



INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

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Eric J. Holcomb
Governor

Bruno Pigott
Commissioner

VIA ELECTRONIC MAIL:

December 14, 2020

Mr. Michael Ricketts
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-0059

Dear Mr. Ricketts:

Re: Section 401 Water Quality Certification
Project: 2020 Reissuance of Nationwide
Permits

The Office of Water Quality has reviewed the Federal Register Notice dated September 15, 2020, announcing the proposed reissuance of the Nationwide Permits (NWP's). We have also reviewed your correspondence dated October 16, 2020, stating the Federal Register Notice is the U.S. Army Corps of Engineers (Corps) application for water quality certification under Section 401 of the Clean Water Act for those NWP's that will result in a discharge of dredged and/or fill material into waters of the United States within the State of Indiana.

In electronic mail correspondence dated October 21, 2020, the Louisville District Corps of Engineers notified IDEM that the previously suspended NWP's 13, 14, 18, 29, 36, 39, 40, 41, 42, 43, and 44 would no longer be suspended and be in full force and effect in the state of Indiana.

Under Section 401 of the Clean Water Act (CWA), a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 Water Quality Certification (WQC) is issued, verifying compliance with water quality requirements. In Indiana, the Indiana Department of Environmental Management (IDEM) is the certifying authority and certification decisions are based on Indiana's water quality standards (WQS) found at 327 IAC 2 http://iac.iga.in.gov/iac/iac_title?iact=327

Per 327 IAC 2.1, the goal of Indiana's water quality standards is to restore and maintain the chemical, physical and biological integrity of the state's waters. Mitigation of dredge and fill impacts to Indiana's water resources is required to maintain water quality. To ensure WQS are met, IDEM conditions the NWP's as outlined in this 401 WQC. Additional information about the conditions is found in Attachment #3.



It is the judgment of this office that NWP's 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 18, 19, 21, 22, 25, 27, 28, 29, 30, 33, 36, 37, 39, 40, 42, 44, 45, 46, 49, 50, 51, 52, C, and D will comply with applicable provisions of state law (including 327 IAC 2) and Sections 301, 302, 303, 306, and 307 of the Clean Water Act subject to the conditions set forth in this Certification. Therefore, subject to the following conditions, the Indiana Department of Environmental Management (IDEM) hereby grants Section 401 Water Quality Certification (WQC) for these NWP's. Any changes in language or scope of any NWP not detailed in the aforementioned Federal Register Notice, or as modified by the conditions below, are not authorized by this certification.

It is the judgement of this office that NWP's 16, 17, 20, 23, 31, 32, 34, 35, 38, 41, 43, 53, 54, and E are denied in the state of Indiana and will require a site specific Individual Section 401 Water Quality Certification. The denial is based on the agency's inability to determine if these activities will comply with Indiana's water quality standards found at 327 IAC 2.

It is the judgement of this office that NWP's 8, 24, 48, A, and B are activities that do not occur in Indiana. Because of this no Section 401 Water Quality Certification is required.

Section 401 Water Quality Certification decisions for NWP's in effect for the State of Indiana-2020

NWP	Activity	Decision	Conditions
1	Aids to Navigation	Approve	None
2	Structures in Artificial Channels	Approve	None
3	Maintenance	Approve	General & Specific
4	Fish and Wildlife Harvesting, Enhancement, and Attraction Devices	Approve	General
5	Scientific Measurement Devices	Approve	General
6	Survey Activities	Approve	General
7	Outfall Structures and Associated Intake Structures	Approve	General & Specific
9	Structures in Fleeting and Anchorage Areas	Approve	None
10	Mooring Buoys	Approve	None
11	Temporary Recreational Structures	Approve	None
12	Oil or Natural Gas Pipeline Activities	Approve	General & Specific
13	Bank Stabilization	Approve	General & Specific
14	Linear Transportation Projects	Approve	General & Specific
15	U.S. Coast Guard Approved Bridges	Approve	General & Specific
16	Return Water from Upland Contained Disposal Areas	Deny	N/A
17	Hydropower Projects	Deny	N/A
18	Minor Discharges	Approve	General & Specific
19	Minor Dredging	Approve	General

20	Response Operations for Oil and Hazardous Substances	Deny	N/A
21	Surface Coal Mining Activities	Approve	None
22	Removal of Vessels	Approve	General
23	Approved Categorical Exclusions	Deny	N/A
25	Structural Discharges	Approve	General & Specific
26	Reserved	N/A	N/A
27	Aquatic Habitat Restoration, Establishment, and Enhancement Activities	Approve	General & Specific
28	Modifications to Existing Marina	Approve	None
29	Residential Developments	Approve	General & Specific
30	Moist Soil Management for Wildlife	Approve	General
31	Maintenance of Existing Flood Control Facilities	Deny	N/A
32	Completed Enforcement Actions	Deny	N/A
33	Temporary Construction, Access, and Dewatering	Approve	General & Specific
34	Cranberry Production Activities	Deny	N/A
35	Maintenance Dredging of Existing Basins	Deny	N/A
36	Boat Ramps	Approve	General & Specific
37	Emergency Watershed Protection and Rehabilitation	Approve	General & Specific
38	Cleanup of Hazardous and Toxic Waste	Deny	N/A
39	Commercial and Institutional Developments	Approve	General & Specific
40	Agricultural Activities	Approve	General & Specific
41	Reshaping Existing Drainage Ditches	Deny	N/A
42	Recreational Facilities	Approve	General & Specific
43	Stormwater Management Facilities	Deny	N/A
44	Mining Activities	Approve	General & Specific
45	Repair of Uplands Damaged by Discrete Events	Approve	None
46	Discharges to Ditches	Approve	General & Specific
47	Reserved	N/A	N/A
49	Coal Remining Activities	Approve	None
50	Underground Coal Mining Activities	Approve	None
51	Land-Based Renewable Energy Generation Facilities	Approve	General & Specific
52	Water-Based Renewable Energy Generation Pilot Projects	Approve	General & Specific
53	Removal of Low-Head Dams	Deny	N/A
54	Living Shorelines	Deny	N/A

C	Electric Utility Line and Telecommunication Activities	Approve	General & Specific
D	Utility Line Activities for Water and Other Substances	Approve	General & Specific
E	Water Reclamation and Reuse Facilities	Deny	N/A

GENERAL CONDITIONS:

The following conditions shall apply to any permittee whose project qualifies under any NWP approved by this certification. All activities that do not meet these conditions require an individual Water Quality Certification from IDEM and are not authorized under this WQC.

- (1) The permittee must submit a complete Notification Form for any NWP that requires notification by this WQC. For those NWPs, the permittee must submit notification at least 30 days prior to the impacts or receive verification from the IDEM Office of Water Quality stating the proposed project meets the terms and conditions of this Section 401 WQC. The notification submitted to the IDEM Office of Water Quality must at a minimum provide applicant information, project location, existing project site conditions, project impacts, and a proposed plan. Failure to submit all required information will result in the project being considered out-of-scope and not authorized.
- (2) The permittee shall deposit any dredged material in a contained upland disposal area to prevent sediment run-off to any waterbody. An upland disposal area is defined as an area of dry land that does not contain any wetlands as defined by the 1987 Army Corps of Engineers Wetland Delineation Manual and the applicable Regional Supplements or any streams¹.
- (3) The permittee shall install run-off and sediment control measures prior to any land disturbance to manage stormwater and to minimize sediment from leaving the project site or entering a waterbody. All operations must phase project activities to minimize the impact of sediment to the receiving waterbody(ies). Erosion and sediment control measures shall be implemented using an appropriate order of construction (sequencing) relative to the land-disturbing activities. Wetlands and/or waterbodies that are adjacent to land-disturbing activities must be protected with appropriate sediment control measures. As work progresses, all areas void of protective cover shall be re-vegetated or stabilized as described in the plan. Areas that are to be re-vegetated must utilize mulch that is anchored or, under more severe conditions, erosion control blankets. Erosion control blankets or other armament shall be used for all areas associated with concentrated flow. Standards and specifications for stormwater management, including erosion and

¹ Stream, for the purpose of this Water Quality Certification, means conveyance channels that have a defined bed and bank and an ordinary high water mark. This term includes natural streams, relocated streams, channelized streams, artificial channels, encapsulated channels and ditches.

sediment control can be obtained in the Indiana Stormwater Quality Manual or similar guidance documents.

- (4) The permittee shall allow the commissioner or an authorized representative of the commissioner (including an authorized contractor), upon the presentation of credentials to conduct the following activities:
 - (a) enter upon the permittee's property;
 - (b) have access to and copy at reasonable times any records that must be kept under the conditions of these permits or this certification;
 - (c) inspect, at reasonable times, any monitoring or operational equipment or method; collection, treatment, pollution management or discharge facility or device; practices required by this certification; and any mitigation site; and
 - (d) sample or monitor any discharge of pollutants or any mitigation site.
- (5) This WQC does not authorize activities that result in a permanent secondary effect to waters of the U.S. (e.g., dredging, excavation, damming, creation of in-channel ponds) that when combined with the primary effect exceeds the area and length thresholds specified by this WQC.
- (6) This WQC does not:
 - (a) authorize impacts or activities outside the scope of this certification;
 - (b) authorize any injury to permittees or private property or invasion of other private rights, or any infringement of federal, state or local laws or regulations;
 - (c) convey any property rights of any sort, or any exclusive privileges;
 - (d) preempt any duty to obtain federal, state or local permits or authorizations required by law for the execution of the project or related activities; or
 - (e) authorize changes in the plan design detailed in the notice or application.
- (7) This WQC does not authorize point source discharges of pollutants other than clean fill² and uncontaminated dredged material.
- (8) This WQC does not authorize activities associated with the establishment of a mitigation bank.
- (9) This WQC does not authorize activities that will permanently change the sinuosity, flow path, velocity, the cross-sectional area under the Ordinary High Water Mark (OHWM), or the slope of a stream.

² Clean fill, for the purpose of this Water Quality Certification, means uncontaminated rocks, bricks, concrete without rebar, road demolition waste materials other than asphalt, or earthen fill.

- (10) This WQC does not authorize activities on or in any of the State's waters that have been designated as salmonid waters (*see Attachment #1*), tributaries of salmonid waters within a two river mile reach upstream from the confluence with the salmonid water unless the activity meets one or more of the following conditions:
- (a) Bank stabilization activities that:
 - (1) Are completed using bioengineered methods, riprap, and/or glacial stone, that conforms to the existing shoreline and does not project out into the channel, and
 - (2) Do not create a wall.
 - (3) Do not include the installation of cofferdams, causeways, temporary access roads, or dewatering activities.
 - (b) Encapsulations that:
 - (1) Are installed to span the width of the ordinary high water mark (OHWM), and are embedded in accordance with Specific Condition 3(f)7 below, and
 - (2) Do not include the installation of cofferdams, causeways, temporary access roads, or dewatering activities.
 - (3) Are installed outside the salmonid fish spawning dates of March 15 through June 15 and from July 15 through November 30.
 - (c) Work is conducted outside the salmonid fish spawning dates of March 15 through June 15 and from July 15 through November 30.
- (11) This WQC does not authorize activities on or in any of the State's waters that have been designated as Outstanding State and/or National Resource Waters (*see Attachment #1*).
- (12) This WQC does not authorize activities on or in any critical wetland or critical special aquatic sites (*see Attachment #2*).
- (13) This WQC does not authorize activities that have a cumulative permanent impact of more than twenty-five hundredths (0.25) acre of waters of the U.S. Note: Activities that have a cumulative permanent impact to waters of the U.S. of more than one-tenth (0.10) acre must comply with the mitigation requirements listed in **General Condition 15** of this WQC.
- (14) This WQC does not authorize activities that will have a cumulative permanent impact of more than 500 linear feet of waters of the U.S. Note: Activities that have a cumulative permanent impact to waters of the U.S. of more than 300 linear feet must comply with the mitigation requirements listed in **General Condition 16** of this WQC.
- (15) Cumulative permanent impacts to waters of the U.S. greater than 0.10 acre up to and including 0.25 acre are authorized provided the following conditions are met:

- (a) The impacts comply with all conditions of this Section 401 Water Quality Certification.
 - (b) Mitigation is provided for all impacts.
 - (c) Sufficient mitigation credits are available in the service area where the impacts occur. Note: Credits may not be available at all times. Failure to purchase credits before impacting water resources will require an individual 401 WQC and may result in additional mitigation requirements to compensate for temporal loss of water resource functions.
 - (d) Mitigation credits are purchased from an approved compensatory mitigation bank or through the Indiana Stream and Wetland Mitigation Program (in-lieu fee (ILF)). Permittee responsible mitigation is not authorized under this 401 WQC.
 - (e) The amount of mitigation credit purchased is 1:1 for streams, open water, and farmed wetlands, 2:1 for emergent wetland, 3:1 for scrub shrub wetland, 4:1 for forested wetland.
 - (f) The credits are purchased in the bank or ILF service area where the impacts occur.
 - (g) Proof of a finalized credit purchase is provided to IDEM:
 - 1) Before the impacts occur. Note: Banks and ILF programs may require 30 days or more to finalize a purchase.
 - 2) Within one (1) year of IDEM's receipt of the Notification form.
- (16) Cumulative permanent impacts to waters of the U.S. greater than 300 linear feet up to and including 500 linear feet are authorized provided the following conditions are met:
- (a) The impacts comply with all conditions of this Section 401 Water Quality Certification.
 - (b) Mitigation is provided for all impacts.
 - (c) Sufficient mitigation credits are available in the service area where the impacts occur. Note: Credits may not be available at all times. Failure to purchase credits before impacting water resources will require an individual 401 WQC and may result in additional mitigation requirements to compensate for temporal loss of water resource functions.
 - (d) Mitigation credits are purchased from an approved compensatory mitigation bank or through the Indiana Stream and Wetland Mitigation Program (in-lieu fee (ILF)). Permittee responsible mitigation is not authorized under this 401 WQC.
 - (e) The amount of mitigation credit purchased is 1:1 for streams.
 - (f) The credits are purchased in the bank or ILF service area where the impacts occur.
 - (g) Proof of a finalized credit purchase is provided to IDEM:
 - 1) Before the impacts occur. Note: Banks and ILF programs may require 30 days or more to finalize a purchase.
 - 2) Within one (1) year of IDEM's receipt of the Notification form.

- (17) The permittee must demonstrate, via letter from the Indiana Department of Natural Resources (IDNR), Division of Nature Preserves, that no state endangered, threatened, or rare species are documented on a permanent or seasonal basis within ½-mile radius of the proposed project site. If you have listed species, you must provide documentation from the IDNR that states your project will not impact the listed species. If IDNR recommends seasonal work restrictions or other avoidance and minimization measures, those restrictions or avoidance and minimization measures must be incorporated into your project plans and implemented during construction.
- (18) This WQC allows the use of multiple NWP's on the same project as long as the cumulative effect for the entire project is less than the specified impact thresholds in **General Conditions 13 & 14** or as specified in the **Specific Conditions** below. If a project exceeds the specified impact thresholds, the activities are not authorized by this WQC and an individual WQC is required. IDEM may certify several federal permits or licenses under one individual WQC.
- (19) Upon request, the applicant must submit additional information necessary to IDEM to determine if a project will qualify under the terms and conditions of this certification. If the applicant fails to provide any information requested by IDEM, then the project is not authorized.
- (20) All stream pump-around activities must be conducted in a manner that does not cause erosion at the outlet. Cofferdam dewatering activities must use filter bags, upland sediment basins/traps, or a combination of other appropriate sediment control measures to minimize the discharge of sediment-laden water into waters of the U.S. All sediment control measures must be installed and maintained in good working order. For stream pump-around activities, the in-stream material used to construct the dam must be constructed of non-sediment producing sources. Examples include sand bags and sheet pile walls.
- (21) The permittee must ensure all placement of riprap or other bank stabilization materials are designed and installed flush with the upstream and downstream bank and stream channel/lake bed elevations and grades.
- (22) Notification to IDEM is required for any temporary impacts that exceed 0.10 acre for any proposed NWP. For emergency repair situations notification may take place after the emergency repair has begun.
- (23) After construction, temporary fill must be removed in their entirety and the affected areas returned to the pre-construction elevations. The areas affected by temporary fill must be revegetated, as appropriate.

- (24) The permittee will submit an application for an individual certification if IDEM determines the project would have more than minimal impacts to water quality, either viewed individually or collectively with other projects that may affect the same waterbody.

NATIONWIDE PERMIT # 13, BANK STABILIZATION, SPECIFIC CONDITIONS

The following conditions apply to NWP # 13. All activities that do not meet these conditions require an Individual WQC from IDEM and are not authorized under this WQC.

- (1) The permittee must notify IDEM in accordance with **General Condition 1** listed above;
- (2) The WQC does not authorize bank stabilization activities within wetlands;
- (3) The activity must not permanently affect more than twenty-five hundredths (0.25) of an acre of waters of the United States. See **General Condition 13** of this WQC for additional impact and mitigation requirements;
- (4) The activity must not permanently affect more than 500 linear feet of streambank or lake shoreline. See **General Condition 14** of this WQC for additional impact and mitigation requirements;
- (5) The activity must not exceed two (2) cubic yards per running foot, as measured along the length of the treated bank or shoreline;
- (6) The permittee must demonstrate that the bank or shoreline in question is unstable;
- (7) Natural shoreline stabilization methods are required where there is no pre-existing seawall or other shoreline hard armament on a lake or reservoir. Natural shoreline stabilization methods include bank stabilization practices that benefit the aquatic environment by incorporating organic materials to produce functional structures, provide wildlife habitat, and provide areas for revegetation; and
- (8) The placement of riprap or other bank stabilization material must be installed flush with the upstream and downstream bank and stream channel/lake bed elevations and grades.

Attachment 1: Indiana Waters Designated for Special Protection

Designated Salmonid Waters:

[327 IAC 2-1.5-5(a)(3)]

- Trail Creek and its tributaries downstream to Lake Michigan, LaPorte County
- East Branch of the Little Calumet River and its tributaries downstream to Lake Michigan via Burns Ditch, Porter and LaPorte Counties
- Salt Creek above (upstream of) its confluence with the Little Calumet River, Porter County
- Kintzele Ditch (Black Ditch) from Beverly Drive downstream to Lake Michigan, Porter County
- The Galena River and its tributaries, LaPorte County
- The St. Joseph River and its tributaries in St. Joseph County from the Twin Branch Dam in Mishawaka downstream to the Indiana/Michigan state line, St. Joseph County
- The Indiana portion of the open waters of Lake Michigan
- Those waters designated by the Indiana Department of Natural Resources (IDNR) for put-and-take trout fishing¹

Waterbodies which have been designated all or partially as Outstanding State Resource Waters: [327 IAC 2-1-11(b), 327 IAC 2-1.3-3(d), and 327 IAC 2-1.5-19(b)]

- Big Pine Creek in Warren County downstream of the State Road 55 bridge near the town of Pine Village to its confluence with the Wabash River
- Mud Pine Creek in Warren County from the bridge on the County Road between Brisco and Rainsville to its confluence with Big Pine Creek
- Fall Creek in Warren County from the old C.R. 119 bridge in the NW quarter of Section 21, Township 22N, Range 8W downstream to its confluence with Big Pine Creek
- Indian Creek in Montgomery County from the County Road 650 West bridge downstream to its confluence with Sugar Creek
- Clifty Creek in Montgomery County within the boundaries of Pine Hills Nature Preserve
- Bear Creek in Fountain County from the bridge on County Road 450 North to its confluence with the Wabash River
- Rattlesnake Creek in Fountain County from the bridge on County Road 450 North to its confluence with Bear Creek
- The small tributary to Bear Creek in Fountain County within the Portland Arch Nature Preserve which enters Bear Creek at the sharpest bend and has formed the small natural bridge called Portland Arch
- Blue River from the confluence of the West and Middle Forks of the Blue River in Washington County downstream to its confluence with the Ohio River
- The South Fork of Blue River in Washington County from the Horner's Chapel Road bridge downstream to its confluence with Blue River.
- Lost River and all surface and underground tributaries upstream from the Orangeville Rise (T2N, R1W, Section 6) and the Rise of Lost River (T2N, R1W, Section 7) and the mainstem of the Lost River from the Orangeville Rise downstream to its confluence with the East Fork of White River.
- The Blue River in Washington, Crawford, and Harrison Counties, from river mile 57.0 to river mile 11.5
- The North Fork of Wildcat Creek in Carroll and Tippecanoe Counties, from river mile 43.11 to river mile 4.82

¹ Available on the internet at: <http://www.in.gov/dnr/fishwild/5457.htm>

- The South Fork of Wildcat Creek in Tippecanoe County, from river mile 10.21 to river mile 0.00
- Cedar Creek in Allen and DeKalb counties, from river mile 13.7 to its confluence with the St. Joseph River
- The Indiana portion of the open waters of Lake Michigan
- All waters incorporated in the Indiana Dunes National Lakeshore.

Attachment 2: Critical Wetlands and Critical Special Aquatic Sites

In the interest of maintaining consistency with the State Regulated (Isolated) Wetland program established at 327 IAC 17, IDEM defines Critical Wetlands and Critical Special Aquatic Sites to be synonymous with Rare and Ecologically Important Wetland Types under 327 IAC 17-1-3(3)(B):

- **Acid bog:** Acid bog is an acidic wetland of kettle holes in glacial terrain. Bogs can be graminoid (*Carex* spp. and *Sphagnum* spp.) or low shrub (*Chamaedaphne calyculata* and *Betula pumila*). The graminoid bog can be a floating, quaking mat. The soils in acid bogs are saturated and acidic peat. Bogs have non-flowing or very slow flowing water. The water level fluctuates seasonally. When a sphagnum mat floats, it rises and falls with the water table. Acid bogs can be found in northern Indiana.
- **Acid seep:** Acid seep is a bog-like wetland typically found in unglaciated hill regions. This community is a small groundwater-fed wetland located primarily in upland terrain. A thin layer of muck may lie over a mineral substrate. The soil reaction is acid. This seep community is characterized by flowing water during at least part of the year. Acid seeps are located primarily in southern Indiana.
- **Circumneutral bog:** Circumneutral bog is a bog-like wetland that receives groundwater. Circumneutral bogs can be a mosaic of tall shrub bog, graminoid bog, and other communities. The graminoid bog often occurs on a quaking or floating mat. Although a few bogs occur in unglaciated regions, most are found in glacial ice-block depressions. The soils in circumneutral bogs are usually peat, or other low nutrient organic substrates, which are saturated and circumneutral to slightly acid. Circumneutral bogs have non-flowing or very slow flowing water. The water level fluctuates seasonally. Circumneutral bogs are usually found in northern Indiana.
- **Circumneutral seep:** The circumneutral seep (or seep-spring) is a groundwater-fed wetland on organic soil. It is primarily herbaceous. Species typically include marsh marigold (*Caltha palustris*) and skunk cabbage (*Symplocarpus foetidus*) with a scattered tree canopy. Circumneutral seep is typically situated on or near the base of a slope. The soil is typically circumneutral muck. This seep community is characterized by slowly flowing water during at least part of the year. Circumneutral seeps can be found scattered throughout Indiana.
- **Cypress swamp:** Bald cypress swamps are seasonally to permanently inundated wetlands found in depressions and sloughs of large bottomlands associated with the Wabash/Ohio River system. Poorly to very poorly drained soils characterize this environment. Bald cypress (*Taxodium distichum*) is present, and green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccharinum*), and overcup oak (*Quercus lyrata*) are also usually present. This community is restricted to extreme southwest Indiana.
- **Dune and swale:** Dune and swale is an ecological system consisting of a mixture of upland (black oak sand savanna, dry to mesic sand prairie) and wetland (pond, panne, sedge meadow, marsh, wet prairie) natural communities. These communities occur in long, narrow, linear complexes, with the dry communities occupying sand ridges, and the wet communities occurring in the intervening swales. Black oak (*Quercus velutina*), paper birch (*Betula papyrifera*), jack pine (*Pinus banksiana*), and prairie vegetation typically occur on the ridges, and sedges, reeds, and marsh/aquatic vegetation line are found in the swales. Water levels are directly influenced by ground water, with the interdunal swales controlled

largely by lateral flow through porous beach ridges. Dune and swale is restricted to extreme northwest Indiana, near Lake Michigan.

- **Fen:** Fen is a calcareous, groundwater-fed wetland. Fens are often a mosaic of grassy areas, sedge areas, graminoid-shrubby cinquefoil, and tall shrub areas. The extent of the tall shrub component of fens may be determined by fire frequency and/or soil moisture. Drying of the soil increases the growth of shrubs. Fens typically occur in the vicinity of glacial moraines. Fens typically have a muck or peat substrate. The water level fluctuates seasonally and is fed by groundwater. Fens can be found in central and northern Indiana.
- **Forested fen:** Forested fen is a tree-dominated wetland on organic soil which receives groundwater. Forested fens are often a mosaic of treed areas, tall shrub areas, and herbaceous areas. A tall shrub layer is often well developed in forested fens. Indicative species typically include tamarack (*Larix laricina*), black ash (*Fraxinus nigra*), yellow birch (*Betula alleghaniensis*), poison sumac (*Toxicodendron vernix*), and red maple (*Acer rubrum*). Forested fens occur in wet lowlands, where moraines meet outwash features or depressions. Forested fens have saturated, poorly to very poorly drained soils that are often muck, but some seasonal flooding can occur in forested fens that are especially level. This community is a late successional stage of fen or circumneutral bog. Forested fens occur in northern Indiana.
- **Forested swamp:** Forested swamp is a seasonally inundated to intermittently exposed wetland of large river bottoms. Forested swamps do not receive direct flow from river flooding except under exceptional circumstances. Forested swamps occur in depressions, sloughs and large bottomlands, typically dominated by tree species such as swamp cottonwood (*Populus heterophylla*), green ash (*Fraxinus pennsylvanica*), and swamp white oak (*Quercus bicolor*). In northern Indiana important tree species include black ash (*Fraxinus nigra*), yellow birch (*Betula alleghaniensis*), and red maple (*Acer rubrum*). Poorly to very poorly drained and aerated soils characterize the swamp environment. Soils usually are mineral not muck or peat. This community type is found throughout Indiana.
- **Marl beach:** Marl beach is a fen-like community located on the marly muck shorelines of lakes. Marl precipitate is evident. A thin layer of water is present in spring, but dries down in summer. Draw-down of a lake creates additional area for this community to develop on. Marl beaches can be found in extreme northern Indiana, primarily in the northeast.
- **Muck flat:** Muck flat is a shoreline and lake community possessing a unique flora of sedges and annual plants, many of which are also found on the Atlantic and Gulf Coastal Plains. This community is found at the margins of lakes or covering shallow basins. This community has a peat substrate. The muck flats can float on the water surface, but during high water periods are usually inundated. The water level of a basin fluctuates during a season or from year to year in response to the amount of precipitation. This exposes bare substrate needed for germination by species of the community. Muck flats are found in northern Indiana.
- **Panne:** Panne is a groundwater fed herbaceous wetland occupying interdunal swales near Lake Michigan. Pannes are located on the lee side of the first or second line of dunes from the lakeshore. The soil is wet, calcareous sand. Pannes are located in counties bordering Lake Michigan.
- **Sand flat:** Sand flat is a shoreline and lake community possessing a unique flora of sedges and annual plants, many of which are also found on the Atlantic and Gulf Coastal Plains. This community is found at the margins of lakes or covering shallow basins. This community has a sand substrate. During high water periods sand flats at the margins of

lakes or ponds are inundated. The water level of a basin fluctuates during a season or from year to year in response to the amount of precipitation. This exposes bare substrate needed for germination by species of the community. Sand flats occur in northern Indiana, and in the Plainville Sand Section of southwest Indiana.

- **Sedge meadow:** Sedge meadow is an herbaceous wetland typically dominated by graminoid species such as flat sedge (*Cyperus* spp.), spike rush (*Eleocharis* spp.), rushes (*Juncus* spp.) and sedges (*Carex* spp.). Sedge meadow is an herbaceous wetland of stream margins and river floodplains, and lake margins or upland depressions. Streamside sedge meadows are frequently flooded in the spring and early summer. Sedge meadows of lake margins and depressions often contain standing water during wet months and after heavy rains; during dry periods, the water level is at or just below the substrate. Sedge meadow usually occupies the ground between a marsh and the uplands, or a shrub swamp or wet forest. Periodic high water can kill trees and shrubs invading sedge meadows. Sedge meadows can be found in the northern half of the state.
- **Shrub swamp:** Shrub swamp is a shrub-dominated wetland that is seasonally inundated to intermittently exposed. This community occurs in depressions and the substrate is either mineral soils or muck, as opposed to peat which is characteristic of bogs. Shrub swamp is characterized by non-flowing or very slowly flowing water with levels that fluctuate seasonally. Shrub swamps are persistent, though considered successional. Two opportunistic native shrubs, sandbar willow (*Salix exigua*) and gray dogwood (*Cornus racemosa*), by themselves, are not indicative of shrub swamps. This community type is found throughout Indiana.
- **Sinkhole pond:** Sinkhole ponds are water-containing depressions in karst topography. Sinkhole ponds are found in the Mitchell Karst Plain in south-central Indiana.
- **Sinkhole swamp:** Sinkhole swamps are depressions in karst topography dominated by tree or shrub species. Sinkhole swamps are found in the Mitchell Karst Plain in south-central Indiana.
- **Wet floodplain forest:** Wet floodplain forest is a broadleaf deciduous forest of river floodplains. Wet floodplain forests occur in depressions and flats on narrow to wide floodplains and also on recently exposed substrates that are frequently flooded. Wet floodplain forests are frequently flooded and may have standing water seasonally to permanently present. Wet floodplain forests occur statewide.
- **Wet prairie:** Wet prairie is an herbaceous wetland typically dominated by graminoid species such as prairie cordgrass (*Spartina pectinata*), bluejoint (*Calamagrostis canadensis*), and sedges (*Carex* spp.). Vegetation height is often 2-3 m. The species diversity of wet prairies is lower than that of mesic prairies. Wet prairies occur in deep swales and the substrate ranges from very deep black mineral soils (which are high in organic matter) to muck. Ponding in spring lasts for several weeks prior to drainage. Wet prairies commonly occur in the Grand Prairie Natural Region, the Tipton Till Plain and the Bluffton Till Plain, with a few examples found in the Northern Lakes Natural Region.
- **Wet sand prairie:** Wet sand prairie is an herbaceous wetland typically dominated by graminoid species such as prairie cordgrass (*Spartina pectinata*), bluejoint (*Calamagrostis canadensis*), and sedges (*Carex* spp.). Vegetation height is often 2-3 m. The species diversity of wet prairies is lower than that of mesic prairies. Wet lowland prairies occur in deep swales and the substrate is sand, sometimes mixed with muck. Flooding is a regular springtime occurrence in wet sand prairie and may last several weeks. This community occurs in a mosaic with marsh and other wetlands, and with upland prairies and sand

savannas. Fire was frequent occurrence, but more common in the fall when waters had receded. This community occurs in northwest Indiana and in the Plainsville Sands area.