

**America's Vulnerable Waters:
Assessing the Nation's Portfolio of Vulnerable
Aquatic Resources since *Rapanos v. U.S.***

**Appendix 5: Potentially Vulnerable Wetland and Stream
Types Identified in Scientific and Conservation
Literature, by EPA Region and State**

An ELI Report

August 2011



**AMERICA'S VULNERABLE WATERS:
Assessing the Nation's Portfolio of Vulnerable
Aquatic Resources since *Rapanos v. United States***

Appendix 5: Potentially Vulnerable Wetland and Stream Types Identified in
Scientific and Conservation Literature, by U.S. Environmental Protection Agency
(EPA) Region and State

An Environmental Law Institute Report

August 2011

ACKNOWLEDGMENTS

This report was prepared by the Environmental Law Institute (ELI) with funding from the U.S. Environmental Protection Agency under EPA Wetlands Program Development Grant No. WD-83417601. The contents of this report do not necessarily represent the views of the Environmental Protection Agency, and no official endorsement of the report or its findings should be inferred. Any errors and omissions are solely the responsibility of ELI.

Principal ELI staff members contributing to this technical appendix were Law Clerk Kim Tuthill, Philip Womble, Rebecca L. Kihslinger, and James M. McElfish, Jr. ELI also gratefully acknowledges the help of Science and Policy Intern, Eric Sweeney, and the following research interns: Katrina Cuskelly, John Stokes, Lucas Ackerknecht, Tim Allan, Kate Glass, Katelyn Henmueller, Jennifer Jones, Allison Tse, Amanda Vasquez, and Carley Wigod.

About ELI Publications—

ELI publishes Research Reports that present the analysis and conclusions of the policy studies ELI undertakes to improve environmental law and policy. In addition, ELI publishes several journals and reporters—including the Environmental Law Reporter, The Environmental Forum, and the National Wetlands Newsletter—and books, which contribute to education of the profession and disseminate diverse points of view and opinions to stimulate a robust and creative exchange of ideas. Those publications, which express opinions of the authors and not necessarily those of the Institute, its Board of Directors, or funding organizations, exemplify ELI's commitment to dialogue with all sectors. ELI welcomes suggestions for article and book topics and encourages the submission of draft manuscripts and book proposals.

*America's Vulnerable Waters: Assessing the Nation's Portfolio of Vulnerable Aquatic Resources since *Rapanos v. United States**, Copyright © 2011 Environmental Law Institute®, Washington, D.C. All rights reserved.
ELI Project No. 0916-01

An electronic retrievable copy (PDF file) of this report may be obtained for no cost from the Environmental Law Institute website at www.eli.org; click on "ELI Publications," then search for this report. [Note: ELI Terms of Use will apply and are available on site.]

(Environmental Law Institute®, The Environmental Forum®, and ELR® – The Environmental Law Institute Law Reporter® are registered trademarks of the Environmental Law Institute.)

Table of Contents

Region 1	87
Connecticut	87
Maine	88
Massachusetts	89
New Hampshire	90
Rhode Island	91
Vermont	92
Region 2	93
New Jersey	93
New York	94
Region 3	97
Delaware	97
Maryland	98
Pennsylvania	99
Virginia	100
West Virginia	102
Region 4	103
Alabama	103
Florida	105
Georgia	107
Kentucky	108
Mississippi	109
North Carolina	110
South Carolina	112
Tennessee	114
Region 5	116
Illinois	116
Indiana	118
Michigan	119
Minnesota	121
Ohio	124
Wisconsin	125
Region 6	128
Arkansas	128
Louisiana	129

New Mexico	130
Oklahoma	131
Texas	132
Region 7	136
Iowa	136
Kansas	137
Missouri	138
Nebraska	139
Region 8	142
Colorado	142
Montana	143
North Dakota	145
South Dakota	146
Utah	147
Wyoming	148
Region 9	150
Arizona	150
California	151
Hawaii	153
Nevada	154
Region 10	156
Alaska	156
Idaho	157
Oregon	158
Washington	159
Sources Key	162

This appendix organizes geographically both the peer-reviewed and grey literature (including studies by and on behalf of state regulators) that documents the existence of vulnerable aquatic resource types. It is intended to serve as a quick, yet complete, reference to the relevant literature. Its chief value lies in its geographic organization, thus facilitating comparisons among states and regions. This information may assist states, federal regulators, and the public to identify vulnerabilities that may arise in the absence of state regulatory programs, as well as to assist them in targeting non-regulatory conservation programs.

Region 1 (CT, MA, ME, NH, RI, VT)

- Several northeastern states contain bogs (Tiner 2003a).
- Woodland vernal pools are often seasonal ponds that are inundated during the wet season, usually from late fall to mid- or late-summer in the Northeastern states (Tiner 2003a).
- The Atlantic Coastal Plain Northern Pondshore is a geographically isolated wetland ecological system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It is restricted to the Atlantic Coastal Plain from the southern portion of the Delmarva Peninsula to Cape Cod, Massachusetts. The system includes groundwater-flooded depressions and occurs on sandy deposits such as outwash plains of the glaciated region (Cape Cod) within an upland matrix of pitch pine barrens (Comer et al. 2005).

Connecticut:

- Contains 17 wetland systems, including five isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Maine:

- Geographically isolated wetlands have moderate levels of abundance in the Casco Bay watershed. A Casco Bay Watershed study area had 17% of wetland area predicted to be isolated and 52% of total wetlands by number predicted to be isolated (Tiner 2003b).
- A Porcupine Mountain study area in the glaciated region classified 17 - 18% of wetland area as isolated and 66 - 67% of the total number of wetlands as isolated (Tiner 2003b).
- Contains 27 wetland systems, including eight isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 30% are isolated (Comer et al. 2005).
- Contains Acadian Near-Boreal Spruce Flat, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Acadian-Appalachian Conifer Seepage Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Conifer Acid Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Massachusetts:

- Contains kettle ponds in sandy coastal areas on glacial outwash deposits such as Cape Cod (Tiner 2003a).
- A Northampton study area in the glaciated region classified 17 - 22 % of wetland area as isolated and 44 - 54% of the total number of wetlands as isolated (Tiner 2003b).
- Contains 26 wetland systems, including eight isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 31% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

New Hampshire:

- A Conway study area in the glaciated region classified 12 - 16% of wetland area as isolated and 38 - 41% of the total number of wetlands as isolated (Tiner 2003b).
- An Epping study site in the glaciated region classified 14 - 16% of wetland area as isolated and 62 - 66% of wetland number as isolated (Tiner 2003b).
- Contains 28 wetland systems, including seven isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 25% are isolated (Comer et al. 2005).
- Contains Acadian Near-Boreal Spruce Flat, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Acadian-Appalachian Conifer Seepage Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Rhode Island:

- In ten watersheds studied in the state, 2,962 individual wetlands were identified, of which 1,216 or 41.1% were isolated (i.e., completely surrounded by upland). The five most abundant types of isolated wetlands in order of abundance were deciduous forested wetlands, woodland vernal pools called shrub swamps, emergent freshwater marshes or wet meadows, coniferous forested wetlands, and woodland vernal pools called palustrine open water. Collectively, they accounted for 99.2% of isolated wetland types in the ten watersheds. Other isolated wetland types include inactive floodplain wetlands, seepage slope wetlands, coastal plain ponds, and fens. (McKinney and Charpentier 2009).
- In response to EPA and the Army Corps of Engineers' (Corps) Advanced Notice of Preliminary Rule-Making (ANPRM) for *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers (SWANCC)*, the state reported that non-navigable tributary streams constitute 85% of the total stream miles in the state (Kusler 2004).
- Contains seven wetland systems, including two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. 29% of wetland systems are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Vermont:

- A Bread Loaf study area in the glaciated region classified 14 - 17% of wetland as isolated and 37 - 41% of the total number of wetlands as isolated (Tiner 2003b).
- Contains 21 wetland systems, including seven isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 33% are isolated (Comer et al. 2005).
- Contains Acadian Near-Boreal Spruce Flat, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Acadian-Appalachian Conifer Seepage Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 2 (NJ, NY)

- The Atlantic Coastal Plain Northern Pondshore is a geographically isolated wetland ecological system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It is restricted to the Atlantic Coastal Plain from the southern portion of the Delmarva Peninsula to Cape Cod, Massachusetts. The system includes groundwater-flooded depressions and deep glacial kettle holes. It occurs on sandy deposits such as outwash plains of the glaciated region (Long Island) and on the deep sands of the New Jersey Pine Barrens, or on finer sediments of the Coastal Plain of Cape May, New Jersey (Comer et al. 2005).

New Jersey:

- An Atsion study area in the coastal zone classified 1% of wetland area as isolated and 49 - 51% of the total number of wetlands as isolated (Tiner 2003b).
- A Boonton study area in the glaciated region classified 5 - 7% of wetland area as isolated and 42 - 49% of the total number of wetlands as isolated (Tiner 2003b).
- A Cape May study area in the coastal zone classified 4 - 5% of wetland area as isolated and 65 - 72% of the total number of wetlands as isolated (Tiner 2003b).
- A Newton study area in the glaciated region classified 18 - 19% of wetland area as isolated and 64 - 67% of the total number of wetlands as isolated (Tiner 2003b).
- Contains 18 wetland systems, including eight isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 44% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Bog, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

New York:

- Contains some kettle ponds in sandy coastal areas such as Long Island (Tiner 2003a).
- A Cannonsville Reservoir Basin study area predicted that 5% of wetland area was isolated and 15% of the total number of wetlands were isolated (Tiner 2003b).
- A Neversink Reservoir Basin study area predicted that 1% of wetland area was isolated and 2% of the total number of wetlands were isolated (excluding ponds) (Tiner 2003b).
- An East Lake Ontario study area in the glaciated region classified 20 - 22% of wetland area as isolated and 65 - 68% of the total number of wetlands as isolated (Tiner 2003b).
- A Millbrook study area in the glaciated region classified 25 - 28% of wetland area as isolated and 62 - 67% of the total number of wetlands as isolated (Tiner 2003b).
- Intermittent and ephemeral streams comprise 11% of the total stream length in the state (Nadeau and Rains 2007).
- There are fewer than 100 medium-to-rich fens in the state, and few are neither continuous with nor adjacent to navigable waters. Twenty-one fens are within 100 meters (m) of navigable waters, 34 fens are within 250 m, and 51 fens are within 500 m of navigable waters (Bedford and Godwin 2003 (citing Reschke 1990, Godwin et al. 2002,

and “the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states”)).

- Contains 36 wetland systems, including 16 isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 44% are isolated (Comer et al. 2005).
- Contains Acadian Near Boreal Spruce Flat, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Acadian-Appalachian Conifer Seepage Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic coastal Plain Northern Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Boreal-Laurentian Conifer Acid Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Alvar, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Great Lakes Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 3 (DE, MD, PA, VA, WV)

- The Atlantic Coastal Plain Northern Pondshore is a geographically isolated wetland ecological system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It is restricted to the Atlantic Coastal Plain from the southern portion of the Delmarva Peninsula to Cape Cod, Massachusetts. The system includes groundwater-flooded depressions and occurs on finer settlements of the Delmarva Peninsula and the Chesapeake Bay region (Comer et al. 2005).

Delaware:

- Contains Delmarva pothole wetlands, a geographically isolated wetland type made up of marshes, shrub swamps, forested wetlands, and ponds, along the Maryland-Delaware border from the headwaters of the Sassafras River to the Nanticoke River (Tiner 2003a; Leibowitz and Nadeau 2003).
- A study of the Nanticoke watershed estimated that 3% of total wetland area is isolated and 30% of the total number of wetlands are isolated (excluding ponds) (Tiner 2003b).
- Upper Delmarva pothole sites studied had 35 - 39% of its wetland area designated as isolated (Tiner 2003b).
- In response to the EPA and the Corps' ANPRM for *SWANCC*, the state reported that if only navigable and directly adjacent wetlands were regulated, 50% of all wetlands would be omitted from Clean Water Act (CWA) jurisdiction (Kusler 2004).
- Contains 13 wetland systems, including five isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 38% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very

infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Atlantic Coastal Plain Northern Pondshore, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Maryland:

- Contains Delmarva pothole wetlands, a geographically isolated wetland type made up of marshes, shrub swamps, forested wetlands, and ponds, along the Maryland-Delaware border from the headwaters of the Sassafras River to the Nanticoke River (Tiner 2003a).
- A Coastal Bays watershed study area found that 2% of wetland area was predicted to be isolated and 24% of the total number of wetlands were predicted to be isolated (excluding ponds) (Tiner 2003b).
- A Mid-Atlantic Coastal Plain study area found that 4 - 46% of wetland area was predicted to be isolated and 52 - 93% of the total number of wetlands were predicted to be isolated (Tiner 2003b).
- A Nanticoke watershed study area found that 3% of wetland area was predicted to be isolated and 29% of the total number of wetlands were predicted to be isolated (Tiner 2003b).
- A Delmarva pothole study area in the coastal zone classified 35 - 39% of its wetland area as isolated and 77 - 81% of the total number of wetlands as isolated (Tiner 2003b).
- A Frederick study area in the mountainous non-glaciated region classified 17 - 18% of wetland area as isolated and 43-48% of wetland number as isolated (Tiner 2003b).
- A Savage River study area in the mountainous non-glaciated region classified 20 - 22% of wetland acreage as isolated and 55 - 61% of wetland number as isolated (Tiner 2003b).
- It is estimated that 88% of the wetlands in the mid-Atlantic coastal area of Maryland, constituting 12% of the region's wetland area, could be excluded from CWA protection (Sharitz 2003).
- Contains 21 wetland systems, including six isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between

the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).

- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Pondshore, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Pennsylvania:

- A Distant study area in the coastal zone classified 17 - 18% of wetland area as isolated and 40 - 44% of the total number of wetlands as isolated (Tiner 2003b).
- An Edgemere study area in the glaciated region classified 15 - 16% of wetland area as isolated and 56 - 59% of the total number of wetlands as isolated (Tiner 2003b).
- A Lake Como study area in the glaciated region classified 16 - 18% of wetland area as isolated and 42 - 46% of the total number of wetlands as isolated (Tiner 2003b).
- Many small fens are present (Bedford and Godwin 2003 (citing "the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states"))).

- Contains 17 wetland systems, including five isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Virginia:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the western portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- An Earlysville study area in the Appalachian mountain region had 14 - 17% of its wetland area classified as isolated and 34 - 38% of its wetland number classified as isolated (Tiner 2003).
- In response to the EPA and the Corps' ANPRM for *SWANCC*, the state reported that up to 43% of the state's wetlands could become unregulated under the CWA (Kusler 2004).
- Contains 40 wetland systems, including nine isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of both surface water

and groundwater between the wetland and other waterbodies. Of wetland systems, 28% are isolated (Comer et al. 2005).

- Contains Atlantic Coastal Plain Northern Basin Peat Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Basin Swamp and Wet Hardwood Forest, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Appalachian Seepage Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Appalachian Seepage Wetland, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Southern Piedmont/Ridge and Valley Upland Depression Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont Granite Flatrock, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

West Virginia:

- A Rainelle study area in the Appalachian mountain region had 35 - 41% of wetland area classified as isolated and 60 - 65% of the total number of wetlands classified as isolated (Tiner 2003b).
- Contains eight wetland systems, including one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 13% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 4 (AL, FL, GA, KY, MS, NC, SC, TN)

- The Southeast contains gum ponds, a geographically isolated wetland type made up of ponds with water gum or swamp black gum (Tiner 2003a).
- The Atlantic Coastal Plain from southeast Virginia to Florida contains egg-shaped basins called Carolina bays, which include wet meadows, forested wetlands, shrub swamps, and seasonal ponds (Tiner 2003a).
- Pocosins are southern peatlands generally located on interfluvies along the Atlantic Coastal Plain from southern Virginia to Florida (Tiner 2003a).
- Pocosin tracts often cover hundreds of square kilometers (km) and are found on flat, clay-based soils, in shallow basins on divides between ancient rivers and sounds on the South Atlantic Coastal Plain. Currently, the largest remaining tracts of freshwater wetlands on the Coastal Plain are pocosins. Pocosins not adjacent to estuaries risk loss of protection after *SWANCC* (Richardson 2003).
- The EPA Office of Enforcement and Compliance Assurance's analysis of CWA enforcement following *Rapanos v. United States* found that formal enforcement action was not pursued by Region 4 in eight §404 permit cases, Region 4 "lowered the priority" of action in 19 §404 cases and six §402 cases, and a lack of CWA jurisdiction was raised as a defense by an alleged discharger in 14 §404 cases in Region 4 (Devine 2008).

Alabama:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the northern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Trinity study area in the Appalachian mountain region classified 7 - 9% of wetland area as isolated and 62 - 68% of the total number of wetlands as isolated (Tiner 2003b).
- Contains 12 wetland systems, including ten isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 36% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains East Gulf Coastal Plain Dune and Coastal Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Northern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Sandhill Lakeshore Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Basin Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Cypress Dome, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Sinkhole, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont/Ridge and Valley Upland Depression Swamp, a depressional isolated wetland system where more than 80% of all known occurrences

have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

- Contains Southern Piedmont Granite Flatrock, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

Florida:

- Two sites studied in Florida's karstlands (Crystal Lake and Dade City) had 41 - 45% of their wetland areas designated as isolated and 74 - 90% of the total number of wetlands designated as isolated (Tiner 2003b).
- Contains Cypress domes, a geographically isolated wetland type made up of shrub swamps, forested wetlands, and ponds. Cypress domes are widespread in Florida's karst landscape (Tiner 2003a).
- Many areas in Florida are pock-marked with isolated depressional wetlands and lakes due to the abundance of limestone on the peninsula (Tiner 2003a).
- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the panhandle and central western portions of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that 34 - 66% of total wetlands in Florida's Panhandle would be at risk (Kusler 2004).
- The most vulnerable wetlands in the state are shallow, forested depressional wetlands such as cypress domes and sinkhole wetlands (National Wildlife Federation 2009a).
- Contains 56 wetland systems, including 12 isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 21% are isolated (Comer et al. 2005).
- The South Florida Cypress Dome is a depressional isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It is found primarily in the Everglades and Big Cypress regions (Comer et al. 2005).
- Contains Atlantic Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Central Florida Herbaceous Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Dune and Coastal Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Sandhill Lakeshore Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Floridian Highlands Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains South Florida Cypress Dome, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains South Florida Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Basin Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Cypress Dome, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Southern Coastal Plain Sinkhole, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Georgia:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the southern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- An Acworth study area in the Appalachian Mountains classified 26 - 29% of wetland area as isolated and 63 - 68% of the total number of wetlands as isolated (Tiner 2003b).
- Contains 12 wetland systems, including ten isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 32% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Sandhill Seep, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Northern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Appalachian Seepage Wetland, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Basin Swamp, a depressional isolated wetland where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Cypress Dome, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Sinkhole, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont/Ridge and Valley Upland Depression Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont Granite Flatrock, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

Kentucky:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the central portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Bee Spring study site had 46 - 48% of its wetland area classified as isolated due to an abundance of ponds designated as isolated, and 88 - 90% of the total number of wetlands designated as isolated (Tiner 2003b).
- In response to the EPA and the Corps' ANPRM for SWANCC, the state reported that if only streams that have perennial flow or are navigable were to be regulated, the CWA would not apply to the majority of stream miles (Kusler 2004).

- Of total state stream miles, 55% are headwater streams and 29% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- The state's Department for Environmental Protection's Division of Water reported that "[o]f Kentucky's 89,000 total stream miles, we estimate that 49,000 miles are intermittent headwater streams" (Devine 2008 (citing Comments of the Kentucky Natural Resources & Environmental Protection Cabinet, Department for Environmental Protection re: ANPRM on the CWA Regulatory Definition of "Waters of the United States," at 1 (March 13, 2003))).
- Contains 15 wetland systems, including two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 13% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains South-Central Interior/Upper Coastal Plain Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Mississippi:

- A Holly Spring study area had 4 - 6% of its wetland area classified as isolated and 56 - 59% of wetlands by number classified as isolated. The area contained many floodplain wetlands (Tiner 2003b).
- A high percentage (61 - 81%) of stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- Of total state stream miles, 55% are headwater streams and 58% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- Contains 25 wetland systems, including seven isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 28% are isolated (Comer et al. 2005).

- Contains East Gulf Coastal Plain Dune and Coastal Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Northern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Basin Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Cypress Dome, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

North Carolina:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the eastern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- Contains pocosins and Carolina bays in the eastern portion of the state (Tiner 2003a).
- Carolina bays are most abundant in southeastern North Carolina, where they extend from the coast inward to the Fall Line, which separates the Coastal Plain from the Piedmont (Sharitz 2003).

- About 70% of the nation's pocosin wetlands are located in North Carolina. Isolated types include small depression pocosins; these types also potentially occur in swales (e.g., the Sandhills of the Carolinas) and in seasonally saturated interfluves (Tiner 2003a).
- Of the nation's pocosins, 70% are found in North Carolina and they comprise more than 50% of North Carolina freshwater wetlands (Richardson 2003).
- A Dublin study area contains many Carolina bays, with 20 - 24% of its total wetland area classified as isolated and 75 - 79% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Charlotte study area in the Appalachian mountain region had 17 - 21% of its wetland area classified as isolated and 40 - 46% of its wetland number classified as isolated (Tiner 2003b).
- Intermittent and ephemeral streams are generally concentrated on the upper coastal plain (Nadeau and Rains 2007).
- Approximately 20% of fens are neither continuous with nor adjacent to navigable waters (Bedford and Godwin 2003 (citing "the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states"))).
- Contains 33 wetland systems, including seven isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 27% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Clay-Based Carolina bay wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Dune and Maritime Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Sandhill Seep, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Appalachian Seepage Wetland, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont/Ridge and Valley Upland Depression Swamp, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont Granite Flatrock, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

South Carolina:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the eastern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Charlotte study area in the Appalachian mountain region had 17 - 21% of its wetland area classified as isolated and 40 - 46% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Horry County site contains many Carolina bays, with 5 -9% of its total wetland area classified as isolated and 63 - 71% of the total number of wetlands classified as isolated (Tiner 2003b).
- It is estimated that 9 - 10% of the state's wetland area is at risk, and the most vulnerable sites are small Carolina bays. As many as 92% of bays in the upper coastal plain of the state may be at risk (Sharitz 2003).
- Carolina bays are most abundant in mid-coastal South Carolina, where they extend from the coast inward to the Fall Line, which separates the Coastal Plain from the Piedmont.

On the upper Coastal Plain, 46% of the 371 known Carolina bays or similar wetland depressions are 1.2 hectares (ha) or less in size (Sharitz 2003).

- In response to the EPA and the Corps' ANPRM for *SWANCC*, the state reported that more than 20% of all wetlands in two coastal counties could be delineated as isolated. Approximately 16% of total wetlands would be removed from regulation if intermittent streams were not used to determine jurisdiction (Kusler 2004).
- The state's isolated wetlands store 4.58 billion gallons of water (Cappiella and Fraley-McNeal 2007 (citing SELC 2004)).
- Contains 28 wetland systems, including six isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Clay-Based Carolina bay Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Sandhill Seep, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Atlantic Coastal Plain Southern Depression Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Appalachian Seepage Wetland, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Basin Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Southern Piedmont/Ridge and Valley Upland Depression Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Piedmont Granite Flatrock, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange both of surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

Tennessee:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the central and western portions of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- Small headwater streams represent at least 60% of the length of all streams in the state (Siedschlag et al. 2010).
- Of Tennessee's wetlands, over half are potentially geographically isolated (Siedschlag et al. 2010).
- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that 57% of rivers are non-navigable waters (Kusler 2004).
- Of total state stream miles, 60% are headwater streams and 18% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- The Tennessee Wildlife Resources Agency reported that the state has some 787,000 acres of wetlands, the majority of which are not adjacent to navigable-in-fact waters (Devine 2008 (citing Comments of the Tennessee Wildlife Resources Agency re: ANPRM on the CWA Regulatory Definition of "Waters of the United States," at 1 (Feb. 26, 2003))).
- Contains 17 wetland systems, including three isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 18% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains South-Central Interior/Upper Coastal Plain Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Appalachian Seepage Wetland, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 5 (IL, IN, MI, MN, OH, WI)

- The Region 5 Branch Chief of the Watersheds and Wetlands Branch reported that a lot of surface waters in the region that would be considered Aquatic Resources of National Interest by the EPA (e.g., fens, bogs, dunes/swales) are seen as nonjurisdictional to the Corps due to *SWANCC* and *Rapanos* (U.S. EPA 2009).
- The Region 5 Branch Chief of the Watersheds and Wetlands Branch reported that of 654 jurisdictional determinations (JDs), 206 were significant nexus (*Rapanos*) calls, of which 28 were found to be nonjurisdictional, and 450 were isolated (*SWANCC*) calls, of which 449 were found to be nonjurisdictional (U.S. EPA 2009).
- The EPA Office of Enforcement and Compliance Assurance's analysis of CWA enforcement following *Rapanos* found that formal enforcement action was not pursued in three §404 permit cases, the Region "lowered the priority" of action in 14 §404 cases and 15 §402 cases, and a lack of CWA jurisdiction was raised as a defense by an alleged discharger in six §404 cases and one §402 case (Devine 2008).
- The Great Lakes Wet-Mesic Lakeplain Prairie is a depressionally isolated wetlands system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs on the lakeplain near the southern and central Great Lakes of the U.S. and Canada. These wetlands occur on level, sandy glacial outwash, sandy glacial lakeplains, and deposits of dune sand over silty/clayey glacial lakeplains (Comer et al. 2005).
- In northern Indiana and Ohio, isolated wetlands (using a 1000-m buffer) in the Great Lakes region make up 9% of all wetland acreage (Petrie et al. 2001).
- Contains kettle ponds formed in sandy coastal areas on glacial outwash deposits along the Great Lakes (Tiner 2003a).
- Interdunal swale wetlands occur along the shores of the Great Lakes (Tiner 2003a).
- Alvars, relatively flat limestone-dolomite bedrock pavement landscapes, occur along the Great Lakes (Tiner 2003a).

Illinois:

- The Illinois Department of Natural Resources estimated that about 60% of the state's wetlands and 12% of the state's remaining wetland area are isolated (Tiner 2003b; Leibowitz and Nadeau 2003).
- A Great Lakes area study estimated that 24 - 29% of total wetland area is isolated and 81 - 88% of the total number of wetlands are isolated (Tiner 2003b (citing Petrie et al. 2001)).

- A Harrisburg study site in the non-glaciated region had 11 - 15% of its wetland area designated as isolated and 71 - 76% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Goose Lake study area in the glaciated region had 5 - 7% of wetland area classified as isolated and 42 - 47% of the total number of wetlands classified as isolated (Tiner 2003b).
- Of total state stream miles, 56% are headwater streams and 55% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- EPA Region 5 reported that the Illinois Natural History Survey estimated that 150,118 acres of wetlands are at risk if “isolated” wetlands are no longer regulated (Devine 2008 (citing Memorandum from Jo Lynn Traub, Water Division Director, EPA Region 5, to Tracy Mehan, Assistant Administrator for Water, at 1 (undated))).
- Of Illinois’ current wetlands, 60% are isolated. Over 60% of streams are intermittent and may have lost federal protection under the CWA. Prairie potholes in particular have lost protection. Between the year before and the year after the *Rapanos* decision, JDs in the Chicago district declined by 55% (National Wildlife Federation 2009b).
- Contains 18 wetland systems, including nine isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 50% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Wet-Mesic Lakeplain Prairie, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Indiana:

- It is estimated that 9 - 33% of the state's waters are isolated and 32 - 89% of the total number of waters would be considered isolated (Kusler 2004).
- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the central southern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Great Lakes study area had 22 - 49% of total wetland area predicted to be isolated and 84 - 92% of the total number of wetlands predicted to be isolated (Tiner 2003b (citing Petrie et al. 2001)).
- A Bluffton study area in the glaciated region had 25 - 28% of wetland area classified as isolated and 80 - 84% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Mongo study area in the glaciated region had 25 - 28% of wetland area classified as isolated and 79 - 81% of wetland number classified as isolated (Tiner 2003b).
- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that 32 - 89% of wetlands would be excluded from CWA jurisdiction depending on the definitions used for tributary and adjacency (Kusler 2004).

- Contains 12 wetland systems, including eight isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 67% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Wet-Mesic Lakeplain Prairie, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Michigan:

- Contains Great Lakes Alvars in the northeastern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).

- A Grand Sable Lake study area in the glaciated region had 15 - 16% of wetland area classified as isolated and 85 - 86% of the total number of wetlands classified as isolated (Tiner 2003b).
- Between 14 - 20% of fens are neither continuous with nor adjacent to navigable waters (Bedford and Godwin 2003 (citing “the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states”)).
- The state’s Department of Environmental Quality has stated that based on federal guidance, as many as 930,856 acres (or about 17%) of Michigan wetlands acreage non-adjacent to any Great Lake or inland lake or stream might not receive protection under the current federal program. However, between the state and federal wetlands programs, only 4 - 5% does not fall under jurisdiction of any wetland protection program (Reyer et al. 2009).
- In response to EPA and the Corps’ ANPRM for *SWANCC*, the state reported that 16.7% of wetlands would be removed from CWA jurisdiction (Kusler 2004).
- More than 930,000 acres of Michigan’s wetlands could be considered isolated (National Wildlife Federation 2009c).
- Contains 26 wetland systems, including 14 isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 54% are isolated (Comer et al. 2005).
- Contains Atlantic Coastal Plain Northern Pondshore, a depressionnal isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005)
- Contains Boreal-Laurentian Bog, a depressionnal isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Conifer Acid Swamp, a depressionnal isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressionnal isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Alvar, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Wet-Mesic Lakeplain Prairie, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Great Lakes Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Minnesota:

- The Board of Water and Soil Resources estimated that 11.4 - 17.8% of National Wetlands Inventory-mapped acreage would fall out of federal jurisdiction after *SWANCC*. If only wetlands directly connected to perennial tributaries were covered, then

protection of wetlands in the northern glaciated plains would range up to a 92% decrease. There are a large number of ephemeral pools in the Great Lakes basin near the Lake Superior shoreline (Reyer et al. 2009).

- Contains prairie potholes in the western portion of the state (Leibowitz and Nadeau 2003; van der Valk & Pederson 2003).
- A Big Lake study area in the glaciated region had 30 - 35% of wetland area classified as isolated and 84 - 86% of the total number of wetlands classified as isolated (Tiner 2003b).
- An Ericsburg study area in the glaciated region had 8 - 9% of wetland area classified as isolated and 81 - 84% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Lake Alexander study area in the glaciated region had 23 - 34% of wetland area classified as isolated and 90 - 93% of the total number of wetlands classified as isolated (Tiner 2003b).
- A small percent of fens are neither continuous with nor adjacent to navigable waters (Bedford and Godwin 2003 (citing “the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states”)).
- In response to EPA and the Corps’ ANPRM for *SWANCC*, the state reported that 12 - 23% would be omitted from CWA jurisdiction with a much higher percentage of up to 92% in the Northern Glaciated Plains ecoregion (Kusler 2004).
- Of total state stream miles, 45% are headwater streams and 51% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- The Minnesota Department of Natural Resources estimated that between 12 and 23% of the state’s wetlands could be considered “isolated” (Devine 2008 (citing Comments of the Minnesota Department of Natural Resources re: ANPRM of the CWA Regulatory Definition of “Waters of the United States,” at 2 (April 8, 2003))).
- Contains 23 wetland systems, including 13 isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 57% are isolated (Comer et al. 2005).
- Contains Boreal-Laurentian Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Boreal-Laurentian Conifer Acid Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Plains Prairie Pothole, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Northern Great Lakes Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Ohio:

- An assessment of 243 wetland sites assessed in the Cuyahoga River watershed found that the area was dominated by depressional (37%) and riverine (36%, including 20% mainstream and 16% headwater) wetlands, with smaller amounts of other wetlands (slope (15%), impoundment (7%), fringing (4%) and bog (1%)) (Reyer et al. 2009).
- Of Ohio's streams, 60% are headwater streams and 45% do not flow year-round (National Wildlife Federation 2009e).
- Contains 18 wetland systems, including nine isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 50% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Alvar, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Wet-Mesic Lakeplain Prairie, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North-Central Interior Freshwater Marsh, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Wisconsin:

- Contains kettle-hole lakes and ponds (including prairie potholes), and many are the sources of streams, but others are geographically isolated (Tiner 2003a).
- The Wisconsin Department of Natural Resources determined that roughly 24% of the state's wetlands would be considered isolated (Leibowitz and Nadeau 2003).
- The Wisconsin Department of Natural Resources predicted that 70% of the state's wetlands would be unprotected after *SWANCC*, and a later assessment revealed that 404,858 - 526,316 hectares of wetlands (approximately 24% of Wisconsin's wetlands) would be at risk (Tiner 2003b (citing Scott Hausman, pers. comm. 2002)).
- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that 25 - 90% of Wisconsin wetlands could become unregulated under the CWA (Kusler 2004).
- Of total state stream miles, 53% are headwater streams and 45% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- The state Department of Natural Resources found that "prairie potholes, wet meadows, many forested wetlands, ephemeral ponds, bogs, and fringing wetlands along small, nonnavigable ponds, are among the major categories of wetlands that would be at risk." The agency estimated that approximately 1.1 million acres of Wisconsin wetlands would lose federal CWA protections (Devine 2008 (citing Comments of the Wisconsin Department of Natural Resources re: ANPRM on the CWA Regulatory Definition of "Waters of the United States," at 2 (April 8, 2003))).

- Many fens of variable size are present in the state (Bedford and Godwin 2003 (citing Curtis 1959, Amon et al. 2002, The Nature Conservancy of Wisconsin, pers. comm.)).
- Contains 23 wetland systems, including 13 isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 57% are isolated (Comer et al. 2005).
- Contains Boreal-Laurentian Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian Conifer Acid Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Boreal-Laurentian-Acadian Acidic Basin Fen, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Alvar, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Dune and Swale, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Lakes Wet-Mesic Lakeplain Prairie, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Laurentian-Acadian Conifer-Hardwood Acid Swamp, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior and Appalachian Acid Peatland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Great Lakes Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 6 (AR, LA, NM, OK, TX)

- The EPA Office of Enforcement and Compliance Assurance's analysis of CWA enforcement following *Rapanos* found that formal enforcement action was not pursued by Region 6 in 52 §402 and §404 permit cases; that the Region "lowered the priority" of action in four §404 and §402 cases; and that a lack of CWA jurisdiction was raised as a defense by an alleged discharger in two §404 and §402 cases (Devine 2008).
- The West Gulf Coastal Plain Pine-Hardwood Flatwoods is an extensive wet flat isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It is found throughout inland portions of the West Gulf Coastal Plain. These areas are usually found on nonriverine, Pleistocene high terraces (Comer et al. 2005).
- On the gulf coast of Region 6, 58% of wetland acreage is made up of isolated wetlands, using a 1000-m buffer (Petrie et al. 2001).

Arkansas:

- A study of the Mississippi Valley area in the state estimated that 1 - 10% of total wetland area is isolated and 17 - 75% of the total number of wetlands are isolated (Tiner 2003b (citing Petrie et al. 2001)).
- A Hazen study site on the Mississippi alluvial plain classified 7 - 9% of wetland area as isolated and 49 - 56% of the total number of wetlands as isolated (Tiner 2003b).
- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the northern central portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- Of total state stream miles, 52% are headwater streams and 63% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- The Arkansas Game and Fish Commission noted that the state was rich in nonnavigable mountain streams, including many that begin in karst topography and move at times through bedrock; they therefore do not appear to flow continuously (Devine 2008 (citing Comments of the Arkansas Game & Fish Commission re: ANPRM on the CWA Regulatory Definition of "Waters of the United States," at 2 (April 15, 2003))).
- Contains 17 wetland systems, including four isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 24% are isolated (Comer et al. 2005).

- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Ozark-Ouachita Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Pine-Hardwood Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Louisiana:

- A Baton Rouge study area in the Mississippi alluvial plain had less than 10% of its wetland acreage classified as isolated and 63 - 72% of wetland number classified as isolated (Tiner 2003b).
- A New Orleans study area in the coastal plain had 2 - 3% of wetland area classified as isolated and 24 - 29% of the total number of wetlands classified as isolated (Tiner 2003b).
- There are a large percentage of unprotected isolated wetlands in the Gulf Coastal Prairie along the gulf coast (Petrie et al. 2001).
- Of total state stream miles, 38% are headwater streams and 36% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- Contains 34 wetland systems, including eight isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 24% are isolated (Comer et al. 2005).
- Contains East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southern Coastal Plain Nonriverine Cypress Dome, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Texas-Louisiana Coastal Prairie, an extensive-wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Texas-Louisiana Coastal Prairie Pondshore, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Flatwoods Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Pine-Hardwood Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

New Mexico:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the central portion of the state, and 2,460 playa basins in the western portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- Playas, shallow depressional recharge wetlands, are most numerous in eastern New Mexico (Haukos and Smith 2003).
- A Carlsbad Caverns study area had 24 - 25% of wetland area classified as isolated and 21 - 23% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Valle Grande study area had 12 - 13% of wetland area classified as isolated and 44 - 48% of the total number of wetlands classified as isolated (Tiner 2003b).

- In response to the EPA and the Corps' ANPRM for *SWANCC*, the state reported that approximately 80% of the drainages in the state are not perennial (Kusler 2004).
- A high percentage (61 - 81%) of total stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- Contains 17 wetland systems, including six isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 35% are isolated (Comer et al. 2005).
- Contains Chihuahuan-Sonoran Desert Bottomland and Swale Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North American Warm Desert Interdunal Swale Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North American Warm Desert Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Oklahoma:

- Contains playas in the panhandle (Tiner 2003a).
- An Oklahoma City study area had 17 - 19% of wetland area classified as isolated and 63 - 66% of the total number of wetlands predicted as isolated (Tiner 2003b).
- In Western Oklahoma, a high percentage (61 - 81%) of total stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).

- Contains 11 wetland systems, including three isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 36% are isolated (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Texas:

- There are numerous small isolated wetlands immediately west of Houston (in Hockley and Lissie). There are also numerous small isolated wetlands in the lower portions of the Texas coast (in Sarita and Pita Camp) (Petrie et al. 2001).
- In the Playa Lakes region of the Texas panhandle, state biologists estimate that nearly 100% of all playas will be without §404 protection (Petrie et al. 2001 (citing Association of State Wetland Managers, 2001)).
- Contains 19,340 playa basins in the panhandle portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- Playas, shallow depressional recharge wetlands, are most numerous in the Southern High Plains of northwestern Texas (Haukos and Smith 2003).
- Two West Texas study sites, Tokio and Tahoka, had all of their wetlands, which were playas, mapped as isolated (Tiner 2003b).

- Most of the isolated wetlands in the Mustang Bayou and St. Charles Bay study sites on the Gulf Coast Prairie were palustrine emergent wetlands. The Mustang Bayou study site had 22 - 29% of wetland area classified as isolated and 78 - 89% of the total number of wetlands classified as isolated. The St. Charles bay study area had 22 - 23% of wetland area classified as isolated and 47 - 48% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Laguna Park study area had 25 - 27% of wetland area classified as isolated and 54 - 59% of the total number of wetlands classified as isolated (Tiner 2003b).
- Approximately 41 - 100% of wetlands by area and 79 - 100% of the total number of wetlands are estimated to be isolated in the Gulf Coastal Prairie region along the gulf coast (Petrie et al. 2001).
- In West Texas a high percentage (61 - 81%) of total stream length is intermittent. (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that approximately 75 - 79% of the stream miles are intermittent, approximately 48% of Texas Pollution Discharge Elimination System permits included wastewater discharges into intermittent streams, and 8% of the wetlands in the coastal zone are isolated (Kusler 2004).
- Contains 47 wetland systems, including 13 isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 32% are isolated (Comer et al. 2005).
- Contains Central and Upper Texas Coast Dune and Coastal Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Chihuahuan-Sonoran Desert Bottomland and Swale Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Edwards Plateau Granitic Forest, Woodland and Glade, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

- Contains North American Warm Desert Interdunal Swale Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North American Warm Desert Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains South Texas Dune and Coastal Grassland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Southeastern Coastal Plain Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Texas-Louisiana Coastal Prairie, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Texas-Louisiana Coastal Prairie Pondshore, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Flatwoods Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains West Gulf Coastal Plain Pine-Hardwood Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 7 (IA, KS, MO, NE)

- The EPA Office of Enforcement and Compliance Assurance’s analysis of CWA enforcement following *Rapanos* found that formal enforcement action was not pursued by Region 7 in ten §402 cases and four §404 permit cases, the Region “lowered the priority” of action in three §404 cases and 19 §402 cases, and a lack of CWA jurisdiction was raised as a defense by an alleged discharger in one §404 case and three §402 cases (Devine 2008).
- The Great Plains Prairie Pothole system is a depressionally isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs in glaciated northern Great Plains and is dominated by depressionally wetlands (Comer et al. 2005).

Iowa:

- Contains prairie potholes, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, and ponds, in the northern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003; van der Valk & Pederson 2003).
- Most fens in the state are neither continuous with nor adjacent to navigable waters (Bedford and Godwin 2003 (citing “the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states”)).
- An Allison study area in the glaciated region had 11 - 12% of wetland area classified as isolated and 45 - 52% of the total number of wetlands classified as isolated (Tiner 2003b).
- In response to EPA and the Corps’ ANPRM for *SWANCC*, the state reported that between 11 and 72% of streams and wetlands will not be regulated, depending upon the definitions used for adjacency and tributary (Kusler 2004).
- The Iowa Department of Natural Resources reported that 11 - 72% of the state’s prairie pothole wetlands could be considered “isolated,” and that fens would likewise be imperiled (Devine 2008 (citing Comments of the Iowa Department of Natural Resources re: ANPRM on the CWA Regulatory Definition of “Waters of the United States,” at 2 (March 31, 2003); Judy L. Meyer et al., *Where Rivers are Born: The Scientific Imperative for Defending Small Streams and Wetlands*, at 22 (American Rivers & Sierra Club, Feb. 2007))).
- Of total state stream miles, 59% are headwater streams and 62% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).

- Contains six wetland systems, including five isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 83% are isolated (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Kansas:

- An Olathe-Kansas City study area had 46 - 49% of wetland area classified as isolated and 70 - 71% of the total number of wetlands classified as isolated (Tiner 2003b).
- In Western Kansas, a high percentage (82 - 100%) of total stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- Contains playas in the Southern High Plains in the southwestern region of the state (Haukos and Smith 2003).
- Contains seven wetland systems, including three isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 57% are isolated (Comer et al. 2005).

- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Missouri:

- Contains sinkhole wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, shrub swamps, forested wetlands, and ponds, in the karst region in the southern central portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Trenton study area in the non-glaciated region had 13 - 15% of its wetland area designated as isolated and 46 - 53% of the total number of wetlands classified as isolated (Tiner 2003b).
- A high percentage (61 - 81%) of stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- Of total state stream miles, 58% are headwater streams and 66% are intermittent/ephemeral (Devine 2008 (citing U.S. EPA, Table 1: State-by-state NHD Analyses of Stream Categories and Drinking Water Data)).
- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that if intermittent/ephemeral stream miles were omitted, 69 - 76% of all stream miles would be affected; 33% of the wetlands would be outside of CWA jurisdiction if an isolated threshold of 50 feet were used to determine isolated (Kusler 2004).
- The state Department of Conservation determined that approximately 660,000 acres of the 1,868,550 acres of wetlands in Missouri could be adversely affected by *SWANCC*, and major affected wetland types include wet meadows, river fringing wetlands along

small nonnavigable rivers and streams, lake fringing wetlands for smaller nonnavigable lakes, many forested wetlands, old meander channels, oxbows, sloughs, fens, seeps and springs (Devine 2008 (citing Comments of the Missouri Department of Conservation re: ANPRM on the CWA Regulatory Definition of "Waters of the United States," at 2 (Feb. 28, 2003))).

- Contains 14 wetland systems, including six isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 43% are isolated (Comer et al. 2005).
- Contains Central Interior Highlands and Appalachian Sinkhole and Depression Pond, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Flatwoods, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Ozark-Ouachita Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Nebraska:

- Contains Rainwater Basin wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, and ponds, in South-central Nebraska. About 13,800 ha of wetlands are reported (Tiner 2003a).

- Two Rainwater Basin study sites, Black Thunder and Olathe-Kansas City had 80 - 81% and 46 - 49% of wetland area mapped as isolated, respectively. Most of the isolated wetlands in these two areas were palustrine emergent wetlands (wet meadows) and ponds with aquatic vegetation, respectively (Tiner 2003b).
- A Rainwater Basin study area had 84 - 85% of its wetland area classified as isolated and 66 - 68% of its total number of wetlands classified as isolated (Tiner 2003b).
- The Nebraska Game and Parks Commission estimates that in the Rainwater Basin 64% of the wetlands are isolated, comprising 84% of the wetland acreage (LaGrange 2003).
- Contains Sandhills wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, and ponds, in North-central Nebraska. About 60% of an estimated 529,000 ha of wetlands in the Sandhills may be geographically isolated (Tiner 2003a).
- The Nebraska Game and Parks Commission estimates that in the Sandhills, 66% of the wetlands are isolated and 47% of wetland acreage is isolated (LaGrange 2003).
- The Rainwater Basin, Central Platte River, and the Sandhills are wetland regions that are considered of international importance to migratory birds. Isolated wetlands are numerous in these areas and are predominant in the Sandhills and Rainwater Basin (LaGrange 1997).
- The Nebraska Game and Parks Commission estimates that in northeast Nebraska, 43% of wetlands are isolated, comprising 24% of wetlands acreage (LaGrange 2003).
- An Altona study area had 20 - 25% of its wetland area classified as isolated and 43 - 51% of the total number of wetlands classified as isolated (Tiner 2003b).
- A Hill Lake study area had 46 - 47% of wetland area classified as isolated and 66 - 74% of the total number of wetlands classified as isolated (Tiner 2003b).
- There are a high percentage of isolated wetlands in the northeast portion of the state in the prairie pothole region. State biologists estimate that 90% of the 34,000 acres of wetlands in the Rainwater Basins will lose §404 protection. For the state as a whole, 60% of all wetlands were classified as isolated and likely to lose §404 protection (Petrie et al. 2001 (citing Association of State Wetland Managers, 2001; LaGrange, T., 2001, Briefing Paper, Nebraska Game and Parks Commission)).
- The Nebraska Game and Parks Commission estimates that 828,918 acres of wetlands are isolated, comprising over 40% of total wetland acreage in the state. This includes 30,693 acres isolated in the Rainwater Basin, 3,328 acres isolated in the Central Table Playas, 3,800 acres isolated in the Southwest Playas, and 1,681 acres isolated in the Todd Valley. Total isolated acres of playa wetlands are 39,502 acres. In the Sandhills, 784,200 acres are isolated wetlands. In the Loup/Platte River Sandhills, 3,216 acres are isolated

wetlands. Total isolated acres of Sandhill wetlands are 787,416 acres. Other isolated wetlands in the state outside of these areas comprise 2,000 acres. To calculate these numbers, the following definition of isolated wetlands was used: "Those waters that do not have a surface tributary connection, including prairie potholes, vernal pools, and playas lakes. A water is not isolated if it is contiguous, or it is adjacent to a surface tributary water" (LaGrange 2003).

- In response to EPA and the Corps' ANPRM for *SWANCC*, the state reported that 40% of wetlands would be outside of CWA jurisdiction and that 76% of stream miles would lose CWA jurisdiction if intermittent streams were omitted from coverage (Kusler 2004).
- Contains ten wetland systems, including three isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 40% are isolated (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 8 (CO, MT, ND, SD, UT, WY)

- The Region 8 Director of the Water Technical Enforcement Program reported that because only 17% of the region's waters are perennial, a significant nexus determination is necessary in almost every case (U.S. EPA 2009).
- A Region 8 staff attorney reported that the Region has a lot of ephemeral streams as well as streams which exhibit perennial flow relatively close to the headwaters, and that after miles of irrigation and supply demands, these streams become more ephemeral downstream (U.S. EPA 2009).
- A staff member from the Ecosystem, Wetlands and Watersheds Unit at Region 8 reported that the Region has lots of borderline "ephemeral" features such as vernal pools and playas lakes. This staff member also reported that the Corps would not claim jurisdiction over prairie potholes based on sub-surface connections between potholes and other waterbodies (U.S. EPA 2009).
- The Great Plains Prairie Pothole system is a depressional isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs in glaciated northern Great Plains and is dominated by depressional wetlands (Comer et al. 2005).
- The Inter-Mountain Basins Greasewood Flat is a depressional isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs in intermontane basins and extends onto the western Great Plains. It typically occurs near intermittent drainages on stream terraces and flats or may support inclusions of more sparsely vegetated desert playas (Comer et al. 2005).
- In the prairie pothole region, it is estimated that 91% of all prairie potholes would be unprotected if wetlands located within 100 m of a navigable waterway or its tributaries were included (Petrie et al. 2001).

Colorado:

- A Cherry Creek Lake study area had 14 - 17% of wetland area classified as isolated and 32 - 37% of the total number of wetlands classified as isolated (Tiner 2003b).
- A small percent of fens in the state are neither continuous with nor adjacent to navigable waters (Bedford and Godwin 2003 (citing "the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states"))).
- Contains playas in the Southern High Plains of the southeastern region of the state (Haukos and Smith 2003).

- Contains 17 wetland systems, including four isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 35% are isolated (Comer et al. 2005).
- Contains Colorado Plateau Hanging Garden, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Interdunal Swale Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Montana:

- There are a high percentage of isolated wetlands in the northern part of the state in the prairie pothole region (Petrie et al. 2001).
- Contains prairie potholes, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, and ponds, in the northern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).

- Few fens in the state are neither continuous with nor adjacent to navigable waters (Bedford and Godwin 2003 (citing “the expert opinion of scientists, regulatory staff, and naturalists who know the fens of their states”)).
- A Hoodoo Hill study area had 20 - 21% of wetland area classified as isolated and 47 - 53% of the total number of wetlands classified as isolated (Tiner 2003b).
- In Eastern Montana, a high percentage (61 - 100%) of stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- In response to EPA and the Corps’ ANPRM for *SWANCC*, the state reported that if intermittent/ephemeral stream miles were omitted, 71% of all stream miles would be omitted (Kusler 2004).
- Contains 20 wetland systems, including four isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 25% are isolated (Comer et al. 2005).
- Contains Boreal Depressional Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Rocky Mountain Wooded Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

North Dakota:

- Prairie potholes, a geographically isolated wetland type, represent the majority of North Dakota's one million ha of wetlands (Tiner 2003a).
- There are a high percentage of isolated wetlands in the prairie pothole region (Petrie et al. 2001).
- Contains prairie potholes in the northern and eastern portions of the state. Of prairie potholes, 53% would be considered isolated under *SWANCC* using a 1000-m buffer (Leibowitz and Nadeau 2003; van der Valk & Pederson 2003).
- A Prairie Potholes region study area found that 61 - 98% of wetland area was predicted to be isolated and 87 - 99% of the total number of wetlands were predicted to be isolated (Tiner 2003b (citing Petrie et al. 2001)).
- A Devils Lake study area in the glaciated prairie pothole region had 49 - 51% of wetland area classified as isolated and 97 - 98% of the total number of wetlands classified as isolated (Tiner 2003b).
- A high percentage (61 - 100%) of stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- Contains 13 wetland systems, including seven isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 54% are isolated (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Great Plains Prairie Pothole, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

South Dakota:

- Prairie potholes, a geographically isolated wetland type, represent the majority of South Dakota's 907,000 ha of wetlands (Tiner 2003a).
- Contains prairie potholes in the eastern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003; van der Valk & Pederson 2003).
- There are a high percentage of isolated wetlands in the prairie pothole region in the eastern half of the state (Petrie et al. 2001).
- A Clark study area in the glaciated prairie pothole region had 98.1 - 98.2% of wetland area classified as isolated due to a lack of streams, which is representative of the prairie pothole region. The study area had 94 - 95% of the total number of wetlands classified as isolated (Tiner 2003b).
- The Enforcement Coordinator of the Corps Omaha district stated that jurisdictional challenges are a significant problem around Rapid City, South Dakota, where rapid development and alluvial fans are common (U.S. EPA 2009).
- A high percentage (82 - 100%) of stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- Contains 18 wetland systems, including seven isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 44% are isolated (Comer et al. 2005).
- Contains Eastern Great Plains Wet Meadow, Prairie, and Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Great Plains Prairie Pothole, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Freshwater Marsh, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Shrub-Graminoid Alkaline Fen, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North-Central Interior Wet Meadow-Shrub Swamp, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Open Freshwater Depression Wetland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Utah:

- Contains salt flats and salt lake wetlands, a geographically isolated wetland type made up of broad saline non-vegetated flats, inland salt marshes, and the shallow-water zone of saline lakes, in the Great Basin region in the western portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Green River study area had 3 - 3.4% of its wetland area classified as isolated and 18 - 21% of the total number of wetlands classified as isolated (Tiner 2003b).

- A Rockport Lake study area had 4 - 8% of its wetland area classified as isolated and 24 - 37% of the total number of wetlands classified as isolated (Tiner 2003b).
- Contains 14 wetland systems, including four isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 36% are isolated (Comer et al. 2005).
- Contains Colorado Plateau Hanging Garden, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Alkaline Closed Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Interdunal Swale Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Wyoming:

- At a Black Thunder study site, isolated wetlands comprised 42% of the wetland number and 80% of wetland area (Tiner 2003b; Leibowitz and Nadeau 2003).
- Contains 17 wetland systems, including four isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).

- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Closed Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Open Freshwater Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Western Great Plains Saline Depression Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 9 (AZ, CA, HI, NV)

- Region-wide, with the exception of Northern California and Hawaii, 61 - 100% of stream length is intermittent (Cappiella and Fraley-McNeal 2007 (citing ASWM, n.d.)).
- The Inter-Mountain Basins Greasewood Flat is a depressionally isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs in intermontane basins and extends onto the western Great Plains. It typically occurs near intermittent drainages on stream terraces and flats or may support inclusions of more sparsely vegetated desert playas (Comer et al. 2005).

Arizona:

- Contains desert springs, some of which are isolated and others which are headwaters of rivers (Tiner 2003a).
- A Blackwater-Florence study area had 3 - 4% of wetland area classified as isolated and 32 - 37% of wetland number classified as isolated (Tiner 2003b).
- Intermittent and ephemeral streams comprise 94% of the total stream length in the state (Nadeau and Rains 2007).
- In response to EPA and the Corps' ANPRM for SWANCC, the state reported that over 95% of its waters are intermittent or ephemeral streams (Kusler 2004).
- More than 95% of the state's streams are intermittent (Cappiella and Fraley-McNeal 2007 (citing Kusler 2004)).
- Contains 17 wetland systems, including four isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).
- Contains Chihuahuan-Sonoran Desert Bottomland and Swale Grassland, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Colorado Plateau Hanging Garden, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains North American Warm Desert Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Sonoran Fan Palm Oasis, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

California:

- Contains West Coast vernal pools, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, and ponds, along the Pacific coast. They have formed in mound and swale topography and are found mostly in parts of the California steppe (Central Valley) and coastal terraces and level terraces of California's coastal mountains (Tiner 2003a).
- Contains desert springs; some are isolated and some are the headwaters of rivers (Tiner 2003a).
- Contains salt flats and salt lake wetlands, a geographically isolated wetland type made up of broad saline non-vegetated flats, inland salt marshes, and the shallow-water zone of saline lakes, in the Great Basin region in the northeast portion of the state, and West Coast Vernal Pools in the western and southwestern portions of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- California's Birds Landing study area included the Jepson Prairie, known for its West Coast vernal pool wetlands. This site had only 3% of its wetlands designated as isolated due to the presence of extensive estuarine wetlands (Tiner 2003b).
- A Sacramento study site had 40 - 48% of wetland area designated as isolated and 66 - 72% of the total number of wetlands designated as isolated. Palustrine emergent wetlands were the predominant isolated wetland types (Tiner 2003b).
- A La Mesa study area had 11% of wetland area classified as isolated and 22 - 25% of the total number of wetlands classified as isolated (Tiner 2003b).
- Contains 36 wetland systems, including eight isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and five isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water

and groundwater between the wetland and other waterbodies. Of wetland systems, 36% are isolated (Comer et al. 2005).

- The Northern California Claypan Vernal Pool is a depressional isolated wetland system where more than 80% of the known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs as shallow ephemeral waterbodies (vernal pools) found in depressions (up to several hectares in size) among grasslands and open woodlands throughout the northern Central Valley of California (Comer et al. 2005).
- Contains California Central Valley Alkali Sink, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Alkaline Closed Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Mediterranean California Alkali Marsh, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Mediterranean California Coastal Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Modoc Basalt Flow Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains North American Warm Desert Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North Pacific Hardpan Vernal Pool, a depressionally isolated wetland where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern California Volcanic Vernal Pool, a depressionally isolated wetland where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Sonoran Fan Palm Oasis, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains South Coastal California Vernal Pool, a depressionally isolated wetland where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Willamette Valley Wet Prairie, an extensive wet flat where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Hawaii:

- The Hawaii Montane Bog is an isolated wetlands system where more than 80% of the known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs primarily between 1,067 and 1,670 m elevation as isolated small depressions 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 subalpine elevations (2,270 m) on Maui and at low elevations (646 m) on Kaua'i. A few bogs occur on steeper terrain (Comer et al. 2005).
- Contains 12 wetland systems, including one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 17% are isolated (Comer et al. 2005).
- Contains Hawaii 'Ihi' ihiluakea Vernal Pool, a depressionally isolated wetland where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Nevada:

- Contains salt flats and salt lake wetlands, a geographically isolated wetland type made up of broad saline non-vegetated flats, inland salt marshes, and the shallow-water zone of saline lakes, in the Great Basin region (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Four Mile Flat study site in the Great Basin contained two terminal basins, and all of its wetlands were considered isolated (Tiner 2003b).
- The Four Mile Flat study area in Nevada contains 4,210 ha of isolated wetlands, almost all of which is comprised of two large salt flats (Leibowitz and Nadeau, 2003).
- Of total stream miles in the state, 36% are intermittent and in danger of losing CWA protection. Playas in particular are at risk in the state (National Wildlife Federation 2009d).
- Contains 24 wetland systems, including six isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 36% are isolated (Comer et al. 2005).
- Contains Columbia Plateau Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Alkaline Closed Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Interdunal Swale Wetland, a depressional isolated wetland where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North American Warm Desert Playa, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Sonoran Fan Palm Oasis, a seepage-fed sloping isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Region 10 (AK, ID, OR, WA)

- Along the Pacific coast are West Coast vernal pools, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, and ponds (Tiner 2003a).
- The Inter-Mountain Basins Greasewood Flat is a depressionally isolated wetland system where more than 80% of all known wetland occurrences are completely surrounded by uplands and there are no apparent surface water inlets and/or outlets. It occurs in intermontane basins and extends onto the western Great Plains. It typically occurs near intermittent drainages on stream terraces and flats or may support inclusions of more sparsely vegetated desert playas (Comer et al. 2005).

Alaska:

- Contains kettle-hole wetlands, a geographically isolated wetland type made up of shrub and forested bogs, marshes, aquatic beds, and ponds. Isolated bogs are common in the Southeast, South-central, and Interior regions (Tiner 2003a).
- Contains precipitation-driven wetlands, a geographically isolated wetland type made up of wetlands formed on permafrost surrounded by upland (Tiner 2003a).
- Inactive floodplain wetlands may be most common in Alaska, such as in the historic floodplain of the Yukon River (Tiner 2003a).
- Alaska may have millions of hectares of geographically isolated wetlands, including seepage slope wetlands on the North Slope of Alaska, fens on plateaus, permafrost wetlands on north-facing slopes, and precipitation-driven wetlands on discontinuous permafrost. Other isolated wetlands include alpine and snowmelt ponds (Tiner 2003a).
- A Charley River study area had 3.7 - 3.8% of wetlands area classified as isolated and 63 - 66% of the total number of wetlands classified as isolated. A Kenai study area had 23 - 25% of study area classified as isolated and 96 - 97% of the total number of wetlands classified as isolated. A Mt. McKinley study area had 5% of wetland area classified as isolated and 83 - 84% of the total number of wetlands classified as isolated. Palustrine scrub-shrub wetland was the dominant isolated wetland type in the Mt. McKinley, Charley River, and Kenai study sites (Tiner 2003b).
- Contains 19 wetland systems, including two isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies. Of wetland systems, 11% are isolated (Comer et al. 2005).
- Contains Boreal Depressionally Isolated Bog, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains North Pacific Coastal Interdunal Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Idaho:

- Contains salt flats and salt lake wetlands, a geographically isolated wetland type made up of broad saline non-vegetated flats, inland salt marshes, and the shallow-water zone of saline lakes, in the Great Basin in the southern portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Wood River study area had 5 - 6% of wetland area classified as isolated and 30 - 33% of the total number of wetlands classified as isolated (Tiner 2003b).
- Contains 17 wetland systems, including five isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and one isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 35% are isolated (Comer et al. 2005).
- Contains Boreal Depressional Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Alkaline Closed Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Interdunal Swale Wetland, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Playa, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Rocky Mountain Wooded Vernal Pools, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

Oregon:

- Contains salt flats and salt lake wetlands, a geographically isolated wetland type made up of broad saline non-vegetated flats, inland salt marshes, and the shallow-water zone of saline lakes, in the Great Basin region in the southeast portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- Contains West Coast vernal pools in the semi-desert regions of eastern Oregon (Tiner 2003a).
- Contains dune marshes along the Oregon coast (Tiner 2003a).
- A Coquille River study site had 8 - 10% of its wetland area classified as isolated and 47 - 49% of the total number of wetlands classified as isolated. This site consisted of extensive floodplain wetlands (Tiner 2003b).
- A Clackamas River study area had 16 - 21% of wetland area classified as isolated and 43 - 48% of the total number of wetlands classified as isolated (Tiner 2003b).
- Contains 41 wetland systems, including six isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and six isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 29% are isolated (Comer et al. 2005).
- Contains Boreal Depressional Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Columbia Plateau Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Alkaline Closed Depression, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

- Contains Inter-Mountain Basins Playa, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Mediterranean California Coastal Interdunal Wetland, a depressionally isolated wetland where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Modoc Basalt Flow Vernal Pool, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains North Pacific Hardpan Vernal Pool, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern California Claypan Vernal Pool, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern California Volcanic Vernal Pool, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Columbia Plateau Basalt Pothole Ponds, a depressionally isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Willamette Valley Wet Prairie, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Washington:

- Contains Channeled Scablands wetlands, a geographically isolated wetland type made up of marshes, aquatic beds, wet meadows, vernal pools, and ponds, in Eastern Washington. Almost 85% of the wetlands in this area are isolated depressions (Tiner 2003a).

- Contains Channeled Scablands in the southeast portion of the state (Tiner 2003a; Leibowitz and Nadeau 2003).
- A Lincoln County study site contained the area called Channeled Scablands; 78% of this wetland area was mapped as isolated and 95% of the total number of wetlands were classified as isolated. Most of the isolated wetland area was represented by palustrine emergent wetlands, with isolated ponds also common (Tiner 2003b).
- Contains West Coast vernal pools, which have formed in mound and swale topography and are found in the semi-desert regions of the state (Tiner 2003a).
- Intermittent and ephemeral streams are generally concentrated east of the Cascade Range and particularly in the southeast (Nadeau and Rains 2007).
- Contains 30 wetland systems, including three isolated wetland systems where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies, and four isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies. Of wetland systems, 23% are isolated (Comer et al. 2005).
- Contains Boreal Depressional Bog, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Columbia Plateau Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Inter-Mountain Basins Greasewood Flat, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).
- Contains Modoc Basalt Flow Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains North Pacific Hardpan Vernal Pool, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).
- Contains Northern Columbia Plateau Basalt Pothole Ponds, a depressional isolated wetland system where more than 80% of all known occurrences have very infrequent

interchange of both surface water and groundwater between the wetland and other waterbodies (Comer et al. 2005).

- Contains Willamette Valley Wet Prairie, an extensive wet flat isolated wetland system where more than 80% of all known occurrences have very infrequent interchange of surface water between the wetland and other waterbodies (Comer et al. 2005).

Sources Key

Bedford, B.L. and K.S. Godwin, 2003. Fens of the United States: Distribution, Characteristics, and Scientific Connections Versus Legal Isolation. *Wetlands*. 23:608-629.

Cappiella, K. and L. Fraley-McNeal, 2007. The Importance of Protecting Vulnerable Streams and Wetlands at the Local Level. Center for Watershed Protection, Ellicott City, Maryland, USA.

Comer, P., K. Goodin, G. Hammerson, S. Menard, M. Pyne, M. Reid, M. Robles, M. Russo, L. Sneddon, K. Snow, A. Tomaino, and M. Tuffly, 2005b. Biodiversity Values of Geographically Isolated Wetlands in the United States. *NatureServe, Arlington, Virginia, USA*.

Devine, J., M. Dorfman, and K.S. Rosselot, 2008. Polluting the Mississippi River Basin's Small Streams and Wetlands. Natural Resources Defense Council, New York, New York, USA.

Haukos, D.A. and L.M. Smith, 2003. Past and Future Impacts of Wetland Regulations on Playa Ecology in the Southern Great Plains. *Wetlands*. 23:577-589.

Kusler, J., 2004. The SWANCC Decision: State Regulation of Wetlands to Fill the Gap. Association of State Wetlands Managers, Berne, New York, USA.

LaGrange, T.G., 1997. A Guide to Nebraska's Wetlands and Their Conservation Needs. Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

LaGrange, T.G., 2003. Memo re: Advance Notice of Proposed Rule making on the Clean Water Act Regulatory Definition of Waters of the United States. Nebraska Game and Parks Commission, Lincoln, Nebraska, USA.

Leibowitz, S.G. and T.-L. Nadeau, 2003. Isolated Wetlands: State-of-the-Science and Future Directions. *Wetlands*. 23:663-684.

McKinney, R.A. and M.A. Charpentier, 2009. Extent, properties, and landscape setting of geographically isolated wetlands in urban southern New England watersheds. *Wetlands Ecol Management*. 17:331-344.

Nadeau, T.-L. and M. Rains, 2007. Hydrological Connectivity between Headwater Streams and Downstream Waters: How Science Can Inform Policy. *Journal of the American Water Resources Association*. 43:118-133.

National Wildlife Federation, 2009a. Weakening the Clean Water Act: What it Means for Florida. National Wildlife Federation, Reston, Virginia, USA.

National Wildlife Federation, 2009b. Weakening the Clean Water Act: What it Means for Illinois. National Wildlife Federation, Reston, Virginia, USA.

National Wildlife Federation, 2009c. Weakening the Clean Water Act: What it Means for Michigan. National Wildlife Federation, Reston, Virginia, USA.

National Wildlife Federation, 2009d. Weakening the Clean Water Act: What it Means for Nevada. National Wildlife Federation, Reston, Virginia, USA.

National Wildlife Federation, 2009e. Weakening the Clean Water Act: What it Means for Ohio. National Wildlife Federation, Reston, Virginia, USA.

Petrie, M., J.P. Rochon, G. Tori, R. Pederson, and T. Moorman, 2001. The SWANCC Decision: Implications for Wetlands and Waterfowl. Ducks Unlimited, Memphis, Tennessee, USA.

Reyer, J., C. Wolf, and M. Murray, 2009. Protecting and Restoring the Kidneys of the Great Lakes: An Assessment of Wetlands Programs in Michigan, Minnesota, Ohio and Wisconsin. National Wildlife Federation, Ann Arbor, Michigan, USA.

Richardson, C.J., 2003. Pocosins: Hydrologically Isolated or Integrated Wetlands on the Landscape? *Wetlands*. 23:563-576.

Sharitz, R.R., 2003. Carolina Bay Wetlands: Unique Habitats of the Southeastern United States. *Wetlands*. 23:550-562.

Siedschlag, S., L. Butcher, and J. McFadden, 2010. Five Case Studies on the Effects of the SWANCC and *Rapanos* Supreme Court Rulings on Tennessee Waterways. National Wildlife Federation, Trout Unlimited, and Ducks Unlimited, USA.

Tiner, R.W., 2003a. Geographically Isolated Wetlands of the United States. *Wetlands*. 23:494-516.

Tiner, R.W. 2003b. Estimated Extent of Geographically Isolated Wetlands in Selected Areas of the United States. *Wetlands*. 23:636-652.

U.S. Environmental Protection Agency (USEPA), 2009. Congressionally Requested Report on Comments Related to Effects of Jurisdictional Uncertainty on Clean Water Act Implementation. USEPA 09-N-0149, Washington, District of Columbia, USA.

van der Valk, A.G. and R.L. Pederson, 2003. The *SWANCC* Decisions and its Implications for Prairie Potholes. *Wetlands*. 23:590-596.

The Environmental Law Institute (ELI) makes law work for people, places, and the planet. For nearly four decades, ELI has played a pivotal role in shaping the fields of environmental law, policy, and management, domestically and abroad. Today, ELI is an internationally recognized independent research and education center known for solving problems

and designing fair, creative, and sustainable approaches to implementation.

The Institute delivers timely, insightful, impartial analysis to opinion makers, including government officials, environmental and business leaders, academics, members of the environmental bar, and journalists. ELI serves as a clearinghouse and a town hall, providing common

ground for debate on important environmental issues.

The Institute's board of directors represents a balanced mix of leaders within the environmental profession. Support for ELI comes from individuals, foundations, government, corporations, law firms, and other sources.

Environmental Law Institute

2000 L Street, N.W., Suite 620

Washington, D.C. 20036

Telephone: (202) 939-3800

Fax: (202) 939-3868

www.eli.org

