	G1		HI(S1)	Hawai'i Montane Bog
<i>Lomatium bradshawii</i>	Bradshaw's Lomatium	Facultative	G2	LE	OR(S2), WA(S1)	Willamette Valley Wet Prairie
<i>Lomatium cookii</i>	Agate Desert Lomatium	Facultative	G1	LE	OR(S1)	Northern California Claypan Vernal Pool
<i>Ludwigia lanceolata</i>	Lance-leaf Seedbox	Unconfirmed	G3		FL(SNR), GA(SNR), NC(S1), SC(SNR)	Southeastern Coastal Plain Interdunal Wetland
<i>Ludwigia spathulata</i>	Spathulate Seedbox	Facultative	G2G3		AL(S1S2), FL(S1S2), GA(S2S3), SC(SNR)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Lycopodiella margueritiae</i>	Northern Prostrate Clubmoss	Facultative	G2		MI(S2), OH(S1), PA(SU), VA(S1)	Atlantic Coastal Plain Northern Pondshore
						Boreal-Laurentian-Acadian Acidic Basin Fen
						Great Lakes Dune and Swale
<i>Lycopodiella subappressa</i>	Northern Appressed Clubmoss	Facultative	G2		IN(S1), MI(S2), OH(S1)	Atlantic Coastal Plain Northern Pondshore
						Boreal-Laurentian-Acadian Acidic Basin Fen
						Great Lakes Dune and Swale
<i>Lysimachia daphnoides</i>	Pacific Loosestrife	Facultative	G1	C	HI(S1.2)	Hawai'i Montane Bog
<i>Lythrum flagellare</i>	Lowland Loosestrife	Obligate	G2		FL(S2)	Atlantic Coastal Plain Southern Depression Pondshore
						Central Florida Herbaceous Pondshore
						South Florida Cypress Dome
<i>Melicope waialealae</i>	Alaniawai	Facultative	G2		HI(S2)	Hawai'i Montane Bog
<i>Mimulus angustatus</i>	Narrow-leaf Pansy Monkey-flower	Facultative	G3G4		CA(SNR)	North Pacific Hardpan Vernal Pool
<i>Mimulus eastwoodiae</i>	Eastwood Monkeyflower	Unconfirmed	G3		AZ(SNR), CO(S1), NV(SNR), UT(S3)	Colorado Plateau Hanging Garden
<i>Muhlenbergia torreyana</i>	Torrey's Dropseed	Facultative	G3		DE(SX), GA(SH), MD(S1), NC(S1), NJ(S3), TN(S1)	Central Interior Highlands and Appalachian Sinkhole and Depression Pond
<i>Muilla clevelandii</i>	San Diego Goldenstar	Facultative	G2		CA(S2.2)	South Coastal California Vernal Pool
<i>Myosurus sessilis</i>	Sessile Mousetail	Facultative	G2		CA(SNR), OR(S1)	Columbia Plateau Vernal Pool
						Mediterranean California Alkali Marsh
						Northern California Claypan Vernal Pool
<i>Myriophyllum laxum</i>	Piedmont Water-milfoil	Unconfirmed	G3		AL(S2), FL(S3), GA(S2), MS(S1), NC(S1), SC(S2), VA(S1)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Myrsine denticulata</i>		Unconfirmed	G1G2		HI(S1S2)	Hawai'i Montane Bog
<i>Myrsine helleri</i>		Facultative	G1G2		HI(S1S2)	Hawai'i Montane Bog
<i>Myrsine vaccinioides</i>		Facultative	G1	C	HI(S1.2)	Hawai'i Montane Bog
<i>Najas filifolia</i>	Narrowleaf Naiad	Obligate	G1		FL(S1), GA(S1)	Central Florida Herbaceous Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Navarretia eriocephala</i>	Hoary Navarretia	Facultative	G3		CA(S3.3)	Northern California Claypan Vernal Pool
<i>Navarretia fossalis</i>	Spreading Navarretia	Facultative	G2	LT	CA(S2.1)	South Coastal California Vernal Pool
<i>Navarretia heterandra</i>	Tehama Navarretia	Facultative	G3		CA(S3.3), OR(S1)	Northern California Claypan Vernal Pool
						Northern California Volcanic Vernal Pool
<i>Navarretia leucocephala</i> ssp. <i>pauciflora</i>	Few-flowered Navarretia	Obligate	G4T1	LE	CA(S1.1)	Northern California Volcanic Vernal Pool
<i>Navarretia leucocephala</i> ssp. <i>plieantha</i>	Many-flowered Navarretia	Obligate	G4T1	LE	CA(S1.2)	Northern California Volcanic Vernal Pool
<i>Navarretia myersii</i>	Pincushion Navarretia	Facultative	G1		CA(SNR)	North Pacific Hardpan Vernal Pool
						Northern California Claypan Vernal Pool
<i>Navarretia prostrata</i>	Prostrate Navarretia	Facultative	G2?		CA(S2.1?)	North Pacific Hardpan Vernal Pool
<i>Neostapfia colusana</i>	Colusa Grass	Obligate	G3	LT	CA(S3.1)	North Pacific Hardpan Vernal Pool
<i>Nitrophila mohavensis</i>	Amargosa Niterwort	Obligate	G1	LE	CA(S1.1), NV(S1)	North American Warm Desert Playa
<i>Oligoneuron houghtonii</i>	Houghton's Goldenrod	Obligate	G3	LT	MI(S3), NY(S1)	Great Lakes Dune and Swale
						Northern Great Lakes Interdunal Wetland
<i>Orcuttia californica</i>	California Orcutt Grass	Obligate	G2	LE	CA(S2.1)	South Coastal California Vernal Pool
<i>Orcuttia inaequalis</i>	San Joaquin Valley Orcutt Grass	Obligate	G2	LT	CA(S2.1)	North Pacific Hardpan Vernal Pool
<i>Orcuttia pilosa</i>	Hairy Orcutt Grass	Obligate	G2	LE	CA(S2.1)	North Pacific Hardpan Vernal Pool
<i>Orcuttia tenuis</i>	Slender Orcutt Grass	Obligate	G3	LT	CA(S3.1)	North Pacific Hardpan Vernal Pool
<i>Orcuttia viscida</i>	Sacramento Orcutt Grass	Obligate	G1	LE	CA(S1.1)	Northern California Claypan Vernal Pool

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Oxypolis canbyi</i>	Canby's Dropwort	Obligate	G2	LE	DE(SX), GA(S2), MD(S1), NC(S1), SC(S1)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
<i>Panicum hirstii</i>	Hirsts' Panic Grass	Obligate	G1	C	DE(S1.1), GA(SH), NC(S1), NJ(S1)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
<i>Panicum longivaginatum</i>	Long-Sheath Panic Grass	Unconfirmed	G1		HI(S1)	Hawai'i Montane Bog
<i>Paronychia ahartii</i>	Ahart's Paronychia	Facultative	G2		CA(S2.1)	Northern California Volcanic Vernal Pool
<i>Perideridia erythrorhiza</i>	Red-root Yampah	Facultative	G1		OR(S1)	Willamette Valley Wet Prairie
<i>Phacelia inundata</i>	Playa Phacelia	Obligate	G2		CA(S2.3), NV(S2?), OR(S1)	Inter-Mountain Basins Playa
<i>Phacelia parishii</i>	Parish's Phacelia	Facultative	G2G3		AZ(S1), CA(S1.1), NV(S2S3)	Inter-Mountain Basins Alkaline Closed Depression
						Inter-Mountain Basins Greasewood Flat
						Inter-Mountain Basins Playa
						North American Warm Desert Playa
<i>Pieris phillyreifolia</i>	Climbing Fetter-bush	Unconfirmed	G3		AL(S2), FL(SNR), GA(S3), MS(S1), SC(SNR)	Atlantic Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Basin Swamp
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Plagiobothrys hirtus</i>	Rough Popcorn-flower	Obligate	G1	LE	OR(S1)	North Pacific Hardpan Vernal Pool
<i>Plagiobothrys humistratus</i>	Dwarf Popcorn-flower	Facultative	G2?		CA(SNR)	North Pacific Hardpan Vernal Pool

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Plagiobothrys salsus</i>	Desert Allocarya	Facultative	G2G3		CA(S1.2?), NV(S2S3), OR(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Plagiobothrys strictus</i>	Calistoga Allocarya	Obligate	G1	LE	CA(S1.1)	North Pacific Hardpan Vernal Pool
<i>Plagiobothrys trachycarpus</i>	Rough-fruit Popcorn-flower	Facultative	G3G4		CA(SNR)	North Pacific Hardpan Vernal Pool
<i>Platanthera leucophaea</i>	Eastern Prairie White-fringed Orchid	Facultative	G3	LT	IA(S1), IL(S1), IN(S1), ME(S1), MI(S1), MO(SH), NY(SH), OH(S2), OK(SH), PA(SX), VA(S1), WI(S2S3)	Central Interior Highlands and Appalachian Sinkhole and Depression Pond
						Eastern Great Plains Wet Meadow, Prairie, and Marsh
						Great Lakes Wet-Mesic Lakeplain Prairie
						Great Plains Prairie Pothole
						North-Central Interior Wet Meadow-Shrub Swamp
						North-Central Interior and Appalachian Acid Peatland
<i>Platanthera zothecina</i>	Alcove Bog-orchid	Facultative	G2		AZ(S2), CO(S1), UT(S2)	Colorado Plateau Hanging Garden
<i>Poa napensis</i>	Napa Blue Grass	Obligate	G1	LE	CA(S1.1)	North Pacific Hardpan Vernal Pool
<i>Pogogyne abramsii</i>	San Diego Mesa Mint	Facultative	G2	LE	CA(S2.1)	South Coastal California Vernal Pool
<i>Pogogyne floribunda</i>	Profuse-flowered Pogogyne	Obligate	G3		CA(S3.2), ID(S1), OR(S1)	Inter-Mountain Basins Alkaline Closed Depression
						Modoc Basalt Flow Vernal Pool
<i>Pogogyne nudiuscula</i>	Otay Mesa Mint	Facultative	G1	LE	CA(S1.1)	South Coastal California Vernal Pool
<i>Polycytenium williamsiae</i>	William's Comb-leaf	Obligate	G2Q		NV(SNR)	Columbia Plateau Vernal Pool
<i>Polygonum hirsutum</i>	Hairy Smartweed	Facultative	G3G4		AL(SNR), FL(SNR), GA(SNR), MS(SNR), NC(S1), SC(SNR)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Southern Depression Pondshore

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Polyradicion lindenii</i>	Ghost Orchid	Obligate	G2G4		FL(S2)	South Florida Cypress Dome
<i>Potentilla basaltica</i>	Soldier Meadow Cinquefoil	Obligate	G1	C	CA(S1.3), NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Potentilla newberryi</i>	Newberry Cinquefoil	Facultative	G3G4		CA(S2.3?), NV(SNR), OR(SNR), WA(SH)	Inter-Mountain Basins Alkaline Closed Depression
<i>Puccinellia simplex</i>	Little Alkali-grass	Facultative	G3G4		CA(SNR), UT(S1)	California Central Valley Alkali Sink
						Inter-Mountain Basins Greasewood Flat
						North American Warm Desert Playa
<i>Rhexia aristosa</i>	Awned Meadowbeauty	Facultative	G3		AL(S1), DE(S1), GA(S2), NC(S3), NJ(S1), SC(S2)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
<i>Rhexia parviflora</i>	Small-flowered Meadowbeauty	Facultative	G2		AL(S1), FL(S2), GA(SH)	East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Basin Swamp
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Rhexia salicifolia</i>	Panhandle Meadowbeauty	Obligate	G2		AL(S1), FL(S2)	East Gulf Coastal Plain Dune and Coastal Grassland
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Sandhill Lakeshore Depression



Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Rhynchospora fernaldii</i>	Fernald's Beakrush	Obligate	G3G4		AL(S1?), FL(SNR), GA(SNR), MS(S1)	Central Florida Herbaceous Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Rhynchospora inundata</i>	Drowned Hornedrush	Facultative	G3G4		AL(SNR), DE(S1), FL(SNR), GA(S3?), MA(S2), MD(S1), MS(SNR), NC(S3), NJ(S2), NY(S2), RI(S1), SC(SNR)	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland
						Atlantic Coastal Plain Northern Pondshore
						Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
						Southern Coastal Plain Nonriverine Cypress Dome
<i>Rhynchospora pleiantha</i>	Brown Beakrush	Facultative	G3		AL(S1), FL(S3), GA(SH), NC(S2), SC(SNR)	Atlantic Coastal Plain Southern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Rhynchospora saxicola</i>	Stone Mountain Beakrush	Obligate	G3Q		AL(S1), GA(S3)	Southern Piedmont Granite Flatrock
<i>Sabatia kennedyana</i>	Plymouth Gentian	Facultative	G3		MA(S3), NC(S1), RI(S1), SC(S1)	Atlantic Coastal Plain Northern Pondshore
<i>Sagittaria teres</i>	Slender Arrowhead	Obligate	G3		MA(S3), NH(S1), NJ(S1), NY(S1), RI(S1), SC(SNR)	Atlantic Coastal Plain Northern Pondshore
<i>Sanicula purpurea</i>	Purple-flowered Sanicle	Unconfirmed	G1	LE	HI(S1.2)	Hawai'i Montane Bog
<i>Sarracenia oreophila</i>	Green Pitcherplant	Unconfirmed	G2	LE	AL(S2), GA(S1), NC(S1), TN(SX)	Southern Appalachian Seepage Wetland

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Saxifraga caroliniana</i>	Carolina Saxifrage	Facultative	G2		GA(SH), NC(S2), TN(S1S2), VA(S2?), WV(S1)	Southern Appalachian Seepage Wetland
<i>Schoenoplectus hallii</i>	Hall's Bulrush	Facultative	G2		GA(SH), IA(S1), IL(S1), IN(S1), KS(S1), KY(S1), MA(SX), MI(S2), MO(S2), NE(S1), OK(S1), SC(SNR), TX(S1), WI(S1)	Central Interior Highlands and Appalachian Sinkhole and Depression Pond
						East Gulf Coastal Plain Northern Depression Pondshore
						Eastern Great Plains Wet Meadow, Prairie, and Marsh
						North-Central Interior Wet Meadow-Shrub Swamp
						Western Great Plains Open Freshwater Depression Wetland
						Western Great Plains Saline Depression Wetland
<i>Scirpus ancistrochaetus</i>	Northeastern Bulrush	Facultative	G3	LE	MA(S1), MD(S1), NH(S1), NY(SX), PA(S3), VA(S2), VT(S2), WV(S1)	Atlantic Coastal Plain Northern Pondshore
						Central Interior Highlands and Appalachian Sinkhole and Depression Pond
						North-Central Interior Wet Meadow-Shrub Swamp
<i>Sedella leiocarpa</i>	Lake County Stonecrop	Facultative	G1	LE	CA(S1.1)	Northern California Volcanic Vernal Pool
<i>Sedum pusillum</i>	Granite Rock Stonecrop	Facultative	G3		AL(SNR), GA(S3), NC(S1), SC(S2)	Southern Piedmont Granite Flatrock
<i>Selaginella deflexa</i>	Deflexed Spike-moss	Unconfirmed	G1G2		HI(S1S2)	Hawai'i Montane Bog
<i>Selaginella eatonii</i>	Eaton Spike-moss	Obligate	G2G3		FL(S2)	South Florida Depression Pondshore
<i>Sidalcea covillei</i>	Owens Valley Checker-mallow	Facultative	G2		CA(S2.1)	Inter-Mountain Basins Playa

Scientific Name	Common Name	Indicator Category	Global Rank	U.S. ESA Status	State (Subnational Rank)	Isolated Wetland Ecological System
<i>Sisyrinchium funereum</i>	Funeral Mountain Blue-eye-grass	Facultative	G2G3		CA(S2.3), NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
						Inter-Mountain Basins Playa
<i>Spiranthes infernalis</i>	Ash Meadows Lady's Tresses	Obligate	G1		NV(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Tectaria coriandrifolia</i>	Hattie Bauer Halberd-fern	Obligate	G2G4		FL(SX)	South Florida Depression Pondshore
<i>Thelypodium brachycarpum</i>	Short-podded Thelypodium	Facultative	G3		CA(S3.2), OR(S2)	Inter-Mountain Basins Alkaline Closed Depression
<i>Thelypodium howellii</i> ssp. <i>spectabilis</i>	Howell's Spectacular Thelypody	Facultative	G2T1	LT	OR(S1)	Inter-Mountain Basins Alkaline Closed Depression
<i>Trichostema rubisepalum</i>	Hernandez Bluecurls	Facultative	G3		CA(S3.3)	North Pacific Hardpan Vernal Pool
<i>Trifolium jokerstii</i>	Butte County Golden Clover	Facultative	G1		CA(S1.2)	North Pacific Hardpan Vernal Pool
<i>Tuctoria greenei</i>	Green's Awnless Orcutt-grass	Obligate	G2	LE	CA(S2.2)	Northern California Claypan Vernal Pool
<i>Tuctoria mucronata</i>	Mucronate Orcutt Grass	Obligate	G1	LE	CA(S1.1)	Northern California Claypan Vernal Pool
<i>Viola kauaensis</i>	Kauai Violet	Unconfirmed	G2		HI(S2)	Hawai'i Montane Bog
<i>Viola maviensis</i>	Mann Violet	Facultative	G2?		HI(S2?)	Hawai'i Montane Bog
<i>Xyris isoetifolia</i>	Quillwort Yellow-eyed Grass	Facultative	G1		AL(SH), FL(S1)	East Gulf Coastal Plain Sandhill Lakeshore Depression
<i>Xyris longisepala</i>	Kral's Yellow-eyed-grass	Obligate	G2		AL(S1), FL(S2)	East Gulf Coastal Plain Northern Depression Pondshore
						East Gulf Coastal Plain Southern Depression Pondshore
<i>Xyris tennesseensis</i>	Tennessee Yellow-eyed-grass	Unconfirmed	G2	LE	AL(S1), GA(S1), TN(S1)	Southern Appalachian Seepage Wetland

## Appendix VI

### Area Weighted Count of At-Risk Species Tied to Isolated Wetland Ecological Systems Documented From U.S. Counties

This table includes only counties for which there is *at least one* documented occurrence of an at-risk species tied to isolated wetlands

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
<b>Alabama</b>	Baldwin	0.23
	Barbour	1.71
	Bibb	0.61
	Calhoun	0.64
	Chambers	1.89
	Cherokee	1.92
	Choctaw	0.41
	Coffee	0.58
	Conecuh	0.47
	Covington	3.97
	DeKalb	0.50
	Escambia	1.59
	Etowah	0.68
	Franklin	0.62
	Geneva	3.92
	Henry	0.69
	Houston	4.99
	Jackson	0.34
	Jefferson	0.35
	Lee	1.29
Marshall	0.63	
Mobile	1.53	
Randolph	1.35	
Shelby	0.48	
Talladega	0.51	
Washington	0.35	
<b>Arizona</b>	Apache	0.10
	Cochise	0.06
	Coconino	0.06
	La Paz	0.09
	Mohave	0.03
	Navajo	0.20
	<b>Arkansas</b>	Arkansas
Ashley		0.42
Benton		0.46
Calhoun		0.60
Clay		0.61
Craighead		0.53
Franklin		0.62
Jackson		0.61
Lawrence		0.64
Miller		0.61

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Poinsett	0.50
	Prairie	0.56
	Saline	0.52
	Woodruff	0.66
<b>California</b>	Alameda	4.67
	Butte	3.02
	Calaveras	0.75
	Colusa	0.66
	Contra Costa	3.63
	El Dorado	0.22
	Fresno	0.91
	Glenn	2.05
	Imperial	0.09
	Inyo	0.31
	Kern	0.42
	Kings	0.84
	Lake	2.35
	Lassen	0.58
	Los Angeles	0.56
	Madera	2.17
	Marin	0.71
	Mendocino	0.22
	Merced	3.95
	Modoc	0.55
	Mono	0.12
	Monterey	0.58
	Napa	4.42
	Nevada	0.40
	Orange	1.94
	Placer	1.55
	Plumas	0.44
	Riverside	0.58
	Sacramento	3.24
	San Benito	0.84
	San Bernardino	0.08
	San Diego	1.18
	San Joaquin	1.90
	San Luis Obispo	0.92
	Santa Barbara	0.42
	Santa Clara	0.60
	Santa Cruz	0.86
	Shasta	0.90
	Sierra	0.40
	Siskiyou	0.24
	Solano	7.19
	Sonoma	2.17
	Stanislaus	2.75
	Sutter	1.27
	Tehama	1.58
	Tulare	0.57
	Tuolumne	0.34

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Ventura	0.84
	Yolo	3.00
	Yuba	3.01
<b>Colorado</b>	Delta	0.34
	El Paso	0.18
	Elbert	0.21
	Kiowa	0.22
	Lincoln	0.15
	Mesa	0.12
	Moffat	0.08
	Montrose	0.17
	Pueblo	0.16
	San Miguel	0.30
<b>Delaware</b>	Kent	1.27
	New Castle	1.70
	Sussex	1.95
<b>Florida</b>	Alachua	2.37
	Baker	1.95
	Bay	4.19
	Bradford	2.66
	Brevard	0.38
	Broward	0.32
	Calhoun	3.38
	Citrus	0.63
	Clay	2.96
	Collier	0.39
	Columbia	1.48
	DeSoto	1.20
	Dixie	0.55
	Duval	1.99
	Franklin	3.69
	Gadsden	1.49
	Gilchrist	1.12
	Glades	0.78
	Gulf	4.76
	Hamilton	0.78
	Hardee	0.61
	Hernando	2.36
	Highlands	1.40
	Hillsborough	0.36
	Holmes	0.79
	Jackson	2.05
	Jefferson	0.62
	Lake	1.98
	Leon	3.29
	Levy	0.34
	Liberty	1.81
	Madison	0.55
	Manatee	0.53

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Marion	1.15
	Martin	1.19
	Miami-Dade	0.77
	Monroe	0.45
	Nassau	0.63
	Okaloosa	3.80
	Okeechobee	0.44
	Orange	0.76
	Osceola	0.26
	Palm Beach	0.36
	Pasco	1.03
	Pinellas	1.26
	Polk	0.77
	Putnam	1.87
	Santa Rosa	2.59
	Sarasota	1.36
	Seminole	1.14
	St. Johns	0.66
	St. Lucie	1.37
	Sumter	0.67
	Suwannee	0.55
	Taylor	0.74
	Volusia	0.32
	Wakulla	1.88
	Walton	2.15
	Washington	5.03
<b>Georgia</b>	Baker	12.56
	Bartow	0.84
	Ben Hill	1.60
	Berrien	2.55
	Brooks	0.78
	Bryan	3.58
	Bulloch	0.56
	Burke	0.90
	Butts	4.11
	Calhoun	2.71
	Camden	1.23
	Charlton	2.48
	Chatham	1.82
	Chattahoochee	3.09
	Clarke	3.02
	Clinch	0.46
	Colquitt	0.69
	Columbia	3.90
	Crisp	1.37
	Decatur	1.85
	DeKalb	4.50
	Dooly	2.86
	Douglas	1.93
	Early	1.50
	Effingham	2.38

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Elbert	1.02
	Emanuel	1.12
	Evans	10.22
	Floyd	0.77
	Gilmer	0.90
	Glynn	1.99
	Gordon	1.09
	Greene	3.84
	Gwinnett	2.60
	Hancock	1.62
	Harris	0.81
	Heard	2.51
	Henry	2.43
	Houston	2.10
	Irwin	2.13
	Jackson	3.46
	Jenkins	4.39
	Lanier	1.95
	Lee	2.23
	Liberty	2.96
	Long	4.68
	Lowndes	1.50
	Marion	2.11
	McIntosh	2.57
	Meriwether	1.53
	Miller	1.33
	Muscogee	1.72
	Newton	2.83
	Oglethorpe	1.77
	Pierce	1.13
	Pike	1.77
	Putnam	2.18
	Richmond	1.14
	Rockdale	8.60
	Schley	2.26
	Screven	3.58
	Seminole	4.44
	Sumter	3.17
	Talbot	2.02
	Taylor	1.99
	Terrell	2.31
	Towns	2.08
	Walton	3.52
	Ware	0.85
	Warren	1.37
	Wayne	0.61
	Wheeler	2.55
	Whitfield	1.34
	Wilcox	1.02
	Wilkes	0.81
	Worth	2.01



STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
<b>Hawaii</b>	Hawaii	0.19
	Honolulu	0.63
	Kauai	5.69
	Maui	3.45
<b>Idaho</b>	Ada	0.37
	Clark	0.22
	Custer	0.08
	Elmore	0.12
	Latah	0.36
	Lemhi	0.08
	Owyhee	0.05
	Twin Falls	0.20
	<b>Illinois</b>	Alexander
Cass		2.03
Cook		0.40
DuPage		1.16
Grundy		0.90
Hancock		0.47
Henry		0.47
Iroquois		0.70
Johnson		1.10
Kane		0.73
Kankakee		1.14
Lake		0.84
Mason		0.68
McHenry		0.64
Morgan		0.68
Union		0.91
Will	0.91	
<b>Indiana</b>	Daviess	1.78
	Hamilton	0.94
	Harrison	0.81
	Henry	0.96
	Jasper	0.70
	Lake	1.57
	Owen	1.04
	Porter	1.77
	Posey	0.93
	Pulaski	0.91
	Ripley	0.88
	Spencer	0.95
	Warrick	0.99
	White	1.57
<b>Iowa</b>	Decatur	0.72
	Jackson	0.60
	Johnson	0.63
	Jones	0.66

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
<b>Kansas</b>	Cherokee	0.67
	Crawford	0.64
	Douglas	0.80
	Harper	0.49
	Harvey	0.72
	Reno	0.30
<b>Kentucky</b>	Ballard	1.51
	Carlisle	1.99
	Christian	0.55
	Edmonson	1.28
	Hart	0.94
	Hickman	1.47
	Marshall	1.19
	McCracken	1.50
	<b>Louisiana</b>	Evangeline
Franklin		0.61
Grant		0.58
Morehouse		0.48
Ouachita		0.61
St. Martin		0.48
St. Tammany		1.82
Tensas		0.59
<b>Maine</b>	Aroostook	0.11
	Franklin	0.22
	Hancock	0.24
	Knox	1.17
	Oxford	0.18
	Penobscot	0.11
	Piscataquis	0.09
	Somerset	0.09
	Waldo	0.53
	Washington	0.14
	York	0.38
<b>Maryland</b>	Caroline	4.65
	Charles	0.85
	Dorchester	1.45
	Kent	1.59
	Queen Anne's	3.27
	Somerset	1.43
	Talbot	1.62
	Washington	0.81
	Wicomico	3.02
<b>Michigan</b>	Allegan	0.89
	Alpena	0.66
	Barry	0.68
	Bay	0.85
	Branch	0.74

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Cass	0.75
	Charlevoix	2.07
	Cheboygan	0.97
	Chippewa	0.79
	Clinton	1.33
	Crawford	0.68
	Delta	0.62
	Emmet	1.57
	Genesee	0.59
	Hillsdale	0.63
	Huron	0.46
	Ingham	0.69
	Jackson	0.53
	Kalamazoo	0.67
	Kalkaska	0.68
	Lapeer	0.58
	Lenawee	0.50
	Livingston	1.35
	Luce	0.41
	Mackinac	1.13
	Menominee	0.37
	Monroe	0.66
	Muskegon	0.75
	Oakland	0.42
	Presque Isle	1.15
	Saginaw	0.47
	Schoolcraft	0.94
	St. Clair	1.08
	St. Joseph	1.49
	Tuscola	0.47
	Washtenaw	1.59
	Wayne	0.63
<b>Minnesota</b>	Cook	0.24
	Lake	0.17
	Norman	0.44
	Renville	0.39
	Scott	1.02
	St. Louis	0.06
<b>Mississippi</b>	Adams	0.83
	Amite	0.51
	Bolivar	0.86
	Coahoma	0.65
	Forrest	0.82
	Greene	0.56
	Hancock	0.81
	Harrison	1.30
	Jackson	3.27
	Jefferson Davis	0.93
	Lamar	0.78
	Leflore	0.64

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Newton	0.67
	Perry	0.59
	Rankin	0.49
	Sharkey	0.86
	Stone	0.85
	Sunflower	0.55
	Tallahatchie	0.59
	Washington	0.51
<b>Missouri</b>	Barton	0.65
	Benton	0.51
	Bollinger	0.63
	Butler	0.55
	Callaway	0.46
	Carter	0.75
	Cedar	0.79
	Henry	0.53
	Holt	0.85
	Howell	1.66
	Jasper	0.62
	Morgan	0.62
	Newton	0.61
	Oregon	0.95
	Pettis	0.56
	Polk	0.59
	Reynolds	0.47
	Ripley	1.18
	Scott	1.80
	Shannon	0.76
	St. Clair	0.55
	Stoddard	0.46
	Texas	0.66
	Vernon	0.47
	Webster	0.65
	Wright	0.56
<b>Montana</b>	Lake	0.23
	Missoula	0.15
<b>Nebraska</b>	Brown	0.31
	Cherry	0.06
	Custer	0.15
	Garfield	1.35
	Holt	0.16
	Loup	0.68
	Rock	0.38
	Wheeler	0.68
<b>Nevada</b>	Carson City	2.39
	Churchill	0.08
	Clark	0.10
	Douglas	0.52

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Elko	0.05
	Esmeralda	0.21
	Eureka	0.09
	Humboldt	0.12
	Lander	0.07
	Lincoln	0.04
	Mineral	0.10
	Nye	0.21
	Pershing	0.06
	Washoe	0.18
	White Pine	0.13
<b>New Jersey</b>	Atlantic	5.74
	Burlington	2.79
	Camden	5.10
	Cape May	8.41
	Cumberland	2.25
	Gloucester	2.30
	Monmouth	0.84
	Ocean	1.85
	Salem	2.20
<b>New Mexico</b>	Hidalgo	0.11
	Luna	0.13
<b>New York</b>	Erie	0.37
	Franklin	0.23
	Genesee	1.59
	Lewis	0.30
	Niagara	0.76
	Oneida	0.31
	Orleans	0.99
	Seneca	1.03
	Suffolk	1.60
	Yates	1.02
<b>North Carolina</b>	Alexander	1.50
	Alleghany	4.91
	Anson	1.43
	Ashe	1.76
	Avery	6.24
	Beaufort	0.49
	Bladen	1.75
	Brunswick	5.08
	Buncombe	0.59
	Burke	1.49
	Caldwell	0.82
	Carteret	4.75
	Caswell	0.88
	Chatham	0.55
	Clay	3.85
	Cleveland	0.84

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Columbus	1.22
	Craven	1.12
	Cumberland	4.03
	Dare	1.06
	Franklin	1.57
	Gates	1.11
	Graham	3.84
	Granville	1.40
	Halifax	0.53
	Haywood	2.07
	Henderson	2.08
	Hoke	6.03
	Jackson	1.58
	Macon	1.51
	Madison	0.85
	McDowell	0.86
	Mecklenburg	0.69
	Mitchell	3.42
	New Hanover	11.61
	Northampton	0.66
	Onslow	5.05
	Pender	0.92
	Person	0.92
	Richmond	2.44
	Robeson	1.23
	Rowan	1.48
	Rutherford	1.36
	Sampson	1.64
	Scotland	6.18
	Swain	2.11
	Transylvania	2.03
	Union	0.61
	Wake	0.91
	Warren	0.85
	Watauga	2.46
	Wayne	0.70
	Yadkin	1.16
	Yancey	3.75
<b>Ohio</b>	Clark	0.97
	Franklin	0.69
	Holmes	0.89
	Jackson	0.92
	Lucas	2.29
	Ottawa	1.57
	Pike	0.89
	Portage	0.79
	Sandusky	0.93
	Wayne	0.69
<b>Oklahoma</b>	Atoka	0.79
	Comanche	0.36

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Woods	0.30
<b>Oregon</b>	Baker	0.13
	Benton	1.13
	Douglas	0.15
	Gilliam	0.31
	Harney	0.04
	Hood River	0.73
	Jackson	0.55
	Josephine	0.47
	Klamath	0.32
	Lake	0.18
	Lane	0.08
	Linn	0.33
	Malheur	0.08
	Marion	0.98
	Polk	0.52
	Union	0.19
	Yamhill	0.54
<b>Pennsylvania</b>	Adams	0.73
	Bedford	0.38
	Blair	1.44
	Carbon	1.00
	Centre	0.35
	Clinton	0.43
	Columbia	0.78
	Cumberland	0.68
	Dauphin	0.72
	Elk	0.47
	Erie	0.47
	Franklin	0.51
	Huntingdon	0.87
	Lackawanna	0.85
	Lehigh	1.14
	Lycoming	0.31
	McKean	0.40
	Mifflin	0.93
	Monroe	0.62
	Perry	0.68
	Snyder	1.16
	Tioga	0.34
	Union	1.20
<b>Rhode Island</b>	Kent	2.27
	Newport	4.40
	Providence	1.80
	Washington	5.75
<b>South Carolina</b>	Aiken	2.47
	Allendale	4.57
	Bamberg	2.97

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Barnwell	6.92
	Beaufort	1.34
	Berkeley	3.18
	Calhoun	0.99
	Charleston	3.94
	Chesterfield	0.48
	Clarendon	3.35
	Colleton	1.48
	Dorchester	0.67
	Edgefield	2.38
	Fairfield	1.09
	Florence	1.44
	Georgetown	0.93
	Hampton	2.77
	Horry	1.35
	Jasper	1.75
	Kershaw	2.10
	Lancaster	2.79
	Lee	1.91
	Lexington	1.02
	Marlboro	2.32
	Oconee	0.57
	Orangeburg	2.39
	Pickens	1.54
	Richland	3.02
	Saluda	5.01
	Spartanburg	0.47
	Sumter	2.29
	Union	0.76
	Williamsburg	1.24
	York	1.66
<b>Tennessee</b>	Carter	2.14
	Cocke	0.85
	Coffee	3.62
	Cumberland	0.57
	Franklin	0.68
	Johnson	2.53
	Lewis	1.37
	Marion	0.74
	Marshall	1.05
	Monroe	0.58
	Polk	0.88
	Sevier	1.28
	Unicoi	1.93
	Warren	0.87
	Washington	1.18
<b>Texas</b>	Andrews	0.26
	Austin	0.59
	Bastrop	0.43
	Brazos	0.65



STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Burleson	0.56
	Burnet	0.38
	Colorado	0.39
	Fort Bend	0.43
	Freestone	0.43
	Harris	0.22
	Lavaca	0.40
	Leon	0.36
	Liberty	0.66
	Llano	0.41
	Marion	0.89
	Mason	0.42
	Milam	0.38
	Nueces	0.45
	Robertson	0.44
	San Patricio	0.55
	Ward	0.46
	Winkler	0.45
	Wise	0.42
	Wood	0.55
<b>Utah</b>	Beaver	0.15
	Garfield	0.22
	Grand	0.21
	Juab	0.11
	Kane	0.19
	Piute	0.50
	San Juan	0.24
	Sanpete	0.25
	Uintah	0.09
<b>Vermont</b>	Essex	0.57
	Franklin	1.15
	Windham	0.48
	Windsor	0.79
<b>Virginia</b>	Alleghany	0.86
	Amelia	1.05
	Augusta	1.58
	Bath	0.73
	Bland	1.06
	Brunswick	0.68
	Caroline	0.72
	Carroll	1.60
	Charles City	1.93
	Chesapeake	1.14
	Chesterfield	0.88
	Dinwiddie	0.76
	Grayson	3.48
	Greensville	1.35
	Halifax	0.46
	Henrico	3.23

STATE	COUNTY NAME	# SPECIES/100km <sup>2</sup>
	Isle of Wight	1.20
	James City	5.00
	King and Queen	1.17
	Mecklenburg	0.57
	Newport News	5.14
	Nottoway	1.29
	Powhatan	1.44
	Prince Edward	1.11
	Prince George	1.38
	Rockingham	0.89
	Russell	0.80
	Smyth	1.71
	Surry	1.34
	Sussex	1.57
	Virginia Beach	1.44
	Washington	0.67
	Wythe	0.82
	York	10.77
<b>Washington</b>	Adams	0.20
	Clark	1.17
	Douglas	0.21
	Grant	0.14
	Klickitat	0.20
	Lincoln	0.17
	Pierce	0.23
	Spokane	0.43
	Thurston	0.55
<b>West Virginia</b>	Berkeley	1.21
	Hardy	0.65
	McDowell	0.73
<b>Wisconsin</b>	Brown	0.72
	Dane	0.61
	Door	0.84
	Douglas	0.29
	Jefferson	0.65
	Juneau	0.47
	Kenosha	1.34
	La Crosse	0.80
	Marinette	0.27
	Ozaukee	1.61
	Rock	0.53
	Walworth	0.67
	Waukesha	0.65
	Winnebago	0.67

## APPENDIX VII. At-Risk US-NVC Associations that are Closely Tied to Isolated Wetland Ecological Systems

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
<b>North Atlantic Coast</b>			
Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4	North-Central Interior and Appalachian Acid Peatland	Obligate
Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3	Atlantic Coastal Plain Northern Basin Peat Swamp, Atlantic Coastal Plain Northern Bog	Facultative
Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3	Atlantic Coastal Plain Northern Basin Peat Swamp	Obligate
Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2	Atlantic Coastal Plain Northern Dune and Maritime Grassland	Obligate
Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?	North-Central Appalachian Seepage Fen	Obligate
Cornus racemosa / Carex (sterilis, aquatilis, lacustris) Shrub Herbaceous Vegetation	G2G3	North-Central Appalachian Seepage Fen, North-Central Interior Shrub-Graminoid Alkaline Fen	Facultative
Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2	North-Central Appalachian Seepage Fen	Facultative
Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Northern Pondshore	Obligate
Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub	G2G3	North-Central Interior and Appalachian Acid Peatland	Facultative
Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2	Atlantic Coastal Plain Northern Pondshore	Facultative
Rhexia virginica - Crotalaria sagittalis Herbaceous Vegetation	G2	Atlantic Coastal Plain Northern Pondshore	Obligate
Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Northern Pondshore	Obligate
Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2	Atlantic Coastal Plain Northern Pondshore	Obligate
Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4	North-Central Interior Freshwater Marsh	Facultative
<b>Central Atlantic Coast</b>			
Acer rubrum - Nyssa sylvatica - Liquidambar styraciflua - Populus heterophylla Forest	G1	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest	Facultative
Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?	Atlantic Coastal Plain Northern Basin Peat Swamp, Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest	Facultative
Cephalanthus occidentalis / Polygonum hydropiperoides - Panicum verrucosum Shrubland	G3?	Atlantic Coastal Plain Northern Pondshore	Obligate
Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4	North-Central Interior and Appalachian Acid Peatland	Obligate
Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3	Atlantic Coastal Plain Northern Basin Peat Swamp, Atlantic Coastal Plain Northern Bog	Facultative
Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3	Atlantic Coastal Plain Northern Basin Peat Swamp	Obligate
Cladium mariscoides - Coelorachis rugosa Herbaceous Vegetation	G1	Atlantic Coastal Plain Northern Pondshore	Obligate
Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2	Atlantic Coastal Plain Northern Dune and Maritime Grassland	Obligate

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?	North-Central Appalachian Seepage Fen	Obligate
Cornus racemosa / Carex (sterilis, aquatilis, lacustris) Shrub Herbaceous Vegetation	G2G3	North-Central Appalachian Seepage Fen, North-Central Interior Shrub-Graminoid Alkaline Fen	Facultative
Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2	North-Central Appalachian Seepage Fen	Facultative
Dasiphora fruticosa ssp. floribunda / Carex interior - Carex flava - Sarracenia purpurea Shrub Herbaceous Vegetation	G3	North-Central Appalachian Seepage Fen, North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Dasiphora fruticosa ssp. floribunda / Rhynchospora capillacea - Scleria verticillata Shrub Herbaceous Vegetation	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, North-Central Appalachian Seepage Fen	Facultative
Deschampsia caespitosa - (Sporobolus heterolepis, Schizachyrium scoparium) - Carex crawei - Packera paupercula Herbaceous Vegetation	G2	Great Lakes Alvar	Obligate
Juniperus virginiana / Betula pumila / Carex sterilis - Oligoneuron rigidum Shrub Herbaceous Vegetation	G1Q	North-Central Appalachian Seepage Fen	Facultative
Juniperus virginiana / Dasiphora fruticosa ssp. floribunda / Carex flava - Carex tetanica Shrub Herbaceous Vegetation	G1G2	North-Central Appalachian Seepage Fen	Facultative
Leersia hexandra - (Panicum verrucosum, Scleria reticularis) Herbaceous Vegetation [Provisional]	G2G3	Atlantic Coastal Plain Northern Pondshore	Obligate
Liquidambar styraciflua - Acer rubrum - Nyssa biflora / Carex jorii Forest	G1G2	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, Atlantic Coastal Plain Northern Pondshore	Facultative
Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Northern Pondshore	Obligate
Morella pensylvanica - Dasiphora fruticosa ssp. floribunda / Carex sterilis - Carex flava Shrub Herbaceous Vegetation	G2	North-Central Appalachian Seepage Fen	Obligate
Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3	North-Central Interior and Appalachian Acid Peatland	Facultative
Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2	Atlantic Coastal Plain Northern Pondshore	Facultative
Orontium aquaticum - Schoenoplectus subterminalis - Eriocaulon aquaticum Herbaceous Vegetation	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Facultative
Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest	Facultative
Platanus occidentalis - Fraxinus pennsylvanica - Ulmus americana / Cornus sericea Forest	G2G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Rhexia virginica - Crotalaria sagittalis Herbaceous Vegetation	G2	Atlantic Coastal Plain Northern Pondshore	Obligate
Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Northern Pondshore	Obligate
Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2	Atlantic Coastal Plain Northern Pondshore	Obligate
Saccharum giganteum - (Dichanthelium spretum, Panicum verrucosum) Herbaceous Vegetation	G1G2	Atlantic Coastal Plain Northern Pondshore	Obligate
Schoenoplectus maritimus - Atriplex patula - Eleocharis parvula Herbaceous Vegetation	G1	Eastern Great Plains Wet Meadow, Prairie, and Marsh	Facultative

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Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3	North-Central Interior Shrub-Graminoid Alkaline Fen, North-Central Interior and Appalachian Acid Peatland	Obligate
Vaccinium formosum - Vaccinium fuscatum / Sphagnum cuspidatum Shrubland	G3?	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?	Atlantic Coastal Plain Southern Depression Pondshore, Central Florida Herbaceous Pondshore	Obligate
Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4	North-Central Interior Freshwater Marsh	Facultative
<b>South Atlantic and Gulf Coast</b>			
(Pinus palustris, Pinus serotina) / Ctenium aromaticum - Muhlenbergia expansa - Calamovilfa brevifolia Woodland	G2	Atlantic Coastal Plain Sandhill Seep	Obligate
(Quercus laurifolia) / Crataegus opaca - Crataegus viridis Forest	G1	East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods, West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
(Stillingia aquatica) / Panicum tenerum - Dichantherium erectifolium Herbaceous Vegetation	G2?	Southeastern Coastal Plain Interdunal Wetland	Obligate
Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?	Atlantic Coastal Plain Northern Basin Peat Swamp, Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest	Facultative
Adiantum capillus-veneris - Thelypteris kunthii / Dumortiera hirsuta Herbaceous Vegetation	G3?	Southern Coastal Plain Sinkhole	Obligate
Alnus serrulata - Linderia benzoin / Osmunda regalis var. spectabilis - Carex tetanica Shrubland	G1?	North-Central Appalachian Seepage Fen	Obligate
Alnus serrulata - Linderia benzoin / Scutellaria lateriflora - Thelypteris noveboracensis Shrubland	G2?	Southern Appalachian Seepage Wetland	Facultative
Amphianthus pusillus - Isoetes melanospora - Isoetes tegetiformans Herbaceous Vegetation	G1	Southern Piedmont Granite Flatrock	Obligate
Amphicarpum muehlenbergianum - (Panicum hemitomom) Herbaceous Vegetation	G2G3	Central Florida Herbaceous Pondshore	Obligate
Andropogon (capillipes, glaucopsis) - Rhynchospora fascicularis var. fascicularis - Rhexia mariana Herbaceous Vegetation	G2?	Central Florida Herbaceous Pondshore	Obligate
Aristida palustris - Panicum virgatum - Eriocaulon compressum - Eleocharis equisetoides Herbaceous Vegetation	G2G3	West Gulf Coastal Plain Flatwoods Pond	Obligate
Aristida palustris - Panicum virgatum - Eriocaulon decangulare var. decangulare - Rhynchospora elliotii Herbaceous Vegetation	G2G3	West Gulf Coastal Plain Flatwoods Pond	Obligate
Arundinaria gigantea ssp. tecta Shrubland	G1	Atlantic Coastal Plain Sandhill Seep	Facultative
Carex aquatilis - Dulichium arundinaceum Herbaceous Vegetation	G1?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Carex atlantica - Solidago patula var. patula - Lilium grayi / Sphagnum bartlettianum Herbaceous Vegetation	G1	North-Central Appalachian Seepage Fen	Facultative
Carex barrattii Herbaceous Vegetation	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate

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Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum spp. Herbaceous Vegetation	G2	Southern Appalachian Seepage Wetland	Facultative
Carex hyalinolepis Seasonally Flooded Herbaceous Vegetation	G1G3	Atlantic Coastal Plain Southern Depression Pondshore, Southeastern Coastal Plain Interdunal Wetland	Obligate
Carex striata var. striata - Xyris fimbriata - Lachnanthes carolina Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Cephalanthus occidentalis - (Leucothoe racemosa) / Carex jorii Shrubland	G1	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Cephalanthus occidentalis - (Salix nigra, Quercus lyrata) Karst Depression Shrubland	G1Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Cephalanthus occidentalis / Dulichium arundinaceum Shrubland	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Cephalanthus occidentalis / Limnobium spongia - Salvinia minima Shrubland	G3?	Floridian Highlands Freshwater Marsh	Facultative
Cephalanthus occidentalis / Polygonum hydropiperoides - Panicum verrucosum Shrubland	G3?	Atlantic Coastal Plain Northern Pondshore	Obligate
Cephalanthus occidentalis / Torreyochloa pallida Shrubland	G1?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Cladium mariscus ssp. jamaicense - Woodwardia virginica Herbaceous Vegetation	G2?	Southeastern Coastal Plain Interdunal Wetland	Obligate
Clethra alnifolia - Toxicodendron vernix / Aristida stricta - Osmunda cinnamomea - Sarracenia spp. Shrub Herbaceous Vegetation	G2?	Atlantic Coastal Plain Sandhill Seep	Obligate
Crataegus rufula Forest	G2G3	East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Cyrilla racemiflora - Lyonia lucida Shrubland	G3?	Atlantic Coastal Plain Southern Depression Pondshore	Facultative
Diamorpha smallii - Minuartia glabra - Minuartia uniflora - Cyperus granitophilus Herbaceous Vegetation	G3	Southern Piedmont Granite Flatrock	Obligate
Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Southern Depression Pondshore, East Gulf Coastal Plain Northern Depression Pondshore, East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3	Southern Appalachian Seepage Wetland	Facultative
Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?	East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Eleocharis elongata - Panicum tenerum - Nymphaea odorata Herbaceous Vegetation	G2?	Southeastern Coastal Plain Interdunal Wetland	Obligate
Eleocharis interstincta - Pontederia cordata - Crinum americanum Herbaceous Vegetation	G2G3	South Florida Depression Pondshore	Obligate
Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) Herbaceous Vegetation	G2G3	East Gulf Coastal Plain Northern Depression Pondshore	Obligate

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Euthamia leptoccephala - Helianthus angustifolius - Boltonia asteroides - Spartina patens Herbaceous Vegetation	G1	Texas-Louisiana Coastal Prairie	Obligate
Fimbristylis castanea - Paspalum distichum Herbaceous Vegetation	G3	Southeastern Coastal Plain Interdunal Wetland	Obligate
Fraxinus caroliniana Seasonally Flooded Forest	G2G3	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Fraxinus pennsylvanica - Populus heterophylla - Ulmus americana - (Quercus texana) Forest	G2?	East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Fuirena scirpoidea - Panicum tenerum - Dichanthelium wrightianum - Andropogon capillipes Herbaceous Vegetation	G2?	East Gulf Coastal Plain Dune and Coastal Grassland	Obligate
Fuirena scirpoidea - Rhynchospora tracyi Herbaceous Vegetation	G3G4	East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Gaylussacia frondosa - Clethra alnifolia - Arundinaria gigantea ssp. tecta / Aristida stricta - Pteridium aquilinum var. pseudocaudatum Herbaceous Vegetation	G3?	Atlantic Coastal Plain Sandhill Seep	Obligate
Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum spp. Herbaceous Vegetation	G2G3	Southern Appalachian Seepage Wetland	Obligate
Hypericum brachyphyllum Dwarf-shrubland	G3?	Central Florida Herbaceous Pondshore	Obligate
Hypericum chapmanii - Ilex myrtifolia - (Nyssa ursina) Shrubland	G1	East Gulf Coastal Plain Southern Depression Pondshore, Southern Coastal Plain Nonriverine Cypress Dome	Obligate
Hypericum fasciculatum / Rhynchospora (chapmanii, harperi) Shrubland	G2G3	East Gulf Coastal Plain Southern Depression Pondshore	Facultative
Hypericum lissophloeus Shrubland	G1	East Gulf Coastal Plain Sandhill Lakeshore Depression	Obligate
Hypericum reductum - Licania michauxii / Andropogon capillipes - Polygonella gracilis - Xyris caroliniana Dwarf-shrubland	G2	Southeastern Coastal Plain Interdunal Wetland	Obligate
Hypericum reductum / Syngonanthus flavidulus - Rhexia salicifolia - (Xyris longisepala) Dwarf-shrubland	G1G2	East Gulf Coastal Plain Sandhill Lakeshore Depression	Obligate
Ilex coriacea - Lyonia lucida - Smilax laurifolia Shrubland	G3G4	Atlantic Coastal Plain Sandhill Seep	Facultative
Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3	Southern Appalachian Seepage Wetland	Facultative
Leersia hexandra - (Panicum verrucosum, Scleria reticularis) Herbaceous Vegetation [Provisional]	G2G3	Atlantic Coastal Plain Northern Pondshore	Obligate
Leucothoe racemosa - Vaccinium fuscatum - Smilax walteri Shrubland	G1?	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Liquidambar styraciflua - Acer rubrum - Nyssa biflora / Carex jorii Forest	G1G2	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, Atlantic Coastal Plain Northern Pondshore	Obligate
Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Morella cerifera / Spartina patens Shrubland	G3G4	Atlantic Coastal Plain Northern Dune and Maritime Grassland	Facultative

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Nelumbo lutea - Pontederia cordata - Schoenoplectus tabernaemontani Herbaceous Vegetation	G2G3	Floridian Highlands Freshwater Marsh	Facultative
Nymphaea odorata - Nuphar lutea ssp. advena - (Nymphoides aquatica, Xyris smalliana) Herbaceous Vegetation	G3?	Atlantic Coastal Plain Southern Depression Pondshore	Facultative
Nymphoides aquatica - Nymphaea odorata - Gratiola brevifolia Herbaceous Vegetation	G3?	West Gulf Coastal Plain Flatwoods Pond	Obligate
Nyssa biflora - Crataegus opaca - (Fraxinus caroliniana) / Rhynchospora mixta Woodland	G2?	West Gulf Coastal Plain Flatwoods Pond	Obligate
Nyssa biflora - Quercus laurifolia / Sphagnum spp. Depression Forest	G3?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Nyssa biflora / Cephalanthus occidentalis - Leucothoe racemosa Forest	G1	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Nyssa biflora / Cephalanthus occidentalis - Lyonia lucida Sagpond Forest	G1G2	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Nyssa biflora / Ilex myrtifolia / Carex glaucescens - Eriocaulon compressum Forest	G2G3	Southern Coastal Plain Nonriverine Basin Swamp	Obligate
Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4	Atlantic Coastal Plain Southern Depression Pondshore, East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Nyssa ogeche / Ilex myrtifolia / Carex turgescens - Carex striata Forest	G2?	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Orontium aquaticum - Schoenoplectus subterminalis - Eriocaulon aquaticum Herbaceous Vegetation	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Facultative
Osmunda regalis var. spectabilis - Peltandra virginica - Sagittaria lancifolia Herbaceous Vegetation	G2?	Floridian Highlands Freshwater Marsh	Facultative
Panicum hemitomon - (Cladium mariscus ssp. jamaicense, Muhlenbergia filipes) Herbaceous Vegetation	G2G3	Southeastern Coastal Plain Interdunal Wetland	Obligate
Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3	Atlantic Coastal Plain Southern Depression Pondshore, East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Panicum hemitomon - Eriocaulon compressum - Rhynchospora corniculata Herbaceous Vegetation	G2	West Gulf Coastal Plain Flatwoods Pond	Obligate
Panicum hemitomon - Pluchea (camphorata, rosea) - Ludwigia spp. Herbaceous Vegetation	G3	Central Florida Herbaceous Pondshore, East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Panicum hemitomon - Pontederia cordata Herbaceous Vegetation	G3G4	Central Florida Herbaceous Pondshore, Floridian Highlands Freshwater Marsh	Facultative
Panicum hemitomon Tropical Herbaceous Vegetation	G3?	South Florida Depression Pondshore	Facultative
Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?	Atlantic Coastal Plain Southern Depression Pondshore, East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Paspalum vaginatum Herbaceous Vegetation	G3G4	South Texas Dune and Coastal Grassland, Southeastern Coastal Plain Interdunal Wetland	Obligate
Pinus glabra - Quercus laurifolia / Crataegus opaca / Sabal minor Forest	G1G2	East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods	Obligate
Pinus palustris - Pinus serotina / Ilex glabra - Lyonia lucida / Ctenium aromaticum Woodland	G3	Atlantic Coastal Plain Sandhill Seep	Facultative



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Pinus serotina - Pinus elliotii var. elliotii / Cliftonia monophylla - Cyrilla racemiflora Woodland	G3?Q	Southern Coastal Plain Nonriverine Basin Swamp	Obligate
Pinus serotina / Cyrilla racemiflora - Lyonia lucida - Vaccinium fuscatum Woodland	G2G3	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) Shrubland	G3	Southern Coastal Plain Nonriverine Basin Swamp	Facultative
Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3	Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest	Facultative
Quercus (pagoda, phellos, shumardii) - Celtis laevigata / Cornus foemina / Podophyllum peltatum - Hymenocallis occidentalis Flatwoods Forest	G2?	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Quercus alba - Nyssa sylvatica Sandstone Ridgetop Depression Forest	G2Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus laurifolia - Liquidambar styraciflua - Nyssa biflora - Acer rubrum / Sabal minor Forest	G3?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Facultative
Quercus lyrata - Quercus phellos - Ulmus americana / Rhynchospora spp. Forest	G2G3	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Quercus michauxii - Quercus (nigra, pagoda) - Liquidambar styraciflua - Pinus taeda Forest	G2G3	East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods	Obligate
Quercus palustris - Quercus bicolor / Carex spp. Forest	G1G3	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Quercus palustris / Panicum rigidulum var. rigidulum - Panicum verrucosum - Eleocharis acicularis Herbaceous Vegetation	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus phellos - Liquidambar styraciflua / Chasmanthium laxum Cumberland Plateau Forest	G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus phellos - Nyssa biflora / Panicum hemitomom - Carex spp. - Woodwardia virginica Forest [Provisional]	G2G3	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Quercus phellos - Quercus (michauxii, shumardii) - Fraxinus americana / (Quercus oglethorpensis) / Zephyranthes atamasca Gabbro Upland Depression Forest	G2?	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Quercus phellos - Quercus similis / Crataegus marshallii - Crataegus spathulata / Chasmanthium laxum Forest	G3?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Quercus phellos / Carex (albolutescens, intumescens, jorii) - Chasmanthium laxum / Sphagnum lescurii Forest	G2G3	Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Quercus phellos / Carex striata var. brevis Forest	G2?	Atlantic Coastal Plain Northern Pondshore	Obligate
Quercus phellos / Chasmanthium laxum - Carex (flaccosperma, intumescens) - Hymenocallis liriosme Flatwoods Forest	G3G4	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Rhynchospora (careyana, inundata) Seasonally Flooded Herbaceous Vegetation	G3?	Atlantic Coastal Plain Southern Depression Pondshore, Central Florida Herbaceous Pondshore	Obligate
Rhynchospora alba Saturated Herbaceous Vegetation	G1?	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?	Atlantic Coastal Plain Southern Depression Pondshore, East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Saccharum baldwinii - Carex glaucescens - Rhynchospora corniculata Herbaceous Vegetation	G2G3	Atlantic Coastal Plain Southern Depression Pondshore	Obligate

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Saccharum spp. - Panicum verrucosum - (Rhexia spp., Sabatia spp.) Herbaceous Vegetation	G2G3	East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Salix caroliniana / Decodon verticillatus / Typha latifolia Forest	G2G3	Floridian Highlands Freshwater Marsh	Facultative
Schoenoplectus robustus - Juncus gerardii - Hordeum jubatum - Atriplex patula Herbaceous Vegetation	G1	Southern Appalachian Seepage Wetland	Obligate
Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum) Herbaceous Vegetation	G2G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Sparganium americanum - Epilobium leptophyllum Herbaceous Vegetation	G2G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Spartina bakeri - Muhlenbergia filipes - Andropogon glomeratus - Rhynchospora colorata Herbaceous Vegetation	G3?	Southeastern Coastal Plain Interdunal Wetland	Obligate
Spartina bakeri - Woodwardia virginica - Saccharum giganteum Herbaceous Vegetation	G3?	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Sphagnum cuspidatum Nonvascular Vegetation	G2?	Atlantic Coastal Plain Northern Bog, Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Talinum teretifolium - Minuartia glabra - Diodia teres - Croton willdenowii Herbaceous Vegetation	G2G3	Southern Piedmont Granite Flatrock	Obligate
Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3	Atlantic Coastal Plain Southern Depression Pondshore, Southern Coastal Plain Nonriverine Cypress Dome	Facultative
Taxodium ascendens / Annona glabra / Bacopa caroliniana Forest	G2?	South Florida Cypress Dome	Obligate
Taxodium ascendens / Chrysobalanus icaco - Ficus aurea - Persea palustris Forest	G2?	South Florida Cypress Dome	Obligate
Taxodium ascendens / Cyrilla racemiflora - Zenobia pulverulenta Woodland	G2	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland, Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Taxodium ascendens / Ilex myrtifolia / Carex (striata, turgescens) Stringer Forest	G3?Q	Southern Coastal Plain Nonriverine Cypress Dome	Obligate
Taxodium ascendens / Ilex myrtifolia / Hypericum myrtifolium / Lobelia floridana - Polygala cymosa Woodland	G3	Southern Coastal Plain Nonriverine Cypress Dome	Obligate
Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?	Atlantic Coastal Plain Southern Depression Pondshore, East Gulf Coastal Plain Northern Depression Pondshore, Southern Coastal Plain Nonriverine Cypress Dome	Obligate
Taxodium ascendens / Panicum hemitomom - Polygala cymosa Woodland	G2G3	Atlantic Coastal Plain Clay-Based Carolina Bay Wetland	Obligate
Taxodium distichum - Nyssa biflora - Magnolia virginiana - Acer rubrum Forest	G2?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Taxodium distichum - Taxodium ascendens / Panicum hemitomom - Sclerolepis uniflora Woodland	G1	Atlantic Coastal Plain Northern Pondshore	Facultative
Taxodium distichum - Taxodium ascendens / Panicum hemitomom Woodland	G3?	Atlantic Coastal Plain Northern Pondshore	Facultative

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3	East Gulf Coastal Plain Northern Depression Pondshore, East Gulf Coastal Plain Southern Depression Pondshore	Obligate
Typha domingensis - Pontederia cordata Herbaceous Vegetation	G3?	South Florida Depression Pondshore	Facultative
Typha domingensis - Setaria magna Herbaceous Vegetation	G2G3	Southeastern Coastal Plain Interdunal Wetland	Obligate
Typha domingensis Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation	G3?	Southeastern Coastal Plain Interdunal Wetland	Obligate
Typha latifolia - Pontederia cordata Herbaceous Vegetation	G3?	Floridian Highlands Freshwater Marsh	Facultative
Vaccinium formosum - Vaccinium fuscatum / Sphagnum cuspidatum Shrubland	G3?	Atlantic Coastal Plain Southern Depression Pondshore	Obligate
Vaccinium macrocarpon / Pogonia ophioglossoides Dwarf-shrubland	G1Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?	Atlantic Coastal Plain Southern Depression Pondshore, Central Florida Herbaceous Pondshore	Obligate
Zizaniopsis miliacea Subtropical Herbaceous Vegetation	G2G4Q	South Florida Depression Pondshore	Facultative
<b>Upper Great Lakes</b>			
Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3	Eastern Great Plains Wet Meadow, Prairie, and Marsh, Western Great Plains Open Freshwater Depression Wetland, Western Great Plains Saline Depression Wetland	Facultative
Carex lasiocarpa - Carex oligosperma - (Lysimachia terrestris) / Sphagnum spp. / Spiraea tomentosa Herbaceous Vegetation	G3G4	North-Central Interior and Appalachian Acid Peatland	Facultative
Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4	Boreal-Laurentian Conifer Acid Swamp, Boreal-Laurentian-Acadian Acidic Basin Fen, Great Plains Prairie Pothole, North-Central Interior Shrub-Graminoid Alkaline Fen	Facultative
Carex lasiocarpa - Rhynchospora alba - Scheuchzeria palustris Herbaceous Vegetation	G2?	Boreal-Laurentian Bog	Facultative
Carex prairea - Schoenoplectus pungens - Rhynchospora capillacea Herbaceous Vegetation	G2	Western Great Plains Open Freshwater Depression Wetland	Facultative
Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4	North-Central Interior and Appalachian Acid Peatland	Facultative
Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3	North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp, Western Great Plains Open Freshwater Depression Wetland	Facultative
Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4	North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?	Great Lakes Dune and Swale, Northern Great Lakes Interdunal Wetland	Facultative

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Deschampsia caespitosa - (Sporobolus heterolepis, Schizachyrium scoparium) - Carex crawei - Packeria paupercula Herbaceous Vegetation	G2	Great Lakes Alvar	Obligate
Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3	Western Great Plains Saline Depression Wetland	Facultative
Picea glauca - Thuja occidentalis - Juniperus communis / Iris lacustris - Carex eburnea Shrubland	G1G2	Great Lakes Alvar	Obligate
Quercus palustris - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3	North-Central Interior Wet Flatwoods	Obligate
Quercus palustris - Quercus bicolor - Nyssa sylvatica - Acer rubrum Sand Flatwoods Forest	G2?	North-Central Interior Wet Flatwoods	Obligate
Rhynchospora capitellata - Rhexia virginica - Rhynchospora scirpoides - Schoenoplectus hallii Herbaceous Vegetation	G2?	Atlantic Coastal Plain Northern Pondshore	Obligate
Salicornia rubra Herbaceous Vegetation	G2G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Interdunal Swale Wetland, Western Great Plains Saline Depression Wetland	Facultative
Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Freshwater Marsh	Facultative
Schoenoplectus maritimus - Atriplex patula - Eleocharis parvula Herbaceous Vegetation	G1	Eastern Great Plains Wet Meadow, Prairie, and Marsh	Facultative
Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp, Western Great Plains Open Freshwater Depression Wetland	Facultative
Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp	Facultative
Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3	Great Lakes Wet-Mesic Lakeplain Prairie	Facultative
Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp	Facultative
Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4	North-Central Interior Freshwater Marsh	Facultative
<b>Central Hardwoods and Interior Highlands</b>			
(Carex interior, Carex lurida) - Carex leptalea - Parnassia grandifolia - Rhynchospora capillacea Herbaceous Vegetation	G2G3	Ozark-Ouachita Fen	Facultative
Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?	Atlantic Coastal Plain Northern Basin Peat Swamp, Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest	Facultative
Calamagrostis cainii - Carex ruthii - Parnassia asarifolia / Sphagnum spp. Herbaceous Vegetation	G1Q	Southern Appalachian Seepage Wetland	Obligate
Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus Herbaceous Vegetation	G3G4	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum spp. Herbaceous Vegetation	G2	Southern Appalachian Seepage Wetland	Facultative

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Carex interior - Carex lurida - Andropogon gerardii - Parnassia grandifolia Herbaceous Vegetation	G1G2	Ozark-Ouachita Fen	Facultative
Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4	North-Central Interior and Appalachian Acid Peatland	Facultative
Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?	North-Central Appalachian Seepage Fen	Obligate
Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3	North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Dasiphora fruticosa ssp. floribunda / Carex interior - Carex flava - Sarracenia purpurea Shrub Herbaceous Vegetation	G3	North-Central Appalachian Seepage Fen, North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4	North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?	Great Lakes Dune and Swale, Northern Great Lakes Interdunal Wetland	Facultative
Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3	Southern Appalachian Seepage Wetland	Facultative
Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation	G1G2	Western Great Plains Saline Depression Wetland	Obligate
Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) Herbaceous Vegetation	G2G3	East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Fagus grandifolia - Acer saccharum - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3	North-Central Interior Wet Flatwoods	Obligate
Fagus grandifolia - Quercus alba - (Quercus michauxii) - Acer rubrum Flatwoods Forest	G3	North-Central Interior Wet Flatwoods	Obligate
Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum spp. Herbaceous Vegetation	G2G3	Southern Appalachian Seepage Wetland	Obligate
Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3	Southern Appalachian Seepage Wetland	Facultative
Juniperus virginiana / Dasiphora fruticosa ssp. floribunda / Carex flava - Carex tetanica Shrub Herbaceous Vegetation	G1G2	North-Central Appalachian Seepage Fen	Obligate
Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Morella pensylvanica - Dasiphora fruticosa ssp. floribunda / Carex sterilis - Carex flava Shrub Herbaceous Vegetation	G2	North-Central Appalachian Seepage Fen	Obligate
Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3	North-Central Interior and Appalachian Acid Peatland	Facultative
Nyssa aquatica / Cephalanthus occidentalis Pond Forest	G1?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Panicum hemitomon - Dulichium arundinaceum Herbaceous Vegetation	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Pontederia cordata - Sagittaria graminea - Sagittaria latifolia Semipermanently Flooded Herbaceous Vegetation	G1G2Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus bicolor - Fraxinus pennsylvanica / Carex spp. Forest	G1G2	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus lyrata - Quercus (palustris, phellos) - Liquidambar styraciflua - (Populus heterophylla) Forest	G2G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus lyrata / Betula nigra / Pleopeltis polypodioides ssp. michauxiana Forest	G1	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus lyrata Pond Forest	G1G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus palustris - (Quercus bicolor) / Carex crinita / Sphagnum spp. Forest	G3?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3	North-Central Interior Wet Flatwoods, South-Central Interior / Upper Coastal Plain Wet Flatwoods	Facultative
Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4	North-Central Interior Wet Flatwoods	Facultative
Quercus palustris - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3	North-Central Interior Wet Flatwoods	Obligate
Quercus palustris - Quercus bicolor - Nyssa sylvatica - Acer rubrum Sand Flatwoods Forest	G2?	North-Central Interior Wet Flatwoods	Obligate
Quercus palustris Pond Forest	G2	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus phellos - (Quercus lyrata) / Carex spp. - Leersia spp. Forest	G3G4Q	South-Central Interior / Upper Coastal Plain Wet Flatwoods	Facultative
Quercus phellos - Liquidambar styraciflua / Chasmanthium laxum Cumberland Plateau Forest	G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Quercus phellos / Chasmanthium laxum - Carex (flaccosperma, intumescens) - Hymenocallis liriosme Flatwoods Forest	G3G4	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Rhynchospora capitellata - Rhexia virginica - Rhynchospora scirpoides - Schoenoplectus hallii Herbaceous Vegetation	G2?	Atlantic Coastal Plain Northern Pondshore	Obligate
Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Freshwater Marsh	Facultative
Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, Southern Piedmont / Ridge and Valley Upland Depression Swamp	Obligate
Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum) Herbaceous Vegetation	G2G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Sparganium americanum - Epilobium leptophyllum Herbaceous Vegetation	G2G3	Central Interior Highlands and Appalachian Sinkhole and Depression Pond	Obligate
Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp	Facultative
Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3	Great Lakes Wet-Mesic Lakeplain Prairie	Facultative

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp	Facultative
Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3	Western Great Plains Open Freshwater Depression Wetland	Facultative
Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3	North-Central Interior Shrub-Graminoid Alkaline Fen, North-Central Interior and Appalachian Acid Peatland	Obligate
Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4	North-Central Interior Freshwater Marsh	Facultative
<b>Great Plains and Tallgrass Prairie Region</b>			
Calamagrostis canadensis - Juncus spp. - Carex spp. Sandhills Herbaceous Vegetation	G3G4	Western Great Plains Open Freshwater Depression Wetland	Facultative
Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3	Eastern Great Plains Wet Meadow, Prairie, and Marsh, Western Great Plains Open Freshwater Depression Wetland, Western Great Plains Saline Depression Wetland	Facultative
Carex interior - Eleocharis elliptica - Thelypteris palustris Herbaceous Vegetation	G1G2	Western Great Plains Open Freshwater Depression Wetland	Facultative
Carex lasiocarpa - Carex oligosperma - (Lysimachia terrestris) / Sphagnum spp. / Spiraea tomentosa Herbaceous Vegetation	G3G4	North-Central Interior and Appalachian Acid Peatland	Facultative
Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4	Boreal-Laurentian Conifer Acid Swamp, Boreal-Laurentian-Acadian Acidic Basin Fen, Great Plains Prairie Pothole, North-Central Interior Shrub-Graminoid Alkaline Fen	Facultative
Carex prairea - Schoenoplectus pungens - Rhynchospora capillacea Herbaceous Vegetation	G2	Western Great Plains Open Freshwater Depression Wetland	Facultative
Carex spp. - Triglochin maritima - Eleocharis quinqueflora Marl Fen Herbaceous Vegetation	G1?	Western Great Plains Open Freshwater Depression Wetland	Facultative
Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?	Central Interior Highlands and Appalachian Sinkhole and Depression Pond, East Gulf Coastal Plain Northern Depression Pondshore	Obligate
Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4	North-Central Interior and Appalachian Acid Peatland	Facultative
Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3	North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp, Western Great Plains Open Freshwater Depression Wetland	Facultative
Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4	North-Central Interior Shrub-Graminoid Alkaline Fen	Obligate
Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?	Great Lakes Dune and Swale, Northern Great Lakes Interdunal Wetland	Facultative

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Distichlis spicata - (Hordeum jubatum, Poa arida, Sporobolus airoides) Herbaceous Vegetation	G3	Western Great Plains Saline Depression Wetland	Obligate
Distichlis spicata - Hordeum jubatum - (Poa arida, Iva annua) Herbaceous Vegetation	G2G3	Western Great Plains Saline Depression Wetland	Obligate
Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3	Western Great Plains Saline Depression Wetland	Facultative
Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation	G1G2	Western Great Plains Saline Depression Wetland	Obligate
Panicum virgatum - (Pascopyrum smithii) Herbaceous Vegetation	G2Q	Western Great Plains Open Freshwater Depression Wetland	Facultative
Pascopyrum smithii - Buchloe dactyloides - (Phyla cuneifolia, Oenothera canescens) Herbaceous Vegetation	G2G3	Western Great Plains Closed Depression Wetland	Obligate
Pascopyrum smithii - Eleocharis spp. Herbaceous Vegetation	G1	Western Great Plains Closed Depression Wetland	Obligate
Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4	Western Great Plains Closed Depression Wetland, Western Great Plains Open Freshwater Depression Wetland	Obligate
Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3	North-Central Interior Wet Flatwoods, South-Central Interior / Upper Coastal Plain Wet Flatwoods	Facultative
Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4	North-Central Interior Wet Flatwoods	Facultative
Quercus palustris - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3	North-Central Interior Wet Flatwoods	Obligate
Quercus palustris - Quercus bicolor - Nyssa sylvatica - Acer rubrum Sand Flatwoods Forest	G2?	North-Central Interior Wet Flatwoods	Obligate
Quercus phellos - (Quercus lyrata) / Carex spp. - Leersia spp. Forest	G3G4Q	South-Central Interior / Upper Coastal Plain Wet Flatwoods	Facultative
Salicornia rubra Herbaceous Vegetation	G2G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Interdunal Swale Wetland, Western Great Plains Saline Depression Wetland	Facultative
Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Freshwater Marsh	Facultative
Schoenoplectus maritimus - Atriplex patula - Eleocharis parvula Herbaceous Vegetation	G1	Eastern Great Plains Wet Meadow, Prairie, and Marsh	Facultative
Schoenoplectus pungens - Suaeda calceoliformis Alkaline Herbaceous Vegetation	G3G4	Western Great Plains Saline Depression Wetland	Facultative
Schoenoplectus pungens Herbaceous Vegetation	G3G4	Inter-Mountain Basins Interdunal Swale Wetland, Western Great Plains Saline Depression Wetland	Facultative
Sedum nuttallianum - Selaginella peruviana Granitic Outcrop Sparse Vegetation	G2	Edwards Plateau Granitic Forest, Woodland and Glade	Facultative
Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp, Western Great Plains Open Freshwater Depression Wetland	Facultative
Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp	Facultative



<b>Project Region and US-NVC Association Name</b>	<b>NatureServe Global Rank</b>	<b>Isolated Wetland Systems</b>	<b>Oblig./Fac. Status</b>
Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3	Great Lakes Wet-Mesic Lakeplain Prairie	Facultative
Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp	Facultative
Spartina pectinata - Carex spp. Herbaceous Vegetation	G3?	Western Great Plains Open Freshwater Depression Wetland	Facultative
Spartina pectinata - Eleocharis spp. - Carex spp. Herbaceous Vegetation	G2G4	Western Great Plains Closed Depression Wetland, Western Great Plains Open Freshwater Depression Wetland	Facultative
Stuckenia pectinata - Myriophyllum (sibiricum, spicatum) Herbaceous Vegetation	G3G4	Western Great Plains Open Freshwater Depression Wetland	Facultative
Stuckenia pectinata - Ruppia maritima Herbaceous Vegetation	G2?	Western Great Plains Saline Depression Wetland	Facultative
Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4	Western Great Plains Open Freshwater Depression Wetland, Western Great Plains Saline Depression Wetland	Facultative
Typha (angustifolia, domingensis, latifolia) - Schoenoplectus americanus Herbaceous Vegetation	G3G4	Eastern Great Plains Wet Meadow, Prairie, and Marsh, Western Great Plains Open Freshwater Depression Wetland	Facultative
Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3	Western Great Plains Open Freshwater Depression Wetland	Facultative
Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4	North-Central Interior Freshwater Marsh	Facultative
<b>Intermountain and Rocky Mountain</b>			
Aquilegia micrantha - Mimulus eastwoodiae Herbaceous Vegetation	G2G3	Colorado Plateau Hanging Garden	Obligate
Betula occidentalis - Dasiphora fruticosa ssp. floribunda Shrubland	G2Q	Western Great Plains Open Freshwater Depression Wetland	Facultative
Camassia quamash Wet Prairie Herbaceous Vegetation	G3	Willamette Valley Wet Prairie	Obligate
Carex aperta Herbaceous Vegetation	G1?	Willamette Valley Wet Prairie	Facultative
Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3	Western Great Plains Saline Depression Wetland	Facultative
Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3	Boreal Depressional Bog	Facultative
Eleocharis palustris - Distichlis spicata Herbaceous Vegetation	G2G4	Inter-Mountain Basins Alkaline Closed Depression	Facultative
Eleocharis palustris - Juncus balticus Herbaceous Vegetation	G2G4	Inter-Mountain Basins Alkaline Closed Depression	Facultative
Juncus balticus - Carex rossii Herbaceous Vegetation	G2G4	Inter-Mountain Basins Interdunal Swale Wetland	Facultative
Lemna spp. Permanently Flooded Herbaceous Vegetation	G3?	Northern Columbia Plateau Basalt Pothole Ponds	Facultative
Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Obligate
Leymus cinereus Bottomland Herbaceous Vegetation	G1	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Obligate
Panicum virgatum - (Pascopyrum smithii) Herbaceous Vegetation	G2Q	Western Great Plains Open Freshwater Depression Wetland	Facultative
Pascopyrum smithii - Eleocharis spp. Herbaceous Vegetation	G1	Western Great Plains Closed Depression Wetland	Obligate

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Pluchea sericea Seasonally Flooded Shrubland [Placeholder]	G3?	Inter-Mountain Basins Playa	Facultative
Populus fremontii / Baccharis salicifolia Woodland	G2	North American Warm Desert Interdunal Swale Wetland	Facultative
Potamogeton richardsonii - Myriophyllum spicatum Herbaceous Vegetation	G2Q	Western Great Plains Open Freshwater Depression Wetland	Obligate
Puccinellia nuttalliana Herbaceous Vegetation	G3?	Inter-Mountain Basins Greasewood Flat, Western Great Plains Saline Depression Wetland	Obligate
Salicornia rubra Herbaceous Vegetation	G2G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Interdunal Swale Wetland, Western Great Plains Saline Depression Wetland	Facultative
Sarcobatus vermiculatus / Juncus balticus Sparse Vegetation	G3?	Inter-Mountain Basins Greasewood Flat	Obligate
Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa, Western Great Plains Closed Depression Wetland	Facultative
Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Facultative
Schoenoplectus americanus Western Herbaceous Vegetation	G3Q	Inter-Mountain Basins Interdunal Swale Wetland, Northern Columbia Plateau Basalt Pothole Ponds	Facultative
Schoenoplectus pungens Herbaceous Vegetation	G3G4	Inter-Mountain Basins Interdunal Swale Wetland, Western Great Plains Saline Depression Wetland	Facultative
Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?	Eastern Great Plains Wet Meadow, Prairie, and Marsh, North-Central Interior Wet Meadow-Shrub Swamp, Western Great Plains Open Freshwater Depression Wetland	Facultative
Spartina pectinata - Carex spp. Herbaceous Vegetation	G3?	Western Great Plains Open Freshwater Depression Wetland	Facultative
Spartina pectinata - Schoenoplectus pungens Herbaceous Vegetation	G3?	Western Great Plains Open Freshwater Depression Wetland, Western Great Plains Saline Depression Wetland	Obligate
Stuckenia pectinata - Myriophyllum (sibiricum, spicatum) Herbaceous Vegetation	G3G4	Western Great Plains Open Freshwater Depression Wetland	Facultative
Stuckenia pectinata - Ruppia maritima Herbaceous Vegetation	G2?	Western Great Plains Saline Depression Wetland	Facultative
Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4	Western Great Plains Open Freshwater Depression Wetland, Western Great Plains Saline Depression Wetland	Facultative
<b>Southwest</b>			
(Quercus laurifolia) / Crataegus opaca - Crataegus viridis Forest	G1	East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods, West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Aristida palustris - Panicum virgatum - Eriocaulon compressum - Eleocharis equisetoides Herbaceous Vegetation	G2G3	West Gulf Coastal Plain Flatwoods Pond	Obligate
Aristida palustris - Panicum virgatum - Eriocaulon decangulare var. decangulare - Rhynchospora elliottii Herbaceous Vegetation	G2G3	West Gulf Coastal Plain Flatwoods Pond	Obligate

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Baccharis salicifolia - Baccharis neglecta / Eustoma exaltatum Shrubland	G2?	North American Warm Desert Interdunal Swale Wetland	Obligate
Distichlis spicata - (Hordeum jubatum, Poa arida, Sporobolus airoides) Herbaceous Vegetation	G3	Western Great Plains Saline Depression Wetland	Obligate
Eleocharis palustris - Carex praegracilis - Berula erecta Herbaceous Vegetation	G2	North American Warm Desert Interdunal Swale Wetland	Facultative
Eleocharis quadrangulata - Sagittaria spp. Herbaceous Vegetation	G3?	Central and Upper Texas Coast Dune and Coastal Grassland, Texas-Louisiana Coastal Prairie Pondshore	Obligate
Fraxinus caroliniana Seasonally Flooded Forest	G2G3	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Fuirena scirpoidea - Fuirena longa - Rhynchospora microcarpa - Rhynchospora divergens Herbaceous Vegetation	G2	Central and Upper Texas Coast Dune and Coastal Grassland, Southeastern Coastal Plain Interdunal Wetland	Obligate
Nymphoides aquatica - Nymphaea odorata - Gratiola brevifolia Herbaceous Vegetation	G3?	West Gulf Coastal Plain Flatwoods Pond	Obligate
Nyssa biflora / Panicum hemitomom - Woodwardia virginica Woodland	G3?	West Gulf Coastal Plain Flatwoods Pond	Obligate
Panicum hemitomom - Eriocaulon compressum - Rhynchospora corniculata Herbaceous Vegetation	G2	West Gulf Coastal Plain Flatwoods Pond	Obligate
Paspalum vaginatum Herbaceous Vegetation	G3G4	South Texas Dune and Coastal Grassland, Southeastern Coastal Plain Interdunal Wetland	Obligate
Pleuraphis mutica - Panicum obtusum Herbaceous Vegetation	G3	Chihuahuan-Sonoran Desert Bottomland and Swale Grassland, Western Great Plains Closed Depression Wetland	Obligate
Populus fremontii / Baccharis salicifolia Woodland	G2	North American Warm Desert Interdunal Swale Wetland	Facultative
Quercus laurifolia - Liquidambar styraciflua - Nyssa biflora - Acer rubrum / Sabal minor Forest	G3?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Facultative
Quercus laurifolia - Quercus phellos - Quercus nigra / Viburnum dentatum - (Sebastiania fruticosa) / Carex glaucescens Upper West Gulf Flatwoods Forest	G2G3	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Quercus phellos - Quercus similis / Crataegus marshallii - Crataegus spathulata / Chasmanthium laxum Forest	G3?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Quercus phellos / Chasmanthium laxum - Carex (flaccosperma, intumescens) - Hymenocallis liriosme Flatwoods Forest	G3G4	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Quercus phellos / Chasmanthium laxum Forest	G3?	West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods	Obligate
Quercus stellata - Pinus taeda Flatwoods Depression Forest	G2G3	West Gulf Coastal Plain Pine-Hardwood Flatwoods	Obligate
Salix exigua / Baccharis salicifolia - Baccharis neglecta / Schoenoplectus spp. Woodland	G2?	North American Warm Desert Interdunal Swale Wetland	Obligate
Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii Shrubland	G2?	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Facultative
Schoenoplectus americanus - Flaveria chlorifolia - (Helianthus paradoxus) Herbaceous Vegetation	G1	North American Warm Desert Interdunal Swale Wetland	Facultative

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Schoenoplectus pungens Herbaceous Vegetation	G3G4	Inter-Mountain Basins Interdunal Swale Wetland, Western Great Plains Saline Depression Wetland	Facultative
Sedum nuttallianum - Selaginella peruviana Granitic Outcrop Sparse Vegetation	G2	Edwards Plateau Granitic Forest, Woodland and Glade	Facultative
Sesuvium verrucosum Sparse Vegetation	G3?	North American Warm Desert Playa	Obligate
Spartina patens - Fimbristylis (caroliniana, castanea) - (Panicum virgatum) Herbaceous Vegetation	G2G3	South Texas Dune and Coastal Grassland, Southeastern Coastal Plain Interdunal Wetland	Obligate
Typha domingensis Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation	G3?	Southeastern Coastal Plain Interdunal Wetland	Obligate
Washingtonia filifera Woodland	G3?	Sonoran Fan Palm Oasis	Obligate
<b>Pacific Coast</b>			
Camassia quamash Wet Prairie Herbaceous Vegetation	G3	Willamette Valley Wet Prairie	Obligate
Carex aperta Herbaceous Vegetation	G1?	Willamette Valley Wet Prairie	Facultative
Carex densa - Deschampsia caespitosa Herbaceous Vegetation [Provisional]	G2	Willamette Valley Wet Prairie	Obligate
Carex densa - Eleocharis palustris Herbaceous Vegetation [Provisional]	G3	Willamette Valley Wet Prairie	Obligate
Carex exsiccata Herbaceous Vegetation [Provisional]	G2G3	Boreal Depressional Bog	Facultative
Deschampsia caespitosa - Danthonia californica Herbaceous Vegetation	G2	Willamette Valley Wet Prairie	Obligate
Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3	Boreal Depressional Bog	Facultative
Eleocharis palustris - Carex unilateralis Herbaceous Vegetation	G2	Willamette Valley Wet Prairie	Facultative
Eryngium petiolatum - Grindelia nana Herbaceous Vegetation	G1G2	North Pacific Hardpan Vernal Pool	Obligate
Eryngium petiolatum - Lasthenia glaberrima Herbaceous Vegetation	G1G2	North Pacific Hardpan Vernal Pool	Obligate
Isoetes nuttallii Herbaceous Vegetation	G3	Willamette Valley Wet Prairie	Obligate
Kalmia microphylla - Ledum groenlandicum / Xerophyllum tenax Shrubland	G1	Boreal Depressional Bog	Facultative
Ledum groenlandicum - Myrica gale / Sphagnum spp. Shrubland	G2	Boreal Depressional Bog	Facultative
Lemna spp. Permanently Flooded Herbaceous Vegetation	G3?	Northern Columbia Plateau Basalt Pothole Ponds	Facultative
Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Obligate
Leymus cinereus Bottomland Herbaceous Vegetation	G1	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Obligate
Leymus triticoides - Poa secunda Herbaceous Vegetation	G2	Inter-Mountain Basins Alkaline Closed Depression, Inter-Mountain Basins Playa	Obligate
Malus fusca Shrubland	G3	Boreal Depressional Bog	Facultative
Pinus contorta var. contorta / Ledum groenlandicum / Sphagnum spp. Woodland	G3	Boreal Depressional Bog	Facultative
Pinus monticola / Ledum groenlandicum / Sphagnum spp. Woodland	G1	Boreal Depressional Bog	Facultative
Plagiobothrys figuratus Vernal Pool Herbaceous Vegetation	G1G2	North Pacific Hardpan Vernal Pool	Obligate
Plagiobothrys scouleri - Plantago bigelovii Herbaceous Vegetation	G2	North Pacific Hardpan Vernal Pool	Obligate
Pluchea sericea Seasonally Flooded Shrubland [Placeholder]	G3?	Inter-Mountain Basins Playa	Facultative
Puccinellia lemmonii - Poa secunda Seasonally Flooded Herbaceous Vegetation	G1	Inter-Mountain Basins Alkaline Closed Depression, Inter-Mountain Basins Playa	Obligate
Rhynchospora alba - (Vaccinium oxycoccos) / Sphagnum tenellum Herbaceous Vegetation [Provisional]	G3	Boreal Depressional Bog	Facultative

Project Region and US-NVC Association Name	NatureServe Global Rank	Isolated Wetland Systems	Oblig./Fac. Status
Rosa nutkana / Deschampsia caespitosa Shrubland [Provisional]	G2	Willamette Valley Wet Prairie	Obligate
Rosa nutkana / Oenante sarmentosa Shrubland [Provisional]	G1	Willamette Valley Wet Prairie	Obligate
Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa, Western Great Plains Closed Depression Wetland	Facultative
Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?	Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa	Facultative
Schoenoplectus americanus Western Herbaceous Vegetation	G3Q	Inter-Mountain Basins Interdunal Swale Wetland, Northern Columbia Plateau Basalt Pothole Ponds	Facultative
Spiraea douglasii / Sphagnum spp. Shrubland	G3	Boreal Depressional Bog	Facultative
Tsuga heterophylla - (Thuja plicata) / Ledum groenlandicum / Sphagnum spp. Forest	G3	Boreal Depressional Bog	Facultative
Tsuga heterophylla - (Thuja plicata) / Sphagnum spp. Forest	G1	Boreal Depressional Bog	Facultative
Washingtonia filifera Woodland	G3?	Sonoran Fan Palm Oasis	Obligate
<b>Alaska</b>			
Pinus contorta / Carex aquatilis var. dives Woodland	G3	Boreal Depressional Bog	Facultative
Pinus contorta / Vaccinium ovalifolium Woodland	G3	Boreal Depressional Bog	Facultative
<b>Hawaii</b>			
Metrosideros polymorpha / Rhynchospora spp. / Dicranopteris linearis Mixed Lowland Bog Dwarf-shrubland	G1	Hawai'i Montane Bog	Obligate
Metrosideros polymorpha Mixed Montane Bog Dwarf-shrubland	G2	Hawai'i Montane Bog	Obligate

## Appendix VIII. At-Risk US-NVC Associations, Animal Species, and Plant Species Tied to Isolated Wetland Ecological Systems in Each State

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
<b>Alabama</b>				
<b>Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)</b>				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Cephalanthus occidentalis - (Salix nigra, Quercus lyrata) Karst Depression Shrubland	G1Q		AL, TN?
	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q		AL, GA, NC, TN
	Nyssa biflora / Cephalanthus occidentalis - Lyonia lucida Sagpond Forest	G1G2		AL, GA, TN?
	Quercus alba - Nyssa sylvatica Sandstone Ridgetop Depression Forest	G2Q		AL, TN?
	Quercus phellos - Liquidambar styraciflua / Chasmanthium laxum Cumberland Plateau Forest	G3		AL, GA, KY, TN
	Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum) Herbaceous Vegetation	G2G3		AL, IN, KY, TN
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
<b>East Gulf Coastal Plain Dune and Coastal Grassland (Partial)</b>				AL, FL, MS
Assoc.	Fuirena scirpoidea - Panicum tenerum - Dichanthelium wrightianum - Andropogon capillipes Herbaceous Vegetation	G2?		AL, FL?, MS:S2
Plant	Rhexia salicifolia (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2
<b>East Gulf Coastal Plain Northern Depression Pondshore (Partial)</b>				AL, GA, MS
Assoc.	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) Herbaceous Vegetation	G2G3		AL, GA?, TN
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3		AL?, FL?, GA, NC, SC
	Panicum hemitomon - Pluchea (camphorata, rosea) - Ludwigia spp. Herbaceous Vegetation	G3		AL, FL, GA, LA?, MS
	Saccharum spp. - Panicum verrucosum - (Rhexia spp., Sabatia spp.) Herbaceous Vegetation	G2G3		AL?, GA, MS?, SC?
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Coelorachis tuberculosa (Florida Jointgrass)	G3		AL:S1, FL:S3
	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	Rhexia salicifolia (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Xyris longisepala (Kral's Yellow-eyed-grass)	G2		AL:S1, FL:S2
<b>East Gulf Coastal Plain Sandhill Lakeshore Depression (Partial)</b>				AL, FL
Assoc.	Hypericum reductum / Syngonanthus flavidulus - Rhexia salicifolia - (Xyris longisepala) Dwarf-shrubland	G1G2		AL
Plant	Rhexia salicifolia (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2
	Xyris isoetifolia (Quillwort Yellow-eyed Grass)	G1		AL:SH, FL:S1
<b>East Gulf Coastal Plain Southern Depression Pondshore (Partial)</b>				AL, FL, GA, LA?, MS
Assoc.	Crataegus rufula Forest	G2G3		AL, FL, GA
	Dichantherium wrightianum - Dichantherium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?		AL, FL, GA, LA?, MS?, NC, SC
	Fuirena scirpoidea - Rhynchospora tracyi Herbaceous Vegetation	G3G4		AL, FL, GA?
	Hypericum fasciculatum / Rhynchospora (chapmanii, harperi) Shrubland	G2G3		AL, FL, GA, SC
	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC
	Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
	Rana sevosia (Dusky Gopher Frog)	G1	LE	AL:SH, LA:SH, MS:S1
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coelorachis tuberculosa (Florida Jointgrass)	G3		AL:S1, FL:S3
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	<i>Fuirena longa</i> (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	<i>Lindera melissifolia</i> (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	<i>Lobelia boykinii</i> (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	<i>Ludwigia spathulata</i> (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	<i>Myriophyllum laxum</i> (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	<i>Polygonum hirsutum</i> (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	<i>Rhexia parviflora</i> (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	<i>Rhexia salicifolia</i> (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2
	<i>Rhynchospora fernaldii</i> (Fernald's Beakrush)	G3G4		AL:S1?, FL:SNR, GA:SNR, MS:S1
	<i>Rhynchospora inundata</i> (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	<i>Rhynchospora pleiantha</i> (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR
	<i>Xyris longisepala</i> (Kral's Yellow-eyed-grass)	G2		AL:S1, FL:S2
<b>East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods (Partial)</b>				AL, FL?, GA?, LA, MS
Assoc.	( <i>Quercus laurifolia</i> ) / <i>Crataegus opaca</i> - <i>Crataegus viridis</i> Forest	G1		AL?, LA, MS, TX
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	( <i>Stillingia aquatica</i> ) / <i>Panicum tenerum</i> - <i>Dichanthelium erectifolium</i> Herbaceous Vegetation	G2?		AL, FL?
	<i>Cladium mariscus</i> ssp. <i>jamaicense</i> - <i>Woodwardia virginica</i> Herbaceous Vegetation	G2?		AL, FL, GA
	<i>Eleocharis elongata</i> - <i>Panicum tenerum</i> - <i>Nymphaea odorata</i> Herbaceous Vegetation	G2?		AL, FL?
	<i>Hypericum reductum</i> - <i>Licania michauxii</i> / <i>Andropogon capillipes</i> - <i>Polygonella gracilis</i> - <i>Xyris caroliniana</i> Dwarf-shrubland	G2		AL, FL
	<i>Typha domingensis</i> Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation	G3?		AL, LA?, MS, TX
Plant	<i>Fuirena longa</i> (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	<i>Lachnocaulon engleri</i> (Engler's Bogbutton)	G3		AL:S1?, FL:S3
<b>Southern Coastal Plain Nonriverine Basin Swamp (Partial)</b>				AL, FL, GA, LA?, MS, SC
Assoc.	<i>Nyssa biflora</i> / <i>Ilex myrtifolia</i> / <i>Carex glaucescens</i> - <i>Eriocaulon compressum</i> Forest	G2G3		AL, FL, GA?
	<i>Pinus serotina</i> - <i>Pinus elliotii</i> var. <i>elliottii</i> / <i>Cliftonia monophylla</i> - <i>Cyrilla racemiflora</i> Woodland	G3?Q		AL, FL, GA
Plant	<i>Coreopsis nudata</i> (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	<i>Pieris phillyreifolia</i> (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	<i>Rhexia parviflora</i> (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
<b>Southern Coastal Plain Nonriverine Cypress Dome (Partial)</b>				AL, FL, GA, LA, MS
Assoc.	<i>Taxodium ascendens</i> / ( <i>Nyssa biflora</i> ) / <i>Leucothoe racemosa</i> - <i>Lyonia lucida</i> - <i>Morella cerifera</i> Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	<i>Taxodium ascendens</i> / <i>Ilex myrtifolia</i> / <i>Carex (striata, turgescens)</i> Stringer Forest	G3?Q		AL, FL, GA, LA, MS, SC
	<i>Taxodium ascendens</i> / <i>Ilex myrtifolia</i> / <i>Hypericum myrtifolium</i> / <i>Lobelia floridana</i> - <i>Polygala cymosa</i> Woodland	G3		AL:S1, FL, GA, MS
	<i>Taxodium ascendens</i> / <i>Ilex myrtifolia</i> Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
Animal	<i>Ambystoma cingulatum</i> (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1



Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	<i>Rana capito</i> (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	<i>Carex verrucosa</i> (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	<i>Coreopsis nudata</i> (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	<i>Croton elliotii</i> (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	<i>Fuirena longa</i> (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	<i>Lindera melissifolia</i> (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	<i>Pieris phillyreifolia</i> (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	<i>Polygonum hirsutum</i> (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	<i>Rhexia parviflora</i> (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	<i>Rhynchospora inundata</i> (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	<b>Southern Coastal Plain Sinkhole (Partial)</b>			
Assoc.	<i>Adiantum capillus-veneris</i> - <i>Thelypteris kunthii</i> / <i>Dumortiera hirsuta</i> Herbaceous Vegetation	G3?		AL, FL, GA
<b>Southern Piedmont / Ridge and Valley Upland Depression Swamp (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	<i>Liquidambar styraciflua</i> - <i>Acer rubrum</i> / <i>Carex</i> spp. - <i>Sphagnum</i> spp. Forest	G2Q		AL, GA, NC, TN
	<i>Quercus</i> ( <i>pagoda</i> , <i>phellos</i> , <i>shumardii</i> ) - <i>Celtis laevigata</i> / <i>Cornus foemina</i> / <i>Podophyllum peltatum</i> - <i>Hymenocallis occidentalis</i> Flatwoods Forest	G2?		AL, GA
	<i>Quercus phellos</i> / <i>Carex</i> ( <i>albolutescens</i> , <i>intumescens</i> , <i>joorii</i> ) - <i>Chasmanthium laxum</i> / <i>Sphagnum lescurii</i> Forest	G2G3		AL, GA?, NC, SC, VA:S2?
Plant	<i>Carex decomposita</i> (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	<i>Isoetes piedmontana</i> (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
<b>Southern Piedmont Granite Flatrock (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	<i>Amphianthus pusillus</i> - <i>Isoetes melanospora</i> - <i>Isoetes tegetiformans</i> Herbaceous Vegetation	G1		AL, GA, SC
	<i>Diamorpha smallii</i> - <i>Minuartia glabra</i> - <i>Minuartia uniflora</i> - <i>Cyperus granitophilus</i> Herbaceous Vegetation	G3		AL, GA, NC, SC
Plant	<i>Amphianthus pusillus</i> (Little Amphianthus)	G2	LT	AL:S1, GA:S2, SC:S1
	<i>Cyperus granitophilus</i> (Granite-loving Flatsedge)	G3Q		AL:S2, GA:S3, NC:S1, SC:SNR, TN:S1, VA:S1, TV:SNR
	<i>Isoetes piedmontana</i> (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
	<i>Rhynchospora saxicola</i> (Stone Mountain Beakrush)	G3Q		AL:S1, GA:S3
	<i>Sedum pusillum</i> (Granite Rock Stonecrop)	G3		AL:SNR, GA:S3, NC:S1, SC:S2
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	<i>Cyrilla racemiflora</i> - <i>Lyonia lucida</i> Shrubland	G3?		AL, FL, GA, LA?, MS, NC, SC
	<i>Pinus palustris</i> - <i>Pinus serotina</i> / <i>Ilex glabra</i> - <i>Lyonia lucida</i> / <i>Ctenium aromaticum</i> Woodland	G3		AL, GA
Animal	<i>Fallicambarus danielae</i> (Speckled Burrowing Crayfish)	G2		AL:S1, MS:S2
Plant	<i>Cardamine clematitidis</i> (Mountain Bitter Cress)	G2G3		AL:SH, NC:S2, SC:SNR, TN:S2, VA:S1S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1,
	Sarracenia oreophila (Green Pitcherplant)	G2	LE	AL:S2, GA:S1, NC:S1
	Xyris tennesseensis (Tennessee Yellow-eyed-grass)	G2	LE	AL:S1, GA:S1, TN:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Alaska

Boreal Depressional Bog (Partial)				AK, BC, ID, MT, OR, WA
Assoc.	Pinus contorta / Carex aquatilis var. dives Woodland	G3		AK:S3
	Pinus contorta / Vaccinium ovalifolium Woodland	G3		AK:S3
North Pacific Coastal Interdunal Wetland (Partial)				AK

*no at-risk isolated wetland elements confirmed in this isolated wetland system in state*

At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Plant	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Arizona

<b>Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (Partial)</b>				AZ, MXCH, MXSO, NM, TX
Assoc.	Pleuraphis mutica - Panicum obtusum Herbaceous Vegetation	G3		AZ:S2, MXCH?, MXCO?, MXSO?, NM:S3, TX
<b>Colorado Plateau Hanging Garden (Strict)</b>				AZ, CO, NV?, UT
Plant	Carex specuicola (Navajo Sedge)	G2	LT	AZ:S2, UT:S1, NN:S2
	Mimulus eastwoodiae (Eastwood Monkeyflower)	G3		AZ:SNR, CO:S1, NV:SNR, UT:S3, NN:S3S4
	Platanthera zothecina (Alcove Bog-orchid)	G2		UT:S2, CO:S1, AZ:S2, NN:S2
<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Plant	Phacelia parishii (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
<b>North American Warm Desert Playa (Partial)</b>				AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX
Plant	Atriplex griffithsii (Griffith's Saltbush)	G2G3		AZ:S2S3, NM:S2
	Phacelia parishii (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
<b>Sonoran Fan Palm Oasis (Partial)</b>				AZ, CA, MXBC, MXSO, NV
Assoc.	Washingtonia filifera Woodland	G3?		AZ, CA:S3
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Eleocharis palustris - Carex praegracilis - Berula erecta Herbaceous Vegetation	G2		AZ:S2, MXSO, NM
Animal	Eocyzicus concavus (Swaybacked Clam Shrimp)	G1G3		AZ:SNR, NM:SNR, TX:SNR
Plant	Cirsium mohavense (Mohave Thistle)	G2G3		AZ:S1, CA:SNR, NV:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Arkansas

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Nyssa aquatica / Cephalanthus occidentalis Pond Forest	G1?		AR?, MO, TN
	Quercus lyrata Pond Forest	G1G3		AR, MO
	Quercus palustris - (Quercus bicolor) / Carex crinita / Sphagnum spp. Forest	G3?		AR, MO
	Quercus palustris Pond Forest	G2		AR
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
Ozark-Ouachita Fen (Partial)				AR, MO
Assoc.	(Carex interior, Carex lurida) - Carex leptalea - Parnassia grandifolia - Rhynchospora capillacea Herbaceous Vegetation	G2G3		AR, MO
West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods (Partial)				AR, LA, OK?, TX
Assoc.	Nyssa biflora - Quercus laurifolia / Sphagnum spp. Depression Forest	G3?		AR?, LA, TX?
	Quercus laurifolia - Quercus phellos - Quercus nigra / Viburnum dentatum - (Sebastiania fruticosa) / Carex glaucescens Upper West Gulf Flatwoods Forest	G2G3		AR?, LA?, TX
	Quercus lyrata - Quercus phellos - Ulmus americana / Rhynchospora spp. Forest	G2G3		AR?, LA, TX?
	Quercus phellos - Quercus similis / Crataegus marshallii - Crataegus spathulata / Chasmanthium laxum Forest	G3?		AR?, LA, TX
	Quercus phellos / Chasmanthium laxum - Carex (flaccosperma, intumescens) - Hymenocallis liriosme Flatwoods Forest	G3G4		AR, LA, OK?, TX
	Quercus phellos / Chasmanthium laxum Forest	G3?		AR?, LA?, OK?, TX
West Gulf Coastal Plain Pine-Hardwood Flatwoods (Partial)				AR, LA, OK?, TX
Assoc.	Quercus stellata - Pinus taeda Flatwoods Depression Forest	G2G3		AR?, LA?, TX
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3		AR, IL, IN, KY?, MO, TN?
	Quercus phellos - (Quercus lyrata) / Carex spp. - Leersia spp. Forest	G3G4Q		AR, IL, KY, MO?, MS?, TN
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1,
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, MO:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## California

California Central Valley Alkali Sink (Partial)				CA
Plant	<i>Atriplex cordulata</i> (Heart-leaf Saltbush)	G2?		CA:S2.2?
	<i>Atriplex coronata</i> var. <i>notatior</i> (San Jacinto Valley Crownscale)	G4T1	LE	CA:S1.1
	<i>Atriplex joaquiniana</i> (San Joaquin Saltbush)	G2		CA:S2.1
	<i>Atriplex minuscula</i> (Lesser Saltbush)	G1		CA:S1.1
	<i>Atriplex spinifera</i> (Mojave Saltbush)	G3?		CA:SNR
	<i>Atriplex tularensis</i> (Bakersfield Saltbush)	G1Q		CA:S1.1
	<i>Atriplex vallicola</i> (Lost Hills Saltbush)	G1		CA:S1.1
	<i>Cordylanthus palmatus</i> (Palmate-bracted Bird's-beak)	G1	LE	CA:S1.1
	<i>Delphinium recurvatum</i> (Byron Larkspur)	G2		CA:S2.2
	<i>Isocoma arguta</i> (Suisun Goldenbush)	G1		CA:S1.1
	<i>Layia munzii</i> (Munz's Tidy-tips)	G1		CA:S1.1
	<i>Puccinellia simplex</i> (Little Alkali-grass)	G3G4		CA:SNR, UT:S1
	Inter-Mountain Basins Alkaline Closed Depression (Partial)			
Assoc.	<i>Leymus triticoides</i> - <i>Poa secunda</i> Herbaceous Vegetation	G2		CA, NV?, OR:S2
Animal	<i>Microtus californicus scirpensis</i> (Amargosa Vole)	G5T1	LE	CA:S1
	<i>Pseudocopaedodes eunus obscurus</i> (Carson Wandering Skipper)	G3G4T1	LE	CA:S1, NV:S1
Plant	<i>Astragalus lemmonii</i> (A Milk-vetch)	G3?		CA:S2.2, NV:S1, OR:SNR
	<i>Calochortus striatus</i> (Alkali Mariposa Lily)	G2		CA:S2.2, NV:S1
	<i>Cirsium mohavense</i> (Mohave Thistle)	G2G3		AZ:S1, CA:SNR, NV:SNR
	<i>Cordylanthus tecopensis</i> (Tecopa Bird's-beak)	G2		CA:S1.2, NV:S2
	<i>Downingia bicornuta</i> (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	<i>Eriogonum ampullaceum</i> (Mono Buckwheat)	G3		CA:SNR, NV:S1
	<i>Goodmania luteola</i> (golden goodmania)	G2G3		CA:S3.2, NV:S1
	<i>Grindelia fraxinopratisensis</i> (Ash Meadows Gumplant)	G2	LT	CA:S1.2, NV:S2
	<i>Ivesia kingii</i> (King's Ivesia)	G3	PS	CA:SNR, NV:S3, UT:S1
	<i>Juncus kelloggii</i> (Kellogg's Rush)	G3?		CA:SNR, NV:SNR, WA:S1
	<i>Juncus uncialis</i> (Inch-high Rush)	G3G4		CA:SNR, NV:SNR, OR:SNR, WA:S2
	<i>Phacelia parishii</i> (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
	<i>Plagiobothrys salsus</i> (Desert Allocarya)	G2G3		CA:S1.2?, NV:S2S3, OR:S1
	<i>Pogogyne floribunda</i> (Profuse-flowered Pogogyne)	G3		CA:S3.2, ID:S1, OR:S1
	<i>Potentilla basaltica</i> (Soldier Meadow Cinquefoil)	G1	C	CA:S1.3, NV:S1
	<i>Potentilla newberryi</i> (Newberry Cinquefoil)	G3G4		CA:S2.3?, NV:SNR, OR:SNR, WA:SH
	<i>Sisyrinchium funereum</i> (Funeral Mountain Blue-eye-grass)	G2G3		CA:S2.3, NV:S1
<i>Thelypodium brachycarpum</i> (Short-podded Thelypodium)	G3		CA:S3.2, OR:S2	
Inter-Mountain Basins Greasewood Flat (Partial)				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	<i>Leymus cinereus</i> - <i>Distichlis spicata</i> Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	<i>Leymus cinereus</i> Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	<i>Salicornia rubra</i> Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	<i>Sarcobatus vermiculatus</i> / <i>Leymus cinereus</i> Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
Plant	<i>Phacelia parishii</i> (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
	<i>Puccinellia simplex</i> (Little Alkali-grass)	G3G4		CA:SNR, UT:S1
Inter-Mountain Basins Playa (Partial)				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	<i>Leymus cinereus</i> - <i>Distichlis spicata</i> Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Leymus cinereus Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	Leymus triticoides - Poa secunda Herbaceous Vegetation	G2		CA, NV?, OR:S2
	Pluchea sericea Seasonally Flooded Shrubland [Placeholder]	G3?		CA:S3, UT
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
<i>Plant</i>	Atriplex spinifera (Mojave Saltbush)	G3?		CA:SNR
	Gratiola heterosepala (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	Phacelia inundata (Playa Phacelia)	G2		CA:S2.3, NV:S2?, OR:S1
	Phacelia parishii (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
	Sidalcea covillei (Owens Valley Checker-mallow)	G2		CA:S2.1
	Sisyrinchium funereum (Funeral Mountain Blue-eye-grass)	G2G3		CA:S2.3, NV:S1
<b>Mediterranean California Alkali Marsh (Partial)</b>				CA, MXBC
<i>Animal</i>	Sorex ornatus relictus (Buena Vista Lake Shrew)	G5T1	LE	CA:S1
<i>Plant</i>	Frankenia salina (Alkali Heath)	G3G4		CA:SNR
	Myosurus sessilis (Sessile Mousetail)	G2		CA:SNR, OR:S1
<b>Mediterranean California Coastal Interdunal Wetland (Partial)</b>				CA, OR
<i>Animal</i>	Branchinecta longiantenna (Longhorn Fairy Shrimp)	G1	LE	CA:S1
	Branchinecta lynchi (Vernal Pool Fairy Shrimp)	G3	LT	CA:S2S3, OR:S2S3
	Cyzicus californicus (California Clam Shrimp)	G2G3		CA:SNR
<i>Plant</i>	Astragalus pycnostachyus (Marsh Milk-vetch)	G2	PS	CA:SNR
	Astragalus pycnostachyus var. lanosissimus (Ventura Marsh Milkvetch)	G2T1	LE	CA:S1.1
	Cirsium loncholepis (La Graciosa Thistle)	G2	LE	CA:S2.2
<b>Modoc Basalt Flow Vernal Pool (Strict)</b>				CA, OR, WA
<i>Plant</i>	Downingia bicornuta (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	Gratiola heterosepala (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	Pogogyne floribunda (Profuse-flowered Pogogyne)	G3		CA:S3.2, ID:S1, OR:S1
<b>North American Warm Desert Playa (Partial)</b>				AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX
<i>Plant</i>	Atriplex spinifera (Mojave Saltbush)	G3?		CA:SNR
	Goodmania luteola (golden goodmania)	G2G3		CA:S3.2, NV:S1
	Ivesia kingii (King's Ivesia)	G3	PS	CA:SNR, NV:S3, UT:S1
	Nitrophila mohavensis (Amargosa Niterwort)	G1	LE	CA:S1.1, NV:S1
	Phacelia parishii (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
	Puccinellia simplex (Little Alkali-grass)	G3G4		CA:SNR, UT:S1
<b>North Pacific Hardpan Vernal Pool (Strict)</b>				BC, CA, OR, WA
<i>Plant</i>	Blennosperma bakeri (Baker's Blennosperma)	G1	LE	CA:S1.2
	Castilleja campestris ssp. succulenta (Fleshy Owl's-clover)	G4?T2	LT	CA:S2.2
	Chamaesyce hooveri (Hoover's Broomspurge)	G2	LT	CA:S2.1
	Eryngium spinosepalum (Spiny Sepaled Coyote-thistle)	G2		CA:S2.2
	Juncus kelloggii (Kellogg's Rush)	G3?		CA:SNR, NV:SNR, WA:S1
	Mimulus angustatus (Narrow-leaf Pansy Monkey-flower)	G3G4		CA:SNR
	Navarretia myersii (Pincushion Navarretia)	G1		CA:SNR
	Navarretia prostrata (Prostrate Navarretia)	G2?		CA:S2.1?
	Neostapfia colusana (Colusa Grass)	G3	LT	CA:S3.1
	Orcuttia inaequalis (San Joaquin Valley Orcutt Grass)	G2	LT	CA:S2.1
	Orcuttia pilosa (Hairy Orcutt Grass)	G2	LE	CA:S2.1
	Orcuttia tenuis (Slender Orcutt Grass)	G3	LT	CA:S3.1
	Plagiobothrys humistratus (Dwarf Popcorn-flower)	G2?		CA:SNR
	Plagiobothrys strictus (Calistoga Allocarya)	G1	LE	CA:S1.1
	Plagiobothrys trachycarpus (Rough-fruit Popcorn-flower)	G3G4		CA:SNR
	Poa napensis (Napa Blue Grass)	G1	LE	CA:S1.1
	Trichostema rubisepalum (Hernandez Bluecurls)	G3		CA:S3.3

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	<i>Trifolium jokerstii</i> (Butte County Golden Clover)	G1		CA:S1.2
<b>Northern California Claypan Vernal Pool (Strict)</b>				CA, OR
<i>Animal</i>	<i>Branchinecta conservatio</i> (Conservancy Fairy Shrimp)	G1	LE	CA:S1
	<i>Branchinecta longiantenna</i> (Longhorn Fairy Shrimp)	G1	LE	CA:S1
	<i>Branchinecta lynchi</i> (Vernal Pool Fairy Shrimp)	G3	LT	CA:S2S3, OR:S2S3
	<i>Branchinecta mesovallensis</i> (Midvalley Fairy Shrimp)	G2		CA:S2
	<i>Cyzicus californicus</i> (California Clam Shrimp)	G2G3		CA:SNR
	<i>Cyzicus elongatus</i> (Elongate Clam Shrimp)	G2G3Q		CA:SNR
	<i>Elaphrus viridis</i> (Delta Green Ground Beetle)	G1	LT	CA:S1
	<i>Linderiella occidentalis</i> (California Fairy Shrimp)	G3G4		CA:S2S3
<i>Plant</i>	<i>Agrostis hendersonii</i> (Henderson's Bentgrass)	G1Q		CA:S1.1, OR:SH
	<i>Boisduvalia cleistogama</i> (Cleistogamous Spike-primrose)	G3G4		CA:SNR
	<i>Callitriche longipedunculata</i> (Long-stock Water-starwort)	G2G3		CA:SNR
	<i>Downingia bella</i> (Hoover's Downingia)	G2G3		CA:SNR
	<i>Downingia cuspidata</i> (Cuspidate Downingia)	G3?		CA:SNR
	<i>Downingia ornatissima</i> (Sollano Downingia)	G2G3		CA:SNR
	<i>Downingia pulchella</i> (Flat-face Downingia)	G3?		CA:SNR
	<i>Downingia pusilla</i> (Dwarf Downingia)	G3		CA:S3.1
	<i>Gratiola heterosepala</i> (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	<i>Hesperevax caulescens</i> (Involucrate Evax)	G3		CA:S3.2
	<i>Hordeum intercedens</i>	G3G4		CA:S3S4
	<i>Isoetes orcuttii</i> (Orcutt's Quillwort)	G2?		CA:SNR
	<i>Ivesia sericoleuca</i> (Plumas Ivesia)	G2		CA:S2.2
	<i>Juncus kelloggii</i> (Kellogg's Rush)	G3?		CA:SNR, NV:SNR, WA:S1
	<i>Juncus leiospermus</i> (Red Bluff Rush)	G2		CA:S2.2
	<i>Lasthenia burkei</i> (Burke's Goldfields)	G1	LE	CA:S1.1
	<i>Lasthenia chrysantha</i>	G3?		CA:SNR
	<i>Lasthenia conjugens</i> (Contra Costa Goldfields)	G1	LE	CA:S1.1
	<i>Lasthenia ferrisiae</i> (Ferris' Goldfields)	G3		CA:S3.2
	<i>Legenere limosa</i> (Legenere)	G2		CA:S2.2
	<i>Limnanthes bakeri</i> (Baker's Meadowfoam)	G1		CA:S1.1
	<i>Limnanthes vinculans</i> (Sebastopol Meadowfoam)	G2	LE	CA:S2.1
	<i>Myosurus sessilis</i> (Sessile Mousetail)	G2		CA:SNR, OR:S1
	<i>Navarretia eriocephala</i> (Hoary Navarretia)	G3		CA:S3.3
	<i>Navarretia heterandra</i> (Tehama Navarretia)	G3		CA:S3.3, OR:S1
	<i>Navarretia myersii</i> (Pincushion Navarretia)	G1		CA:SNR
	<i>Orcuttia viscida</i> (Sacramento Orcutt Grass)	G1	LE	CA:S1.1
	<i>Tuctoria greenei</i> (Green's Awnless Orcutt-grass)	G2	LE	CA:S2.2
	<i>Tuctoria mucronata</i> (Mucronate Orcutt Grass)	G1	LE	CA:S1.1
	<b>Northern California Volcanic Vernal Pool (Strict)</b>			
<i>Plant</i>	<i>Downingia bicornuta</i> (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	<i>Eryngium castrense</i>	G1G2		CA:SNR
	<i>Eryngium constancei</i> (Loch Lomond Coyote-thistle)	G1	LE, PT	CA:S1.1
	<i>Eryngium mathiasiae</i> (Mathias' Coyote-thistle)	G3		CA:SNR
	<i>Eryngium pinnatisectum</i> (Tuolumne Coyote-thistle)	G3		CA:S3.2
	<i>Gratiola heterosepala</i> (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	<i>Limnanthes floccosa</i> ssp. <i>californica</i> (Shippee Meadowfoam)	G4T1	LE	CA:S1.1
	<i>Limnanthes striata</i> (Foot-hill Meadow-foam)	G3?		CA:SNR
	<i>Navarretia heterandra</i> (Tehama Navarretia)	G3		CA:S3.3, OR:S1
	<i>Navarretia leucocephala</i> ssp. <i>pauciflora</i> (Few-flowered Navarretia)	G4T1	LE	CA:S1.1
	<i>Navarretia leucocephala</i> ssp. <i>plieantha</i> (Many-flowered Navarretia)	G4T1	LE	CA:S1.2



Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Paronychia ahartii (Ahart's Paronychia)	G2		CA:S2.1
	Sedella leiocarpa (Lake County Stonecrop)	G1	LE	CA:S1.1
<b>Sonoran Fan Palm Oasis (Partial)</b>				AZ, CA, MXBC, MXSO, NV
Assoc.	Washingtonia filifera Woodland	G3?		AZ, CA:S3
Animal	Batrachoseps major aridus (Desert Slender Salamander)	G4T1	LE	CA:S1
<b>South Coastal California Vernal Pool (Strict)</b>				CA, MXBC
Animal	Branchinecta longiantenna (Longhorn Fairy Shrimp)	G1	LE	CA:S1
	Branchinecta lynchi (Vernal Pool Fairy Shrimp)	G3	LT	CA:S2S3, OR:S2S3
	Branchinecta sandiegonensis (San Diego Fairy Shrimp)	G1	LE	CA:S1
	Cyzicus californicus (California Clam Shrimp)	G2G3		CA:SNR
	Linderiella occidentalis (California Fairy Shrimp)	G3G4		CA:S2S3
	Linderiella santarosae (Santa Rosa Plateau Fairy Shrimp)	G1G2		CA:S1S2
	Streptocephalus woottoni (Riverside Fairy Shrimp)	G2	LE	CA:S1
Plant	Atriplex parishii (Parish's Saltbush)	G1G2		CA:S1.1
	Brodiaea filifolia (Thread-leaved Brodiaea)	G2	LT	CA:S2.1
	Brodiaea orcuttii (Orcutt's Brodiaea)	G3		CA:S3.1
	Eryngium aristulatum var. parishii (San Diego Button Celery)	G5T2	LE	CA:S2.1
	Eryngium pendletonensis	G1		CA:S1.1
	Isoetes orcuttii (Orcutt's Quillwort)	G2?		CA:SNR
	Juncus luciensis	G3?		CA:SNR
	Juncus triformis (Yosemite Dwarf Rush)	G2G3		CA:SNR
	Muilla clevelandii (San Diego Goldenstar)	G2		CA:S2.2
	Navarretia fossalis (Spreading Navarretia)	G2	LT	CA:S2.1
	Orcuttia californica (California Orcutt Grass)	G2	LE	CA:S2.1
	Pogogyne abramsii (San Diego Mesa Mint)	G2	LE	CA:S2.1
	Pogogyne nudiuscula (Otay Mesa mint)	G1	LE	CA:S1.1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3		BC:S2, CA:S1?, ID:S2, MT:S2, OR:S3, WA:S2S3, WY?
	Lemna spp. Permanently Flooded Herbaceous Vegetation	G3?		CA:S3, CO
	Schoenoplectus americanus Western Herbaceous Vegetation	G3Q		CA:S3, ID:S3, OR:S2S3, WA:S1?
Plant	Howellia aquatilis (Water Howellia)	G3	LT	CA:S1.2, ID:S1, MT:S2, OR:S1, WA:S2S3

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Colorado

Colorado Plateau Hanging Garden (Strict)				AZ, CO, NV?, UT
Assoc.	Aquilegia micrantha - Mimulus eastwoodiae Herbaceous Vegetation	G2G3		CO:S2S3, UT
Plant	Mimulus eastwoodiae (Eastwood Monkeyflower)	G3		AZ:SNR, CO:S1, NV:SNR, UT:S3, NN:S3S4
	Platanthera zothecina (Alcove Bog-orchid)	G2		UT:S2, CO:S1, AZ:S2, NN:S2
Inter-Mountain Basins Greasewood Flat (Partial)				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Puccinellia nuttalliana Herbaceous Vegetation	G3?		CO:S1?, MT, NV?, SK?, UT?
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Sarcobatus vermiculatus / Juncus balticus Sparse Vegetation	G3?		CO:S3?
	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
Inter-Mountain Basins Interdunal Swale Wetland (Partial)				AZ?, CO, ID, NV, UT, WY?
Assoc.	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
Inter-Mountain Basins Playa (Partial)				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
Western Great Plains Closed Depression Wetland (Strict)				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Eleocharis spp. Herbaceous Vegetation	G1		CO, MT?, SD, WY:S1
Plant	Ambrosia linearis (Linear-leaf Bursage)	G3		CO:S3
Western Great Plains Saline Depression Wetland (Partial)				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Puccinellia nuttalliana Herbaceous Vegetation	G3?		CO:S1?, MT, NV?, SK?, UT?
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Lemna spp. Permanently Flooded Herbaceous Vegetation	G3?		CA:S3, CO

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Connecticut

Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
	Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3		CT, NH, NJ:S1, NY, RI
Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
North-Central Appalachian Seepage Fen (Partial)				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?		CT, MA, NJ:S2S3, NY, OH, PA
	Cornus racemosa / Carex (sterilis, aquatilis, lacustris) Shrub Herbaceous Vegetation	G2G3		CT, MA, NY, VT
	Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2		CT, MA, NH, NY, VT
North-Central Interior and Appalachian Acid Peatland (Partial)				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
North-Central Interior Wet Flatwoods (Partial)				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3		CT, MA, ME, NH, ON, VT
	Rhexia virginica - Crotalaria sagittalis Herbaceous Vegetation	G2		CT, MA, NY, RI
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
Animal	Eulimnadia agassizii (Agassiz Clam Shrimp)	G1G2		CT:SH, MA:S1
Plant	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Delaware

Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest (Partial)				DE, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3		DE, MD, NC, NJ:S1?, VA
Animal	Hydrochus spangleri (Seth Forest Water Scavenger Beetle)	G1		DE:SNR, MD:S1
Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
Assoc.	Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2		DE, MA, NH:S1, NJ:S1S2, NY, RI
Atlantic Coastal Plain Northern Pondshore (Partial)				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Cephalanthus occidentalis / Polygonum hydropiperoides - Panicum verrucosum Shrubland	G3?		DE, MA?, MD, RI?, VA
	Cladium mariscoides - Coelorachis rugosa Herbaceous Vegetation	G1		DE, NJ:S1
	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Panicum hirstii (Hirsts' Panic Grass)	G1	C	DE:S1.1, NC:S1, GA:SH, NJ:S1
	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Orontium aquaticum - Schoenoplectus subterminalis - Eriocaulon aquaticum Herbaceous Vegetation	G1		DE, VA:S1
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Vaccinium formosum - Vaccinium fuscum / Sphagnum cuspidatum Shrubland	G3?		DE, MD, NC, SC, VA?

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Florida

Atlantic Coastal Plain Southern Depression Pondshore (Partial)				FL, GA, NC, SC, VA
Assoc.	Carex striata var. striata - Xyris fimbriata - Lachnanthes caroliniana Herbaceous Vegetation	G2G3		FL, GA?, SC
	Cyrilla racemiflora - Lyonia lucida Shrubland	G3?		AL, FL, GA, LA?, MS, NC, SC
	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Nymphaea odorata - Nuphar lutea ssp. advena - (Nymphoides aquatica, Xyris smalliana) Herbaceous Vegetation	G3?		FL?, GA?, NC, SC
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3		AL?, FL?, GA, NC, SC
	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC
	Rhynchospora (careyana, inundata) Seasonally Flooded Herbaceous Vegetation	G3?		FL, GA, NC, SC?
	Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC
	Sphagnum cuspidatum Nonvascular Vegetation	G2?		FL, GA, NC, SC
	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
	Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT
Notophthalmus perstriatus (Striped Newt)		G2G3		FL:S2S3, GA:S2
Rana capito (Carolina Gopher Frog)		G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Amaranthus floridanus (Florida Amaranth)	G3		FL:S3
	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Linum westii (West's Flax)	G2		FL:S2, GA:SH, MS:SNR
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	Lythrum flagellare (Lowland Loosestrife)	G2		FL:S2
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Rhynchospora pleiantha (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR
<b>Central Florida Herbaceous Pondshore (Partial)</b>				FL
Assoc.	Amphicarpum muehlenbergianum - (Panicum hemitomom) Herbaceous Vegetation	G2G3		FL
	Andropogon (capillipes, glaucopsis) - Rhynchospora fascicularis var. fascicularis - Rhexia mariana Herbaceous Vegetation	G2?		FL
	Hypericum brachyphyllum Dwarf-shrubland	G3?		FL, GA?
	Panicum hemitomom - Pluchea (camphorata, rosea) - Ludwigia spp. Herbaceous Vegetation	G3		AL, FL, GA, LA?, MS
	Panicum hemitomom - Pontederia cordata Herbaceous Vegetation	G3G4		FL
	Rhynchospora (careyana, inundata) Seasonally Flooded Herbaceous Vegetation	G3?		FL, GA, NC, SC?
	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
Animal	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Amaranthus floridanus (Florida Amaranth)	G3		FL:S3
	Campanula robinsiae (Robins' Bellflower)	G1	LE	FL:S1
	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coelorachis tuberculosa (Florida Jointgrass)	G3		AL:S1, FL:S3
	Cucurbita okeechobeensis (Okeechobee Gourd)	G1	LE	FL:S1
	Echinochloa paludigena (Florida Cockspur)	G3Q		FL:S3
	Hypericum edisonianum (Edison's Ascyrum)	G2		FL:S2
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lythrum flagellare (Lowland Loosestrife)	G2		FL:S2
	Najas filifolia (Narrowleaf Naiad)	G1		FL:S1, GA:S1
	Rhynchospora fernaldii (Fernald's Beakrush)	G3G4		AL:S1?, FL:SNR, GA:SNR, MS:S1
<b>East Gulf Coastal Plain Dune and Coastal Grassland (Partial)</b>				AL, FL, MS
Assoc.	Fuirena scirpoidea - Panicum tenerum - Dichantherium wrightianum - Andropogon capillipes Herbaceous Vegetation	G2?		AL, FL?, MS:S2
Plant	Rhexia salicifolia (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2
<b>East Gulf Coastal Plain Sandhill Lakeshore Depression (Partial)</b>				AL, FL
Assoc.	Hypericum lissophloeus Shrubland	G1		FL
Plant	Hypericum lissophloeus (Smooth-barked St. John's-wort)	G2		FL:S2
	Rhexia salicifolia (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2
	Xyris isoetifolia (Quillwort Yellow-eyed Grass)	G1		AL:SH, FL:S1
<b>East Gulf Coastal Plain Southern Depression Pondshore (Partial)</b>				AL, FL, GA, LA?, MS
Assoc.	Crataegus rufula Forest	G2G3		AL, FL, GA
	Dichantherium wrightianum - Dichantherium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?		AL, FL, GA, LA?, MS?, NC, SC
	Fuirena scirpoidea - Rhynchospora tracyi Herbaceous Vegetation	G3G4		AL, FL, GA?
	Hypericum chapmanii - Ilex myrtifolia - (Nyssa ursina) Shrubland	G1		FL
	Hypericum fasciculatum / Rhynchospora (chapmanii, harperi) Shrubland	G2G3		AL, FL, GA, SC
	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC

Isolated Wetland Ecological System (Isolation Type)				System distribution	
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	Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC	
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS	
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1	
	Notophthalmus perstriatus (Striped Newt)	G2G3		FL:S2S3, GA:S2	
	Procambarus eonfiniae (Panama City Crayfish)	G1		FL:S1	
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR	
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR	
	Coelorachis tuberculosa (Florida Jointgrass)	G3		AL:S1, FL:S3	
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2	
	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR	
	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2	
	Hypericum chapmanii (Chapman's St. John's-wort)	G3		FL:S3	
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1	
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR	
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR	
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1	
	Najas filifolia (Narrowleaf Naiad)	G1		FL:S1, GA:S1	
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR	
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH	
	Rhexia salicifolia (Panhandle Meadowbeauty)	G2		AL:S1, FL:S2	
	Rhynchospora fernaldii (Fernald's Beakrush)	G3G4		AL:S1?, FL:SNR, GA:SNR, MS:S1	
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR	
	Rhynchospora pleiantha (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR	
	Xyris longisepala (Kral's Yellow-eyed-grass)	G2		AL:S1, FL:S2	
	<b>Floridian Highlands Freshwater Marsh (Partial)</b>				FL
	Assoc.	Cephalanthus occidentalis / Limnobium spongia - Salvinia minima Shrubland	G3?		FL
Nelumbo lutea - Pontederia cordata - Schoenoplectus tabernaemontani Herbaceous Vegetation		G2G3		FL	
Osmunda regalis var. spectabilis - Peltandra virginica - Sagittaria lancifolia Herbaceous Vegetation		G2?		FL	
Panicum hemitomon - Pontederia cordata Herbaceous Vegetation		G3G4		FL	
Salix caroliniana / Decodon verticillatus / Typha latifolia Forest		G2G3		FL	
Typha latifolia - Pontederia cordata Herbaceous Vegetation		G3?		FL	
<b>South Florida Cypress Dome (Partial)</b>				FL	
Assoc.	Taxodium ascendens / Annona glabra / Bacopa caroliniana Forest	G2?		FL	
	Taxodium ascendens / Chrysobalanus icaco - Ficus aurea - Persea palustris Forest	G2?		FL	
Plant	Aeschynomene pratensis (Meadow Joint-vetch)	G1		FL:S1	
	Lythrum flagellare (Lowland Loosestrife)	G2		FL:S2	
	Polyradicion lindenii (Ghost Orchid)	G2G4		FL:S2	



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<b>South Florida Depression Pondshore (Partial)</b>				FL
Assoc.	Eleocharis interstincta - Pontederia cordata - Crinum americanum Herbaceous Vegetation	G2G3		FL
	Panicum hemitomon Tropical Herbaceous Vegetation	G3?		FL
	Typha domingensis - Pontederia cordata Herbaceous Vegetation	G3?		FL
	Zizaniopsis miliacea Subtropical Herbaceous Vegetation	G2G4Q		FL
Plant	Echinochloa paludigena (Florida Cockspur)	G3Q		FL:S3
	Selaginella eatonii (Eaton Spike-moss)	G2G3		FL:S2
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	(Stillingia aquatica) / Panicum tenerum - Dichantherium erectifolium Herbaceous Vegetation	G2?		AL, FL?
	Cladium mariscus ssp. jamaicense - Woodwardia virginica Herbaceous Vegetation	G2?		AL, FL, GA
	Eleocharis elongata - Panicum tenerum - Nymphaea odorata Herbaceous Vegetation	G2?		AL, FL?
	Fimbristylis castanea - Paspalum distichum Herbaceous Vegetation	G3		FL
	Hypericum reductum - Licania michauxii / Andropogon capillipes - Polygonella gracilis - Xyris caroliniana Dwarf-shrubland	G2		AL, FL
	Panicum hemitomon - (Cladium mariscus ssp. jamaicense, Muhlenbergia filipes) Herbaceous Vegetation	G2G3		FL
	Paspalum vaginatum Herbaceous Vegetation	G3G4		FL, TX
	Spartina bakeri - Muhlenbergia filipes - Andropogon glomeratus - Rhynchospora colorata Herbaceous Vegetation	G3?		FL, GA?
	Typha domingensis - Setaria magna Herbaceous Vegetation	G2G3		FL, GA, NC, SC
Plant	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	Lachnocaulon engleri (Engler's Bogbutton)	G3		AL:S1?, FL:S3
	Ludwigia lanceolata (Lance-leaf Seedbox)	G3		FL:SNR, GA:SNR, NC:S1, SC:SNR
<b>Southern Coastal Plain Nonriverine Basin Swamp (Partial)</b>				AL, FL, GA, LA?, MS, SC
Assoc.	Nyssa biflora / Ilex myrtifolia / Carex glaucescens - Eriocaulon compressum Forest	G2G3		AL, FL, GA?
	Pinus serotina - Pinus elliotii var. elliotii / Cliftonia monophylla - Cyrilla racemiflora Woodland	G3?Q		AL, FL, GA
	Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) Shrubland	G3		FL, GA, NC, SC, VA
Plant	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Hymenocallis henryae (Henry's Spider-lily)	G2		FL:S2
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
<b>Southern Coastal Plain Nonriverine Cypress Dome (Partial)</b>				AL, FL, GA, LA, MS
Assoc.	Hypericum chapmanii - Ilex myrtifolia - (Nyssa ursina) Shrubland	G1		FL
	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Ilex myrtifolia / Carex (striata, turgescens) Stringer Forest	G3?Q		AL, FL, GA, LA, MS, SC
	Taxodium ascendens / Ilex myrtifolia / Hypericum myrtifolium / Lobelia floridana - Polygala cymosa Woodland	G3		AL:S1, FL, GA, MS
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1

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	<i>Rana capito</i> (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
<i>Plant</i>	<i>Carex verrucosa</i> (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	<i>Coreopsis nudata</i> (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	<i>Croton elliotii</i> (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	<i>Fuirena longa</i> (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	<i>Litsea aestivalis</i> (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	<i>Pieris phillyreifolia</i> (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	<i>Polygonum hirsutum</i> (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	<i>Rhexia parviflora</i> (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	<i>Rhynchospora inundata</i> (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	<b>Southern Coastal Plain Sinkhole (Partial)</b>			
<i>Assoc.</i>	<i>Adiantum capillus-veneris</i> - <i>Thelypteris kunthii</i> / <i>Dumortiera hirsuta</i> Herbaceous Vegetation	G3?		AL, FL, GA
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
<i>Assoc.</i>	<i>Morella cerifera</i> / <i>Spartina patens</i> Shrubland	G3G4		FL, GA, NC, SC, VA?
<i>Plant</i>	<i>Hartwrightia floridana</i> (Hartwrightia)	G2		FL:S2, GA:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Georgia

Atlantic Coastal Plain Sandhill Seep (Partial)				GA, NC, SC
Assoc.	Arundinaria gigantea ssp. tecta Shrubland	G1		AL?, FL?, GA, MS?, NC, SC?, VA
	Ilex coriacea - Lyonia lucida - Smilax laurifolia Shrubland	G3G4		AL?, GA, LA, MS
	Pinus palustris - Pinus serotina / Ilex glabra - Lyonia lucida / Ctenium aromaticum Woodland	G3		AL, GA
Plant	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
	Hartwrightia floridana (Hartwrightia)	G2		FL:S2, GA:S1
Atlantic Coastal Plain Southern Depression Pondshore (Partial)				FL, GA, NC, SC, VA
Assoc.	Carex striata var. striata - Xyris fimbriata - Lachnanthes caroliniana Herbaceous Vegetation	G2G3		FL, GA?, SC
	Cyrilla racemiflora - Lyonia lucida Shrubland	G3?		AL, FL, GA, LA?, MS, NC, SC
	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Nymphaea odorata - Nuphar lutea ssp. advena - (Nymphoides aquatica, Xyris smalliana) Herbaceous Vegetation	G3?		FL?, GA?, NC, SC
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Nyssa ogeche / Ilex myrtifolia / Carex turgescens - Carex striata Forest	G2?		GA, SC
	Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3		AL?, FL?, GA, NC, SC
	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC
	Quercus phellos - Nyssa biflora / Panicum hemitomon - Carex spp. - Woodwardia virginica Forest [Provisional]	G2G3		GA?, NC?, SC
	Rhynchospora (careyana, inundata) Seasonally Flooded Herbaceous Vegetation	G3?		FL, GA, NC, SC?
	Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC
	Spartina bakeri - Woodwardia virginica - Saccharum giganteum Herbaceous Vegetation	G3?		GA?, SC
	Sphagnum cuspidatum Nonvascular Vegetation	G2?		FL, GA, NC, SC
	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Notophthalmus perstriatus (Striped Newt)	G2G3		FL:S2S3, GA:S2
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2

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	<i>Fimbristylis perpusilla</i> (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	<i>Hypericum adpressum</i> (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	<i>Lindera melissifolia</i> (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	<i>Linum westii</i> (West's Flax)	G2		FL:S2, GA:SH, MS:SNR
	<i>Litsea aestivalis</i> (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	<i>Lobelia boykinii</i> (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	<i>Ludwigia spathulata</i> (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	<i>Myriophyllum laxum</i> (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	<i>Oxypolis canbyi</i> (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	<i>Panicum hirstii</i> (Hirsts' Panic Grass)	G1	C	DE:S1.1, NC:S1, GA:SH, NJ:S1
	<i>Pieris phyllireifolia</i> (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	<i>Polygonum hirsutum</i> (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	<i>Rhexia aristosa</i> (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	<i>Rhynchospora inundata</i> (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	<i>Rhynchospora pleiantha</i> (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR
<b>Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)</b>				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	<i>Cephalanthus occidentalis</i> / <i>Hibiscus moscheutos</i> ssp. <i>moscheutos</i> Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	<i>Liquidambar styraciflua</i> - <i>Acer rubrum</i> / <i>Carex</i> spp. - <i>Sphagnum</i> spp. Forest	G2Q		AL, GA, NC, TN
	<i>Nyssa biflora</i> / <i>Cephalanthus occidentalis</i> - <i>Lyonia lucida</i> Sagpond Forest	G1G2		AL, GA, TN?
	<i>Quercus phellos</i> - <i>Liquidambar styraciflua</i> / <i>Chasmanthium laxum</i> Cumberland Plateau Forest	G3		AL, GA, KY, TN
	<i>Scirpus cyperinus</i> - <i>Dulichium arundinaceum</i> / <i>Sphagnum</i> spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
Plant	<i>Carex decomposita</i> (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	<i>Fimbristylis perpusilla</i> (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	<i>Muhlenbergia torreyana</i> (Torrey's Dropseed)	G3		GA:SH, MD:S1, NC:S1, NJ:S3, TN:S1, TV:SNR
	<i>Schoenoplectus hallii</i> (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>East Gulf Coastal Plain Northern Depression Pondshore (Partial)</b>				AL, GA, MS
Assoc.	<i>Cephalanthus occidentalis</i> / <i>Hibiscus moscheutos</i> ssp. <i>moscheutos</i> Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	<i>Dichantherium wrightianum</i> - <i>Dichantherium erectifolium</i> Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) Herbaceous Vegetation	G2G3		AL, GA?, TN
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Panicum hemitomom - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3		AL?, FL?, GA, NC, SC
	Panicum hemitomom - Pluchea (camphorata, rosea) - Ludwigia spp. Herbaceous Vegetation	G3		AL, FL, GA, LA?, MS
	Saccharum spp. - Panicum verrucosum - (Rhexia spp., Sabatia spp.) Herbaceous Vegetation	G2G3		AL?, GA, MS?, SC?
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Notophthalmus perstriatus (Striped Newt)	G2G3		FL:S2S3, GA:S2
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Oxypolis canbyi (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>East Gulf Coastal Plain Southern Depression Pondshore (Partial)</b>				AL, FL, GA, LA?, MS
Assoc.	Crataegus rufula Forest	G2G3		AL, FL, GA
	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?		AL, FL, GA, LA?, MS?, NC, SC
	Fuirena scirpoidea - Rhynchospora tracyi Herbaceous Vegetation	G3G4		AL, FL, GA?

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Hypericum fasciculatum / Rhynchospora (chapmanii, harperi) Shrubland	G2G3		AL, FL, GA, SC
	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC
	Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Notophthalmus perstriatus (Striped Newt)	G2G3		FL:S2S3, GA:S2
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Najas filifolia (Narrowleaf Naiad)	G1		FL:S1, GA:S1
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	Rhynchospora fernaldii (Fernald's Beakrush)	G3G4		AL:S1?, FL:SNR, GA:SNR, MS:S1
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Rhynchospora pleiantha (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	Cladium mariscus ssp. jamaicense - Woodwardia virginica Herbaceous Vegetation	G2?		AL, FL, GA
	Spartina bakeri - Muhlenbergia filipes - Andropogon glomeratus - Rhynchospora colorata Herbaceous Vegetation	G3?		FL, GA?
	Typha domingensis - Setaria magna Herbaceous Vegetation	G2G3		FL, GA, NC, SC
Plant	Ludwigia lanceolata (Lance-leaf Seedbox)	G3		FL:SNR, GA:SNR, NC:S1, SC:SNR
<b>Southern Appalachian Seepage Wetland (Partial)</b>				AL?, GA, KY?, NC, SC, TN, VA, WV?
Assoc.	Alnus serrulata - Lindera benzoin / Scutellaria lateriflora - Thelypteris noveboracensis Shrubland	G2?		GA?, KY?, NC, SC?, TN?
	Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3		GA, NC, SC?, TN, VA
	Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum spp. Herbaceous Vegetation	G2G3		AL?, GA, NC, SC?, TN
	Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3		GA, NC, SC, TN, VA, WV?

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Plant	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
	Sarracenia oreophila (Green Pitcherplant)	G2	LE	AL:S2, GA:S1, NC:S1, TV:SNR
	Saxifraga caroliniana (Carolina Saxifrage)	G2		GA:SH, NC:S2, TN:S1S2, VA:S2?, WV:S1, TV:SNR, GS:PNR
	Xyris tennesseensis (Tennessee Yellow-eyed-grass)	G2	LE	AL:S1, GA:S1, TN:S1, TV:SNR
<b>Southern Coastal Plain Nonriverine Basin Swamp (Partial)</b>				AL, FL, GA, LA?, MS, SC
Assoc.	Nyssa biflora / Ilex myrtifolia / Carex glaucescens - Eriocaulon compressum Forest	G2G3		AL, FL, GA?
	Pinus serotina - Pinus elliotii var. elliotii / Cliftonia monophylla - Cyrilla racemiflora Woodland	G3?Q		AL, FL, GA
	Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) Shrubland	G3		FL, GA, NC, SC, VA
Plant	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
<b>Southern Coastal Plain Nonriverine Cypress Dome (Partial)</b>				AL, FL, GA, LA, MS
Assoc.	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Ilex myrtifolia / Carex (striata, turgescens) Stringer Forest	G3?Q		AL, FL, GA, LA, MS, SC
	Taxodium ascendens / Ilex myrtifolia / Hypericum myrtifolium / Lobelia floridana - Polygala cymosa Woodland	G3		AL:S1, FL, GA, MS
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhexia parviflora (Small-flowered Meadowbeauty)	G2		AL:S1, FL:S2, GA:SH
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
<b>Southern Coastal Plain Sinkhole (Partial)</b>				AL, FL, GA
Assoc.	Adiantum capillus-veneris - Thelypteris kunthii / Dumortiera hirsuta Herbaceous Vegetation	G3?		AL, FL, GA
<b>Southern Piedmont / Ridge and Valley Upland Depression Swamp (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q		AL, GA, NC, TN
	Quercus (pagoda, phellos, shumardii) - Celtis laevigata / Cornus foemina / Podophyllum peltatum - Hymenocallis occidentalis Flatwoods Forest	G2?		AL, GA

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Quercus phellos - Quercus (michauxii, shumardii) - Fraxinus americana / (Quercus oglethorpensis) / Zephyranthes atamasca Gabbro Upland Depression Forest	G2?		GA, SC
	Quercus phellos / Carex (albolutescens, intumescens, jorii) - Chasmanthium laxum / Sphagnum lescurii Forest	G2G3		AL, GA?, NC, SC, VA:S2?
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
<b>Southern Piedmont Granite Flatrock (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Amphianthus pusillus - Isoetes melanospora - Isoetes tegetiformans Herbaceous Vegetation	G1		AL, GA, SC
	Diamorpha smallii - Minuartia glabra - Minuartia uniflora - Cyperus granitophilus Herbaceous Vegetation	G3		AL, GA, NC, SC
Plant	Amphianthus pusillus (Little Amphianthus)	G2	LT	AL:S1, GA:S2, SC:S1
	Cyperus granitophilus (Granite-loving Flatsedge)	G3Q		AL:S2, GA:S3, NC:S1, SC:SNR, TN:S1, VA:S1, TV:SNR
	Isoetes melanospora (Black-spored Quillwort)	G1	LE	GA:S1, SC:S1
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
	Isoetes tegetiformans (Merlin's-grass)	G1	LE	GA:S1
	Rhynchospora saxicola (Stone Mountain Beakrush)	G3Q		AL:S1, GA:S3
	Sedum pusillum (Granite Rock Stonecrop)	G3		AL:SNR, GA:S3, NC:S1, SC:S2
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Morella cerifera / Spartina patens Shrubland	G3G4		FL, GA, NC, SC, VA?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1,



Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Hawaii

<b>Hawai'i 'Ihi'ihiluakea Vernal Pool (Partial)</b>	HI
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*no at-risk isolated wetland elements confirmed in this isolated wetland system in state*

<b>Hawai'i Montane Bog (Strict)</b>	HI
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Assoc.	Metrosideros polymorpha / Rhynchospora spp. / Dicranopteris linearis Mixed Lowland Bog Dwarf-shrubland	G1		HI:S1.1
	Metrosideros polymorpha Mixed Montane Bog Dwarf-shrubland	G2		HI:S2.2
Plant	Acaena exigua (Liliwai)	G1	LE	HI:S1
	Argyroxiphium caliginis (Eke Silversword)	G1		HI:S1.2
	Argyroxiphium grayanum (Greensword)	G1		HI:S1
	Astelia waialealae	G1	C	HI:SNR
	Calamagrostis expansa	G1	C	HI:S1
	Calamagrostis hillebrandii (Hillebrand's Small-reedgrass)	G1	C	HI:S1.1
	Carex montis-eeka (A Sedge)	G2		HI:S2
	Chamaesyce sparsiflora	G1		HI:S1.1
	Coprosma elliptica (Elliptic Coprosma)	G3		HI:SNR
	Dichanthelium cynodon (Dog-tooth Witchgrass)	G2G3		HI:S2S3
	Dichanthelium hillebrandianum (Hillebrand's Witchgrass)	G2G3		HI:S2S3
	Dichanthelium isachnoides	G2G3		HI:S2S3
	Dubautia paleata (Naenae Puakea)	G1G2		HI:S1S2
	Dubautia waialealae (Na`ena`e)	G1	C	HI:S1
	Geranium hanaense (Nohoanu)	G1	C	HI:S1
	Geranium humile (Hinahina)	G1	C	HI:S1.2
	Geranium kauaiense	G1	C	HI:S1.1
	Isoetes hawaiiensis	G1		HI:S1.2
	Keysseria erici	G1	C	HI:S1.2
	Labordia pumila	G1	C	HI:S1.2
	Lagenifera helenae	G1	C	HI:S1.1
	Lagenifera maviensis (Howaiaulu)	G2		HI:S2.2
	Lobelia gloria-montis (Hawaiian Lobelia)	G1G2		HI:S1S2
	Lobelia kauaensis	G2		HI:S2
	Lobelia villosa (Hairy Lobelia)	G1		HI:S1
	Lysimachia daphnoides (Pacific Loosestrife)	G1	C	HI:S1.2
	Melicope waialealae (Alaniawai)	G2		HI:S2
	Myrsine denticulata	G1G2		HI:S1S2
	Myrsine helleri	G1G2		HI:S1S2
	Myrsine vaccinioides	G1	C	HI:S1.2
	Panicum longivaginatatum (Long-Sheath Panic Grass)	G1		HI:S1
	Sanicula purpurea (Purple-flowered Sanicle)	G1	LE	HI:S1.2
	Selaginella deflexa (Deflexed Spike-moss)	G1G2		HI:S1S2
Viola kauaensis (Kauai Violet)	G2	PS	HI:S2	
Viola maviensis (Mann Violet)	G2?		HI:S2?	

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Idaho

<b>Boreal Depressional Bog (Partial)</b>				AK, BC, ID, MT, OR, WA
Assoc.	Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3		BC:S2, CA:S1?, ID:S2, MT:S2, OR:S3, WA:S2S3, WY?
<b>Inter-Mountain Basins Alkaline Closed Depression (Partial)</b>				CA, ID, NV, OR, UT, WA?
Plant	Astragalus diversifolius (Mesic Milkvetch)	G2		WY:SH, ID:S2, NV:S1, UT:S1
	Downingia bicornuta (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	Lepidium davisii (Davis' Peppergrass)	G3		ID:S3, NV:S1, OR:S1
	Pogogyne floribunda (Profuse-flowered Pogogyne)	G3		CA:S3.2, ID:S1, OR:S1
<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Leymus cinereus Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
<b>Inter-Mountain Basins Interdunal Swale Wetland (Partial)</b>				AZ?, CO, ID, NV, UT, WY?
Assoc.	Schoenoplectus americanus Western Herbaceous Vegetation	G3Q		CA:S3, ID:S3, OR:S2S3, WA:S1?
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
<b>Inter-Mountain Basins Playa (Partial)</b>				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Leymus cinereus Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
Plant	Lepidium davisii (Davis' Peppergrass)	G3		ID:S3, NV:S1, OR:S1
<b>Northern Rocky Mountain Wooded Vernal Pool (Strict)</b>				ID, MT
Plant	Howellia aquatilis (Water Howellia)	G3	LT	CA:S1.2, ID:S1, MT:S2, OR:S1, WA:S2S3
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Betula occidentalis - Dasiphora fruticosa ssp. floribunda Shrubland	G2Q		ID, MT?
	Camassia quamash Wet Prairie Herbaceous Vegetation	G3		ID, OR:S3, WA:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Illinois

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Schoenoplectus maritimus - Atriplex patula - Eleocharis parvula Herbaceous Vegetation	G1		IL:S1, MI:S1, NY:S1, ON?
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
	Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?		IL, IN, ON?, WI
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Great Lakes Dune and Swale (Partial)				IL, IN, MI, MN, OH, ON, PA, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
Great Lakes Wet-Mesic Lakeplain Prairie (Partial)				IL, IN, MI, OH, ON, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3		IL, IN, MI:S2, OH, ON
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
North-Central Interior and Appalachian Acid Peatland (Partial)				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Carex lasiocarpa - Carex oligosperma - (Lysimachia terrestris) / Sphagnum spp. / Spiraea tomentosa Herbaceous Vegetation	G3G4		IL:S2, MI, MN:S3, WI:S2
	Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4		IL:S2, IN, MI, OH, ON, WI:S3
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>North-Central Interior Freshwater Marsh (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
<b>North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)</b>				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
	Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3		IL:S1S2, IN, MI, OH, ON, WI
	Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4		IL, IN, MI, MN:S1, OH, ON:S1, WI:S3
Plant	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
Assoc.	Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3		AR, IL, IN, KY?, MO, TN?
	Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
	Quercus palustris - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3		IL:S2, IN:S2, MI, OH, ON
	Quercus palustris - Quercus bicolor - Nyssa sylvatica - Acer rubrum Sand Flatwoods Forest	G2?		IL:S1, IN:S1, MI, OH, ON
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
	Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?		IL, IN, ON?, WI
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Quercus phellos - (Quercus lyrata) / Carex spp. - Leersia spp. Forest	G3G4Q		AR, IL, KY, MO?, MS?, TN

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Indiana

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus Herbaceous Vegetation	G3G4		IN, KY?, MO:S4S5, TN?
	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum) Herbaceous Vegetation	G2G3		AL, IN, KY, TN
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Great Lakes Dune and Swale (Partial)				IL, IN, MI, MN, OH, ON, PA, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
Plant	Lycopodiella subappressa (Northern Appressed Clubmoss)	G2		IN:S1, MI:S2, OH:S1
Great Lakes Wet-Mesic Lakeplain Prairie (Partial)				IL, IN, MI, OH, ON, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3		IL, IN, MI:S2, OH, ON
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
North-Central Interior and Appalachian Acid Peatland (Partial)				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4		IL:S2, IN, MI, OH, ON, WI:S3
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
North-Central Interior Freshwater Marsh (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3		IL:S1S2, IN, MI, OH, ON, WI

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4		IL, IN, MI, MN:S1, OH, ON:S1, WI:S3
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON
Plant	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
Assoc.	Fagus grandifolia - Acer saccharum - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3		IN:S2, MI?, OH, ON?
	Fagus grandifolia - Quercus alba - (Quercus michauxii) - Acer rubrum Flatwoods Forest	G3		IN:S2, OH
	Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3		AR, IL, IN, KY?, MO, TN?
	Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
	Quercus palustris - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3		IL:S2, IN:S2, MI, OH, ON
	Quercus palustris - Quercus bicolor - Nyssa sylvatica - Acer rubrum Sand Flatwoods Forest	G2?		IL:S1, IN:S1, MI, OH, ON
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
	Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?		IL, IN, ON?, WI
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Rhynchospora capitellata - Rhexia virginica - Rhynchospora scirpoides - Schoenoplectus hallii Herbaceous Vegetation	G2?		IN, MI:S2, ON:S3, WI:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Iowa

Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
North-Central Interior Freshwater Marsh (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
North-Central Interior Wet Flatwoods (Partial)				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
Assoc.	Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
North-Central Interior Wet Meadow-Shrub Swamp (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Carex prairea - Schoenoplectus pungens - Rhynchospora capillacea Herbaceous Vegetation	G2		IA, MN, ND, SD
	Stuckenia pectinata - Ruppia maritima Herbaceous Vegetation	G2?		IA:SU, MT:S2, ND:S3, SD
	Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3		IA, KS:SU, MO:S2, NE:S3, SD



Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Kansas

Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Typha (angustifolia, domingensis, latifolia) - Schoenoplectus americanus Herbaceous Vegetation	G3G4		KS:SU, OK, TX?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Western Great Plains Closed Depression Wetland (Strict)				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Buchloe dactyloides - (Phyla cuneifolia, Oenothera canescens) Herbaceous Vegetation	G2G3		KS:SU, NE:S1, OK:S2, TX?
	Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4		KS:SU, NE:S1, OK?
	Spartina pectinata - Eleocharis spp. - Carex spp. Herbaceous Vegetation	G2G4		KS:SU, OK:S2
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
Western Great Plains Open Freshwater Depression Wetland (Partial)				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Calamagrostis canadensis - Juncus spp. - Carex spp. Sandhills Herbaceous Vegetation	G3G4		KS:SU, ND:SU, NE:S3, SD:SU, SK?
	Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4		KS:SU, NE:S1, OK?
	Spartina pectinata - Eleocharis spp. - Carex spp. Herbaceous Vegetation	G2G4		KS:SU, OK:S2
	Typha (angustifolia, domingensis, latifolia) - Schoenoplectus americanus Herbaceous Vegetation	G3G4		KS:SU, OK, TX?
	Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3		IA, KS:SU, MO:S2, NE:S3, SD
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Western Great Plains Saline Depression Wetland (Partial)				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Distichlis spicata - (Hordeum jubatum, Poa arida, Sporobolus airoides) Herbaceous Vegetation	G3		KS:S2, NE:S3, OK, TX
	Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation	G1G2		AR?, KS:SU, MO, NE:S1, TX?
	Schoenoplectus pungens - Suaeda calceoliformis Alkaline Herbaceous Vegetation	G3G4		KS, NE:S3
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Kentucky

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus Herbaceous Vegetation	G3G4		IN, KY?, MO:S4S5, TN?
	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Quercus bicolor - Fraxinus pennsylvanica / Carex spp. Forest	G1G2		KY
	Quercus lyrata - Quercus (palustris, phellos) - Liquidambar styraciflua - (Populus heterophylla) Forest	G2G3		KY, TN
	Quercus phellos - Liquidambar styraciflua / Chasmanthium laxum Cumberland Plateau Forest	G3		AL, GA, KY, TN
	Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum) Herbaceous Vegetation	G2G3		AL, IN, KY, TN
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
South-Central Interior / Upper Coastal Plain Wet Flatwoods (Partial)				IL?, IN?, KY, TN
Assoc.	Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3		AR, IL, IN, KY?, MO, TN?
	Quercus phellos - (Quercus lyrata) / Carex spp. - Leersia spp. Forest	G3G4Q		AR, IL, KY, MO?, MS?, TN
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
Plant	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Louisiana

East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods (Partial)				AL, FL?, GA?, LA, MS
Assoc.	(Quercus laurifolia) / Crataegus opaca - Crataegus viridis Forest	G1		AL?, LA, MS, TX
	Pinus glabra - Quercus laurifolia / Crataegus opaca / Sabal minor Forest	G1G2		LA
	Quercus michauxii - Quercus (nigra, pagoda) - Liquidambar styraciflua - Pinus taeda Forest	G2G3		LA
Southeastern Coastal Plain Interdunal Wetland (Partial)				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	Spartina patens - Fimbristylis (caroliniana, castanea) - (Panicum virgatum) Herbaceous Vegetation	G2G3		LA?, MXTM?, TX
	Typha domingensis Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation	G3?		AL, LA?, MS, TX
Southern Coastal Plain Nonriverine Cypress Dome (Partial)				AL, FL, GA, LA, MS
Assoc.	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Ilex myrtifolia / Carex (striata, turgescens) Stringer Forest	G3?Q		AL, FL, GA, LA, MS, SC
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
Texas-Louisiana Coastal Prairie (Partial)				LA, TX
Assoc.	Euthamia leptoccephala - Helianthus angustifolius - Boltonia asteroides - Spartina patens Herbaceous Vegetation	G1		LA, TX?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
Texas-Louisiana Coastal Prairie Pondshore (Partial)				LA, TX
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
West Gulf Coastal Plain Flatwoods Pond (Partial)				LA, TX
Assoc.	Aristida palustris - Panicum virgatum - Eriocaulon compressum - Eleocharis equisetoides Herbaceous Vegetation	G2G3		LA, TX
	Aristida palustris - Panicum virgatum - Eriocaulon decangulare var. decangulare - Rhynchospora elliottii Herbaceous Vegetation	G2G3		LA, TX
	Nymphoides aquatica - Nymphaea odorata - Gratiola brevifolia Herbaceous Vegetation	G3?		LA, TX
	Nyssa biflora - Crataegus opaca - (Fraxinus caroliniana) / Rhynchospora mixta Woodland	G2?		LA, TX?
	Nyssa biflora / Panicum hemitomom - Woodwardia virginica Woodland	G3?		LA?, TX
	Panicum hemitomom - Eriocaulon compressum - Rhynchospora corniculata Herbaceous Vegetation	G2		LA, TX

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
<b>West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods (Partial)</b>				AR, LA, OK?, TX
Assoc.	(Quercus laurifolia) / Crataegus opaca - Crataegus viridis Forest	G1		AL?, LA, MS, TX
	Fraxinus caroliniana Seasonally Flooded Forest	G2G3		LA, TX
	Nyssa biflora - Quercus laurifolia / Sphagnum spp. Depression Forest	G3?		AR?, LA, TX?
	Quercus laurifolia - Liquidambar styraciflua - Nyssa biflora - Acer rubrum / Sabal minor Forest	G3?		LA, TX
	Quercus laurifolia - Quercus phellos - Quercus nigra / Viburnum dentatum - (Sebastiania fruticosa) / Carex glaucescens Upper West Gulf Flatwoods Forest	G2G3		AR?, LA?, TX
	Quercus lyrata - Quercus phellos - Ulmus americana / Rhynchospora spp. Forest	G2G3		AR?, LA, TX?
	Quercus phellos - Quercus similis / Crataegus marshallii - Crataegus spatulata / Chasmanthium laxum Forest	G3?		AR?, LA, TX
	Quercus phellos / Chasmanthium laxum - Carex (flaccosperma, intumescens) - Hymenocallis liriosme Flatwoods Forest	G3G4		AR, LA, OK?, TX
	Quercus phellos / Chasmanthium laxum Forest	G3?		AR?, LA?, OK?, TX
	Taxodium distichum - Nyssa biflora - Magnolia virginiana - Acer rubrum Forest	G2?		LA, TX?
<b>West Gulf Coastal Plain Pine-Hardwood Flatwoods (Partial)</b>				AR, LA, OK?, TX
Assoc.	Quercus stellata - Pinus taeda Flatwoods Depression Forest	G2G3		AR?, LA?, TX
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Fraxinus pennsylvanica - Populus heterophylla - Ulmus americana - (Quercus texana) Forest	G2?		AR?, LA
	Ilex coriacea - Lyonia lucida - Smilax laurifolia Shrubland	G3G4		AL?, GA, LA, MS
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
Animal	Eulimnadia astraova (Star Cyst Clam Shrimp)	G1G3		LA:SNR
	Rana sevosia (Dusky Gopher Frog)	G1	LE	AL:SH, LA:SH, MS:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Maine

<b>Acadian Near-Boreal Spruce Flat (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Acadian-Appalachian Conifer Seepage Forest (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)</b>				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian Conifer Acid Swamp (Partial)</b>				MB, ME, MI, MN, NB, NH?, NS, NY, ON, PE?, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
<i>Plant</i>	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
<i>Plant</i>	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
<i>Assoc.</i>	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
<i>Plant</i>	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
<i>Assoc.</i>	Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3		CT, MA, ME, NH, ON, VT
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
<i>Plant</i>	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Maryland

Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?

Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest (Partial)				DE, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Liquidambar styraciflua - Populus heterophylla Forest	G1		MD?, NJ:S1
	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Liquidambar styraciflua - Acer rubrum - Nyssa biflora / Carex jorii Forest	G1G2		MD, VA
	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3		DE, MD, NC, NJ:S1?, VA
Animal	Hydrochus spangleri (Seth Forest Water Scavenger Beetle)	G1		DE:SNR, MD:S1
Plant	Juncus caesariensis (New Jersey Rush)	G2		MD:S1, NC:S1, NJ:S2, VA:S2

Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
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*no at-risk isolated wetland elements confirmed in this isolated wetland system in state*

Atlantic Coastal Plain Northern Pondshore (Partial)				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Cephalanthus occidentalis / Polygonum hydropiperoides - Panicum verrucosum Shrubland	G3?		DE, MA?, MD, RI?, VA
	Leersia hexandra - (Panicum verrucosum, Scleria reticularis) Herbaceous Vegetation [Provisional]	G2G3		MD:S1, NC
	Liquidambar styraciflua - Acer rubrum - Nyssa biflora / Carex jorii Forest	G1G2		MD, VA
	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
	Quercus phellos / Carex striata var. brevis Forest	G2?		MD?, VA:S2?
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
	Saccharum giganteum - (Dichanthelium spretum, Panicum verrucosum) Herbaceous Vegetation	G1G2		MD, VA?
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Oxypolis canbyi (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Platanus occidentalis - Fraxinus pennsylvanica - Ulmus americana / Cornus sericea Forest	G2G3		MD?, NJ:S1S2, PA?

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Muhlenbergia torreyana (Torrey's Dropseed)	G3		GA:SH, MD:S1, NC:S1, NJ:S3, TN:S1, TV:SNR
	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?

*no at-risk isolated wetland elements confirmed in this isolated wetland system in state*

At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Vaccinium formosum - Vaccinium fuscatum / Sphagnum cuspidatum Shrubland	G3?		DE, MD, NC, SC, VA?
	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
Plant	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1



Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Massachusetts

<b>Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)</b>				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
<b>Atlantic Coastal Plain Northern Bog (Partial)</b>				MA, NJ, NY
Assoc.	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
	Sphagnum cuspidatum Nonvascular Vegetation	G2?		FL, GA, NC, SC
Animal	Papaipema sulphurata (Decodon Stem Borer Moth)	G2		MA:S2
<b>Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)</b>				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
Assoc.	Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2		DE, MA, NH:S1, NJ:S1S2, NY, RI
<b>Atlantic Coastal Plain Northern Pondshore (Partial)</b>				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Cephalanthus occidentalis / Polygonum hydropiperoides - Panicum verrucosum Shrubland	G3?		DE, MA?, MD, RI?, VA
	Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3		CT, MA, ME, NH, ON, VT
	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
	Rhexia virginica - Crotalaria sagittalis Herbaceous Vegetation	G2		CT, MA, NY, RI
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
Animal	Eulimnadia agassizii (Agassiz Clam Shrimp)	G1G2		CT:SH, MA:S1
	Papaipema sulphurata (Decodon Stem Borer Moth)	G2		MA:S2
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Euthamia galetorum (Narrow-leaf Fragrant Golden-rod)	G3		MA:S1?
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Sabatia kennedyana (Plymouth Gentian)	G3		MA:S3, NC:S1, RI:S1, SC:S1
	Sagittaria teres (Slender Arrowhead)	G3		MA:S3, NH:S1, NJ:S1, NY:S1, RI:S1, SC:SNR
	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?		CT, MA, NJ:S2S3, NY, OH, PA
	Cornus racemosa / Carex (sterilis, aquatilis, lacustris) Shrub Herbaceous Vegetation	G2G3		CT, MA, NY, VT
	Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2		CT, MA, NH, NY, VT
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
Animal	Caenestheriella gynecia (Feminine Clam Shrimp)	G2G3		MA:SNR, OH:SNR, PA:SNR
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI

*no at-risk isolated wetland elements confirmed in this isolated wetland system in state*

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Michigan

<b>Atlantic Coastal Plain Northern Pondshore (Partial)</b>				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Rhynchospora capitellata - Rhexia virginica - Rhynchospora scirpoides - Schoenoplectus hallii Herbaceous Vegetation	G2?		IN, MI:S2, ON:S3, WI:S1
Plant	Lycopodiella margueritiae (Northern Prostrate Clubmoss)	G2		OH:S1, PA:SU, MI:S2, VA:S1, TV:SNR
	Lycopodiella subappressa (Northern Appressed Clubmoss)	G2		IN:S1, MI:S2, OH:S1
<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian Conifer Acid Swamp (Partial)</b>				MB, ME, MI, MN, NB, NH?, NS, NY, ON, PE?, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
	Lycopodiella margueritiae (Northern Prostrate Clubmoss)	G2		OH:S1, PA:SU, MI:S2, VA:S1, TV:SNR
	Lycopodiella subappressa (Northern Appressed Clubmoss)	G2		IN:S1, MI:S2, OH:S1
<b>Great Lakes Alvar (Partial)</b>				MI, NY, OH, ON, WI
Assoc.	Deschampsia caespitosa - (Sporobolus heterolepis, Schizachyrium scoparium) - Carex crawei - Packera paupercula Herbaceous Vegetation	G2		MI, NY, ON:S2
	Picea glauca - Thuja occidentalis - Juniperus communis / Iris lacustris - Carex eburnea Shrubland	G1G2		MI, ON:S1
Plant	Iris lacustris (Dwarf Lake Iris)	G3	LT	MI:S3, WI:S3
<b>Great Lakes Dune and Swale (Partial)</b>				IL, IN, MI, MN, OH, ON, PA, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
Plant	Iris lacustris (Dwarf Lake Iris)	G3	LT	MI:S3, WI:S3
	Lycopodiella margueritiae (Northern Prostrate Clubmoss)	G2		OH:S1, PA:SU, MI:S2, VA:S1, TV:SNR
	Lycopodiella subappressa (Northern Appressed Clubmoss)	G2		IN:S1, MI:S2, OH:S1
	Oligoneuron houghtonii (Houghton's Goldenrod)	G3	LT	MI:S3, NY:S1
<b>Great Lakes Wet-Mesic Lakeplain Prairie (Partial)</b>				IL, IN, MI, OH, ON, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3		IL, IN, MI:S2, OH, ON
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma - (Lysimachia terrestris) / Sphagnum spp. / Spiraea tomentosa Herbaceous Vegetation	G3G4		IL:S2, MI, MN:S3, WI:S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4		IL:S2, IN, MI, OH, ON, WI:S3
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>North-Central Interior Freshwater Marsh (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
<b>North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)</b>				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
	Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3		IL:S1S2, IN, MI, OH, ON, WI
	Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4		IL, IN, MI, MN:S1, OH, ON:S1, WI:S3
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON
Animal	Oecanthus laricis (Laricis Tree Cricket)	G1G2		MI:S1S2, OH:SNR
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
Assoc.	Fagus grandifolia - Acer saccharum - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3		IN:S2, MI?, OH, ON?
	Quercus palustris - Quercus bicolor - Acer rubrum Flatwoods Forest	G2G3		IL:S2, IN:S2, MI, OH, ON
	Quercus palustris - Quercus bicolor - Nyssa sylvatica - Acer rubrum Sand Flatwoods Forest	G2?		IL:S1, IN:S1, MI, OH, ON
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>Northern Great Lakes Interdunal Wetland (Partial)</b>				MI, MN, NY, ON, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
Plant	Oligoneuron houghtonii (Houghton's Goldenrod)	G3	LT	MI:S3, NY:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Schoenoplectus maritimus - Atriplex patula - Eleocharis parvula Herbaceous Vegetation	G1		IL:S1, MI:S1, NY:S1, ON?

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Minnesota

<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
Assoc.	Carex lasiocarpa - Rhynchospora alba - Scheuchzeria palustris Herbaceous Vegetation	G2?		MB:S2?, MN:S2, ON?
<b>Boreal-Laurentian Conifer Acid Swamp (Partial)</b>				MB, ME, MI, MN, NB, NH?, NS, NY, ON, PE?, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
<b>Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)</b>				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Great Lakes Dune and Swale (Partial)</b>				IL, IN, MI, MN, OH, ON, PA, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Great Plains Prairie Pothole (Partial)</b>				AB, IA?, MB, MN, ND, SD, SK
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma - (Lysimachia terrestris) / Sphagnum spp. / Spiraea tomentosa Herbaceous Vegetation	G3G4		IL:S2, MI, MN:S3, WI:S2
<b>North-Central Interior Freshwater Marsh (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
<b>North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)</b>				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
	Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4		IL, IN, MI, MN:S1, OH, ON:S1, WI:S3
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2
	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Northern Great Lakes Interdunal Wetland (Partial)</b>				MI, MN, NY, ON, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Carex prairea - Schoenoplectus pungens - Rhynchospora capillacea Herbaceous Vegetation	G2		IA, MN, ND, SD
	Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3		MB:S3, MN, MT, ND, SD:SU
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Mississippi

East Gulf Coastal Plain Dune and Coastal Grassland (Partial)				AL, FL, MS
Assoc.	Fuirena scirpoidea - Panicum tenerum - Dichanthelium wrightianum - Andropogon capillipes Herbaceous Vegetation	G2?		AL, FL?, MS:S2
East Gulf Coastal Plain Northern Depression Pondshore (Partial)				AL, GA, MS
Assoc.	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Panicum hemitomon - Pluchea (camphorata, rosea) - Ludwigia spp. Herbaceous Vegetation	G3		AL, FL, GA, LA?, MS
	Saccharum spp. - Panicum verrucosum - (Rhexia spp., Sabatia spp.) Herbaceous Vegetation	G2G3		AL?, GA, MS?, SC?
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
East Gulf Coastal Plain Southern Depression Pondshore (Partial)				AL, FL, GA, LA?, MS
Assoc.	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?		AL, FL, GA, LA?, MS?, NC, SC
	Taxodium distichum East Gulf Coastal Plain Pondshore Woodland	G3		AL, FL?, GA?, MS
Animal	Rana sevosia (Dusky Gopher Frog)	G1	LE	AL:SH, LA:SH, MS:S1
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhynchospora fernaldii (Fernald's Beakrush)	G3G4		AL:S1?, FL:SNR, GA:SNR, MS:S1
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
<b>East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods (Partial)</b>				AL, FL?, GA?, LA, MS
Assoc.	(Quercus laurifolia) / Crataegus opaca - Crataegus viridis Forest	G1		AL?, LA, MS, TX
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	Typha domingensis Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation	G3?		AL, LA?, MS, TX
Plant	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
<b>Southern Coastal Plain Nonriverine Basin Swamp (Partial)</b>				AL, FL, GA, LA?, MS, SC
Plant	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
<b>Southern Coastal Plain Nonriverine Cypress Dome (Partial)</b>				AL, FL, GA, LA, MS
Assoc.	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Ilex myrtifolia / Carex (striata, turgescens) Stringer Forest	G3?Q		AL, FL, GA, LA, MS, SC
	Taxodium ascendens / Ilex myrtifolia / Hypericum myrtifolium / Lobelia floridana - Polygala cymosa Woodland	G3		AL:S1, FL, GA, MS
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis nudata (Georgia Tickseed)	G3?		AL:S1, FL:SNR, GA:S3S4, LA:S2, MS:S1S2
	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Cyrilla racemiflora - Lyonia lucida Shrubland	G3?		AL, FL, GA, LA?, MS, NC, SC
	Ilex coriacea - Lyonia lucida - Smilax laurifolia Shrubland	G3G4		AL?, GA, LA, MS
Animal	Fallicambarus danielae (Speckled Burrowing Crayfish)	G2		AL:S1, MS:S2
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1
	Linum westii (West's Flax)	G2		FL:S2, GA:SH, MS:SNR



Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Missouri

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus Herbaceous Vegetation	G3G4		IN, KY?, MO:S4S5, TN?
	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Nyssa aquatica / Cephalanthus occidentalis Pond Forest	G1?		AR?, MO, TN
	Quercus lyrata Pond Forest	G1G3		AR, MO
	Quercus palustris - (Quercus bicolor) / Carex crinita / Sphagnum spp. Forest	G3?		AR, MO
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Helenium virginicum (Virginia Sneezeweed)	G2	LT	MO:S3, VA:S2
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
North-Central Interior Freshwater Marsh (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
North-Central Interior Wet Flatwoods (Partial)				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
Assoc.	Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3		AR, IL, IN, KY?, MO, TN?
	Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
North-Central Interior Wet Meadow-Shrub Swamp (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>Ozark-Ouachita Fen (Partial)</b>				AR, MO
Assoc.	(Carex interior, Carex lurida) - Carex leptalea - Parnassia grandifolia - Rhynchospora capillacea Herbaceous Vegetation	G2G3		AR, MO
	Carex interior - Carex lurida - Andropogon gerardii - Parnassia grandifolia Herbaceous Vegetation	G1G2		MO:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation	G1G2		AR?, KS:SU, MO, NE:S1, TX?
	Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3		IA, KS:SU, MO:S2, NE:S3, SD
Plant	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, MO:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Montana

<b>Boreal Depressional Bog (Partial)</b>				AK, BC, ID, MT, OR, WA
Assoc.	Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3		BC:S2, CA:S1?, ID:S2, MT:S2, OR:S3, WA:S2S3, WY?
<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Puccinellia nuttalliana Herbaceous Vegetation	G3?		CO:S1?, MT, NV?, SK?, UT?
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
<b>Northern Rocky Mountain Wooded Vernal Pool (Strict)</b>				ID, MT
Plant	Howellia aquatilis (Water Howellia)	G3	LT	CA:S1.2, ID:S1, MT:S2, OR:S1, WA:S2S3
<b>Western Great Plains Open Freshwater Depression Wetland (Partial)</b>				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Betula occidentalis - Dasiphora fruticosa ssp. floribunda Shrubland	G2Q		ID, MT?
	Panicum virgatum - (Pascopyrum smithii) Herbaceous Vegetation	G2Q		MT:S2, SD
	Potamogeton richardsonii - Myriophyllum spicatum Herbaceous Vegetation	G2Q		MT:S2
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. Herbaceous Vegetation	G3?		MT:S3, ND, SD
	Spartina pectinata - Schoenoplectus pungens Herbaceous Vegetation	G3?		MT:S3, WY:S2S3
	Stuckenia pectinata - Myriophyllum (sibiricum, spicatum) Herbaceous Vegetation	G3G4		AB, CA?, MT:S1, ND:SU, ON?, SD:SU, SK:SU
	Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4		MT:S1, ND:SU, SD:SU, SK:SU
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3		MB:S3, MN, MT, ND, SD:SU
	Puccinellia nuttalliana Herbaceous Vegetation	G3?		CO:S1?, MT, NV?, SK?, UT?
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
	Spartina pectinata - Schoenoplectus pungens Herbaceous Vegetation	G3?		MT:S3, WY:S2S3
	Stuckenia pectinata - Ruppia maritima Herbaceous Vegetation	G2?		IA:SU, MT:S2, ND:S3, SD
	Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4		MT:S1, ND:SU, SD:SU, SK:SU
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Carex aperta Herbaceous Vegetation	G1?		ID?, MT, OR:S1, WA

Isolated Wetland Ecological System (Isolation Type)				System distribution
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<b>Nebraska</b>				
<b>Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)</b>				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>Western Great Plains Closed Depression Wetland (Strict)</b>				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Buchloe dactyloides - (Phyla cuneifolia, Oenothera canescens) Herbaceous Vegetation	G2G3		KS:SU, NE:S1, OK:S2, TX?
	Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4		KS:SU, NE:S1, OK?
Animal	Branchinecta potassa (Potassium Loving Fairy Shrimp)	G3		NE:SNR
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Western Great Plains Open Freshwater Depression Wetland (Partial)</b>				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Calamagrostis canadensis - Juncus spp. - Carex spp. Sandhills Herbaceous Vegetation	G3G4		KS:SU, ND:SU, NE:S3, SD:SU, SK?
	Carex interior - Eleocharis elliptica - Thelypteris palustris Herbaceous Vegetation	G1G2		NE:S1S2, SD:S1
	Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4		KS:SU, NE:S1, OK?
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3		IA, KS:SU, MO:S2, NE:S3, SD
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Distichlis spicata - (Hordeum jubatum, Poa arida, Sporobolus airoides) Herbaceous Vegetation	G3		KS:S2, NE:S3, OK, TX
	Distichlis spicata - Hordeum jubatum - (Poa arida, Iva annua) Herbaceous Vegetation	G2G3		NE:S1
	Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation	G1G2		AR?, KS:SU, MO, NE:S1, TX?
	Schoenoplectus pungens - Suaeda calceoliformis Alkaline Herbaceous Vegetation	G3G4		KS, NE:S3

Isolated Wetland Ecological System (Isolation Type)				System distribution
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<i>Plant</i>	<i>Eleocharis wolfii</i> (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	<i>Schoenoplectus hallii</i> (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Nevada

<b>Columbia Plateau Vernal Pool (Strict)</b>				BC?, NV, OR, WA
Plant	<i>Ivesia ptyocharis</i> (Pine Nut Ivesia)	G2		NV:S2
	<i>Juncus uncialis</i> (Inch-high Rush)	G3G4		CA:SNR, NV:SNR, OR:SNR, WA:S2
	<i>Polyctenium williamsiae</i> (William's Comb-leaf)	G2Q		NV:SNR
<b>Inter-Mountain Basins Alkaline Closed Depression (Partial)</b>				CA, ID, NV, OR, UT, WA?
Assoc.	<i>Leymus triticoides</i> - <i>Poa secunda</i> Herbaceous Vegetation	G2		CA, NV?, OR:S2
Animal	<i>Pseudocopaedes eunus obscurus</i> (Carson Wandering Skipper)	G3G4T1	LE	CA:S1, NV:S1
Plant	<i>Astragalus diversifolius</i> (Mesic Milk-vetch)	G2		WY:SH, ID:S2, NV:S1, UT:S1
	<i>Astragalus lemmonii</i> (A Milk-vetch)	G3?		CA:S2.2, NV:S1, OR:SNR
	<i>Astragalus phoenix</i> (Ash Meadows Milk-vetch)	G2	LT	NV:S2
	<i>Astragalus pterocarpus</i> (Winged Milk-vetch)	G3		NV:S3
	<i>Calochortus striatus</i> (Alkali Mariposa Lily)	G2		CA:S2.2, NV:S1
	<i>Castilleja salsuginosa</i> (Monte Neva Paintbrush)	G1Q		NV:S1
	<i>Centaureum namophilum</i> (Spring-loving Centaury)	G2Q	LT	NV:S2
	<i>Cirsium mohavense</i> (Mohave Thistle)	G2G3		AZ:S1, CA:SNR, NV:SNR
	<i>Cordylanthus tecopensis</i> (Tecopa Bird's-beak)	G2		CA:S1.2, NV:S2
	<i>Downingia bicornuta</i> (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	<i>Eriogonum ampullaceum</i> (Mono Buckwheat)	G3		CA:SNR, NV:S1
	<i>Eriogonum argophyllum</i> (Ruby Valley Buckwheat)	G1		NV:S1
	<i>Goodmania luteola</i> (golden goodmania)	G2G3		CA:S3.2, NV:S1
	<i>Grindelia fraxinopratisensis</i> (Ash Meadows Gumplant)	G2	LT	CA:S1.2, NV:S2
	<i>Ivesia kingii</i> (King's Ivesia)	G3	PS	CA:SNR, NV:S3, UT:S1
	<i>Ivesia kingii</i> var. <i>eremica</i> (Ash Meadows Mousetails)	G3T1T2Q	LT	NV:S1S2
	<i>Juncus kelloggii</i> (Kellogg's Rush)	G3?		CA:SNR, NV:SNR, WA:S1
	<i>Juncus uncialis</i> (Inch-high Rush)	G3G4		CA:SNR, NV:SNR, OR:SNR, WA:S2
	<i>Lepidium davisii</i> (Davis' Peppergrass)	G3		ID:S3, NV:S1, OR:S1
	<i>Phacelia parishii</i> (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
	<i>Plagiobothrys salsus</i> (Desert Allocarya)	G2G3		CA:S1.2?, NV:S2S3, OR:S1
	<i>Potentilla basaltica</i> (Soldier Meadow Cinquefoil)	G1	C	CA:S1.3, NV:S1
	<i>Potentilla newberryi</i> (Newberry Cinquefoil)	G3G4		CA:S2.3?, NV:SNR, OR:SNR, WA:SH
	<i>Sisyrinchium funereum</i> (Funeral Mountain Blue-eye-grass)	G2G3		CA:S2.3, NV:S1
	<i>Spiranthes infernalis</i> (Ash Meadows Lady's Tresses)	G1		NV:S1
	<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>			
Assoc.	<i>Leymus cinereus</i> - <i>Distichlis spicata</i> Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	<i>Puccinellia nuttalliana</i> Herbaceous Vegetation	G3?		CO:S1?, MT, NV?, SK?, UT?
	<i>Salicornia rubra</i> Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	<i>Sarcobatus vermiculatus</i> / <i>Leymus cinereus</i> Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
Plant	<i>Astragalus pterocarpus</i> (Winged Milk-vetch)	G3		NV:S3
	<i>Atriplex bonnevillensis</i> (Bonneville Saltbush)	G2G3Q		NV:SNR, UT:S2
	<i>Phacelia parishii</i> (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
<b>Inter-Mountain Basins Interdunal Swale Wetland (Partial)</b>				AZ?, CO, ID, NV, UT, WY?
Assoc.	<i>Salicornia rubra</i> Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	<i>Schoenoplectus pungens</i> Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
<b>Inter-Mountain Basins Playa (Partial)</b>				CA, CO, ID, NM, NV, OR, UT, WA?, WY

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Leymus triticoides - Poa secunda Herbaceous Vegetation	G2		CA, NV?, OR:S2
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
Plant	Lepidium davisii (Davis' Peppergrass)	G3		ID:S3, NV:S1, OR:S1
	Phacelia inundata (Playa Phacelia)	G2		CA:S2.3, NV:S2?, OR:S1
	Phacelia parishii (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
	Sisyrinchium funereum (Funeral Mountain Blue-eye-grass)	G2G3		CA:S2.3, NV:S1
<b>North American Warm Desert Playa (Partial)</b>				AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX
Plant	Goodmania luteola (golden goodmania)	G2G3		CA:S3.2, NV:S1
	Ivesia kingii (King's Ivesia)	G3	PS	CA:SNR, NV:S3, UT:S1
	Nitrophila mohavensis (Amargosa Niterwort)	G1	LE	CA:S1.1, NV:S1
	Phacelia parishii (Parish's Phacelia)	G2G3		AZ:S1, CA:S1.1, NV:S2S3
<b>Sonoran Fan Palm Oasis (Partial)</b>				AZ, CA, MXBC, MXSO, NV
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Plant	Mimulus eastwoodiae (Eastwood Monkeyflower)	G3		AZ:SNR, CO:S1, NV:SNR, UT:S3

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## New Hampshire

<b>Acadian Near-Boreal Spruce Flat (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				

<b>Acadian-Appalachian Conifer Seepage Forest (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				

<b>Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)</b>				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
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Assoc.	Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2		DE, MA, NH:S1, NJ:S1S2, NY, RI
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<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				

<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
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Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
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<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
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Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
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<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
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Assoc.	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
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	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
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<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
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Assoc.	Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3		CT, NH, NJ:S1, NY, RI
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	Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2		CT, MA, NH, NY, VT
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	Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3		CT, MA, ME, NH, ON, VT
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	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
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	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
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Plant	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2
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	Sagittaria teres (Slender Arrowhead)	G3		MA:S3, NH:S1, NJ:S1, NY:S1, RI:S1, SC:SNR
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	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
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Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## New Jersey

<b>Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)</b>				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
	Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3		CT, NH, NJ:S1, NY, RI
<b>Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest (Partial)</b>				DE, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Liquidambar styraciflua - Populus heterophylla Forest	G1		MD?, NJ:S1
	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3		DE, MD, NC, NJ:S1?, VA
Plant	Juncus caesariensis (New Jersey Rush)	G2		MD:S1, NC:S1, NJ:S2, VA:S2
<b>Atlantic Coastal Plain Northern Bog (Partial)</b>				MA, NJ, NY
Assoc.	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
<b>Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)</b>				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
Assoc.	Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2		DE, MA, NH:S1, NJ:S1S2, NY, RI
<b>Atlantic Coastal Plain Northern Pondshore (Partial)</b>				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Cladium mariscoides - Coelorachis rugosa Herbaceous Vegetation	G1		DE, NJ:S1
	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Panicum hirtii (Hirsts' Panic Grass)	G1	C	DE:S1.1, NC:S1, GA:SH, NJ:S1
	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Sagittaria teres (Slender Arrowhead)	G3		MA:S3, NH:S1, NJ:S1, NY:S1, RI:S1, SC:SNR
<b>Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)</b>				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Dasiphora fruticosa ssp. floribunda / Rhynchospora capillacea - Scleria verticillata Shrub Herbaceous Vegetation	G1		NJ:S1, NY
	Platanus occidentalis - Fraxinus pennsylvanica - Ulmus americana / Cornus sericea Forest	G2G3		MD?, NJ:S1S2, PA?
Plant	Boltonia sp. 1	G2?		NJ:SNR, VA:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Muhlenbergia torreyana (Torrey's Dropseed)	G3		GA:SH, MD:S1, NC:S1, NJ:S3, TN:S1, TV:SNR
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?		CT, MA, NJ:S2S3, NY, OH, PA
	Dasiphora fruticosa ssp. floribunda / Rhynchospora capillacea - Scleria verticillata Shrub Herbaceous Vegetation	G1		NJ:S1, NY
	Juniperus virginiana / Betula pumila / Carex sterilis - Oligoneuron rigidum Shrub Herbaceous Vegetation	G1Q		NJ:S1
	Juniperus virginiana / Dasiphora fruticosa ssp. floribunda / Carex flava - Carex tetanica Shrub Herbaceous Vegetation	G1G2		NJ:S1S2, NY, PA
	Morella pensylvanica - Dasiphora fruticosa ssp. floribunda / Carex sterilis - Carex flava Shrub Herbaceous Vegetation	G2		NJ:S2, NY?, PA
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## New Mexico

<b>Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (Partial)</b>				AZ, MXCH, MXSO, NM, TX
Assoc.	Pleuraphis mutica - Panicum obtusum Herbaceous Vegetation	G3		AZ:S2, MXCH?, MXCO?, MXSO?, NM:S3, TX
<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii Shrubland	G2?		NM:S2?
<b>Inter-Mountain Basins Playa (Partial)</b>				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii Shrubland	G2?		NM:S2?
<b>North American Warm Desert Interdunal Swale Wetland (Partial)</b>				NM, TX
Assoc.	Eleocharis palustris - Carex praegracilis - Berula erecta Herbaceous Vegetation	G2		AZ:S2, MXSO, NM
	Populus fremontii / Baccharis salicifolia Woodland	G2		NM:S1?, UT:S1S2
	Schoenoplectus americanus - Flaveria chlorifolia - (Helianthus paradoxus) Herbaceous Vegetation	G1		NM?, TX
<b>North American Warm Desert Playa (Partial)</b>				AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX
Animal	Streptocephalus moorei (Spinythumb Fairy Shrimp)	G1G2		NM:SNR
Plant	Atriplex griffithsii (Griffith's Saltbush)	G2G3		AZ:S2S3, NM:S2
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Animal	Eocyclus concavus (Swaybacked Clam Shrimp)	G1G3		AZ:SNR, NM:SNR, TX:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## New York

<b>Acadian Near-Boreal Spruce Flat (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Acadian-Appalachian Conifer Seepage Forest (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)</b>				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
	Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3		CT, NH, NJ:S1, NY, RI
<b>Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest (Partial)</b>				DE, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
<b>Atlantic Coastal Plain Northern Bog (Partial)</b>				MA, NJ, NY
Assoc.	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
	Sphagnum cuspidatum Nonvascular Vegetation	G2?		FL, GA, NC, SC
<b>Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)</b>				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
Assoc.	Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2		DE, MA, NH:S1, NJ:S1S2, NY, RI
<b>Atlantic Coastal Plain Northern Pondshore (Partial)</b>				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Nymphaea odorata - Eleocharis Robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
	Rhexia virginica - Crotalaria sagittalis Herbaceous Vegetation	G2		CT, MA, NY, RI
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Sagittaria teres (Slender Arrowhead)	G3		MA:S3, NH:S1, NJ:S1, NY:S1, RI:S1, SC:SNR
<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian Conifer Acid Swamp (Partial)</b>				MB, ME, MI, MN, NB, NH?, NS, NY, ON, PE?, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>Great Lakes Alvar (Partial)</b>				MI, NY, OH, ON, WI

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Deschampsia caespitosa - (Sporobolus heterolepis, Schizachyrium scoparium) - Carex crawei - Packeria paupercula Herbaceous Vegetation	G2		MI, NY, ON:S2
<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?		CT, MA, NJ:S2S3, NY, OH, PA
	Cornus racemosa / Carex (sterilis, aquatilis, lacustris) Shrub Herbaceous Vegetation	G2G3		CT, MA, NY, VT
	Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2		CT, MA, NH, NY, VT
	Dasiphora fruticosa ssp. floribunda / Carex interior - Carex flava - Sarracenia purpurea Shrub Herbaceous Vegetation	G3		NY, OH, ON:S4
	Dasiphora fruticosa ssp. floribunda / Rhynchospora capillacea - Scleria verticillata Shrub Herbaceous Vegetation	G1		NJ:S1, NY
	Juniperus virginiana / Dasiphora fruticosa ssp. floribunda / Carex flava - Carex tetanica Shrub Herbaceous Vegetation	G1G2		NJ:S1S2, NY, PA
	Morella pensylvanica - Dasiphora fruticosa ssp. floribunda / Carex sterilis - Carex flava Shrub Herbaceous Vegetation	G2		NJ:S2, NY?, PA
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Northern Great Lakes Interdunal Wetland (Partial)</b>				MI, MN, NY, ON, WI
Plant	Oligoneuron houghtonii (Houghton's Goldenrod)	G3	LT	MI:S3, NY:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Schoenoplectus maritimus - Atriplex patula - Eleocharis parvula Herbaceous Vegetation	G1		IL:S1, MI:S1, NY:S1, ON?
	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## North Carolina

Atlantic Coastal Plain Clay-Based Carolina Bay Wetland (Partial)				GA?, NC, SC
Assoc.	Taxodium ascendens / Cyrilla racemiflora - Zenobia pulverulenta Woodland	G2		NC, SC
	Taxodium ascendens / Panicum hemitomon - Polygala cymosa Woodland	G2G3		GA?, NC, SC
Animal	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Oxypolis canbyi (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	Panicum hirstii (Hirsts' Panic Grass)	G1	C	DE:S1.1, NC:S1, GA:SH, NJ:S1
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)			
Assoc.	Morella cerifera / Spartina patens Shrubland	G3G4		FL, GA, NC, SC, VA?
Atlantic Coastal Plain Sandhill Seep (Partial)				GA, NC, SC
Assoc.	(Pinus palustris, Pinus serotina) / Ctenium aromaticum - Muhlenbergia expansa - Calamovilfa brevifolia Woodland	G2		NC, SC
	Arundinaria gigantea ssp. tecta Shrubland	G1		AL?, FL?, GA, MS?, NC, SC?, VA
	Clethra alnifolia - Toxicodendron vernix / Aristida stricta - Osmunda cinnamomea - Sarracenia spp. Shrub Herbaceous Vegetation	G2?		NC, SC
	Gaylussacia frondosa - Clethra alnifolia - Arundinaria gigantea ssp. tecta / Aristida stricta - Pteridium aquilinum var. pseudocaudatum Herbaceous Vegetation	G3?		NC, SC
Plant	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
Atlantic Coastal Plain Southern Depression Pondshore (Partial)				FL, GA, NC, SC, VA
Assoc.	Cyrilla racemiflora - Lyonia lucida Shrubland	G3?		AL, FL, GA, LA?, MS, NC, SC
	Dichantherium wrightianum - Dichantherium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Nymphaea odorata - Nuphar lutea ssp. advena - (Nymphoides aquatica, Xyris smalliana) Herbaceous Vegetation	G3?		FL?, GA?, NC, SC
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3		AL?, FL?, GA, NC, SC
	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	<i>Pinus serotina</i> / <i>Cyrilla racemiflora</i> - <i>Lyonia lucida</i> - <i>Vaccinium fuscatum</i> Woodland	G2G3		NC, SC, VA?
	<i>Quercus phellos</i> - <i>Nyssa biflora</i> / <i>Panicum hemitomon</i> - <i>Carex</i> spp. - <i>Woodwardia virginica</i> Forest [Provisional]	G2G3		GA?, NC?, SC
	<i>Rhynchospora</i> ( <i>careyana</i> , <i>inundata</i> ) Seasonally Flooded Herbaceous Vegetation	G3?		FL, GA, NC, SC?
	<i>Rhynchospora alba</i> Saturated Herbaceous Vegetation	G1?		NC
	<i>Rhynchospora filifolia</i> - <i>Juncus abortivus</i> Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC
	<i>Sphagnum cuspidatum</i> Nonvascular Vegetation	G2?		FL, GA, NC, SC
	<i>Taxodium ascendens</i> / ( <i>Nyssa biflora</i> ) / <i>Leucothoe racemosa</i> - <i>Lyonia lucida</i> - <i>Morella cerifera</i> Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	<i>Taxodium ascendens</i> / <i>Cyrilla racemiflora</i> - <i>Zenobia pulverulenta</i> Woodland	G2		NC, SC
	<i>Taxodium ascendens</i> / <i>Ilex myrtifolia</i> Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	<i>Vaccinium formosum</i> - <i>Vaccinium fuscatum</i> / <i>Sphagnum cuspidatum</i> Shrubland	G3?		DE, MD, NC, SC, VA?
	<i>Woodwardia virginica</i> / <i>Sphagnum cuspidatum</i> Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
Animal	<i>Rana capito</i> (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	<i>Carex decomposita</i> (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	<i>Carex verrucosa</i> (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	<i>Fimbristylis perpusilla</i> (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	<i>Hypericum adpressum</i> (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	<i>Lindera melissifolia</i> (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	<i>Litsea aestivalis</i> (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	<i>Lobelia boykinii</i> (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	<i>Myriophyllum laxum</i> (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	<i>Oxypolis canbyi</i> (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	<i>Panicum hirtii</i> (Hirsts' Panic Grass)	G1	C	DE:S1.1, NC:S1, GA:SH, NJ:S1
	<i>Polygonum hirsutum</i> (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	<i>Rhexia aristosa</i> (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	<i>Rhynchospora inundata</i> (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	<i>Rhynchospora pleiantha</i> (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR
<b>Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)</b>				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV

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Assoc.	Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q		AL, GA, NC, TN
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
	Sparganium americanum - Epilobium leptophyllum Herbaceous Vegetation	G2G3		NC, TN, VA:S1?, WV
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Isoetes virginica (Virginia Quillwort)	G1		NC:S1, VA:S1?
	Muhlenbergia torreyana (Torrey's Dropseed)	G3		GA:SH, MD:S1, NC:S1, NJ:S3, TN:S1, TV:SNR
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	Typha domingensis - Setaria magna Herbaceous Vegetation	G2G3		FL, GA, NC, SC
Plant	Ludwigia lanceolata (Lance-leaf Seedbox)	G3		FL:SNR, GA:SNR, NC:S1, SC:SNR
<b>Southern Appalachian Seepage Wetland (Partial)</b>				AL?, GA, KY?, NC, SC, TN, VA, WV?
Assoc.	Alnus serrulata - Linderia benzoin / Scutellaria lateriflora - Thelypteris noveboracensis Shrubland	G2?		GA?, KY?, NC, SC?, TN?
	Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum spp. Herbaceous Vegetation	G2		NC, TN, VA?
	Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3		GA, NC, SC?, TN, VA
	Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum spp. Herbaceous Vegetation	G2G3		AL?, GA, NC, SC?, TN
	Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3		GA, NC, SC, TN, VA, WV?
Plant	Cardamine clematitidis (Mountain Bitter Cress)	G2G3		AL:SH, NC:S2, SC:SNR, TN:S2, VA:S1S2, TV:SNR, GS:P2
	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
	Glyceria nubigena (Smoky Mountains Manna-grass)	G2		NC:S2, TN:S1S2, TV:SNR, GS:P1
	Sarracenia oreophila (Green Pitcherplant)	G2	LE	AL:S2, GA:S1, NC:S1, TV:SNR
	Saxifraga caroliniana (Carolina Saxifrage)	G2		GA:SH, NC:S2, TN:S1S2, VA:S2?, WV:S1, TV:SNR, GS:PNR
<b>Southern Piedmont / Ridge and Valley Upland Depression Swamp (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Cephalanthus occidentalis - (Leucothoe racemosa) / Carex jorii Shrubland	G1		NC:S1S2, SC?
	Leucothoe racemosa - Vaccinium fuscatum - Smilax walteri Shrubland	G1?		NC
	Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q		AL, GA, NC, TN
	Nyssa biflora / Cephalanthus occidentalis - Leucothoe racemosa Forest	G1		NC
	Quercus phellos / Carex (albulotescens, intumescens, jorii) - Chasmanthium laxum / Sphagnum lescurii Forest	G2G3		AL, GA?, NC, SC, VA:S2?
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?



Isolated Wetland Ecological System (Isolation Type)				System distribution
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Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
	Isoetes virginica (Virginia Quillwort)	G1		NC:S1, VA:S1?
<b>Southern Piedmont Granite Flatrock (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Diamorpha smallii - Minuartia glabra - Minuartia uniflora - Cyperus granitophilus Herbaceous Vegetation	G3		AL, GA, NC, SC
Plant	Cyperus granitophilus (Granite-loving Flatsedge)	G3Q		AL:S2, GA:S3, NC:S1, SC:SNR, TN:S1, VA:S1, TV:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
	Sedum pusillum (Granite Rock Stonecrop)	G3		AL:SNR, GA:S3, NC:S1, SC:S2
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Carex atlantica - Solidago patula var. patula - Liliium grayi / Sphagnum bartlettianum Herbaceous Vegetation	G1		NC, TN?, VA?
	Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?		AL, FL, GA, LA?, MS?, NC, SC
	Leersia hexandra - (Panicum verrucosum, Scleria reticularis) Herbaceous Vegetation [Provisional]	G2G3		MD:S1, NC
	Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) Shrubland	G3		FL, GA, NC, SC, VA
	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3		DE, MD, NC, NJ:S1?, VA
	Taxodium distichum - Taxodium ascendens / Panicum hemitomom - Sclerolepis uniflora Woodland	G1		NC
	Taxodium distichum - Taxodium ascendens / Panicum hemitomom Woodland	G3?		NC
Plant	Carex sp. 2 (Fen Sedge)	G1		NC:S1, VA:S1
	Juncus caesariensis (New Jersey Rush)	G2		MD:S1, NC:S1, NJ:S2, VA:S2
	Sabatia kennedyana (Plymouth Gentian)	G3		MA:S3, NC:S1, RI:S1, SC:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## North Dakota

Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
Great Plains Prairie Pothole (Partial)				AB, IA?, MB, MN, ND, SD, SK
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
North-Central Interior Freshwater Marsh (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
North-Central Interior Wet Meadow-Shrub Swamp (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
Western Great Plains Open Freshwater Depression Wetland (Partial)				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Calamagrostis canadensis - Juncus spp. - Carex spp. Sandhills Herbaceous Vegetation	G3G4		KS:SU, ND:SU, NE:S3, SD:SU, SK?
	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Carex prairea - Schoenoplectus pungens - Rhynchospora capillacea Herbaceous Vegetation	G2		IA, MN, ND, SD
	Carex spp. - Triglochin maritima - Eleocharis quinqueflora Marl Fen Herbaceous Vegetation	G1?		ND:S1, SD:S1
	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. Herbaceous Vegetation	G3?		MT:S3, ND, SD
	Stuckenia pectinata - Myriophyllum (sibiricum, spicatum) Herbaceous Vegetation	G3G4		AB, CA?, MT:S1, ND:SU, ON?, SD:SU, SK:SU

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4		MT:S1, ND:SU, SD:SU, SK:SU
<i>Plant</i>	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
<i>Assoc.</i>	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3		MB:S3, MN, MT, ND, SD:SU
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
	Stuckenia pectinata - Ruppia maritima Herbaceous Vegetation	G2?		IA:SU, MT:S2, ND:S3, SD
	Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4		MT:S1, ND:SU, SD:SU, SK:SU
<i>Plant</i>	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Ohio

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3

Great Lakes Alvar (Partial)				MI, NY, OH, ON, WI
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*no at-risk isolated wetland elements confirmed in this isolated wetland system in state*

Great Lakes Dune and Swale (Partial)				IL, IN, MI, MN, OH, ON, PA, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
Plant	Lycopodiella margueritiae (Northern Prostrate Clubmoss)	G2		OH:S1, PA:SU, MI:S2, VA:S1, TV:SNR
	Lycopodiella subappressa (Northern Appressed Clubmoss)	G2		IN:S1, MI:S2, OH:S1

Great Lakes Wet-Mesic Lakeplain Prairie (Partial)				IL, IN, MI, OH, ON, WI
Assoc.	Spartina pectinata - Carex spp. - Calamagrostis canadensis Lakeplain Herbaceous Vegetation	G2G3		IL, IN, MI:S2, OH, ON
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3

North-Central Interior and Appalachian Acid Peatland (Partial)				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4		IL:S2, IN, MI, OH, ON, WI:S3
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON
Animal	Caenestheriella gynecia (Feminine Clam Shrimp)	G2G3		MA:SNR, OH:SNR, PA:SNR
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3

North-Central Interior Freshwater Marsh (Partial)				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI

North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3		IL:S1S2, IN, MI, OH, ON, WI
	Dasiphora fruticosa ssp. floribunda / Carex interior - Carex flava - Sarracenia purpurea Shrub Herbaceous Vegetation	G3		NY, OH, ON:S4
	Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4		IL, IN, MI, MN:S1, OH, ON:S1, WI:S3
	Vaccinium corymbosum - Gaylussacia baccata - Photinia melanocarpa / Calla palustris Shrubland	G2G3		IN, MI?, NY, OH:S1, ON

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
<i>Animal</i>	<i>Oecanthus laricis</i> (Laricis Tree Cricket)	G1G2		MI:S1S2, OH:SNR
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
<i>Assoc.</i>	<i>Fagus grandifolia</i> - <i>Acer saccharum</i> - <i>Quercus bicolor</i> - <i>Acer rubrum</i> Flatwoods Forest	G2G3		IN:S2, MI?, OH, ON?
	<i>Fagus grandifolia</i> - <i>Quercus alba</i> - ( <i>Quercus michauxii</i> ) - <i>Acer rubrum</i> Flatwoods Forest	G3		IN:S2, OH
	<i>Quercus palustris</i> - <i>Quercus bicolor</i> - ( <i>Liquidambar styraciflua</i> ) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
	<i>Quercus palustris</i> - <i>Quercus bicolor</i> - <i>Acer rubrum</i> Flatwoods Forest	G2G3		IL:S2, IN:S2, MI, OH, ON
	<i>Quercus palustris</i> - <i>Quercus bicolor</i> - <i>Nyssa sylvatica</i> - <i>Acer rubrum</i> Sand Flatwoods Forest	G2?		IL:S1, IN:S1, MI, OH, ON
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
<i>Assoc.</i>	<i>Spartina pectinata</i> - <i>Carex</i> spp. - <i>Calamagrostis canadensis</i> - <i>Lythrum alatum</i> - ( <i>Oxypolis rigidior</i> ) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
<i>Plant</i>	<i>Eleocharis wolfii</i> (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	<i>Platanthera leucophaea</i> (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
<i>Assoc.</i>	<i>Cornus amomum</i> - <i>Salix candida</i> / <i>Dasiphora fruticosa</i> ssp. <i>floribunda</i> / <i>Carex stricta</i> Shrubland	G3?		CT, MA, NJ:S2S3, NY, OH, PA

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Oklahoma

Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Typha (angustifolia, domingensis, latifolia) - Schoenoplectus americanus Herbaceous Vegetation	G3G4		KS:SU, OK, TX?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Western Great Plains Closed Depression Wetland (Strict)				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Buchloe dactyloides - (Phyla cuneifolia, Oenothera canescens) Herbaceous Vegetation	G2G3		KS:SU, NE:S1, OK:S2, TX?
	Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4		KS:SU, NE:S1, OK?
	Spartina pectinata - Eleocharis spp. - Carex spp. Herbaceous Vegetation	G2G4		KS:SU, OK:S2
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
Western Great Plains Open Freshwater Depression Wetland (Partial)				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Polygonum spp. - Echinochloa spp. - Distichlis spicata Playa Lake Herbaceous Vegetation	G2G4		KS:SU, NE:S1, OK?
	Spartina pectinata - Eleocharis spp. - Carex spp. Herbaceous Vegetation	G2G4		KS:SU, OK:S2
	Typha (angustifolia, domingensis, latifolia) - Schoenoplectus americanus Herbaceous Vegetation	G3G4		KS:SU, OK, TX?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
Western Great Plains Saline Depression Wetland (Partial)				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Distichlis spicata - (Hordeum jubatum, Poa arida, Sporobolus airoides) Herbaceous Vegetation	G3		KS:S2, NE:S3, OK, TX
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Sedum nuttallianum - Selaginella peruviana Granitic Outcrop Sparse Vegetation	G2		OK, TX

Isolated Wetland Ecological System (Isolation Type)				System distribution
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<i>Plant</i>	<i>Carex decomposita</i> (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Oregon

<b>Boreal Depressional Bog (Partial)</b>				AK, BC, ID, MT, OR, WA
Assoc.	Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3		BC:S2, CA:S1?, ID:S2, MT:S2, OR:S3, WA:S2S3, WY?
	Malus fusca Shrubland	G3		BC:S2S3, OR:S2, WA:S2S3
	Spiraea douglasii / Sphagnum spp. Shrubland	G3		BC:S2?, OR:S1, WA:S2
<b>Columbia Plateau Vernal Pool (Strict)</b>				BC?, NV, OR, WA
Plant	Juncus uncialis (Inch-high Rush)	G3G4		CA:SNR, NV:SNR, OR:SNR, WA:S2
	Myosurus sessilis (Sessile Mousetail)	G2		CA:SNR, OR:S1
<b>Inter-Mountain Basins Alkaline Closed Depression (Partial)</b>				CA, ID, NV, OR, UT, WA?
Assoc.	Leymus triticoides - Poa secunda Herbaceous Vegetation	G2		CA, NV?, OR:S2
	Puccinellia lemmonii - Poa secunda Seasonally Flooded Herbaceous Vegetation	G1		OR:S1
Plant	Astragalus applegatei (Applegate's Milk-vetch)	G1	LE	OR:S1
	Astragalus lemmonii (A Milk-vetch)	G3?		CA:S2.2, NV:S1, OR:SNR
	Downingia bicornuta (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	Juncus uncialis (Inch-high Rush)	G3G4		CA:SNR, NV:SNR, OR:SNR, WA:S2
	Lepidium davisii (Davis' Peppergrass)	G3		ID:S3, NV:S1, OR:S1
	Plagiobothrys salsus (Desert Allocarya)	G2G3		CA:S1.2?, NV:S2S3, OR:S1
	Pogogyne floribunda (Profuse-flowered Pogogyne)	G3		CA:S3.2, ID:S1, OR:S1
	Potentilla newberryi (Newberry Cinquefoil)	G3G4		CA:S2.3?, NV:SNR, OR:SNR, WA:SH
	Thelypodium brachycarpum (Short-podded Thelypodium)	G3		CA:S3.2, OR:S2
	Thelypodium howellii ssp. spectabilis (Howell's Spectacular Thelypody)	G2T1	LT	OR:S1
<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Leymus cinereus Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
<b>Inter-Mountain Basins Playa (Partial)</b>				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Leymus cinereus Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	Leymus triticoides - Poa secunda Herbaceous Vegetation	G2		CA, NV?, OR:S2
	Puccinellia lemmonii - Poa secunda Seasonally Flooded Herbaceous Vegetation	G1		OR:S1
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
Plant	Gratiola heterosepala (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	Lepidium davisii (Davis' Peppergrass)	G3		ID:S3, NV:S1, OR:S1
	Phacelia inundata (Playa Phacelia)	G2		CA:S2.3, NV:S2?, OR:S1
<b>Mediterranean California Coastal Interdunal Wetland (Partial)</b>				CA, OR
Animal	Branchinecta lynchi (Vernal Pool Fairy Shrimp)	G3	LT	CA:S2S3, OR:S2S3
<b>Modoc Basalt Flow Vernal Pool (Strict)</b>				CA, OR, WA
Plant	Downingia bicornuta (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	Gratiola heterosepala (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	Pogogyne floribunda (Profuse-flowered Pogogyne)	G3		CA:S3.2, ID:S1, OR:S1



Isolated Wetland Ecological System (Isolation Type)				System distribution
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<b>North Pacific Hardpan Vernal Pool (Strict)</b>				BC, CA, OR, WA
Assoc.	Eryngium petiolatum - Grindelia nana Herbaceous Vegetation	G1G2		OR:S1
	Eryngium petiolatum - Lasthenia glaberrima Herbaceous Vegetation	G1G2		OR:S1
	Plagiobothrys figuratus Vernal Pool Herbaceous Vegetation	G1G2		OR:S1
Plant	Plagiobothrys hirtus (Rough Popcorn-flower)	G1	LE	OR:S1
<b>Northern California Claypan Vernal Pool (Strict)</b>				CA, OR
Animal	Branchinecta lynchi (Vernal Pool Fairy Shrimp)	G3	LT	CA:S2S3, OR:S2S3
Plant	Agrostis hendersonii (Henderson's Bentgrass)	G1Q		CA:S1.1, OR:SH
	Gratiola heterosepala (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	Limnanthes floccosa ssp. grandiflora (Large-flowered Woolly Meadowfoam)	G4T1	LE	OR:S1
	Lomatium cookii (Agate Desert Lomatium)	G1	LE	OR:S1
	Myosurus sessilis (Sessile Mousetail)	G2		CA:SNR, OR:S1
	Navarretia heterandra (Tehama Navarretia)	G3		CA:S3.3, OR:S1
<b>Northern California Volcanic Vernal Pool (Strict)</b>				CA, OR
Plant	Downingia bicornuta (Double-horn Downingia)	G3G4		CA:SNR, ID:SNR, NV:SNR, OR:SNR
	Gratiola heterosepala (Boggs Lake Hedge-hyssop)	G3		CA:S3.1, OR:S1
	Navarretia heterandra (Tehama Navarretia)	G3		CA:S3.3, OR:S1
<b>Northern Columbia Plateau Basalt Pothole Ponds (Strict)</b>				OR, WA
Assoc.	Schoenoplectus americanus Western Herbaceous Vegetation	G3Q		CA:S3, ID:S3, OR:S2S3, WA:S1?
Plant	Howellia aquatilis (Water Howellia)	G3	LT	CA:S1.2, ID:S1, MT:S2, OR:S1, WA:S2S3
<b>Willamette Valley Wet Prairie (Partial)</b>				OR, WA
Assoc.	Camassia quamash Wet Prairie Herbaceous Vegetation	G3		ID, OR:S3, WA:S1
	Carex aperta Herbaceous Vegetation	G1?		ID?, MT, OR:S1, WA
	Carex densa - Deschampsia caespitosa Herbaceous Vegetation [Provisional]	G2		OR:S2, WA:S1
	Carex densa - Eleocharis palustris Herbaceous Vegetation [Provisional]	G3		OR:S3
	Deschampsia caespitosa - Danthonia californica Herbaceous Vegetation	G2		OR:S2, WA:S1
	Eleocharis palustris - Carex unilateralis Herbaceous Vegetation	G2		OR:S2
	Isoetes nuttallii Herbaceous Vegetation	G3		BC:S1, OR:S3, WA?
	Rosa nutkana / Deschampsia caespitosa Shrubland [Provisional]	G2		OR:S2
	Rosa nutkana / Oenanche sarmentosa Shrubland [Provisional]	G1		OR:S1
Plant	Lomatium bradshawii (Bradshaw's Lomatium)	G2	LE	OR:S2, WA:S1
	Perideridia erythrorhiza (Red-root Yampah)	G1		OR:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Pennsylvania

<b>Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)</b>				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Platanus occidentalis - Fraxinus pennsylvanica - Ulmus americana / Cornus sericea Forest	G2G3		MD?, NJ:S1S2, PA?
Plant	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
<b>Great Lakes Dune and Swale (Partial)</b>				IL, IN, MI, MN, OH, ON, PA, WI
Plant	Lycopodiella margueritiae (Northern Prostrate Clubmoss)	G2		OH:S1, PA:SU, MI:S2, VA:S1, TV:SNR
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Cornus amomum - Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?		CT, MA, NJ:S2S3, NY, OH, PA
	Juniperus virginiana / Dasiphora fruticosa ssp. floribunda / Carex flava - Carex tetanica Shrub Herbaceous Vegetation	G1G2		NJ:S1S2, NY, PA
	Morella pensylvanica - Dasiphora fruticosa ssp. floribunda / Carex sterilis - Carex flava Shrub Herbaceous Vegetation	G2		NJ:S2, NY?, PA
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
Animal	Caenestheriella gynecia (Feminine Clam Shrimp)	G2G3		MA:SNR, OH:SNR, PA:SNR
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI
Assoc.	Quercus palustris - Quercus bicolor - (Liquidambar styraciflua) Mixed Hardwood Forest	G3G4		IA, IL, IN, KY, MO, OH, PA?, TN?, WV?
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Rhode Island

<b>Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)</b>				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
Assoc.	Cladium mariscoides / Vaccinium macrocarpon - Morella pensylvanica Dwarf-shrubland	G2		DE, MA, NH:S1, NJ:S1S2, NY, RI
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Chamaecyparis thyoides / Chamaedaphne calyculata Woodland	G3G4		CT, MA, ME:S1, NH, NJ, NY, RI
	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum Forest	G3		CT, DE, MA, NJ:S3, NY, RI
	Chamaecyparis thyoides / Rhododendron maximum Forest	G2G3		CT, NH, NJ:S1, NY, RI
	Nymphaea odorata - Eleocharis robbinsii Herbaceous Vegetation	G2		DE, MA, MD, NH, NJ:S1S2, NY, RI
	Rhexia virginica - Crotalaria sagittalis Herbaceous Vegetation	G2		CT, MA, NY, RI
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
Plant	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Sabatia kennedyana (Plymouth Gentian)	G3		MA:S3, NC:S1, RI:S1, SC:S1
	Sagittaria teres (Slender Arrowhead)	G3		MA:S3, NH:S1, NJ:S1, NY:S1, RI:S1, SC:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## South Carolina

Atlantic Coastal Plain Clay-Based Carolina Bay Wetland (Partial)				GA?, NC, SC
Assoc.	Taxodium ascendens / Cyrilla racemiflora - Zenobia pulverulenta Woodland	G2		NC, SC
	Taxodium ascendens / Panicum hemitomon - Polygala cymosa Woodland	G2G3		GA?, NC, SC
Animal	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Oxypolis canbyi (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR
	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Atlantic Coastal Plain Sandhill Seep (Partial)			
Assoc.	(Pinus palustris, Pinus serotina) / Ctenium aromaticum - Muhlenbergia expansa - Calamovilfa brevifolia Woodland	G2		NC, SC
	Arundinaria gigantea ssp. tecta Shrubland	G1		AL?, FL?, GA, MS?, NC, SC?, VA
	Clethra alnifolia - Toxicodendron vernix / Aristida stricta - Osmunda cinnamomea - Sarracenia spp. Shrub Herbaceous Vegetation	G2?		NC, SC
	Gaylussacia frondosa - Clethra alnifolia - Arundinaria gigantea ssp. tecta / Aristida stricta - Pteridium aquilinum var. pseudocaudatum Herbaceous Vegetation	G3?		NC, SC
Plant	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
Atlantic Coastal Plain Southern Depression Pondshore (Partial)				FL, GA, NC, SC, VA
Assoc.	Carex hyalinolepis Seasonally Flooded Herbaceous Vegetation	G1G3		SC
	Carex striata var. striata - Xyris fimbriata - Lachnanthes caroliniana Herbaceous Vegetation	G2G3		FL, GA?, SC
	Cyrilla racemiflora - Lyonia lucida Shrubland	G3?		AL, FL, GA, LA?, MS, NC, SC
	Dichanthelium wrightianum - Dichanthelium erectifolium Herbaceous Vegetation	G2G3		AL?, FL, GA, MS, NC, SC
	Nymphaea odorata - Nuphar lutea ssp. advena - (Nymphaeoides aquatica, Xyris smalliana) Herbaceous Vegetation	G3?		FL?, GA?, NC, SC
	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Nyssa ogeche / Ilex myrtifolia / Carex turgescens - Carex striata Forest	G2?		GA, SC
	Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata Herbaceous Vegetation	G3		AL?, FL?, GA, NC, SC

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	Panicum virgatum - Andropogon (capillipes, glaucopsis) - Aristida palustris Herbaceous Vegetation	G2?		AL, FL, GA, LA?, NC, SC
	Pinus serotina / Cyrilla racemiflora - Lyonia lucida - Vaccinium fuscum Woodland	G2G3		NC, SC, VA?
	Quercus phellos - Nyssa biflora / Panicum hemitomon - Carex spp. - Woodwardia virginica Forest [Provisional]	G2G3		GA?, NC?, SC
	Rhynchospora (careyana, inundata) Seasonally Flooded Herbaceous Vegetation	G3?		FL, GA, NC, SC?
	Rhynchospora filifolia - Juncus abortivus Herbaceous Vegetation	G2?		AL, FL, GA, NC, SC
	Spartina bakeri - Woodwardia virginica - Saccharum giganteum Herbaceous Vegetation	G3?		GA?, SC
	Sphagnum cuspidatum Nonvascular Vegetation	G2?		FL, GA, NC, SC
	Taxodium ascendens / (Nyssa biflora) / Leucothoe racemosa - Lyonia lucida - Morella cerifera Depression Forest	G3		AL, FL, GA, LA, MS, NC, SC
	Taxodium ascendens / Cyrilla racemiflora - Zenobia pulverulenta Woodland	G2		NC, SC
	Taxodium ascendens / Ilex myrtifolia Depression Forest	G3?		AL:S1S2, FL, GA, LA?, MS, NC, SC
	Vaccinium formosum - Vaccinium fuscum / Sphagnum cuspidatum Shrubland	G3?		DE, MD, NC, SC, VA?
	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
Animal	Ambystoma cingulatum (Flatwoods Salamander)	G2G3	LT	AL:S1, FL:S2S3, GA:S2, SC:S1
	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1, TV:SNR
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Coreopsis rosea (Rose Coreopsis)	G3		DE:S1, GA:SNR, MA:S3, MD:S1, MS:SNR, NJ:S2, NY:S3, RI:S2, SC:S2
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Lindera melissifolia (Pondberry)	G2	LE	AL:S1, AR:S2, GA:S1, LA:SNR, MS:S2, NC:S1, SC:S1, TV:SNR, MO:S1
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Lobelia boykinii (Boykin's Lobelia)	G2G3		AL:S1S2, FL:S1, GA:S2S3, MS:S1, NC:S1, NJ:S1, SC:SNR, TV:SNR
	Ludwigia spathulata (Spathulate Seedbox)	G2G3		AL:S1S2, FL:S1S2, GA:S2S3, SC:SNR
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
	Oxypolis canbyi (Canby's Dropwort)	G2	LE	GA:S2, MD:S1, NC:S1, SC:S1
	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
	Polygonum hirsutum (Hairy Smartweed)	G3G4		AL:SNR, FL:SNR, GA:SNR, MS:SNR, NC:S1, SC:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Rhexia aristosa (Awned Meadowbeauty)	G3		AL:S1, DE:S1, GA:S2, NC:S3, NJ:S1, SC:S2
	Rhynchospora inundata (Drowned Hornedrush)	G3G4		AL:SNR, DE:S1, FL:SNR, GA:S3?, MA:S2, MD:S1, MS:SNR, NC:S3, NJ:S2, NY:S2, RI:S1, SC:SNR
	Rhynchospora pleiantha (Brown Beakrush)	G3		AL:S1, FL:S3, GA:SH, NC:S2, SC:SNR
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	Carex hyalinolepis Seasonally Flooded Herbaceous Vegetation	G1G3		SC
	Typha domingensis - Setaria magna Herbaceous Vegetation	G2G3		FL, GA, NC, SC
Plant	Ludwigia lanceolata (Lance-leaf Seedbox)	G3		FL:SNR, GA:SNR, NC:S1, SC:SNR
<b>Southern Appalachian Seepage Wetland (Partial)</b>				AL?, GA, KY?, NC, SC, TN, VA, WV?
Assoc.	Alnus serrulata - Linder benzoin / Scutellaria lateriflora - Thelypteris noveboracensis Shrubland	G2?		GA?, KY?, NC, SC?, TN?
	Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3		GA, NC, SC?, TN, VA
	Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum spp. Herbaceous Vegetation	G2G3		AL?, GA, NC, SC?, TN
	Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3		GA, NC, SC, TN, VA, WV?
Plant	Cardamine clematitidis (Mountain Bitter Cress)	G2G3		AL:SH, NC:S2, SC:SNR, TN:S2, VA:S1S2, TV:SNR, GS:P2
	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
<b>Southern Coastal Plain Nonriverine Basin Swamp (Partial)</b>				AL, FL, GA, LA?, MS, SC
Assoc.	Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) Shrubland	G3		FL, GA, NC, SC, VA
Plant	Pieris phillyreifolia (Climbing Fetter-bush)	G3		AL:S2, FL:SNR, GA:S3, MS:S1, SC:SNR
<b>Southern Piedmont / Ridge and Valley Upland Depression Swamp (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Cephalanthus occidentalis - (Leucothoe racemosa) / Carex jooirii Shrubland	G1		NC:S1S2, SC?
	Quercus phellos - Quercus (michauxii, shumardii) - Fraxinus americana / (Quercus oglethorpensis) / Zephyranthes atamasca Gabbro Upland Depression Forest	G2?		GA, SC
	Quercus phellos / Carex (albolutescens, intumescens, jooirii) - Chasmanthium laxum / Sphagnum lescurii Forest	G2G3		AL, GA?, NC, SC, VA:S2?
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
<b>Southern Piedmont Granite Flatrock (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Amphianthus pusillus - Isoetes melanospora - Isoetes tegetiformans Herbaceous Vegetation	G1		AL, GA, SC
	Diamorpha smallii - Minuartia glabra - Minuartia uniflora - Cyperus granitophilus Herbaceous Vegetation	G3		AL, GA, NC, SC
Plant	Amphianthus pusillus (Little Amphianthus)	G2	LT	AL:S1, GA:S2, SC:S1

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	Cyperus granitophilus (Granite-loving Flatsedge)	G3Q		AL:S2, GA:S3, NC:S1, SC:SNR, TN:S1, VA:S1, TV:SNR
	Isoetes melanospora (Black-spored Quillwort)	G1	LE	GA:S1, SC:S1
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
	Sedum pusillum (Granite Rock Stonecrop)	G3		AL:SNR, GA:S3, NC:S1, SC:S2
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Eleocharis (elongata, equisetoides) - Rhynchospora tracyi Semipermanently Flooded Herbaceous Vegetation	G3?		AL, FL, GA, LA?, MS?, NC, SC
	Hypericum fasciculatum / Rhynchospora (chapmanii, harperi) Shrubland	G2G3		AL, FL, GA, SC
	Morella cerifera / Spartina patens Shrubland	G3G4		FL, GA, NC, SC, VA?
	Taxodium ascendens / Ilex myrtifolia / Carex (striata, turgescens) Stringer Forest	G3?Q		AL, FL, GA, LA, MS, SC
Plant	Croton elliotii (Elliott's Croton)	G2G3		AL:S1, FL:SH, GA:S2S3, SC:SNR
	Sabatia kennedyana (Plymouth Gentian)	G3		MA:S3, NC:S1, RI:S1, SC:S1
	Sagittaria teres (Slender Arrowhead)	G3		MA:S3, NH:S1, NJ:S1, NY:S1, RI:S1, SC:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## South Dakota

<b>Eastern Great Plains Wet Meadow, Prairie, and Marsh (Partial)</b>				IA, IL, KS, MN, MO, ND, NE, OK, SD, TX?
Assoc.	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
<b>Great Plains Prairie Pothole (Partial)</b>				AB, IA?, MB, MN, ND, SD, SK
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior Freshwater Marsh (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)</b>				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
<b>Western Great Plains Closed Depression Wetland (Strict)</b>				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Eleocharis spp. Herbaceous Vegetation	G1		CO, MT?, SD, WY:S1
<b>Western Great Plains Open Freshwater Depression Wetland (Partial)</b>				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Calamagrostis canadensis - Juncus spp. - Carex spp. Sandhills Herbaceous Vegetation	G3G4		KS:SU, ND:SU, NE:S3, SD:SU, SK?
	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Carex interior - Eleocharis elliptica - Thelypteris palustris Herbaceous Vegetation	G1G2		NE:S1S2, SD:S1
	Carex prairea - Schoenoplectus pungens - Rhynchospora capillacea Herbaceous Vegetation	G2		IA, MN, ND, SD
	Carex spp. - Triglochin maritima - Eleocharis quinqueflora Marl Fen Herbaceous Vegetation	G1?		ND:S1, SD:S1
	Panicum virgatum - (Pascopyrum smithii) Herbaceous Vegetation	G2Q		MT:S2, SD
	Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation	G3?		IA:SU, MB:S1S2, MN, MT, ND:S2?, NE:S1, SD
	Spartina pectinata - Carex spp. Herbaceous Vegetation	G3?		MT:S3, ND, SD
	Stuckenia pectinata - Myriophyllum (sibiricum, spicatum) Herbaceous Vegetation	G3G4		AB, CA?, MT:S1, ND:SU, ON?, SD:SU, SK:SU
	Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4		MT:S1, ND:SU, SD:SU, SK:SU
	Typha latifolia - Equisetum hyemale - Carex (hystericina, pellita) Seep Herbaceous Vegetation	G3		IA, KS:SU, MO:S2, NE:S3, SD
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Calamagrostis stricta - Carex sartwellii - Carex praegracilis - Plantago eriopoda Saline Herbaceous Vegetation	G2G3		MB:SU, MN, ND:SU, SD
	Distichlis spicata - Hordeum jubatum - Puccinellia nuttalliana - Suaeda calceoliformis Herbaceous Vegetation	G2G3		MB:S3, MN, MT, ND, SD:SU
	Salicornia rubra Herbaceous Vegetation	G2G3		CA?, CO:S1?, MB:S2, MN, MT:S2?, ND, NV?, SD, SK
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY



Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
	Stuckenia pectinata - Ruppia maritima Herbaceous Vegetation	G2?		IA:SU, MT:S2, ND:S3, SD
	Stuckenia pectinata - Zannichellia palustris Herbaceous Vegetation	G3G4		MT:S1, ND:SU, SD:SU, SK:SU

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Tennessee

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Carex comosa - Carex decomposita - Dulichium arundinaceum - Lycopus rubellus Herbaceous Vegetation	G3G4		IN, KY?, MO:S4S5, TN?
	Cephalanthus occidentalis - (Salix nigra, Quercus lyrata) Karst Depression Shrubland	G1Q		AL, TN?
	Cephalanthus occidentalis / Hibiscus moscheutos ssp. moscheutos Depression Pond Shrubland	G3?		AL?, GA, IL, IN, KY, MO:S1, MS?, TN
	Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest	G2Q		AL, GA, NC, TN
	Nyssa aquatica / Cephalanthus occidentalis Pond Forest	G1?		AR?, MO, TN
	Nyssa biflora / Cephalanthus occidentalis - Lyonia lucida Sagpond Forest	G1G2		AL, GA, TN?
	Panicum hemitomon - Dulichium arundinaceum Herbaceous Vegetation	G1		TN
	Pontederia cordata - Sagittaria graminea - Sagittaria latifolia Semipermanently Flooded Herbaceous Vegetation	G1G2Q		TN
	Quercus alba - Nyssa sylvatica Sandstone Ridgetop Depression Forest	G2Q		AL, TN?
	Quercus lyrata - Quercus (palustris, phellos) - Liquidambar styraciflua - (Populus heterophylla) Forest	G2G3		KY, TN
	Quercus lyrata / Betula nigra / Pleopeltis polypodioides ssp. michauxiana Forest	G1		TN
	Quercus phellos - Liquidambar styraciflua / Chasmanthium laxum Cumberland Plateau Forest	G3		AL, GA, KY, TN
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
	Scirpus cyperinus - Panicum rigidulum - Rhynchospora corniculata - (Dulichium arundinaceum) Herbaceous Vegetation	G2G3		AL, IN, KY, TN
	Sparganium americanum - Epilobium leptophyllum Herbaceous Vegetation	G2G3		NC, TN, VA:S1?, WV
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Muhlenbergia torreyana (Torrey's Dropseed)	G3		GA:SH, MD:S1, NC:S1, NJ:S3, TN:S1, TV:SNR
South-Central Interior / Upper Coastal Plain Wet Flatwoods (Partial)				IL?, IN?, KY, TN
Assoc.	Quercus palustris - (Quercus stellata) - Quercus pagoda / Isoetes spp. Forest	G2G3		AR, IL, IN, KY?, MO, TN?
	Quercus phellos - (Quercus lyrata) / Carex spp. - Leersia spp. Forest	G3G4Q		AR, IL, KY, MO?, MS?, TN
Southern Appalachian Seepage Wetland (Partial)				AL?, GA, KY?, NC, SC, TN, VA, WV?
Assoc.	Alnus serrulata - Lindera benzoin / Scutellaria lateriflora - Thelypteris noveboracensis Shrubland	G2?		GA?, KY?, NC, SC?, TN?
	Calamagrostis cainii - Carex ruthii - Parnassia asarifolia / Sphagnum spp. Herbaceous Vegetation	G1Q		TN
	Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum spp. Herbaceous Vegetation	G2		NC, TN, VA?
	Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3		GA, NC, SC?, TN, VA

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Glyceria striata - Carex gynandra - Chelone glabra - Symphyotrichum puniceum / Sphagnum spp. Herbaceous Vegetation	G2G3		AL?, GA, NC, SC?, TN
	Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3		GA, NC, SC, TN, VA, WV?
<i>Plant</i>	Cardamine clematitidis (Mountain Bitter Cress)	G2G3		AL:SH, NC:S2, SC:SNR, TN:S2, VA:S1S2, TV:SNR, GS:P2
	Glyceria nubigena (Smoky Mountains Manna-grass)	G2		NC:S2, TN:S1S2, TV:SNR, GS:P1
	Saxifraga caroliniana (Carolina Saxifrage)	G2		GA:SH, NC:S2, TN:S1S2, VA:S2?, WV:S1, TV:SNR, GS:PNR
	Xyris tennesseensis (Tennessee Yellow-eyed-grass)	G2	LE	AL:S1, GA:S1, TN:S1, TV:SNR
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
<i>Assoc.</i>	Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) Herbaceous Vegetation	G2G3		AL, GA?, TN
<i>Animal</i>	Rana capito (Carolina Gopher Frog)	G3		AL:S2, FL:S3, GA:S2S3, NC:S2, SC:S1, TN:S1
<i>Plant</i>	Cyperus granitophilus (Granite-loving Flatsedge)	G3Q		AL:S2, GA:S3, NC:S1, SC:SNR, TN:S1, VA:S1
	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Texas

<b>Central and Upper Texas Coast Dune and Coastal Grassland (Partial)</b>				TX
Assoc.	Eleocharis quadrangulata - Sagittaria spp. Herbaceous Vegetation	G3?		TX
	Fuirena scirpoidea - Fuirena longa - Rhynchospora microcarpa - Rhynchospora divergens Herbaceous Vegetation	G2		TX
<b>Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (Partial)</b>				AZ, MXCH, MXSO, NM, TX
Assoc.	Pleuraphis mutica - Panicum obtusum Herbaceous Vegetation	G3		AZ:S2, MXCH?, MXCO?, MXSO?, NM:S3, TX
<b>Edwards Plateau Granitic Forest, Woodland and Glade (Strict)</b>				TX
Assoc.	Sedum nuttallianum - Selaginella peruviana Granitic Outcrop Sparse Vegetation	G2		OK, TX
Plant	Isoetes lithophila (Rock Quillwort)	G2		TX:S2
<b>North American Warm Desert Interdunal Swale Wetland (Partial)</b>				NM, TX
Assoc.	Baccharis salicifolia - Baccharis neglecta / Eustoma exaltatum Shrubland	G2?		TX
	Salix exigua / Baccharis salicifolia - Baccharis neglecta / Schoenoplectus spp. Woodland	G2?		TX
	Schoenoplectus americanus - Flaveria chlorifolia - (Helianthus paradoxus) Herbaceous Vegetation	G1		NM?, TX
Plant	Cyperus onerosus (Dune Flat-sedge)	G2		TX:S2
<b>North American Warm Desert Playa (Partial)</b>				AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX
Assoc.	Sesuvium verrucosum Sparse Vegetation	G3?		TX
Animal	Branchinella acaciodea (Acacia Fairy Shrimp)	G2G3		TX:SNR
	Branchinella sublettei (Salt Playa Fairy Shrimp)	G3		TX:SNR
<b>South Texas Dune and Coastal Grassland (Partial)</b>				TX
Assoc.	Paspalum vaginatum Herbaceous Vegetation	G3G4		FL, TX
	Spartina patens - Fimbristylis (caroliniana, castanea) - (Panicum virgatum) Herbaceous Vegetation	G2G3		LA?, MXTM?, TX
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
Assoc.	Fuirena scirpoidea - Fuirena longa - Rhynchospora microcarpa - Rhynchospora divergens Herbaceous Vegetation	G2		TX
	Paspalum vaginatum Herbaceous Vegetation	G3G4		FL, TX
	Spartina patens - Fimbristylis (caroliniana, castanea) - (Panicum virgatum) Herbaceous Vegetation	G2G3		LA?, MXTM?, TX
	Typha domingensis Seasonally Flooded Gulf Coastal Plain Herbaceous Vegetation	G3?		AL, LA?, MS, TX
Plant	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
<b>Texas-Louisiana Coastal Prairie (Partial)</b>				LA, TX
Assoc.	Euthamia leptoccephala - Helianthus angustifolius - Boltonia asteroides - Spartina patens Herbaceous Vegetation	G1		LA, TX?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Texas-Louisiana Coastal Prairie Pondshore (Partial)</b>				LA, TX
Assoc.	Eleocharis quadrangulata - Sagittaria spp. Herbaceous Vegetation	G3?		TX
<b>West Gulf Coastal Plain Flatwoods Pond (Partial)</b>				LA, TX
Assoc.	Aristida palustris - Panicum virgatum - Eriocaulon compressum - Eleocharis equisetoides Herbaceous Vegetation	G2G3		LA, TX

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Aristida palustris - Panicum virgatum - Eriocaulon decangulare var. decangulare - Rhynchospora elliottii Herbaceous Vegetation	G2G3		LA, TX
	Nymphoides aquatica - Nymphaea odorata - Gratiola brevifolia Herbaceous Vegetation	G3?		LA, TX
	Nyssa biflora - Crataegus opaca - (Fraxinus caroliniana) / Rhynchospora mixta Woodland	G2?		LA, TX?
	Nyssa biflora / Panicum hemitomom - Woodwardia virginica Woodland	G3?		LA?, TX
	Panicum hemitomom - Eriocaulon compressum - Rhynchospora corniculata Herbaceous Vegetation	G2		LA, TX
Animal	Bufo houstonensis (Houston Toad)	G1	LE	TX:S1
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Fuirena longa (Coastal-plain Umbrella-sedge)	G3G4		AL:SNR, FL:SNR, MS:S3S4, TX:S2
<b>West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods (Partial)</b>				AR, LA, OK?, TX
Assoc.	(Quercus laurifolia) / Crataegus opaca - Crataegus viridis Forest	G1		AL?, LA, MS, TX
	Fraxinus caroliniana Seasonally Flooded Forest	G2G3		LA, TX
	Nyssa biflora - Quercus laurifolia / Sphagnum spp. Depression Forest	G3?		AR?, LA, TX?
	Quercus laurifolia - Liquidambar styraciflua - Nyssa biflora - Acer rubrum / Sabal minor Forest	G3?		LA, TX
	Quercus laurifolia - Quercus phellos - Quercus nigra / Viburnum dentatum - (Sebastiania fruticosa) / Carex glaucescens Upper West Gulf Flatwoods Forest	G2G3		AR?, LA?, TX
	Quercus lyrata - Quercus phellos - Ulmus americana / Rhynchospora spp. Forest	G2G3		AR?, LA, TX?
	Quercus phellos - Quercus similis / Crataegus marshallii - Crataegus spathulata / Chasmanthium laxum Forest	G3?		AR?, LA, TX
	Quercus phellos / Chasmanthium laxum - Carex (flaccosperma, intumescens) - Hymenocallis liriosme Flatwoods Forest	G3G4		AR, LA, OK?, TX
	Quercus phellos / Chasmanthium laxum Forest	G3?		AR?, LA?, OK?, TX
	Taxodium distichum - Nyssa biflora - Magnolia virginiana - Acer rubrum Forest	G2?		LA, TX?
<b>West Gulf Coastal Plain Pine-Hardwood Flatwoods (Partial)</b>				AR, LA, OK?, TX
Assoc.	Quercus stellata - Pinus taeda Flatwoods Depression Forest	G2G3		AR?, LA?, TX
Animal	Bufo houstonensis (Houston Toad)	G1	LE	TX:S1
<b>Western Great Plains Closed Depression Wetland (Strict)</b>				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Buchloe dactyloides - (Phyla cuneifolia, Oenothera canescens) Herbaceous Vegetation	G2G3		KS:SU, NE:S1, OK:S2, TX?
	Pleuraphis mutica - Panicum obtusum Herbaceous Vegetation	G3		AZ:S2, MXCH?, MXCO?, MXSO?, NM:S3, TX
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
<b>Western Great Plains Open Freshwater Depression Wetland (Partial)</b>				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Typha (angustifolia, domingensis, latifolia) - Schoenoplectus americanus Herbaceous Vegetation	G3G4		KS:SU, OK, TX?

Isolated Wetland Ecological System (Isolation Type)				System distribution
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Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Distichlis spicata - (Hordeum jubatum, Poa arida, Sporobolus airoides) Herbaceous Vegetation	G3		KS:S2, NE:S3, OK, TX
	Distichlis spicata - Schoenoplectus maritimus - Salicornia rubra Herbaceous Vegetation	G1G2		AR?, KS:SU, MO, NE:S1, TX?
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Animal	Eocyclus concavus (Swaybacked Clam Shrimp)	G1G3		AZ:SNR, NM:SNR, TX:SNR
Plant	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Utah

Colorado Plateau Hanging Garden (Strict)				AZ, CO, NV?, UT
Assoc.	Aquilegia micrantha - Mimulus eastwoodiae Herbaceous Vegetation	G2G3		CO:S2S3, UT
Plant	Carex specuicola (Navajo Sedge)	G2	LT	AZ:S2, UT:S1, NN:S2
	Mimulus eastwoodiae (Eastwood Monkeyflower)	G3		AZ:SNR, CO:S1, NV:SNR, UT:S3, NN:S3S4
	Platanthera zothecina (Alcove Bog-orchid)	G2		UT:S2, CO:S1, AZ:S2, NN:S2
Inter-Mountain Basins Alkaline Closed Depression (Partial)				CA, ID, NV, OR, UT, WA?
Assoc.	Eleocharis palustris - Distichlis spicata Herbaceous Vegetation	G2G4		UT:S2S4
	Eleocharis palustris - Juncus balticus Herbaceous Vegetation	G2G4		UT:S2S4
Plant	Astragalus diversifolius (Mesic Milkvetch)	G2		WY:SH, ID:S2, NV:S1, UT:S1
	Ivesia kingii (King's Ivesia)	G3	PS	CA:SNR, NV:S3, UT:S1
Inter-Mountain Basins Greasewood Flat (Partial)				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Puccinellia nuttalliana Herbaceous Vegetation	G3?		CO:S1?, MT, NV?, SK?, UT?
	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
Plant	Atriplex bonnevillensis (Bonneville Saltbush)	G2G3Q		NV:SNR, UT:S2
	Puccinellia simplex (Little Alkali-grass)	G3G4		CA:SNR, UT:S1
Inter-Mountain Basins Interdunal Swale Wetland (Partial)				AZ?, CO, ID, NV, UT, WY?
Assoc.	Juncus balticus - Carex rossii Herbaceous Vegetation	G2G4		UT:S2S4
	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
Inter-Mountain Basins Playa (Partial)				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Pluchea sericea Seasonally Flooded Shrubland [Placeholder]	G3?		CA:S3, UT
	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Assoc.	Populus fremontii / Baccharis salicifolia Woodland	G2		NM:S1?, UT:S1S2

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Vermont

<b>Acadian Near-Boreal Spruce Flat (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Acadian-Appalachian Conifer Seepage Forest (Partial)</b>				ME, NB, NH, NY, QC, VT
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
Plant	Carex wiegandii (Wiegand's Sedge)	G3		MA:S1, ME:S3, MI:S2, NH:S1S2, NY:S1, PA:S1, VT:S1
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Cornus racemosa / Carex (sterilis, aquatilis, lacustris) Shrub Herbaceous Vegetation	G2G3		CT, MA, NY, VT
	Dasiphora fruticosa ssp. floribunda / Carex (sterilis, hystericina, flava) Shrub Herbaceous Vegetation	G2		CT, MA, NH, NY, VT
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Myrica gale - Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa - Cladium mariscoides Shrub Herbaceous Vegetation	G2G3		CT, MA, NH?, NJ:S1, NY, PA, RI?, VT
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Lysimachia terrestris - Dulichium arundinaceum - Rhexia virginica Herbaceous Vegetation	G2G3		CT, MA, ME, NH, ON, VT
	Rhexia virginica - Panicum verrucosum Herbaceous Vegetation	G2G3		CT, DE, MA, MD:S2, NH?, NJ:S1S3, NY, RI?, VT
	Rhynchospora capitellata - Cyperus dentatus - Rhexia virginica - Xyris difformis Herbaceous Vegetation	G2		CT, MA, ME, NH, NJ?, NS?, NY, ON, RI, VT
	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
Plant	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2
	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1



Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Virginia

Atlantic Coastal Plain Northern Basin Peat Swamp (Partial)				CT, DE, MA, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest (Partial)				DE, MD, NJ, NY, VA
Assoc.	Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest	G3?		DC, DE, MD, NJ:S4S5, NY, PA, VA:S3?
	Liquidambar styraciflua - Acer rubrum - Nyssa biflora / Carex jorii Forest	G1G2		MD, VA
	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G3		DE, MD, NC, NJ:S1?, VA
Plant	Juncus caesariensis (New Jersey Rush)	G2		MD:S1, NC:S1, NJ:S2, VA:S2
Atlantic Coastal Plain Northern Dune and Maritime Grassland (Partial)				CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA
Assoc.	Morella cerifera / Spartina patens Shrubland	G3G4		FL, GA, NC, SC, VA?
Atlantic Coastal Plain Northern Pondshore (Partial)				DE, MA, MD, MI, NJ, NY, VA, VT
Assoc.	Cephalanthus occidentalis / Polygonum hydropiperoides - Panicum verrucosum Shrubland	G3?		DE, MA?, MD, RI?, VA
	Liquidambar styraciflua - Acer rubrum - Nyssa biflora / Carex jorii Forest	G1G2		MD, VA
	Quercus phellos / Carex striata var. brevis Forest	G2?		MD?, VA:S2?
	Saccharum giganteum - (Dichanthelium spretum, Panicum verrucosum) Herbaceous Vegetation	G1G2		MD, VA?
Plant	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Helenium virginicum (Virginia Sneezeweed)	G2	LT	MO:S3, VA:S2
	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Lycopodiella margueritiae (Northern Prostrate Clubmoss)	G2		OH:S1, PA:SU, MI:S2, VA:S1, TV:SNR
	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
Atlantic Coastal Plain Southern Depression Pondshore (Partial)				FL, GA, NC, SC, VA
Assoc.	Nyssa biflora / Itea virginica - Cephalanthus occidentalis Depression Forest	G3G4		AL:S1, FL, GA, LA, MS, NC, SC, VA?
	Pinus serotina / Cyrilla racemiflora - Lyonia lucida - Vaccinium fuscatum Woodland	G2G3		NC, SC, VA?
	Saccharum baldwinii - Carex glaucescens - Rhynchospora corniculata Herbaceous Vegetation	G2G3		VA
	Vaccinium formosum - Vaccinium fuscatum / Sphagnum cuspidatum Shrubland	G3?		DE, MD, NC, SC, VA?
	Woodwardia virginica / Sphagnum cuspidatum Herbaceous Vegetation	G2?		DE, FL, GA, MD, NC, SC, VA?
Plant	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Carex verrucosa (Warty Sedge)	G3G4		AL:SNR, FL:SNR, GA:S4?, LA:SNR, MS:S2, NC:S1, SC:SNR, TX:S2S3, VA:SNR
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR

Isolated Wetland Ecological System (Isolation Type)				System distribution
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	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH, TV:SNR
	Litsea aestivalis (Pondspice)	G3		FL:S2, GA:S2, LA:SH, MD:S1, NC:S2, SC:S3, VA:S1
	Myriophyllum laxum (Piedmont Water-milfoil)	G3		AL:S2, FL:S3, GA:S2, MS:S1, NC:S1, SC:S2, VA:S1
<b>Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)</b>				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Carex aquatilis - Dulichium arundinaceum Herbaceous Vegetation	G1?		VA:S1
	Carex barrattii Herbaceous Vegetation	G1		VA:S1
	Cephalanthus occidentalis / Dulichium arundinaceum Shrubland	G1		VA:S1
	Cephalanthus occidentalis / Torreyochloa pallida Shrubland	G1?		VA
	Orontium aquaticum - Schoenoplectus subterminalis - Eriocaulon aquaticum Herbaceous Vegetation	G1		DE, VA:S1
	Quercus palustris / Panicum rigidulum var. rigidulum - Panicum verrucosum - Eleocharis acicularis Herbaceous Vegetation	G1		VA:S1
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
	Sparganium americanum - Epilobium leptophyllum Herbaceous Vegetation	G2G3		NC, TN, VA:S1?, WV
	Vaccinium macrocarpon / Pogonia ophioglossoides Dwarf-shrubland	G1Q		VA
Plant	Boltonia sp. 1	G2?		NJ:SNR, VA:S1
	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Fimbristylis perpusilla (Harper's Fimbristylis)	G2		DE:S1, GA:S1, MD:S2, NC:S1, SC:S2, TN:S1, VA:S1, TV:SNR
	Helenium virginicum (Virginia Sneezeweed)	G2	LT	MO:S3, VA:S2
	Isoetes virginica (Virginia Quillwort)	G1		NC:S1, VA:S1?
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
<b>North-Central Appalachian Seepage Fen (Partial)</b>				CT, MA, MD, NJ, NY, PA, VA, VT, WV?
Assoc.	Alnus serrulata - Lindera benzoin / Osmunda regalis var. spectabilis - Carex tetanica Shrubland	G1?		VA:S1
	Carex atlantica - Solidago patula var. patula - Lilium grayi / Sphagnum bartlettianum Herbaceous Vegetation	G1		NC, TN?, VA?
Plant	Carex sp. 2 (Fen Sedge)	G1		NC:S1, VA:S1, TV:SNR
	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
<b>Southeastern Coastal Plain Interdunal Wetland (Partial)</b>				AL, FL, GA, LA, MS, NC, SC, TX, VA
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Southern Appalachian Seepage Wetland (Partial)</b>				AL?, GA, KY?, NC, SC, TN, VA, WV?

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)
Assoc.	Carex gynandra - Platanthera clavellata - Drosera rotundifolia - Carex ruthii - Carex atlantica / Sphagnum spp. Herbaceous Vegetation	G2		NC, TN, VA?
	Diphylleia cymosa - Saxifraga micranthidifolia - Laportea canadensis Herbaceous Vegetation	G3		GA, NC, SC?, TN, VA
	Impatiens (capensis, pallida) - Monarda didyma - Rudbeckia laciniata var. humilis Herbaceous Vegetation	G3		GA, NC, SC, TN, VA, WV?
	Schoenoplectus robustus - Juncus gerardii - Hordeum jubatum - Atriplex patula Herbaceous Vegetation	G1		VA
Plant	Cardamine clematitidis (Mountain Bitter Cress)	G2G3		AL:SH, NC:S2, SC:SNR, TN:S2, VA:S1S2, TV:SNR, GS:P2
	Chelone cuthbertii (Cuthbert's Turtlehead)	G3		GA:S1, NC:S3?, SC:SNR, VA:S2, TV:SNR
	Saxifraga caroliniana (Carolina Saxifrage)	G2		GA:SH, NC:S2, TN:S1S2, VA:S2?, WV:S1, TV:SNR, GS:PNR
<b>Southern Piedmont / Ridge and Valley Upland Depression Swamp (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Quercus palustris - Quercus bicolor / Carex spp. Forest	G1G3		VA:S2
	Quercus phellos / Carex (albolutescens, intumescens, jorii) - Chasmanthium laxum / Sphagnum lescurii Forest	G2G3		AL, GA?, NC, SC, VA:S2?
	Scirpus cyperinus - Dulichium arundinaceum / Sphagnum spp. Herbaceous Vegetation	G1Q		GA, NC, SC?, TN, VA?
Plant	Boltonia sp. 1	G2?		NJ:SNR, VA:S1
	Carex decomposita (Cypress-knee Sedge)	G3		AL:S1, AR:S2, DC:SH, DE:S1, FL:SNR, GA:S2?, IL:S1, IN:S2, KY:S2, LA:S1, MD:S1, MO:S3, MS:S3, NC:S1, NY:SH, OH:S1, OK:SU, SC:SNR, TN:S2, TX:S1, VA:S2, TV:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
	Isoetes virginica (Virginia Quillwort)	G1		NC:S1, VA:S1?
<b>Southern Piedmont Granite Flatrock (Strict)</b>				AL, GA, NC, SC, VA
Assoc.	Talinum teretifolium - Minuartia glabra - Diodia teres - Croton willdenowii Herbaceous Vegetation	G2G3		VA:S2
Plant	Cyperus granitophilus (Granite-loving Flatsedge)	G3Q		AL:S2, GA:S3, NC:S1, SC:SNR, TN:S1, VA:S1, TV:SNR
	Isoetes piedmontana (Piedmont Quillwort)	G3		AL:S2, GA:S3, NC:S1, SC:S2, TX:S1, VA:S1?
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Arundinaria gigantea ssp. tecta Shrubland	G1		AL?, FL?, GA, MS?, NC, SC?, VA
	Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) Shrubland	G3		FL, GA, NC, SC, VA

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Washington

Boreal Depressional Bog (Partial)				AK, BC, ID, MT, OR, WA
Assoc.	Carex exsiccata Herbaceous Vegetation [Provisional]	G2G3		BC:S2, WA:S2S3
	Dulichium arundinaceum Seasonally Flooded Herbaceous Vegetation	G3		BC:S2, CA:S1?, ID:S2, MT:S2, OR:S3, WA:S2S3, WY?
	Kalmia microphylla - Ledum groenlandicum / Xerophyllum tenax Shrubland	G1		WA:S1
	Ledum groenlandicum - Myrica gale / Sphagnum spp. Shrubland	G2		BC:S2, WA:S1
	Malus fusca Shrubland	G3		BC:S2S3, OR:S2, WA:S2S3
	Pinus contorta var. contorta / Ledum groenlandicum / Sphagnum spp. Woodland	G3		BC:S2S3, WA:S2
	Pinus monticola / Ledum groenlandicum / Sphagnum spp. Woodland	G1		WA:S1
	Rhynchospora alba - (Vaccinium oxycoccos) / Sphagnum tenellum Herbaceous Vegetation [Provisional]	G3		BC:S3, WA:S2
	Spiraea douglasii / Sphagnum spp. Shrubland	G3		BC:S2?, OR:S1, WA:S2
	Tsuga heterophylla - (Thuja plicata) / Ledum groenlandicum / Sphagnum spp. Forest	G3		BC:S3, WA:S2
	Tsuga heterophylla - (Thuja plicata) / Sphagnum spp. Forest	G1		WA:S1
Columbia Plateau Vernal Pool (Strict)				BC?, NV, OR, WA
Plant	Juncus uncialis (Inch-high Rush)	G3G4		CA:SNR, NV:SNR, OR:SNR, WA:S2
Inter-Mountain Basins Greasewood Flat (Partial)				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Leymus cinereus - Distichlis spicata Herbaceous Vegetation	G3		CA:S1, CO, ID:S1, NV, OR:S3, UT, WA:S1
	Leymus cinereus Bottomland Herbaceous Vegetation	G1		CA:S1, ID:S1, OR:S1, WA:S1
	Sarcobatus vermiculatus / Leymus cinereus Shrubland	G3		CA?, ID:S2, MT:S2S3, NV?, OR:S2, WA:S1
Modoc Basalt Flow Vernal Pool (Strict)				CA, OR, WA
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
North Pacific Hardpan Vernal Pool (Strict)				BC, CA, OR, WA
Assoc.	Plagiobothrys scouleri - Plantago bigelovii Herbaceous Vegetation	G2		BC:S2, WA:S1?
Plant	Juncus kelloggii (Kellogg's Rush)	G3?		CA:SNR, NV:SNR, WA:S1
Northern Columbia Plateau Basalt Pothole Ponds (Strict)				OR, WA
Assoc.	Schoenoplectus americanus Western Herbaceous Vegetation	G3Q		CA:S3, ID:S3, OR:S2S3, WA:S1?
Plant	Howellia aquatilis (Water Howellia)	G3	LT	CA:S1.2, ID:S1, MT:S2, OR:S1, WA:S2S3
Willamette Valley Wet Prairie (Partial)				OR, WA
Assoc.	Camassia quamash Wet Prairie Herbaceous Vegetation	G3		ID, OR:S3, WA:S1
	Carex aperta Herbaceous Vegetation	G1?		ID?, MT, OR:S1, WA
	Carex densa - Deschampsia caespitosa Herbaceous Vegetation [Provisional]	G2		OR:S2, WA:S1
	Deschampsia caespitosa - Danthonia californica Herbaceous Vegetation	G2		OR:S2, WA:S1
	Isoetes nuttallii Herbaceous Vegetation	G3		BC:S1, OR:S3, WA?
Plant	Lomatium bradshawii (Bradshaw's Lomatium)	G2	LE	OR:S2, WA:S1
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Plant	Potentilla newberryi (Newberry Cinquefoil)	G3G4		CA:S2.3?, NV:SNR, OR:SNR, WA:SH

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## West Virginia

Central Interior Highlands and Appalachian Sinkhole and Depression Pond (Partial)				AL, AR, DE, GA, IL, IN, KY, MD, MO, NC, NJ, OH, PA, TN, VA, WV
Assoc.	Sparganium americanum - Epilobium leptophyllum Herbaceous Vegetation	G2G3		NC, TN, VA:S1?, WV
Plant	Scirpus ancistrochaetus (Northeastern Bulrush)	G3	LE	MA:S1, MD:S1, NH:S2, PA:S3, VA:S2, VT:S2, WV:S1
At-risk isolated wetland elements not confirmed in any isolated wetland system in state				
Plant	Hypericum adpressum (Creeping St. John's-wort)	G3		CT:SH, DE:S2, GA:S2?, IL:S1, IN:S1, KY:SH, MA:S2, MD:S1, MO:S1, NC:SH, NJ:S2, NY:S2, RI:S2, SC:S1, TN:S1, VA:S1, WV:SH
	Saxifraga caroliniana (Carolina Saxifrage)	G2		GA:SH, NC:S2, TN:S1S2, VA:S2?, WV:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
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## Wisconsin

<b>Boreal-Laurentian Bog (Partial)</b>				MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, QC, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>Boreal-Laurentian Conifer Acid Swamp (Partial)</b>				MB, ME, MI, MN, NB, NH?, NS, NY, ON, PE?, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
<b>Boreal-Laurentian-Acadian Acidic Basin Fen (Partial)</b>				MA, ME, MI, MN, NB?, NH, NS?, NY, QC, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
<b>Great Lakes Alvar (Partial)</b>				MI, NY, OH, ON, WI
Plant	Iris lacustris (Dwarf Lake Iris)	G3	LT	MI:S3, WI:S3
<b>Great Lakes Dune and Swale (Partial)</b>				IL, IN, MI, MN, OH, ON, PA, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
Plant	Iris lacustris (Dwarf Lake Iris)	G3	LT	MI:S3, WI:S3
<b>Great Lakes Wet-Mesic Lakeplain Prairie (Partial)</b>				IL, IN, MI, OH, ON, WI
Plant	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>Laurentian-Acadian Conifer-Hardwood Acid Swamp (Partial)</b>				ME, MI, MN, NB?, NH, NY, ON, VT, WI
<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior and Appalachian Acid Peatland (Partial)</b>				CT, IL, IN, MA, ME, MI, MN, NH, NJ, NY, OH, ON, PA, RI, VT, WI
Assoc.	Carex lasiocarpa - Carex oligosperma - (Lysimachia terrestris) / Sphagnum spp. / Spiraea tomentosa Herbaceous Vegetation	G3G4		IL:S2, MI, MN:S3, WI:S2
	Chamaedaphne calyculata / Carex oligosperma - Eriophorum virginicum Dwarf-shrubland	G3G4		IL:S2, IN, MI, OH, ON, WI:S3
Plant	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
<b>North-Central Interior Freshwater Marsh (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON?, SD, WI
Assoc.	Schoenoplectus fluviatilis - Schoenoplectus spp. Herbaceous Vegetation	G3G4		IA, IL, IN, MB:S3, MN, MO, OH, WI
	Zizania (aquatica, palustris) Herbaceous Vegetation	G3G4		IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3
<b>North-Central Interior Shrub-Graminoid Alkaline Fen (Partial)</b>				IA, IL, IN, MI, MN, ND, OH, ON, SD, WI
Assoc.	Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation	G3G4		IA:S1, IL?, MB:SU, MI, MN, ND, ON, WI:S3
	Cornus amomum - Salix spp. - Toxicodendron vernix - Rhamnus lanceolata Fen Shrubland	G2G3		IL:S1S2, IN, MI, OH, ON, WI
	Dasiphora fruticosa ssp. floribunda / Carex sterilis - Andropogon gerardii - Arnoglossum plantagineum Shrub Herbaceous Vegetation	G3G4		IL, IN, MI, MN:S1, OH, ON:S1, WI:S3
<b>North-Central Interior Wet Flatwoods (Partial)</b>				CT, IA, IL, IN, MA, MI, MN, MO, NY, OH, ON, PA, VT, WI

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<i>no at-risk isolated wetland elements confirmed in this isolated wetland system in state</i>				
<b>North-Central Interior Wet Meadow-Shrub Swamp (Partial)</b>				IA, IL, IN, MI, MN, MO, ND, OH, ON, SD, WI
Assoc.	Cornus sericea - Salix (bebbiana, discolor, petiolaris) / Calamagrostis stricta Shrubland	G3G4		IA:S3?, IL, MB:SU, MN:S3, ND, WI
	Spartina pectinata - Carex spp. - Calamagrostis canadensis - Lythrum alatum - (Oxypolis rigidior) Herbaceous Vegetation	G3?		IA:SU, IL, IN:S1, MI:S2, MN, MO:S1, NE:S1, OH, WI:S1
	Spartina pectinata - Carex spp. - Calamagrostis canadensis Sand Herbaceous Vegetation	G3?		IL, IN, ON?, WI
Plant	Eleocharis nitida (Slender Spikerush)	G3G4		AK:S1, ME:SNR, MI:S1, MN:S2, NH:SH, VT:SH, WI:S2
	Eleocharis wolfii (Wolf Spikerush)	G3G4		AL:S1, AR:S2, GA:S1, IA:S1, IL:S1, IN:S2, KS:S1, LA:S1?, MN:S1, MO:S3, MS:SNR, ND:SH, NE:S1, OH:S1, OK:SU, TN:S1, TX:S1, WI:S1, TV:SNR
	Platanthera leucophaea (Eastern Prairie White-fringed Orchid)	G3	LT	IA:S1, IL:S1, IN:S1, ME:S1, MI:S1, MO:SH, NY:SH, OH:S2, OK:SH, VA:S1, WI:S2S3
	Schoenoplectus hallii (Hall's Bulrush)	G2		GA:SH, IA:S1, IN:S1, MI:S2, NE:S1, OK:S1, SC:SNR, WI:S1, TV:SNR, IL:S1, KS:S1, KY:S1, MO:S2, TX:S1
<b>Northern Great Lakes Interdunal Wetland (Partial)</b>				MI, MN, NY, ON, WI
Assoc.	Dasiphora fruticosa ssp. floribunda / Cladium mariscoides - Juncus balticus - (Rhynchospora capillacea) Herbaceous Vegetation	G3?		IL:S1, IN:S1, MI:S2, ON, WI:S1
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Assoc.	Rhynchospora capitellata - Rhexia virginica - Rhynchospora scirpoides - Schoenoplectus hallii Herbaceous Vegetation	G2?		IN, MI:S2, ON:S3, WI:S1

Isolated Wetland Ecological System (Isolation Type)				System distribution
Type	Scientific Name (Common Name)	NatureServe Global Rank	U.S. ESA Status	Subnational distribution (subnational rank)

## Wyoming

<b>Inter-Mountain Basins Greasewood Flat (Partial)</b>				AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY
Assoc.	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
<b>Inter-Mountain Basins Playa (Partial)</b>				CA, CO, ID, NM, NV, OR, UT, WA?, WY
Assoc.	Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation	G3?		CO, OR:S4, UT, WY:S3?
<b>Western Great Plains Closed Depression Wetland (Strict)</b>				CO, KS, NE, NM?, OK, SD, TX, WY
Assoc.	Pascopyrum smithii - Eleocharis spp. Herbaceous Vegetation	G1		CO, MT?, SD, WY:S1
<b>Western Great Plains Open Freshwater Depression Wetland (Partial)</b>				KS, MT, ND, NE, OK, SD, TX, WY
Assoc.	Spartina pectinata - Schoenoplectus pungens Herbaceous Vegetation	G3?		MT:S3, WY:S2S3
<b>Western Great Plains Saline Depression Wetland (Partial)</b>				CO, KS, MT, ND, NE, NM, OK, SD, TX, WY
Assoc.	Schoenoplectus pungens Herbaceous Vegetation	G3G4		CO:S3, ID, KS, MT:S3, ND, NM, NV, SD, UT:S2S4, WY
	Spartina pectinata - Schoenoplectus pungens Herbaceous Vegetation	G3?		MT:S3, WY:S2S3
<b>At-risk isolated wetland elements not confirmed in any isolated wetland system in state</b>				
Plant	Astragalus diversifolius (Mesic Milkvetch)	G2		WY:SH, ID:S2, NV:S1, UT:S1