Hydro Ecosystem Observation (springs and wetlands) Feature Classes:

A Data Management Supplement to the Groundwater Inventory, Monitoring & Assessment Technical Guide And Groundwater Dependent Ecosystems: Level 1 and II Inventory Field Guides

Feature Dataset: **HydroEcosystem Observation**

The Hydro-Ecosystem Observation feature dataset contains the following feature classes (layers):

Feature Class Names:

- ***HydroEcosystem_PL*** - Wetlands and springs of larger extent
- ***HydroEcosystem_PT*** - Springs

Abstract/ Description:	Hydro-Ecosystem Observation consists of two feature classes (Point and Polygon) for recording the location and basic information about springs and wetlands. The point layer captures all identified springs and the polygon layer captures wetlands and springs of large extent.
	
	The Federal Geographic Data Committee (FGDC) endorsed standard for springs captured in the point layer is the Geographic Information Framework Data Content Standard Part 6: Hydrography that has been implemented by the United States Geological Survey (USGS) in the National Hydrography Dataset (NHD).
	The FGDC endorsed standard for wetlands captured in the polygon layer is the Wetlands Mapping Standard which has been implemented by the U.S. Fish and Wildlife Service (USFWS) in the National Wetlands Inventory (NWI). This standard is based on the Cowardin Classification System (Cowardin et al. 1979).
	The layers in this supplement to the technical guide and field guides serve as the foundation for incorporating and updating NHD and NWI data with updated locations and attributes. Additional attributes are provided to meet Forest Service needs and to incorporate data from local observation and other sources.
	
	Purposes:
	• Serve as a vehicle for using and updating FGDC standard spring and wetland layers. Note: Federal Agencies are expected to participate in updating these datasets.
	  o NHD and NWI data may be used directly from the Enterprise Data Warehouse (EDW).
	  o If the intent is to enhance or update these data, then these feature classes function as:
	  ▪ The primary vehicle for using and updating FGDC standard wetlands data from NWI.
	  ▪ The vehicle store and manage features to update NHD when the NHD import process.
	• Capture initial observations of spring and wetland features from a variety of sources such as field data collection or identification using digital aerial photography.
	• Provide a repository of legacy data such as spring and wetlands data collected under local classification systems.

	• Address potential environmental effects during project design and analysis. • Link the Groundwater Dependent Ecosystem (GDE) database to spatial locations. • Support GDE inventory planning and design (see section 2.3.3, Groundwater IM&A Technical Guide) by providing a source for selecting potential GDE features for inventory under GDE Level I or II protocols or components of Level 1. • Contribute to tentative identification of potential jurisdictional wetlands regulated by the U.S. Army Corps of Engineers (Corps) under Section 404. Attributes were selected to 1) allow updates to national dataset and 2) allow basic characterization and to provide information needed to alert land managers of conditions and the potential effects to springs and wetlands. Attributes address NWI and NHD identifiers and classifications, Forest Service site identification for linking to the GDE database, inventory status, readily observable site characteristics, site integrity, legacy classifications, comments, and feature-level metadata. To aid in data entry, domains of valid values are provided for standardized fields. A technical knowledge of springs and wetlands is not required. For example, fire, wildlife, or range monitoring crews could make the observations and record these in either of the two layers. The point and polygon layers will reside in the Unit GIS library and will be available for use by all employees. There are two workflows associated with these feature classes that include: 1) NHD and NWI data use and update workflow, and 2) GDE Inventory Planning and Design workflow. These are described in supplemental information below.
References:	National Hydrography Dataset (NHD) and NHD FAQ • National Hydrography Dataset Data Dictionary Data Model version 2.0: United States Geological Survey (USGS), U.S. Department of the Interior. • NHD User Guide, NHD FCode List • Federal Geographic Data Committee (FGDC), 2008, Geographic Information Framework Data Standard, Part 6, Hydrography: FGDC Document, FGDC-STD-014.6-2008, 37 pages. National Wetlands Inventory (NWI) • National Wetlands Inventory Metadata • Federal Geographic Data Committee (FGDC), July 2009, Wetlands Mapping Standard: FGDC, Wetlands Subcommittee, FGDC Document, FGDC-STD-015-2009, 35 pages. • Carter, Golet and LaRoe, August 2013 (Adapted from Cowardin, Carter, Golet and LaRoe (1979), Classification of Wetlands and Deepwater Habitats of the United States Wetlands: Subcommittee Federal Geographic Data Committee, 85 pages. • Cowardin, L.M., V. Carter V., F.C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States: U.S. Fish and Wildlife Service Report No. FWS/OBS/-79/31.Washington, D.C., page 10. • United States Fish and Wildlife Service (USFWS), November 2009, A-System-for-Mapping-Riparian-Areas-In-The-Western-United-States: USFWS document, pages 5, 7-9. - Note: This source applies to riparian areas distinct from either wetlands or uplands. “Riparian areas lack the amount or duration of water usually present in wetlands, yet their connection to surface or subsurface water distinguishes them from adjacent uplands” (USFWS, Nov. 2009, pg. 5). This source is provided for completeness of hydro ecosystem concepts. Army Corps of Engineers • Smith, Ammann, Bartoldus, and Mark M. Brinson, 1995, An Approach for

<table>
<tr><td></td><td>
Assessing Wetland Functions, Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices: Wetlands Research Program Technical Report WRP-DE-9, Army Corps of Engineers, pgs. 11-19)
• United States Army Corps of Engineers, Recognizing Wetlands, An Informational Pamphlet.
Groundwater-Dependent Ecosystems (GDE) –Groundwater Inventory, Monitoring, and Assessment Technical Guide (In Press)
• Coles-Ritchie, Marc; Gurrieri, Joe; Carlson, Chris; Solem, Steve. Groundwater-Dependent Ecosystems, Level I Inventory Field Guide, Inventory Methods for Project Design and Analysis. Gen. Tech. Rep.GTRWO-86a: U.S. Department of Agriculture, Forest Service, 201 pages.
• Forest Service GDE Level I Inventory Form (.docx)
• Coles-Ritchie, Marc; Gurrieri, Joe; Carlson, Chris; Solem, Steve. Groundwater-Dependent Ecosystems, Level II Inventory Field Guide, Inventory Methods for Project Design and Analysis. Gen. Tech. Rep.GTRWO-86b: U.S. Department of Agriculture, Forest Service, 131 pages.
• Forest Service GDE Level II Inventory Form (.docx)
• Groundwater Dependent Ecosystems Inventory Database User's Guide: Minerals and Geology Management Staff; Watershed, Fisheries, Wildlife, Air and Rare Plants Staff
</td></tr>
<tr><td>Spatial Data Source:</td><td>Best available source minimum standards for source scale geo-registration as follows: base level - 1:24,000 for continental U.S., Puerto Rico, and Hawaii and 1:63,360 for Alaska</td></tr>
<tr><td>Horizontal Accuracy:</td><td>
Map projects are designed to address specific business needs. Geospatial positioning accuracy is a business requirement that is generally defined during the project planning process. Feasible spatial precision is generally determined by the data sources and methods used to develop a map.
In general, the geospatial positioning accuracy of geospatial datasets produced during a mapping project must be calculated according to the standard defined in Geospatial Positioning Accuracy Standards Part 3: National Standard for Spatial Data Accuracy (see FGDC-STD-007.3-1998; FGDC 1998).
If the map is based on aerial or satellite imagery, and the original images have not been subjected to spatial transformation (re-projection or other warping), then the positional accuracy of the derived map products can be assumed to be the same as that of the input imagery.
If the imagery has undergone a spatial transformation, or if the maps are not based on satellite imagery with metadata on positional accuracy, then the procedures described in FGDC-STD-007.3-1998 should be used.
If the positional accuracy of a dataset cannot be determined by the prescribed procedure, the FGDC (1998) identifies four alternatives for determining positional accuracy: 1) comparison to an independent source of higher accuracy (preferred), 2) deductive estimate, 3) internal evidence, and 4) comparison to source.
NWI accuracy standards
NHD accuracy standards
Original hydrographic data were compiled to meet National Map Accuracy standards. These standards have been maintained in the process of creating the
<table>
<tr><th rowspan="2"></th><th colspan="3">Map Level</th></tr>
<tr><th>Lower 48 States, Hawaii, & Territories</th><th>Estuarine & Lacustrine Deepwater</th><th>Alaska (Including Deepwaters)</th></tr>
<tr><td>Horizontal Accuracy</td><td>5m</td><td>15m</td><td>25m</td></tr>
</table>
NHD. At 1:100,000 scale, ninety percent of well-defined features are within 167 feet (0.02 inches at map scale) of their true geographic position. USGS Map Accuracy standards for 1:24,000 scale require ninety percent of well-defined features to lie
</td></tr>
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	within 40 feet of their true geographic position.
Spatial Reference Information:	Level appropriate. Datum: NAD83. Projection: Forest Service Regions should use their standardized regional projections.
Feature Type:	Polygon, Point
Precision:	Layers (feature classes) should be in high precision.

HydroEcosystem_PL Schema

Name	Recommended or Optional (R or O)	Type	Length	Precision, Scale
NWI_ATTRIBUTE*1	R	STRING	20	
NWI_WETLAND_TYPE*1	R	STRING	50	
NWI_ACRES*1	R	DOUBLE	8	14,6
NWI_GLOBALID*1	R	GLOABLID	38	
SITE_ID*2	O	STRING	50	
SITE_NAME	O	STRING	75	
FS_UNIT_ID	R	STRING	4	
FS_UNIT_NAME	R	STRING	4	
PROJECT_NAME	O	STRING	60	
INVENTORY_STATUS	R	STRING	11	
ALTERNATIVE_ID	O	STRING	50	
NHD_Permanent_Identifier	O	STRING	40	
OBSERVATION_DATE	O	DATE	8	
OBSERVER_NAME	O	STRING	20	
WETLAND_SIZE_AC	O	DOUBLE	8	6,1
AC_HYDROGEOMORPHIC_CLASS	O	STRING	17	
OBSERVED_WATER	O	STRING	9	
NWI_HABITAT_CLASS	O	STRING	2	
NWI_WATER_REGIME	O	STRING	1	
WETLAND_VEG _PRESENT	O	STRING	12	
WETLAND_VEG_DESCRIPTION	O	STRING	150	
LOCAL_CLASS	O	STRING	50	
FENCED	O	STRING	11	
OBSERVED_DISTURBANCE	O	STRING	5	
DISTURBANCE_COMMENT	O	STRING	150	
COMMENT	O	STRING	255	
HYDRO_FEATURE_SOURCE	R	STRING	24	
SOURCE_DATE_YEAR	R	SMALLINTEGER	2	4
SOURCE_DATE_MONTH	O	SMALLINTEGER	2	2
SOURCE_DATE_DAY	O	SMALLINTEGER	2	2
DATA_SOURCE_COMMENT	O	STRING	100	
REV_DATE	R	DATE	8	
DATA_SOURCE	R	STRING	2	
ACCURACY	O	DOUBLE	8	6,2

*1 - Data will come from NWI with these attribute fields populated. For new features, these fields must be populated when feeding data back to the USFWS to update NWI except that new features will not have a Global ID when submitted to NWI.

*2 – Required for features to be linked with the GDE Database.

HydroEcosystem_PT Schema

Name	Recommended or Optional (R or O)	Type	Length	Precision, Scale
NHD_Permanent_Identifier*1	O	STRING	40	
NHD_ReachCode*1	O	STRING	14	
SITE_ID*2	R	STRING	50	
SITE_NAME	O	STRING	75	
FS_UNIT_ID	R	STRING	4	
FS_UNIT_NAME	R	STRING	4	
PROJECT_NAME	O	STRING	60	
ALTERNATVE_ID*3	O	STRING	50	
WATER_RIGHT_ID*3	O	STRING	50	
INVENTORY_STATUS	R	STRING	17	
OBSERVATION_DATE	O	DATE	8	
OBSERVER_NAME	O	STRING	20	
GDE_SPRING_TYPE	O	STRING	17	
ASSOCIATED_WETLAND_ID*4	O	STRING	50	
ASSOCIATED_WETLAND_SIZE_AC	O	STRING	8	6,1
OBSERVED_WATER	O	STRING	9	
CONFIDENTIAL	O	STRING	3	
FENCED	O	STRING	11	
OBSERVED_DISTURBANCE	O	STRING	5	
DISTURBANCE_COMMENT	O	STRING	150	
COMMENT	O	STRING	255	
HYDRO_FEATURE_SOURCE	R	STRING	24	
SOURCE_DATE_YEAR	R	SMALLINTEGER	2	4
SOURCE_DATE_MONTH	O	SMALLINTEGER	2	2
SOURCE_DATE_DAY	O	SMALLINTEGER	2	2
DATA_SOURCE_COMMENT	O	STRING	100	
REV_DATE	R	DATE	8	
DATA_SOURCE	R	STRING	2	
ACCURACY	O	DOUBLE	8	6,2

*1 – Data will come from NHD with this attribute populated and must be preserved for updating NHD.

*2 - Required for features to be linked with the GDE Database

*3 – A number of IDs may be associated with a given spring. NHD_PERMANENT_ID, SITE_ID, WATER_RIGHT_ID, and ASSOCIATED_WETLANDS_ID have been provided to capture the most important ones. ALTERNATE_ID provides an additional identifier to use as needed. The comments field can be used to describe the meaning of the ALTERNATE_ID. If additional IDs are needed, they can be listed in the comments field.

*4 – Springs may be associated with wetlands using this attribute. This relationship may be seen through geospatial analysis or field observation. If other spring relationships need to be tracked, such as a complex of springs in a rock outcrop, site IDs can be listed in the comments field.

Attribute Field Description and Domains, HydroEcosystem_PL and HydroEcosystem_PT

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_*ATTRIBUTE*

The ATTRIBUTE displays the National Wetland Inventory (NWI) Wetland Classification as Wetland Codes. NWI data acquired from USFWS include this field populated with the Wetland Codes applied to each wetland feature. The field should also be populated when providing data to USFWS to update NWI.
The field is composed of a series of letter and number codes that have been developed to adapt the national wetland classification system to map form. These alpha-numeric codes correspond to the classification nomenclature (Cowardin et al. 1979) that best describes the wetland habitat, for example, PFO1A (Palustrine, forested, broad-leaved deciduous, temporarily flooded). Currently there are over 7,000 code combinations in the dataset with over 14 million possible permutations of the code. Visit this web page for information on the wetland codes.
When this domain is not assigned to the field, only the code will show which some users may prefer. Examples only are provided below.

CODE	DESCRIPTION
PAB4Hb	Palustrine, aquatic bed, floating vascular, permanently flooded, beaver
PEM1/SS1B	Palustrine, emergent, persistent/scrub-shrub, broad-leaved deciduous, saturated
PEM1Fb	Palustrine, emergent, persistent, semi-permanently flooded, beaver
PFO1B	Palustrine, forested, broad-leaved deciduous, saturated
PSS1Ch	Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded, diked/impounded
PUBF	Palustrine, unconsolidated bottom, semi permanently flooded
L1UBH	Lacustrine, limnetic, unconsolidated bottom, permanently flooded
L2USCh	Lacustrine, littoral, unconsolidated shore, seasonally flooded, diked/ impounded
LIUBHh	Lacustrine, limnetic, unconsolidated bottom, permanently flooded, diked/impounded

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_WETLAND_TYPE

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_WETLAND_TYPE

This is a general description of the wetland based from the USFWS Wetlands Mapper Legend Categories. NWI data acquired from USFWS include this field. The field should also be populated when providing data to USFWS to update NWI.
The NWI Wetlands Data Verification Toolset can be used to auto populate this field.

CODE	DESCRIPTION	GENERAL DESCRIPTION (NWI)	COWARDIN
Freshwater-Forested and Shrub wetland	Freshwater- Forested and Shrub wetland	Forested swamp or wetland shrub bog or wetland.	Palustrine forested and/or Palustrine shrub
Freshwater Emergent wetland	Freshwater Emergent wetland	Herbaceous marsh, fen, swale and wet meadow	Palustrine emergent
Freshwater pond	Freshwater pond	Pond	Palustrine unconsolidated bottom, Palustrine aquatic bed
Estuarine and Marine wetland	Estuarine and Marine wetland	Vegetated and non-vegetated brackish and saltwater marsh, shrubs, beach, bar, shoal or flat	Estuarine intertidal and Marine intertidal wetland
Riverine	Riverine	River or stream channel	Riverine wetland and deepwater
Lakes	Lakes	Lake or reservoir basin	Lacustrine wetland and deepwater
Estuarine and Marine Deepwater	Estuarine and Marine Deepwater	Open water estuary, bay, sound, open ocean	Estuarine and Marine subtidal water and wetland
Other Freshwater wetland	Other Freshwater wetland	Farmed wetland, saline seep and other miscellaneous wetland	Palustrine wetland

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_ACRES

For data acquired from NWI, wetland size was calculated in an Albers Equal Area projection using ESRI's geometry calculator.

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_GLOBALID

The GLOBAL_ID uniquely identifies the wetland feature. This attribute comes from the NWI.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: *SITE_ID*

The ***SITE_ID*** is a unique identifier for each spring or wetland feature and is used to link to the GDE database. The site ID may be obtained from the Natural Resource Manager (NRM) INFRA database, NRM-NRIS Water Rights and Uses database, or NHD Permanent Identifier. Units may have created their own site IDs in the past. If multiple site IDs exist, then choose the one that best represents the site and meets management needs.
If no site ID exists (or it is unknown), then create a SITE_ID using the approach recommended in the Groundwater-Dependent Ecosystem Level I and II Field Guides. Using this approach, numbers for the region, forest, and district form the beginning of the SITE_ID followed by a name and/or number, for example, "040213 Johnson's Spring."
Link to Groundwater-Dependent Ecosystem Level I and II Field Guides

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: SITE_NAME

The site name is a descriptive name for the site, such as the common name of a spring or wetland.
The site name can be obtained from the following: U.S. Geological Survey (USGS) quadrangle map (also listed in Geographic Names Database [GNIS]), Forest Service primary base series maps, management plans, such as a forest plan, project plan, or allotment plan, or existing authorizations that specify the site by name.
If no site name exists in the sources previously listed, create a descriptive name that is representative—and respectful— of the site. It is helpful if this name is unique.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: FS_UNIT_ID

Change description to: FS_UNIT_ID identifies the National Forest System administrative unit in which this feature is located. A domain is used to ensure only valid values are entered. The domain's code and value are the same to allow display of the FS_UNIT_ID value. This value is in the format of RRFF where RR is the Region code and FF is the Administrative Forest Code. The authoritative source is the Automated Lands Program Administrative Forest list of values. For example for the Tongass National Forest, the value entered and displayed will both be 1005. See also FS_UNIT_NAME

CODE	DESCRIPTION	DEFINITION
1005	1005	Tongass National Forest

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: FS_UNIT_NAME

FS_UNIT_NAME identifies the name of the National Forest System administrative unit in which this feature is located. The full Unit Name is displayed in ARCGIS using the domain value while the domain's code is entered into the field. The domain's code is the same as the value in the FS_UNIT_ID and is in the format of RRFF where RR is the Region code and FF is the Administrative Forest Code. The authoritative source is the Automated Lands Program Administrative Forest list of values. For example, for the Tongass National Forest, the value entered will be 1005 and the value displayed will be Tongass National Forest. See also FS_UNIT_ID.

CODE	DESCRIPTION
1005	Tongass National Forest

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: PROJECT_NAME

The project name is a descriptive term for the implementation effort whether it be a GDE inventory or NEPA analysis. It is consistent with the structure in the GDE database.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: INVENTORY_STATUS

This field is used to document the level of observation ranging from unverified to inventoried. If the site shows evidence of being a spring or wetland, or has been verified, but is dry at the time of observation, be sure to complete the field OBSERVED_WATER.
Attributing a feature as "no spring" or "no wetland" is preferable to deleting the feature to prevent reappearance of the feature as a spring or wetland from legacy data.

CODE	DESCRIPTION	DEFINITIONS
unverified	unverified	Reported, but not verified or inventoried
no spring	no spring	The spring has been reported, but eluded all search or shows no evidence of ever having been a spring.
no wetland	no wetland	The wetland has been reported, but eluded all search or shows no evidence of ever having been a wetland.
verified	verified	Reported and verified, but has not been inventoried
inventoried	inventoried	Either Level I, II, partial level 1, or multiple surveys

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: NHD_Permanent_Identifier

As defined in the National Hydrography Dataset Data Dictionary Data Model version 2.0, the Permanent_Identifier is "40 char GUID value that uniquely identifies the occurrence of each feature in The National Map." This attribute comes from the NHD and should be preserved to track and update NHD features.
NHDs earlier COM_IDs have been rolled into the Permanent_Identifier. See the NHD Data Dictionary.

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: NHD_ReachCode

Unique identifier for a 'reach'. The first eight numbers are the WBD_HUC8. The next six numbers are randomly assigned, sequential numbers that are unique within a HUC8, 14 - char value. ReachCode, as applied to points such as springs, allows a number user defined events to be associated with the spring using NHD Hydrography Event Management Tool.
See the NHD Data Dictionary.

CODE	DESCRIPTION
05010000000001	Number is assigned in the NHD update process.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: OBSERVATION_DATE

This is the date when the feature was observed on the ground or the date of the imagery used. The date places observations in temporal context. For example, a wetland observed in September as "flooded" is likely to be classified as permanently flooded in the NWI system.

Note: To definitively characterize a spring or wetland may take several visits at different times of the year, which are not accommodated by this dataset. This type of characterization should be done using a GDE Level I or II Inventory.

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: OBSERVER_NAME

Name of person observing the spring or wetland. Can be an on-the-ground or remotely sensed observer.

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: WETLAND_SIZE_AC, ASSOCIATED_WETLAND_SIZE_AC

Size of wetland in acres. Use this field for wetland polygons where size is estimated, such as when data is initially captured as point, then buffered. Use in the point layer to represent area of influence of a wetland emanating from a spring.

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: AC_HYDROGEOMORPHIC_CLASS

The Hydrogeomorphic classification of the Army Corps of Engineers provides the geomorphic setting of a wetland such as being on a slope or flat, or in a depression. Concepts of water source are also built into this classification. (Smith et al., 1995)

CODE	DESCRIPTION	DEFINITIONS
Depressional	Depressional	Depressional wetlands occur in topographic depressions with a closed elevation contour that allows accumulation of surface water. Dominant sources of water are precipitation, groundwater discharge, and interflow from adjacent uplands. The direction of water movement is normally from the surrounding uplands toward the center of the depression. Depressional wetlands may have any combination of inlets and outlets or lack them

		completely. Depressional wetlands may lose water through intermittent or perennial drainage from an outlet, by evapotranspiration, and, if they are not receiving groundwater discharge, may slowly contribute to groundwater. Dominant hydrodynamics are vertical fluctuations, primarily seasonal. Peat deposits may develop in depressional wetlands.
Riverine	Riverine	Riverine wetlands occur in floodplains and riparian corridors in association with stream channels. Dominant water sources are overbank flow from the channel or subsurface hydraulic connections between the stream channel and wetlands. Additional water sources may be interflow and return flow from adjacent uplands, occasional overland flow from adjacent uplands, tributary inflow, and precipitation. When overbank flow occurs, surface flows down the floodplain may dominate hydrodynamics. At their headwater most extension, riverine wetlands often intergrade with slope or depressional wetlands as the channel (bed) and bank disappear, or they may intergrade with poorly drained flats or uplands. Perennial flow is not required. Riverine wetlands lose surface water via the return of floodwater to the channel after flooding and through saturation surface flow to the channel during rainfall events. They lose subsurface water by discharge to the channel, movement to deeper groundwater (for losing streams), and evapotranspiration. Peat may accumulate in off-channel depressions (oxbows) that have become isolated from riverine processes and subjected to long periods of saturation from groundwater sources.
Mineral Soil Flats	Mineral Soil Flats	Mineral soil flats are most common on interfluves, extensive relic lake bottoms, or large floodplain terraces where the main source of water is precipitation. They receive virtually no groundwater discharge which distinguishes them from depressions and slopes. Dominant hydrodynamics are vertical fluctuations. They lose water by evapotranspiration, saturation overland flow, and seepage to underlying groundwater. They are distinguished from flat upland areas by their poor vertical drainage, often due to spodic horizons and hardpans, and low lateral drainage, usually due to low hydraulic gradients. Mineral soil flats that accumulate peat can eventually become the class organic soil flats.
Organic Soil Flats	Organic Soil Flats	Organic soil flats, or extensive peatlands, differ from mineral soil flats, in part, because their elevation and topography are controlled by vertical accretion of organic matter. They occur commonly on flat interfluves, but may also be located where depressions have become filled with peat to form a relatively large flat surface. Water source is dominated by precipitation, while water loss is by saturation overland flow and seepage to underlying groundwater.
Tidal Fringe	Tidal Fringe	Tidal fringe wetlands occur along coasts and estuaries and are under the influence of sea level. They intergrade landward with riverine wetlands where tidal currents diminish and river flow becomes the dominant water source. Additional water sources may be groundwater discharge and precipitation. The interface between the tidal fringe and riverine classes is where bidirectional flows from tides dominate over unidirectional ones controlled by floodplain slope of riverine wetlands. Because they frequently flood and water table elevations are controlled mainly

		by sea surface elevation, tidal fringe wetlands seldom dry for significant periods. Tidal fringe wetlands lose water by tidal exchange, by saturation overland flow to tidal creek channels, and by evapotranspiration. Organic matter normally accumulates in higher elevation marsh areas where flooding is less frequent and they are isolated from shoreline wave erosion by intervening areas of low marsh.
Lacustrine Fringe	Lacustrine Fringe	Lacustrine fringe wetlands are adjacent to lakes where the water elevation of the lake maintains the water table in the wetland. In some cases, they consist of a floating mat attached to land. Additional sources of water are precipitation and groundwater discharge, the latter dominating where lacustrine fringe wetlands intergrade with uplands or slope wetlands. Surface water flow is bidirectional, usually controlled by water level fluctuations such as seiches in the adjoining lake. Lacustrine fringe wetlands are indistinguishable from depressional wetlands where the size of the lake becomes so small relative to fringe wetlands that the lake is incapable of stabilizing water tables. Lacustrine wetlands lose water by flow returning to the lake after flooding, by saturation surface flow, and by evapotranspiration. Organic matter normally accumulates in areas sufficiently protected from shoreline wave erosion.
Slopes	Slopes	Slope wetlands normally are found where there is a discharge of groundwater to the land surface. They normally occur on sloping land; elevation gradients may range from steep hillsides to slight slopes. Slope wetlands are usually incapable of depressional storage because they lack the necessary closed contours. Principal water sources are usually groundwater return flow and interflow from surrounding uplands as well as precipitation. Hydrodynamics are dominated by downslope unidirectional water flow. Slope wetlands can occur in nearly flat landscapes if groundwater discharge is a dominant source to the wetland surface. Slope wetlands lose water primarily by saturation subsurface and surface flows and by evapotranspiration. Slope wetlands may develop channels, but the channels serve only to convey water away from the slope wetland. Fens are a common example of slope wetlands.

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: OBSERSERVED_WATER

This field categorizes the water observed on the site on the date of observation. More than one choice can occur. Use value that best characterizes water on the site. If known, the NWI_WATER_REGIME can also be completed.

CODE	DESCRIPTION	DEFINITION
flowing	flowing	Observed in spring or streams.
seeping	Seeping	Observed seepage applying to springs.
dry	dry	No surface water or saturated soil observed in a spring, stream, or wetland.
flooded	flooded	Surface water observed in a wetland.
saturated	saturated	The substrate is saturated to surface. Applies to wetlands.
unknown	unknown	Unknown

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_HABITAT_CLASS (known as Class in NWI)

Cowardin et al. 1979 describes Class as "the highest taxonomic unit below the Subsystem level" In the Wetland Classification. Class represents "the general appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate-features that can be recognized without the aid of detailed environmental measurements" (Cowardin et al. 1979, pg. 10). The advantages in the use of life forms at the Class level include the following: "(1) extensive biological knowledge is not required to distinguish between various life forms, and (2) it has been established that various life forms are easily recognizable on a great variety of remote sensing products (e.g., Radforth 1962, Anderson et al. 1976)." (Cowardin et al. 1979, pg. 10).
Class codes are from the USFWS Wetland Classification Codes. Descriptions and Definitions are from Carter, Golet and LaRoe, August 2013, Classification of Wetlands and Deepwater Habitats of the United States Wetlands which updates Cowardin, etc al, 1979.

Note that detailed vegetative characterization requires a more thorough inventory, for example, using GDE Levels I, or II field inventories. Additionally, the combination of biological and physical factors used to define NWI Classes precludes a one-to-one crosswalk to the U.S. National Vegetation Classification, which focuses on vegetation.

CODE	DESCRIPTION	DEFINITION
RB	Rock Bottom	The Class "Rock Bottom" includes all wetlands and deepwater habitats with substrates having an areal cover of stones, boulders, or bedrock 75 percent or greater and vegetative cover of less than 30 percent. Water Regimes are restricted to Subtidal, Permanently Flooded, Intermittently Exposed, Semipermanently Flooded, Permanently Flooded-Tidal Fresh, and Semipermanently Flooded-Tidal Fresh. Subclasses include Bedrock and Rubble.
UB	Unconsolidated Bottom	The Class "Unconsolidated Bottom" includes all wetland and deepwater habitats with at least 25 percent cover of particles smaller than stones, and a vegetative cover less than 30 percent. Water Regimes are restricted to Subtidal, Permanently Flooded, Intermittently Exposed, Semipermanently Flooded, Permanently Flooded-Tidal Fresh, and Semipermantly Flooded-Tidal Fresh. Subclasses include Cobble-Gravel, Sand, Mud, and Organic.

AB	Aquatic Bed	The Class "Aquatic Bed" includes wetlands and deep-water habitats where plants that grow principally on or below the surface of the water (i.e., surface plants or submergents) are the uppermost life form layer with at least 30 percent areal coverage. Water Regimes include Subtidal, Irregularly Exposed, Regularly Flooded, Permanently Flooded, Intermittently Exposed, Semipermanently Flooded, Seasonally Flooded, Seasonally Flooded-Saturated, Permanently Flooded-Tidal Fresh, Semipermanently Flooded-Tidal Fresh, and Seasonally Flooded-Tidal Fresh. Subclasses Include: Algal, Aquatic Moss, Rooted Vascular, and Floating Vascular Plants.
R	Reef	The Class "Reef" includes ridge-like or mound- like structures formed by the colonization and growth of sedentary invertebrates. Water Regimes are restricted to Subtidal, Irregularly Exposed, Regularly Flooded, and Irregularly Flooded. Subclasses include Coral, Mollusk, and Worm.
SB	Streambed	The Class "Streambed" includes all wetland contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide. Water Regimes are restricted to Irregularly Exposed, Regularly Flooded, Irregularly Flooded, Seasonally Flooded-Saturated, Temporarily Flooded, Intermittently Flooded, and Regularly Flooded-Tidal Fresh. Subclasses include Bedrock, Rubble, Cobble-Gravel, Sand, Mud, Organic, and Vegetated.
RS	Rocky Shore	The Class "Rocky Shore" includes wetland habitats characterized by bedrock, stones, or boulders which singly or in combination have an areal cover of 75 percent or more and an areal coverage by vegetation of less than 30 percent. Water Regimes are restricted to Irregularly Exposed, Regularly Flooded, Irregularly Flooded, Seasonally Flooded-Saturated, Temporarily Flooded, Intermittently Flooded, and Flooded-Tidal Fresh. Subclasses include Bedrock and Rubble.
US	Unconsolidated Shore	The Class "Unconsolidated Shore" includes all wetland habitats having three characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock; (2) less than 30 percent areal cover of vegetation other than pioneering plants; and (3) any of the following Water Regimes: Irregularly Exposed, Regularly Flooded, Irregularly Flooded, Seasonally Flooded, Seasonally Flooded-Saturated, or Temporarily Flooded, Intermittently Flooded, Regularly Flooded-Tidal Fresh, Seasonally Flooded-Tidal Fresh, or Temporarily Flooded-Tidal Fresh. Intermittent or intertidal channels of the Riverine System and intertidal channels of the Estuarine System are classified as Streambed. Subclasses include Cobble-Gravel, Sand, And Mud, Organic, and Vegetated.
ML	Moss lichen	The "Moss-Lichen" Wetland Class includes areas where mosses or lichens cover at least 30 percent substrates other than rock and where emergents, shrubs, or trees alone or in combination cover less than 30 percent. Water Regimes include Seasonally Saturated and Continuously Saturated. Subclasses include: Moss and Lichen.
EM	Emergent	In the "Emergent" Wetland Class, emergent plants – i.e., erect, rooted, herbaceous hydrophytes, excluding mosses and lichens – are the tallest life form with at least 30 percent areal coverage. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. All water Regimes are included

		except Subtidal and Irregularly Exposed. Subclasses include: persistent and nonpersistent. –*Persisten*t In this Subclass, the areal coverage of persistent emergents exceeds that of nonpersistent emergents. Persistent emergents are emergent hydrophytes whose stems and leaves are evident all year above the surface of the water, or above the soil surface if water is absent. Persistent Emergent Wetlands occur only in the Estuarine and Palustrine Systems. –*Nonpersistent* In this Subclass, the areal coverage of nonpersistent emergents exceeds that of persistent emergents. Nonpersistent emergents are emergent hydrophytes whose stems and leaves are evident above the water surface, or above the soil surface if surface water is absent, only during the growing season or shortly thereafter. During the dormant season, there is no obvious sign of emergent vegetation. Nonpersistent Emergent Wetlands occur in all Systems except the Marine.
SS	Shrub/scrub	In Scrub-Shrub Wetlands woody vegetation less than 6 m (20 ft.) tall are the dominant life form - i.e. the tallest life form with at least 30 percent areal coverage. The "shrub" life form actually includes true shrubs, young specimens of tree species that have not reached 6m in height, and woody plants (including tree species) that are stunted because of adverse environmental conditions. All water regimes except Subtidal are included. Subclasses include: Broad-Leaved Deciduous, Needle-Leaved Deciduous, Broad-Leaved Evergreen, Needle-Leaved Evergreen, and Dead.
FO	Forested	In Forested Wetlands tree are the dominant life form – i.e., the tallest life form with at least 30 percent area coverage. Trees are defined as woody plants at least 6 m (20ft.) in height. All water regimes are included except Subtidal. Subclasses include: Broad-Leaved Deciduous, Needle-Leaved Deciduous, Broad-Leaved Evergreen, Needle-Leaved Evergreen, and Dead.

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: NWI_WATER_REGIME

If known, use this NWI modifier for water regime (codes A to V) can aid in later NWI classification. Use of these codes assumes knowledge about the site that extends beyond the date of observation.
Domain Descriptions and Definitions are from Carter, Golet and LaRoe, August 2013, Classification of Wetlands and Deepwater Habitats of the United States Wetlands which updates Cowardin, etc al, 1979. The codes are from FGDC Wetlands Mapping Standard Document Number FGDC-STD-015-2009 except for "C" (Seasonally Flooded) and "X" (Regularly Flooded – Tidal Fresh) which were added here to reflect the updated Wetland Classification in Carter, Golet and LaRoe, August 2013.

CODE	DESCRIPTION	DEFINITION
	NONTIDAL WATER REGIMES	
A	Temporarily Flooded	Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for the most of the season.
B	Saturated	The substrate is saturated at or near the surface throughout the year in all, or most, years. Widespread surface inundation is rare, but water may be present in shallow depressions that intersect the groundwater table, particularly on a floating peat mat.

C	Seasonally Flooded	Surface water is present for extended periods (generally more than a month) during the growing season, but is absent by the end of the season in most years. When surface water is absent, the depth to substrate saturation may vary considerably among sites and among years.
D	Seasonally saturated	The substrate is saturated at or near the surface for extended periods during the growing season, but unsaturated conditions prevail by the end of the season in most years. Surface water is typically absent, but may occur for a few days after heavy rain and upland runoff.
E	Seasonally Flooded-saturated	Surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the season in most years. When surface water is absent, the substrate typically remains saturated at or near the surface.
F	Semi permanently Flooded	Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.
G	Intermittently exposed	Water covers the substrate throughout the year except in years of extreme drought.
H	Permanently Flooded	Water covers the substrate throughout the year in all years.
J	Intermittently Flooded	The substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation. The dominant plant communities under this Water Regime may change as soil moisture conditions change. Some areas exhibiting this Water Regime do not fall within our definition of wetland because they do not have hydric soils or support hydrophytes. This Water Regime is generally limited to the arid West.
K	Artificially Flooded	The amount and duration of flooding are controlled by means of pumps or siphons in combination with dikes, berms, or dams. The vegetation growing on these areas cannot be considered a reliable indicator of Water Regime. Examples of Artificially Flooded wetlands are some agricultural lands managed under a rice-soybean rotation, and wildlife management areas where forests, crops, or pioneer plants may be flooded or dewatered to attract wetland wildlife. Neither wetlands within or resulting from leakage from man-made impoundments, nor irrigated pasture lands supplied by diversion ditches or artesian wells, are included under this Modifier. The Artificially Flooded Water Regime Modifier should not be used for impoundments or excavated wetlands unless both water inputs and outputs are controlled to achieve a specific depth and duration of flooding
TIDAL SALT WATER REGIMES		
L	Subtidal	Tidal salt water continuously covers the substrate.
M	Irregularly Exposed	Tides expose the substrate less often than daily.
N	Regularly Flooded	Tides alternately flood and expose the substrate at least once daily.
P	Irregularly Flooded	Tides flood the substrate less often than daily.
TIDAL FRESH WATER REGIMES		
R	Seasonally Flooded – Tidal Fresh	Tidal fresh surface water is present for extended periods (generally for more than a month) during the growing season, but is absent by the end of the season in most years. When surface water is absent, the depth to substrate saturation may vary considerably among sites and among years.

S	Temporarily Flooded – Tidal Fresh	Tidal fresh surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for the most of the season.
T	Semipermanently Flooded – Tidal Fresh	Tidal fresh surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
V	Permanently Flooded – Tidal Fresh	Tidal fresh water covers the substrate throughout the year in all years.
X	Regularly Flooded – Tidal Fresh	Tides alternately flood the substrate with freshwater and expose it at least once daily.
UNKNOWN		
U	Unknown	

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: WETLAND_VEG_PRESENT

Indicates that wetland specific vegetation is present, absent, or unknown to the observer.
Examples of wetland vegetation include: Hydrophyte, which are plants growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. Species, including cattails, bulrushes, cordgrass, sphagnum moss, bald cypress, willows, mangroves, sedges, rushes, arrowheads, and water plantains are examples.
Specific vegetation can be listed in the WETLAND_VEG_COMMENT field or deferred for detailed inventory under the GDE protocol.

CODE	DESCRIPTION
Present	Present
Absent	Absent
Undetermined	Undetermined

Attribute field description and domains, HydroEcosystem_PL

FIELD NAME: WETLAND_VEG_DESCRIPTION

Describe the wetland vegetation present. Examples of wetland vegetation include: Hydrophyte which are plants growing In water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. Species, including cattails, bulrushes, cordgrass, sphagnum moss, bald cypress, willows, mangroves, sedges, rushes, arrowheads, and water plantains are examples.
Specific vegetation can be listed in the comment field or deferred for detailed inventory under the GDE protocol.

Attribute field description and domains, HydroEcosystem_Pl

FIELD NAME: LOCAL _CLASS

Use this field to enter legacy data based on a local wetlands classification.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: FENCED

This field documents springs and wetlands that are protected by effective fencing.

CODE	DESCRIPTION	DEFINITION
Effective	Effective	Fence effectively protects the spring or wetland.
Ineffective	Ineffective	Fence is in disrepair or does not completely protect the spring or wetland.
No Fence	No fence	No fence
Unknown	Unknown	Unknown if a fence is present

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: OBSERVED_DISTURBANCE

Use this field to identify observed disturbances that may affect the condition of a spring or wetland. These categories are consistent with those listed in the EPA publication EPA 843-F-01-002d. Use of this field can identify the need to complete a Level I or II GDE inventory and more fully evaluate disturbances.

CODE	DESCRIPTION	EXAMPLES
ND	No disturbance	Site appears unaltered.
HA	Hydrologic alteration	Common hydrologic alterations in wetland areas include: • Deposition of fill • Drainage for development • Dredging, stream channelization • Diking and damming • Diversion of flow. • Soil compaction or addition of impervious surfaces • Bare soil, soil erosion, rutting, post holing
P	Pollution	Examples of wetland pollutants include: • Sediment • Fertilizer • Human sewage • Animal waste • Road salts • Pesticides • Heavy metals • Selenium
VD	Vegetation damage	Vegetation damage includes: • Grazing by domestic animals. • Introduction of nonnative plants • Removal of vegetation • Vegetation conversion to other species
HA_P	Hydrologic alteration and Pollution	Combination of above disturbances
HA_VD	Hydrologic alteration and vegetation damage	Combination of above disturbances
P_VD	Pollution and Vegetation damage	Combination of above disturbances
ALL	Hydrologic alteration, Pollution, and vegetation damage	Combination of above disturbances

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: DISTURANCE_COMMENT

List any land uses or other disturbance observed such as road, trails, grazing, vegetative treatment, recreation use, such as constructed dam, diversion, or mining.

Attribute field description and domains, HydroEcosystem_PL
FIELD NAME: ALTERNATE_ID
Provide any additional ID used to identify the site. Use DATA_SOURCE_COMMENT to explain the source of the ID. Note that WATER_RIGHT_ID is a separate field.

Attribute field description and domains, HydroEcosystem_PT
FIELD NAME: WATER_RIGHT_ID
This field is used to identify State Water Right Number.

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: GDE_SPRING_TYPE

These values are included in the Groundwater Dependent Ecosystem Field Guides and the GDE database. Derived from Springer and Stevens Spheres of Discharge of Springs, 2008.

CODE	DESCRIPTION	DEFINITION
Cave	Cave spring	Groundwater emerges in or from a cave; common in karst terrain.
Exposure	Exposure spring	Groundwater is exposed at the land surface but does not have surface inflow or outflow; occurs in karst (sinkholes) and lava flows but could form in other types of vertical conduits into an aquifer.
Fountain	Fountain spring	Cool artesian spring that is forced above the land surface by stratigraphic head-driven pressure or carbon dioxide (CO2).
Geyser	Geyser spring	Intermittent geothermal spring that emerges explosively and usually erratically.
Gushet	Gushet spring	Discrete source of flow pouring from cliff faces; typically emerges from perched, unconfined aquifers, often with dissolution enhancement along fractures; exhibits thin sheets of water flowing over rock faces.
Hanging Garden	Hanging Garden spring	Spring that emerges along geologic contacts or fractures and seeps, drips, or pours onto underlying walls; typically emerges from perched, unconfined aquifers in aeolian sandstone units.
Helocrene	Helocrene spring	Spring that emerges diffusely from low gradient wetlands; often indistinct or multiple sources seeping from shallow, unconfined aquifers (may include fens and cienegas).
Hillslope	Hillslope spring	Spring and/or wetland on a hillslope (generally 20- to 60-degree slope); often with indistinct or multiple sources of groundwater.
Hypocrene	Hypocrene spring	A buried spring where groundwater levels come near, but do not reach, the surface in arid regions, typically due to very low discharge and high evaporation or transpiration. In humid regions, these features may be equivalent to shallow groundwater areas including wet meadows.
Limnocrene	Limnocrene spring	Groundwater emerges in pool(s).

(Carbonate) mound	Mound-form (carbonate) spring	Spring that emerges from a mineralized mound (usually carbonate), frequently at magmatic or fault system. May also include springs issuing from peat mounds.
Rheocrene	Rheocrene spring	Flowing spring that emerges directly into one or more stream channels. Spring-fed streams are also referred to as springbrooks or spring runs.
unknown type	unknown type spring	Other/unknown (describe in notes).

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: ASSOCIATED_WETLAND_ID

Characteristics of wetlands associated with springs are attributed in the *HydroEcosystem_Pl* layer. This field provides a link to the associated wetland in that layer.

Attribute field description and domains, HydroEcosystem_PT

FIELD NAME: CONFIDENTIAL

Acknowledgment that data related to the site are confidential and should not be disclosed, released, or subject to the Freedom of Information Act according provisions of the Antiquities Act, Endangered Species Act, or Homeland Security Presidential Directive 7.

CODE	DESCRIPTION
Yes	Yes
No	No

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: COMMENT

Use this field to add comments and data not covered by other attributes or to clarify other attributes. Separate comment fields related to data sources are provided below.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: HYDRO_FEATURE_SOURCE

Acknowledgment that data related to the site are confidential and should not be disclosed, released, or subject to the Freedom of Information Act according provisions of the Antiquities Act, Endangered Species Act, or Homeland Security Presidential Directive 7.

CODE	DESCRIPTION

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL	
FIELD NAME: HYDRO_FEATURE_SOURCE	
NWI	Source of the feature is National Wetlands Inventory and the feature has not been modified
NHD	Source of the feature is National Hydrographic Dataset and the feature has not been modified
NWI Modified	Source of the feature is National Wetlands Inventory and the feature has been modified
NHD Modified	Source of the feature is National Hydrographic Dataset and the feature has been modified
Other	The wetland was identified by wetlands inventory or photo interpretation from sources other than NWI and NHD. This may include newly identified features. The DATA_SOURCE_COMMENT in addition to the DATA_SOURCE fields can be used to document the source of these features.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL
FIELD NAME AND DOMAIN: SOURCE_DATE_YEAR
Remote sensing source date is the year when the imagery was captured. This is feature-level metadata for documenting the date for the source of the remote sensing imagery used when establishing or updating features. When field sample data is the source, record the date of sample. The Format is YYYY.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL
FIELD NAME AND DOMAIN: SOURCE_DATE_MONTH
Remote sensing source date is the month when the imagery was captured. This is feature-level metadata for documenting the date for the source of the remote sensing imagery used when establishing or updating features. When field sample data is the source, record the date of sample. The Format is MM.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL
FIELD NAME AND DOMAIN: SOURCE_DATE_DAY
Remote sensing source date is the day when the imagery was captured. This is feature-level metadata for documenting the date for the source of the remote sensing imagery used when establishing or updating features. When field sample data is the source, record the date of sample. The Format is DD.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL
FIELD NAME: DATA_SOURCE_COMMENT
Any clarification needed to describe the source of the data including how it was done, by whom, and when if not covered adequately by *HYDRO_FEATURE_SOURCE, SOURCE_DATE_YEAR, SOURCE_DATE_MONTH, SOURCE_DATE_DAY, DATA_SOURCE, REVDATE, or ACCURACY.*

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: DATA_SOURCE

Data Source is a Feature Level Metadata field used to document the data used to derive features in the feature class. See the Forest Service Feature Level Metadata Standard.

Because image data have no inherent scale, image scale is determined as a function of spatial resolution and positional accuracy using National Map Accuracy Standards (NMAS) thresholds for specified map level accuracy requirements as described above under Horizontal Accuracy.

CODE	DESCRIPTION
00	Unknown
01	Original CFF
02	GPS – Uncorrected Data
03	GPS – Differentially Corrected Data
04	GPS Survey Grade and Sub-meter
05	Resurvey Plat
06	Photogrammetric Compilation
07	Digitized from Hard Copy PBS/SEQ
08	Digitized from Hardcopy Orthophoto quad
09	Automated Lands Project (ALP)
20	Digitized Other
21	Geographic Coordinate Database (GCDB)
22	Other Cadastral Information
23	Other Agency Digital
24	Other
30	Remote Sensing Data – Base Level
31	Remote Sensing Data – Mid Level
32	Remote Sensing Data – Broad Level
33	Remote Sensing Data – National Level
41	Geographic Names Information System - GNIS
44	Digital Base Map
46	Digital Broad Scale Map
47	Other Land Survey Data

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: REV_DATE

REV_DATE is a feature-level metadata field used to document when changes were made to individual features. See the Forest Service Feature Level Metadata Standard.

Attribute field description and domains, HydroEcosystem_PT & HydroEcosystem_PL

FIELD NAME: ACCURACY

Accuracy is the calculated positional accuracy of map features compared to true ground position based on the FGDC NSSDA (National Standard for Spatial Data Accuracy (FGDC-STD-007.3-1998). See the Forest Service Feature Level Metadata Standard.

Supplemental Information

NHD and NWI Use and Update Workflow:

1) Clip most current FGDC NHD spring data and NWI wetland data from EDW to area of interest such as a national forest or ecological boundary. Note that updates from NWI occur in January, May, June, and October.
2) Load data into standardized HydroEcosystem schemas.
3) Use and attribute data to achieve the purposes described above.
4) Update as needed to add or revise features based on improved imagery, field mapping, or other local data of higher quality than current NWI or NHD data. Deletion of features based on limited observation should be avoided. See field description for INVENTORY_STATUS.
5) To ensure features are uniquely identified, apply the following measures:
    a. Preserve Permanent_Identifier and ReachCode if it has been assigned by NHD.
    b. Attribute both point and polygon features with a Site ID
    c. Do not store overlapping versions of the same feature in these feature classes.
6) Review processes for contributing updates to NHD and NWI
    a. NWI – Visit the NWI website for contributing data and contact the National Standards and Support Team with any questions.
    b. NHD – Visit the NHD stewardship site.
7) For Updating NWI
    a. Complete the NWI classification using the NWI_ATTRIBUTE field for wetland features. The various observation fields in the feature class should help with classification.
    b. Use the NWI Wetlands Data Verification Toolset to auto populate NWI_WETLAND_TYPE and NWI_ACRES fields and verify wetland codes.
        i. Wetlands Data Verification Toolset
8) For updating NHD, work with principal data stewards typically at the state level to Check-out and edit NHD data. The HydroEcosystem_PT feature class can facilitate the process of importing data into NHD.
    a. Note that all Spring and Seep features share the NHD FType = 458) and FCode =45800. Additionally, wetlands could be used to update NHD Swamp/Marsh features, FType = 466 (FCode = 46600).
9) Data stewards validate updates and make data available to NWI and NHD through approved state process.

GDE Inventory Planning and Design Workflow: (see section 2.3.3, Groundwater IM&A Technical Guide)

1) Within an area of interest such as a NEPA analysis area, use a sampling design to select features from the HydroEcosystem layers to be inventoried under GDE Level I or II protocols.
    a. These are primarily springs and groundwater-dependent wetlands, however, surface water dependent features can be inventoried as well.
2) Conduct field inventory for selected sites recording data using GDE forms or Global Positioning System (GPS) with GDE supplement to the field guides.
3) Update HydroEcosystem point and polygon layers with additions, deletions, and revised shapes.
    a. Preserve NHD permanent identifier and NWI global ID for revised features.
4) Create record in GDE Database either by downloading the supplement to the field guides or entering data from GDE field forms.
    a. HydroEcosystem layers link to the records in the GDE database using the SITE_ID and Unit ID. Ensure these links exist and match both in GIS and in the GDE database.
5) Update GDE database records in the Enterprise Data Warehouse.
    a. This requires that GDE databases be located in standard locations to allow automatic update. Storage of database records at a regional office is recommended.