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ARC HYDRO ENHANCED DATABASE (AHED)

AHED DATA DICTIONARY

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AHED Data Dictionary Document History

Date	Version	Editor	Comments
10/06/2004	1.0	Jack Hampson, Mark Aurit, PBS&J	Data dictionary as part of AHED Logical design document (task 2).
9/26/2005	2.0	Maryam Mashayekhi	Updated the final task 2 delivery document with proposed Pilot schema changes, plus additional background info, maps and descriptions.
06/28/2006	3.0	Maryam Mashayekhi, Ashish Shah	Updated document based on changes made in Pilot implementation of Enterprise ArcHydro Enhanced database.
07/26/2007	4.0	Maryam Mashayekhi, Ashish Shah	Updated document based on changes made in AHED Population phase 1
07/4/2008	5.0	Alex Wigle	Updated document based on AHED database schema at the beginning of P2S2.
07/30/2008	5.1	Maryam Mashayekhi	Updated section 9.2 related to the APUNIQUEID and LAYERKEYTABLE; added definition of Primary, Secondary, Tertiary, section 4.1; updated NHD_FCODE domain values
12/3/2008	6.0	Michael Kohler	Updated document based on AHED database schema at the beginning of P2S3&4
06/09/2010	7.0	Maryam Mashayekhi	Formatted document to include an overview and Data Model description. Updated feature class details to reflect the AHED schema at the beginning of production publishing in June 2010. Updated maps and domains.
8/18/2010	7.1	Maryam Mashayekhi	Changed the definition of OWNER field in the SourceQuality table.
9/30/2010	7.2	Tim Minter	In Draft for Adding AGENCY field to MONITORINGSITE feature class
01/31/2011	7.3	Maryam Mashayekhi	Removed references to UML. Updated Monitoring Sites, RainArea, Waterbody and WCUCatchment for field changes (AREAACRES and AGENCY).
04/28/2011	7.4	Maryam Mashayekhi	Updated definition of HYDROCODE field.
06/16/2011	7.5	Maryam Mashayekhi	Updated description for Name field.
09/30/2011	8.0	Maryam Mashayekhi	Added schema changes to reflect integration of ODSS feature classes, relationship classes and domains with AHED schema. The schema changes initiate AHED Data Model v.2.
9/30/2011	8.1	Tim Minter	Added description for how Operations Decision Support System relies on AHED (section 2.1.).
10/13/2011	8.2	Maryam Mashayekhi	Added WCU and WCS attribute and domain changes to reflect ODSS v.1.3 Model.
11/1/2011	8.3	Maryam Mashayekhi	Changed “Culvert (Barrel)” value for ODSS_HETYPE domain to “Culvert”

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AHED DATA DICTIONARY

OVERVIEW

Arc Hydro Enhanced Database (AHED) Data Dictionary was originally developed as part of the Logical Design document delivered to the District with the completion of the Arc Hydro Prototype Project in 2004.

Since then the Data Dictionary has evolved to a free-standing support document for the AHED database that is updated with each database schema change.

In this document the term **SME** is used in reference to Subject Matter Expert.

1. WHAT IS AHED

The Arc Hydro Enhanced Database (AHED) serves as the District's system of record for the geospatial properties of hydrographic data objects. AHED is an integrated data model based on the industry's Arc Hydro Model for water resources. It has been enhanced and customized to match the specific requirements of South Florida and the District.

AHED integrates the hydrographic data features into one model with relationships among features. Layers that previously existed separately and were managed by various business units, are managed in AHED as related entities under one governance system.

AHED is governed under the umbrella of Hydrographic Spatial Data Management Process (HSDMP) managed by the District's IT-GIS. The HSDMP document describes the details of AHED Governance and stewardship processes.

Many other documents have been developed that describe the AHED Model, its data ingestion and data maintenance workflows, quality control, and tools. These documents are stored and maintained in Documentum repository and are available on the AHED Website. Below is a list of these documents:

- AHED Entity Relationship Diagram (ERD)
- AHED Data Ingestion Workflow Diagram
- AHED data Ingestion Methods & Protocols Diagrams
- AHED Data Construction Manual
- Data Stewardship Training Manual
- AHED Quality Assurance Plan and Quality Control Procedures
- AHED Compliance Specifications

- AHED Feature Class Edit Matrix
- AHED Tools User Manual
- AHED Checker Tools User Manual
- AHED Enterprise Tools User Manual

2. AHED DATA MODEL

AHED Model consists of feature datasets, feature classes, relationship classes, a geometric network, subtypes and domains, and tables.

2.1. INTEGRATING ODSS INTO AHED

The Operations Decision Support System (ODSS) will aid the water manager's decision process by providing improved water management system data aggregation, state visualization, strategic planning tools, and water control device management functionality.

In September 2011, elements of the Operations Decision Support System (ODSS) Data Model (v. 1.3) were integrated into the AHED schema. These include feature classes, a table, relationship classes, and domains that specifically support ODSS functionalities. The specific ODSS related AHED schema changes are highlighted below.

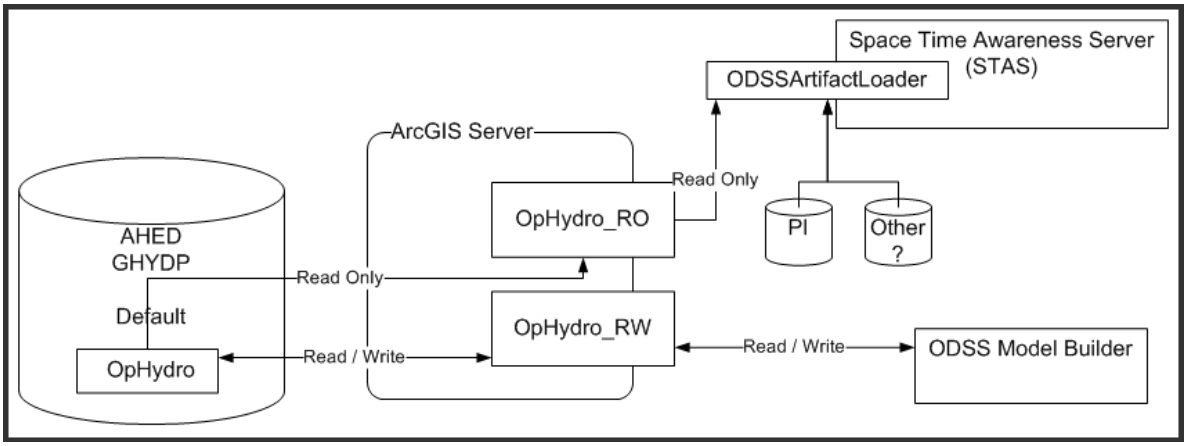
Background

ODSS uses AHED as a loosely federated database. The ODSS data model elements that have been integrated into AHED largely follow AHED data modeling conventions. Therefore, the schema for these elements in AHED are not always exactly as specified in the ODSS Data Model. AHED schema uses aliases for some of the fields and feature classes so that ODSS may perceive the AHED elements to be as specified in the ODSS Data Model. ODSS components ODSSArtifactLoader and ODSS Model Builder interface with ArcGIS Server map and feature services that are established based on a GHYDP version named "OpHydro".

ODSSArtifactLoader is an extract-transform-load (ETL) tool built by Space-Time-Insight, Inc. to extract various ODSS data model content from various systems including AHED and PI, transform the data elements into Space Time Awareness Server (STAS) artifacts, and load them into the STAS in-memory data structure (space time node grains or "STINGS"). This tool reads data from the OpHydro_RO ArcGIS Server Feature Service every 24 hours or as triggered by staff to refresh the STAS STINGS. The OpHydro_RO services use AHED GHYDP instance OpHydro version objects: WMSJUNCTION, HYDRAULICELEMENT, HYDRAULICELEMENTSET, STRUCTURE, MONITORINGSITE, STATION, WATERCONTROLUNIT,

WATERCONTROLCATCHMENT, WATERCONTROLSYSTEM, HES_HE, and associated domains and relationship classes.

ODSS Model Builder is a web tool that is used by Water Managers and Water System Operators to edit ODSS data model content for reloading into STAS STINGS. This tool uses the OpHydro_RW ArcGIS Server Feature Service to allow users to persist changes to the AHED data that ODSS uses in the GHYDP OpHydro version. The OpHydro_RW service uses the same objects listed above for the OpHydro_RO service. The Hydrographic Spatial Data Management Process (HSDMP) sees these OpHydro version changes as requests for change to the base tables. If the changes are confirmed and authorized, then staff will construct the AHED data according to established methods and protocols during defined edit windows.



2.2. FEATURE DATASETS

There are three feature datasets in AHED Model: ENHANCED ARC HYDRO, HP (HYDROPERIOD), and (HH) HYDROLOGY & HYDRAULICS. The ODSS feature dataset that was previously part of AHED, has been removed as part of schema changes to this version of the database.
Each of these feature datasets is described in detail in this document.

2.3. RELATIONSHIP CLASSES

AHED includes many explicitly defined relationship classes. Relationships are established by coding primary and foreign keys in features of the related feature classes. The relationships in the database are displayed in the AHED Entity Relationship Diagram (ERD). Instructions for building relationships are described in the AHED Data Construction Manual.

2.4. HYDRO NETWORK

AHED HydroEdge and HydroJunction feature classes participate in the Hydro Network. The Hydro Network in AHED is a geometric network that allows tracing of water movement through streams and canals through topological

connections among features building the network. Other critical components of the system such as drainage areas, Hydraulic Elements and monitoring points are related to the Hydro Network through HydroJunctions.

Refer to the instructions for building the Hydro Network in the AHED Compliance Specification document. The connectivity rules for AHED Hydro Network are also defined in that document.

2.5. SUBTYPES AND DOMAINS

To create rules for coherency of the database, there are several domains and subtypes in place. A list of all database domains is included in the Domains section of this document.

2.6. FEATURE LEVEL METADATA

AHED Model stores specific metadata attributes related to each individual feature or a group of features. This is described in more detail in section 3.4.

2.7. DRAINAGE AREA NOMENCLATURE

AHED has adopted the drainage boundary definitions and nomenclature from USGS to be consistent with national datasets such as the National Hydrography Dataset (NHD) and the National Watershed Boundaries Dataset (NWBD). This nomenclature is different from what the District has been using in the past. The table below lists the current District naming system compared to AHED adopted naming conventions:

SFWMD	AHED / USGS	HUC Level	# of Digits in HUC (Hydrologic Unit Code)
-	Region (not in AHED)	1	2
-	SubRegion (not in AHED)	2	4
-	Basin (formerly Accounting Unit)	3	6
Watershed	SubBasin (formerly Cataloging Unit)	4	8
Basin	Watershed	5	10
SubBasin	SubWatershed	6	12

As seen in the table above, AHED has four different scales of drainage areas from SubWatershed (smallest units) to Basins (largest units). Topology rules such as no gaps, no overlaps, and coincident boundaries are enforced using the AHED Topology Class.

2.8. AHED DATA SOURCES

The USGS National Hydrography Dataset or NHD (1:24000 NHDinGEO) was used as source data for the following AHED feature classes: Basin, Subbasin, HydroEdge and Waterbody.

The starting point for other AHED feature classes was the District's existing hydrography layers either completely or partially. This will be explained in more detail under each feature class description in section 4.

3. ATTRIBUTES

AHED feature classes have many attributes that are common among all feature classes in addition to attributes that are specific to each feature class. Specific attributes are described under each feature class description and the common attributes are described below in section 3.3.

3.1. ATTRIBUTE POPULATION GUIDELINES

AHED attributes are populated based on the criteria described in the AHED Compliance Specification Document. These criteria are also indicated on the AHED Entity Relationship Diagram (ERD) for each attribute field and are listed below:

- **Required (R):** Must be accurately coded.
  These are attributes that are required because they participate in AHED relationship building. An example is the HydroID attribute.
- **Conditionally Required (CR):** If a defined condition exists, then must be accurately coded.
  These are attributes that exist based on some conditions. If the condition is true, the attributes must be populated. Example: All HydroEdges may not have a Waterbody; those which have Waterbodies should have the WaterbodyID field populated.
- **Optional (O):** If accurate data content is available, then must be accurately coded.
  For example, the field "Alias": Not all features have an Alias, but if one is known, then the field must get populated..

3.2. PRIMARY, SECONDARY, TERTIARY DEFINITIONS

AHED features that directly participate in or are related to the Hydro Network, are classified as Primary, Secondary or Tertiary.

This classification is purely based on drainage definitions. The field HYDRO_ORDER is used to classify features.

Currently, all Primary features and some Secondary features are classified in AHED. More Secondary features and Tertiary features will be classified in the future. Below is a definition for these classifications:

- **Primary** – features existing or influencing water resources at the watershed scale. Watersheds are drainage areas delineated at a scale one level finer than the USGS Subbasins. Examples of primary point and line features are structures located on watershed boundaries that control inflow/outflow between watersheds and canals or other conveyance features that convey water between watersheds.
- **Secondary** – features existing or influencing water resources at the subwatershed scale and hydrologically linked to features at the primary or watershed scale. Subwatersheds are drainage areas delineated at a scale one level finer than watersheds. Examples of secondary point and line features are structures located on subwatershed boundaries that control inflow/outflow between subwatersheds and canals or other conveyance features that convey water between subwatersheds and also from subwatersheds to the primary conveyance system.
- **Tertiary** – features existing or influencing water resources below the subwatershed scale and hydrologically linked to features at the secondary or subwatershed scale. Local scale drainage areas are delineated at a scale finer than the subwatersheds and may be delineated at a very fine scale. Examples of tertiary point and line features are structures located between subwatershed boundaries that control flow interior to subwatersheds and canals or other conveyance features that convey water within subwatersheds and to the secondary conveyance system. Tertiary feature data may be generated for specific project areas involving analyses at a fine scale.

3.3. COMMON ATTRIBUTES IN EACH FEATURE CLASS

- **OBJECTID**: owned by ArcGIS software.
- **SHAPE**: owned by ArcGIS software. Stores geometry type and parameters
- **SHAPE_Length**: owned by ArcGIS software. Stores automatically calculated length in linear spatial reference system units of polygon perimeter line.
- **SHAPE_Area**: owned by ArcGIS software. Stores automatically calculated area in square spatial reference system units of polygon area.
- **DECISION** - Holds any key expert decision or assignment required for this feature.

- **EXPERT** - Name of expert to consult with in regards to the feature.
- **SOURCEID** - Relational key field for relating features to AHED_SourceQuality table, described in more detail in the next section.
- **HYDROID** - Unique feature identifier used across the geodatabase. The Next Available HYDROID is maintained in a counter in the APUNIQUEID Table so that HYDROID remains unique across the entire geodatabase. The Assign HydroID Tool on the Arc Hydro Toolbar assigns HydroIDs to newly added features as they are added or to a selected set of features. For more information refer to section 7.2 APUNIQUEID and LAYERKEYTABLE.
- **HYDROCODE** - This field is adopted from the Arc Hydro Data Model to serve as a permanent public identifier for features. This field is currently not being populated. The method to populate it will be determined later.
- **NAME** - SFWMD Feature Name unless otherwise noted. New names for all AHED features, excluding Monitoring Points, Monitoring Sites and ODSS features, are proposed by Subject Matter Experts, approved by HSDMP Steering Committee and are forwarded to the Naming Authority for approval.

  Names of ODSS features are supplied by ODSS SMEs and do not require approval by HSDMP Steering Committee and the Naming Authority.
- **ALIAS** - SFWMD Alias – Alternate name, if available
- **AREAACRES-** Area calculated in Acres for polygon features.
- **QCSTATUS** – This field describes the status of the QC performed on features in a feature class. The values are stored in a domain called QC_STATUS.

  0 = LOADED NO QC – Data has been loaded but no QC checks have been performed

  1 = EDITOR QC – The feature has been QC'd by an editor

  2 = DBO QC – The feature has been QC'd by database owner

  3 = FINAL QC - The data has passed the final QC before being promoted to production. For ODSS features, this status also indicates availability for use by water managers.

  The codes 4 – 7 were added to QCSTATUS domain to track updates made by the Monitoring Point Refresh Tool.

  4 = ADDED – A new MonitoringPoint or MonitoringSite has been added.

  5 = DELETE – A MonitoringPoint or MonitoringSite is no longer active and need to be deleted from AHED.

  6 = MOVE – A MonitoringPoint or MonitoringSite need to be moved. Moving distance is more than 250 feet.

7 = UPDATED – Either name, activity type, activity_subtype, or XY ccordinate change of less than 250 feet has been made to the feature.

Status = UPDATED is also used for tracking of features during the construction of ODSS feature classes and the resulting updates to AHED features.

3.4. FEATURE LEVEL METADATA ATTRIBUTES IN SOURCEQUALITY TABLE

Table
SOURCEQUALITY

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
R	SOURCEID	Long integer	Yes			0		
O	QCCODE	String	Yes					50
O	ORIGINATOR	String	Yes		AHED_ORIGINATOR			20
O	OWNER	String	Yes		AHED_ORIGINATOR			20
O	MAP_SCALE	Long integer	Yes		MAPSCALE	0		
O	MAPACCURACY	String	Yes					255
O	GPS_DEVICE	String	Yes					100
O	GPS_ACCURACY	Long integer	Yes		GPS_ACCURACY	0		
O	HOR_DATUM	Long integer	Yes		HOR_DATUM	0		
O	VERT_DATUM	Long integer	Yes		VERT_DATUM	0		
O	HOR_REF_SOURCE	String	Yes					255
O	VERT_REF_SOURCE	String	Yes					255
O	SOURCEDATE	Date	Yes			0	0	8
O	HOR_SURVEYORDER	Long integer	Yes		HOR_SURVEY_ORDER	0		
O	VERT_SURVEYORDER	Long integer	Yes		VERT_SURVEY_ORDER	0		
O	SURVEYDATE	Date	Yes			0	0	8
O	SURVEYCERTIFICATE	String	Yes					255
O	QADOCS	String	Yes					255
O	FEAT_UPD_DATE	Date	Yes			0	0	8
O	META_UPD_DATE	Date	Yes			0	0	8
O	METAGROUP_DESC	String	Yes					255
R	AHED_ADD_DATE	Date	Yes			0	0	8
O	AHED_RETIRE_DATE	Date	Yes			0	0	8
O	COMMENTS	String	Yes					255

The feature level metadata attributes are stored in the SourceQuality table and are related to features in each feature class through SOURCEID field. Relationship classes are explicitly defined in the database as:

SourceQuality HAS <Feature Class>.

Populate Metadata tool facilitates creation of new SourceID's and population of SourceQuality table. Some of the common fields mentioned above are also populated using this tool.

Attributes:

- **SOURCEID** – Primary key field to link the records in this table to features in feature classes. This field is populated using the Populate

Metadata tool. Populate Metadata tool looks for the maximum number in this field and assigns the next SourceID to the new record.

- **QCCODE** – A coding system that can be developed by subject matter experts describing the quality of data. Currently not populated.
- **ORIGINATOR** – The organization that created the data. This field has a domain: AHED_ORIGINATOR
- **OWNER** – This field defines the owner of the real world entity (not data) that was mapped in AHED. It is assumed that the data received from any other agency will be owned by SFWMD. OWNER field also uses the AHED_ORIGINATOR domain.
- **MAP_SCALE** – The scale at which the original data was developed. This field has a domain: MAPSCALE.
- **MAPACCURACY** – The accuracy of original data, as published by the originator.
- **GPS_ACCURACY** – For surveyed data, the GPS accuracy is captured in this field and it will follow the District's GPS Accuracy Standards. This field has a domain: GPS_ACCURACY.
- **GPS_DEVICE** – This field will store the metadata about the GPS device used to in gathering the location of the object.
- **HOR_DATUM** – The Horizontal Datum of original data. The horizontal datum values are: NAD 1983, NAD 1983 HARN or NAD 1927 stored in HOR_DATUM domain.
- **VERT_DATUM** – The Vertical Datum of original data. The vertical datum values are: National Geodetic Vertical Datum of 1929 (NGVD29) or North American Vertical Datum of 1988 (NAVD88), stored in VERT_DATUM domain.
- **HOR_REF_SOURCE** – The source of data for example: NHD
- **VERT_REF_SOURCE** – The source for data with Z values, for example: NED
- **SOURCEDATE** – The date the source data was initially captured.
- **HOR_SURVEYORDER** – Survey accuracy standard values stored in HOR_SURVEY_ORDER domain.
- **VERT_SURVEYORDER** – Elevation accuracy standard values stored in VERT_SURVEY_ORDER domain.
- **SURVEYDATE** - The date survey was completed.
- **SURVEYCERTIFICATE** – Surveyor's license number or name as appears on Survey documents.
- **QADOCS** – Link to quality assurance documents from the originator of data.
- **FEAT_UPD_DATE** – Date feature was last updated.
- **META_UPD_DATE** – Date metadata was last updated, auto populated when Populate Metadata Tool is used.

- **METAGROUP_DESC** – Project name or other information that describes a group of data that a feature belongs to.
- **AHED_ADD_DATE –** Date when feature is added to AHED.
- **AHED_RETIRE_DATE –** Date when feature is retired from AHED.
- **COMMENTS** – Comments

3.5. NHD STATUS TRACKING

Edits to geometry and attributes of features in HydroEdge and Waterbody feature classes are tracked in NHDStatus table and are planned to be shared with Florida DEP NHD coordinator who is in charge of NHD population and updates in Florida.

The NHDStatus table is linked to these feature classes via pre-defined relationship classes using HYDROID as the primary key. The NHDStatus table has three attributes: FEATUREID, COMID, and STATUS. The STATUS field is populated using a domain that describes different types of editing performed to original NHD features. See the description of NHDStatus table and NHD_FEATURE_STATUS domain details in Sections 9 and 11.

For each changed AHED feature, a record is created in the NHDStatus table using ArcMap functionalities for related tables. The instructions below are followed when populating the NHDStatus table:

1. **Deleting features**- The FEATUREID will be populated with feature's HYDROID. COMID will be populated with NHD_COMID; The STATUS field will be populated with value **DELETE FEATURE**.

2. **Newly created features**- These features will not have any real NHD_COMID, but are assigned a value of 999999. The FEATUREID will be populated with feature's HYDROID. The STATUS field will have value **ADD FEATURE**.

3. **For features created during the split of an existing feature**- The original feature's COMID and HydroID will be added to the NHDStatus table prior to split with **DELETE FEATURE** value. The new features will not have any COMID, but HydroID assigned. The FEATUREID will be populated with feature's HYDROID. The STATUS field will have value **ADD FEATURE**.

4. **For features which have different NAME or ALIAS than the NHD_GNIS_NAME**- The FEATUREID will be populated with feature's HYDROID. COMID will be populated with NHD_COMID; the STATUS field will be populated with value **MODIFY FEATURE ATTRIBUTE**.

For features which have undergone geometry change- The FEATUREID will be populated with feature's HYDROID. COMID will be populated with NHD_COMID; the STATUS field will be populated with value **MODIFY FEATURE GEOMETRY**.

4. AH_ENHANCEDARCHYDRO

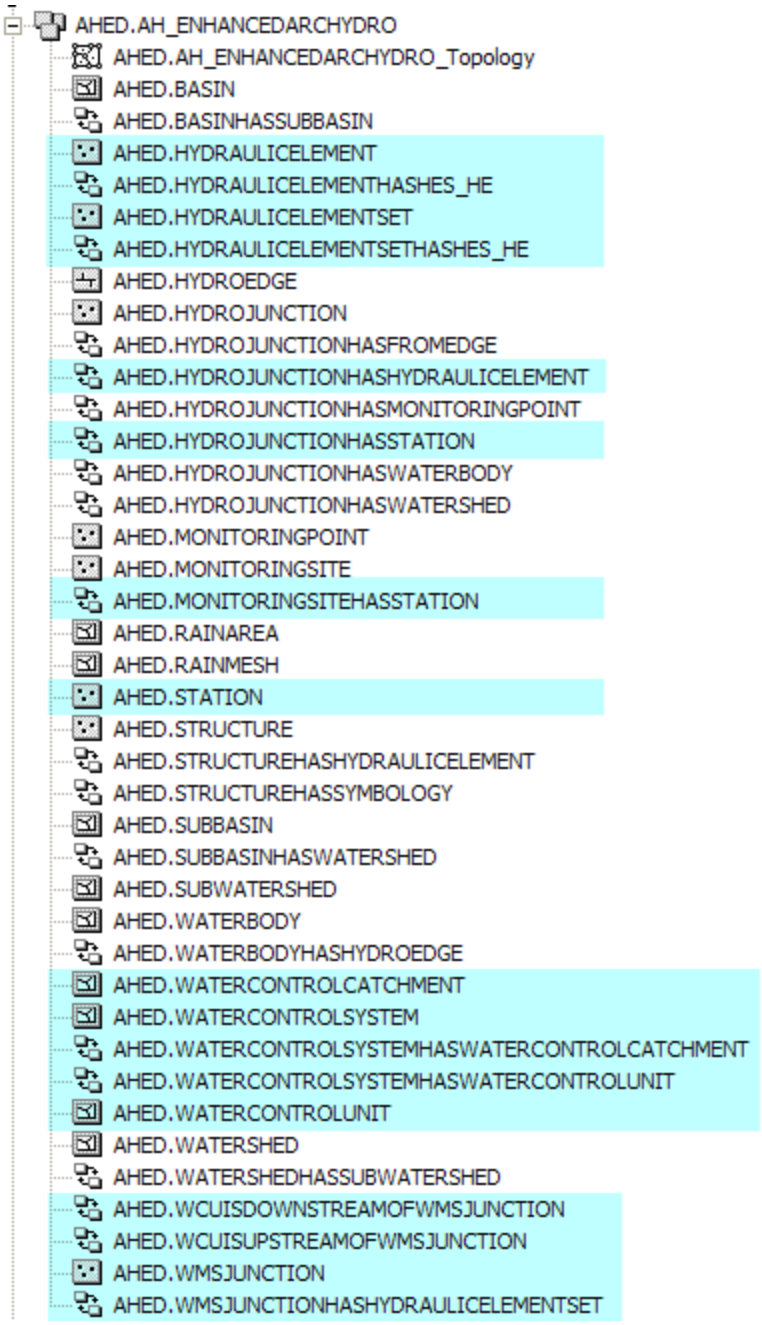
ENHANCED ARC HYDRO FEATURE DATASET

The Enhanced Arc Hydro Feature Dataset contains the geospatial properties for enterprise hydrographic features including ODSS features. These features will be maintained regularly by the AHED Data Stewards and used by GIS users across the District.

The other two AHED feature datasets are project based and will not be maintained regularly or published at the enterprise level.

The figure below shows the feature classes and relationships within ENHANCEDARCHYDRO feature dataset.

Items highlighted in blue are the ODSS objects that have been added to **AHED Database v2**.


AHED.AH_ENHANCEDARCHYDRO
AHED.AH_ENHANCEDARCHYDRO_Topology
AHED.BASIN
AHED.BASINHASSUBBASIN
AHED.HYDRAULICELEMENT
AHED.HYDRAULICELEMENTHASHES_HE
AHED.HYDRAULICELEMENTSET
AHED.HYDRAULICELEMENTSETHASHES_HE
AHED.HYDROEDGE
AHED.HYDROJUNCTION
AHED.HYDROJUNCTIONHASFROMEDGE
AHED.HYDROJUNCTIONHASHYDRAULICELEMENT
AHED.HYDROJUNCTIONHASMONITORINGPOINT
AHED.HYDROJUNCTIONHASSTATION
AHED.HYDROJUNCTIONHASWATERBODY
AHED.HYDROJUNCTIONHASWATERSHED
AHED.MONITORINGPOINT
AHED.MONITORINGSITE
AHED.MONITORINGSITEHASSTATION
AHED.RAINAREA
AHED.RAINMESH
AHED.STATION
AHED.STRUCTURE
AHED.STRUCTUREHASHYDRAULICELEMENT
AHED.STRUCTUREHASSYMBOLOGY
AHED.SUBBASIN
AHED.SUBBASINHASWATERSHED
AHED.SUBWATERSHED
AHED.WATERBODY
AHED.WATERBODYHASHYDROEDGE
AHED.WATERCONTROLCATCHMENT
AHED.WATERCONTROLSYSTEM
AHED.WATERCONTROLSYSTEMHASWATERCONTROLCATCHMENT
AHED.WATERCONTROLSYSTEMHASWATERCONTROLUNIT
AHED.WATERCONTROLUNIT
AHED.WATERSHED
AHED.WATERSHEDHASSUBWATERSHED
AHED.WCUISDOWNSTREAMOFWMSJUNCTION
AHED.WCUISUPSTREAMOFWMSJUNCTION
AHED.WMSJUNCTION
AHED.WMSJUNCTIONHASHYDRAULICELEMENTSET

Feature class descriptions:

4.1. BASIN

Simple feature class
BASIN

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
	SHAPE	Geometry	Yes					
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
R	HYDROCODE	String	Yes					30
R	NAME	String	Yes					30
O	ALIAS	String	Yes					30
R	NHD_HUA_CODE	String	Yes					30
O	DRAINID	Long integer	Yes			0		
R	AREAACRES	Double	Yes			0	0	
R	JUNCTIONID	Long integer	Yes			0		
O	NEXTDOWNID	Long integer	Yes			0		
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

These are the USGS defined Basins imported from the 1:24000 NHDinGEO database. They are defined by a six-digit Hydrologic Unit Code (HUC) in the NHD. Formerly known as accounting units, Basins are the highest level drainage units that fit within the South Florida Water Management District. The next-higher-level, the four-digit Subregion, covers the entire Florida peninsula.

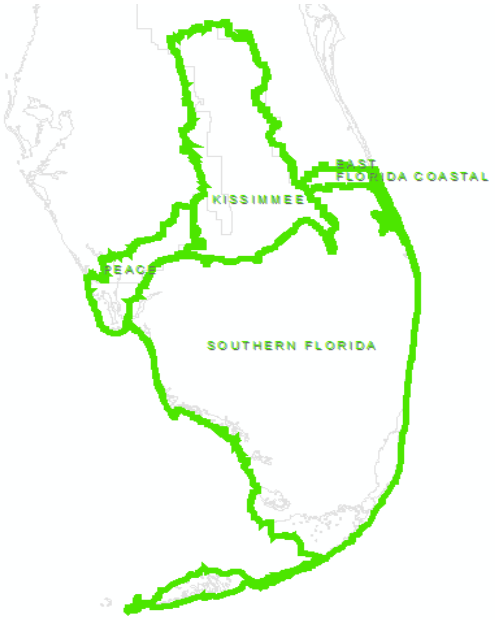


Figure 1: Basins

SOURCE

Basin boundaries and attributes were imported from NHD Basin feature class under NHD HydrologicUnits feature dataset .

GEOMETRY

Basin boundaries are coincident with other AHED drainage area feature class boundaries. Boundaries are corrected at Watershed or subwatershed levels using topology tools.

TOPOLOGY

Basin Must Not Overlap

Basin Must Not Have Gaps

ATTRIBUTES

NHD_HUA_CODE- This field is populated by the HUC_6 field in the NHD feature class

DRAINID- HydroID of the Water Control Catchment Node representing the highest level of abstraction in the ODSS Schematic. Currently not populated.

JUNCTIONID- Basins are not currently related to the Hydro Network. If we need to relate them in the future, the HydroID of the relating Hydrojunction will be stored in this field.

NEXTDOWNID- HydroID of the next downstream Basin if any. This is a user defined relationship to allow Arc Hydro Tools such as 'Accumulate Attributes' and 'Trace by NextDownID' to operate on the Basin. The tool can use the value to trace upstream or downstream along a connected series of NEXTDOWNID values. Currently not populated.

> **Note:** *This field was originally developed for dendritic networks in standard Arc Hydro. In south Florida, multiple outlets occur in one drainage area. Therefore, this field can be populated if the use of above mentioned tools is intended.*

4.2. SUBBASIN

Simple feature class
SUBBASIN

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
	SHAPE	Geometry	Yes					
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
R	HYDROCODE	String	Yes					30
R	NAME	String	Yes					30
O	ALIAS	String	Yes					30
R	NHD_HUA_CODE	String	Yes					30
O	DRAINID	Long integer	Yes			0		
R	AREAACRES	Double	Yes			0	0	
R	JUNCTIONID	Long integer	Yes			0		
O	NEXTDOWNID	Long integer	Yes			0		
R	BASINID	Long integer	Yes			0		
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

SubBasins are the next level of drainage areas inside Basins. They are defined by an eight-digit Hydrologic Unit Code (HUC) in the NHD. They were

imported from the 1:24000 NHDinGEO database. SubBasins were previously known as Watersheds at the District, see Drainage Area Nomenclature above.

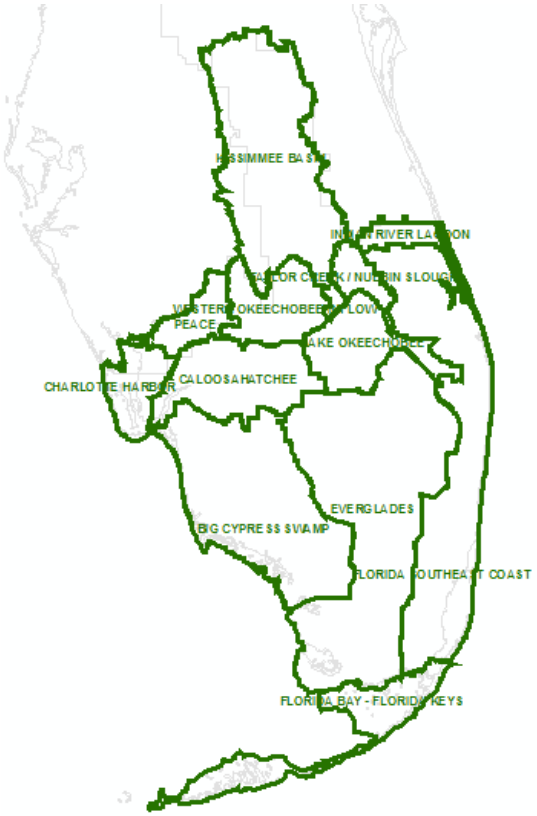


Figure 2: SubBasins

SOURCE

SubBasin boundaries and attributes were imported from NHD Subbaisn feature class under NHD HydrologicUnits feature dataset.

GEOMETRY

SubBasins are formed based on aggregation of Watersheds. AHED SubBasins follow the NHD SubBasins but boundary details are based on AHED Watersheds that represent the knowledge of Subject Matter Experts. Topology rules are enforced among features of Basin, SubBasin, Watershed, SubWatershed, and RainArea feature classes.

TOPOLOGY

SubBasin Must Not Overlap

SubBasin Must Not Have Gaps

SubBasin Area Boundary Must Be Covered By Boundary of Basin

ATTRIBUTES

NHD_HUA_CODE- This field is populated by the HUC_8 field in the NHD feature class.

DRAINID- HydroID of the Water Control Catchment Node representing the highest level of abstraction in the ODSS Schematic. Currently not populated.

JUNCTIONID- SubBasins are not currently related to the network. If we need to relate them in the future, the HydroID of the relating Hydrojunction will be stored in this field.

NEXTDOWNID- HydroID of the next downstream SubBasin. This is a user defined relationship to allow Arc Hydro Tools such as 'Accumulate Attributes' and 'Trace by NextDownID' to operate on the basin. The tool can use the value to trace upstream or downstream along a connected series of NEXTDOWNID values. Currently not populated.

Note: *This field was originally developed for dendritic networks in the Arc Hydro Model. In South Florida, multiple outlets occur in one drainage area. Therefore, this field can be populated if the use of above mentioned tools is intended.*

BASINID- HydroID of the containing Basin. This field builds a relationship between Subbasins and Basinsand is populated using Feature Relationship builder tool.

4.3. WATERSHED

Simple feature class
WATERSHED

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	NAME	String	Yes					30
O	ALIAS	String	Yes					30
O	NHD_HUA_CODE	String	Yes					30
O	DRAINID	Long integer	Yes			0		
R	AREAACRES	Double	Yes			0	0	
R	JUNCTIONID	Long integer	Yes			0		
O	NEXTDOWNID	Long integer	Yes			0		
R	SUBBASINID	Long integer	Yes			0		
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

Watersheds are the next level drainage areas under SubBasins and have ten-digit HUCs. They were formerly known at the District as Dbasins or Basins, see Drainage Area Nomenclature above.

SOURCE

The starting point for AHED Watersheds was District Basins layer as it was edited by HESM group in 2004. Since then, many meetings with the SME's from various District business groups have been conducted that have resulted in updates to the boundaries.

At the time of AHED population (2005), the Watershed feature class in NHD database was not populated. The Natural Resources Conservation Service (NRCS) Watershed boundaries were quite different from District Basins due

to specific drainage characteristics and water management practices of South Florida. Therefore, NRCS dataset was not used as a source for AHED Watersheds.

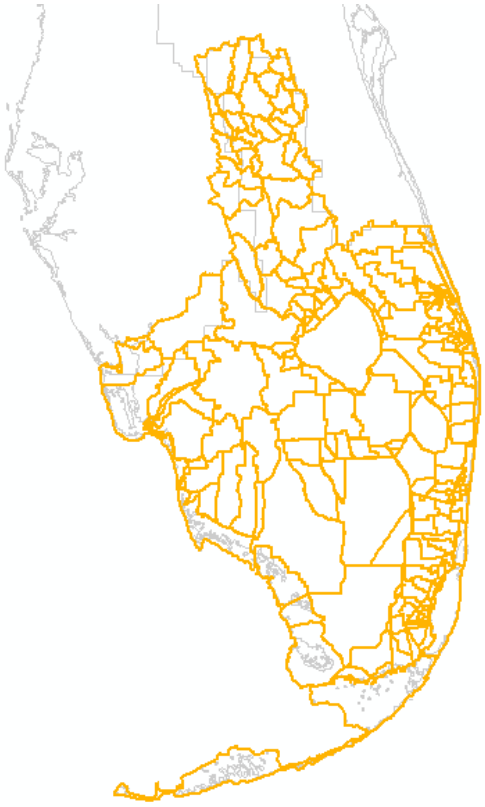


Figure 3: Watersheds

GEOMETRY

The Watershed boundaries are coincident with other drainage area feature classes. They fit inside SubBasins.

Boundaries are edited to be coincident with Controlled and Uncontrolled HydroJunctions associated with Hydraulic Elements on structures.

TOPOLOGY

Watershed Must Not Overlap

Watershed Must Not Have Gaps

Watershed Area Boundary Must Be Covered By Boundary of SubBasin

ATTRIBUTES

NHD_HUA_CODE- This field corresponds to the 10 digit HUC from NHD Watershed features. It is not currently populated in AHED, because AHED watersheds are sourced from the District and there is a not a one to one match between our Watersheds and NHD or NRCS Watersheds.

DRAINID- HydroID of the Water Control Catchment Node representing the drainage area of the Watershed. Currently not populated.

JUNCTIONID- The HydroID of the HydroJunction of type 'Drainpoint' that relates the Watershed to the network

NEXTDOWNID- HydroID of the next downstream Watershed. This is a user defined relationship to allow Arc Hydro Tools trace by NextDownID to operate on the watershed. The tool can use the value to trace upstream or downstream along a connected series of NEXTDOWNID values

Note: *This field was originally developed for dendritic networks in standard Arc Hydro. In south Florida, multiple outlets occur in one drainage area. Therefore, this field can be populated if the use of above mentioned tools is intended.*

SUBBASINID- HydroID of the containing SubBasin. This field builds a relationship between Watersheds and Subbasins and is populated using Feature Relationship Builder tool.

4.4. SUBWATERSHED

Simple feature class
SUBWATERSHED

Geometry Polygon
Contains M values No
Contains Z values No

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			10		
R	HYDROID	Long integer	Yes			10		
O	HYDROCODE	String	Yes					30
R	NAME	String	Yes					30
O	ALIAS	String	Yes					30
CR	NHD_HUA_CODE	String	Yes					30
O	DRAINID	Long integer	Yes			10		
R	AREAACRES	Double	Yes			38	8	
O	JUNCTIONID	Long integer	Yes			10		
O	NEXTDOWNID	Long integer	Yes			10		
R	WATERSHEDID	Long integer	Yes			10		
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	5		
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

SubWatersheds are the next level of drainage areas under Watersheds. They were formerly known at the District as SubBasins.

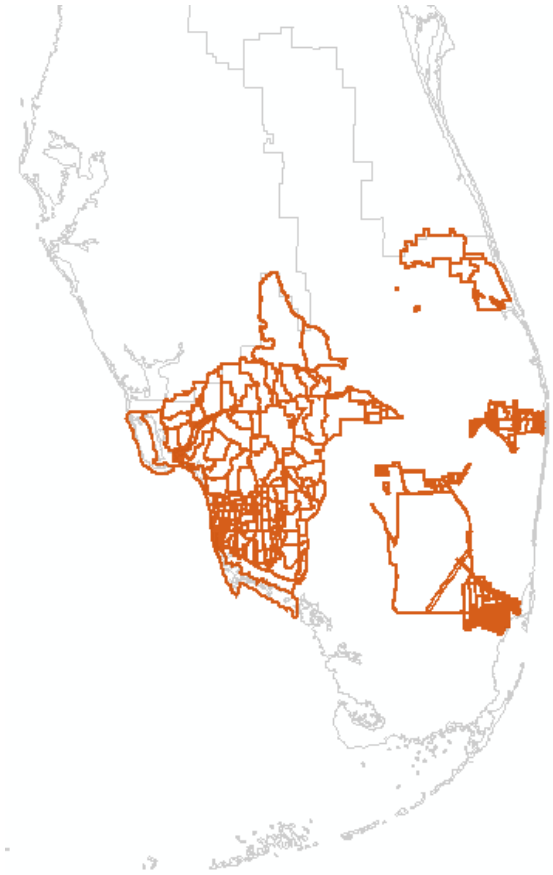


Figure 4: Sub-Watershed

SOURCE

SubWatersheds are loaded in AHED for parts of the District where updated boundaries have been available. As more data becomes available it will be added. The source of this data usually is from business groups' projects or from Counties.

GEOMETRY

SubWatershed boundaries are edited through SME consultations to make them fit within AHED Watershed boundaries. SMEs may also determine that SubWatershed boundaries are more accurate and the Watershed boundary will be modified to match them.

TOPOLOGY

SubWatershed Must Not Overlap

SubWatershed Must Not Have Gaps

SubWatershed Area Boundary Must Be Covered By Boundary of Watershed

ATTRIBUTES

NHD_HUA_CODE- This field corresponds to the HUC_12 field in the NHD feature class. It is not populated in AHED because the AHED SubWatersheds are not sourced from the NHD and there is not a one to one match.

DRAINID- HydroID of the Water Control Catchment Node representing the drainage area of the SubWatershed. Currently not populated.

JUNCTIONID- SubWatersheds are not related to the network at this time. If we need to relate them in the future, the HydroID of the relating Hydrojunction will be stored in this field.

NEXTDOWNID- HydroID of the next downstream Watershed. This is a user defined relationship to allow Arc Hydro Tools trace by NextDownID to operate on the watershed. The tool can use the value to trace upstream or downstream along a connected series of NEXTDOWNID values. Currently not populated.

Note: *This field was originally developed for dendritic networks in standard Arc Hydro. In south Florida, multiple outlets occur in one drainage area. Therefore, this field can be populated if the use of above mentioned tools is intended.*

WATERSHEDID- HydroID of the containing Watershed. This field builds a relationship between SubWatersheds and Watersheds and is populated using Feature Relationship builder tool.

4.5. HYDROEDGE

Simple feature class
HYDROEDGE

Geometry *Polyline*
Contains M values *Yes*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
	ENABLED	Short integer	Yes	1	EnabledDomain	0		
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			30
O	EXPERT	String	Yes					30
R	HYDROID	Long integer	Yes			0		
O	DRAINID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
O	NAME	String	Yes					30
O	ALIAS	String	Yes					100
R	LENGTHMI	Double	Yes			0	0	
O	LENGTHDOWN	Double	Yes			0	0	
R	EDGETYPE	Long integer	Yes	1	AH_HYDROEDGETYPE	0		
R	NHD_FLOWDIR	Long integer	Yes	1	AH_HYDROFLOWDIR	0		
R	NHD_COMID	Long integer	Yes			0		
R	NHD_FDATE	Date	Yes			0	0	8
R	NHD_RESOLUTION	Long integer	Yes		NHD_RESOLUTION	0		
R	NHD_FCODE	Long integer	Yes		NHD_FCODE	0		
O	NHD_GNIS_ID	String	Yes					10
O	NHD_GNIS_NAME	String	Yes					65
R	NHD_LENGTHMI	Double	Yes			0	0	
R	NHD_REACHCODE	String	Yes					14
O	FMEASURE	Double	Yes			0	0	
O	TMEASURE	Double	Yes			0	0	
CR	FROM_NODE	Long integer	Yes			0		
CR	TO_NODE	Long integer	Yes			0		
O	HYDRO_ORDER	String	Yes		AHED_HYDRO_ORDER			30
CR	WATERBODYID	Long integer	Yes			0		
R	FLOWDIR	Long integer	Yes	1	AH_HYDROFLOWDIR	0		
R	SOURCEID	Long integer	Yes			0		
O	SEG_NAME	String	Yes					30
CR	FLOWLINETYPE	Long integer	Yes		AHED_FLOWLINETYPE	0		
O	NEXTDOWNID	Long integer	Yes			0		
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE	Geometry	Yes					
CR	CARTO	Short integer	Yes	0	CARTO	0		
	SHAPE_Length	Double	Yes			0	0	

Subtypes of HYDROEDGE

Subtype field *EDGETYPE*
Default subtype *1*

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
2	SHORELINE	ENABLED	1	EnabledDomain
		DECISION		AHED_DECISIONDOMAIN
		EDGETYPE	2	AH_HYDROEDGETYPE
		NHD_FLOWDIR	1	AH_HYDROFLOWDIR
		NHD_RESOLUTION		NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		FLOWDIR	1	AH_HYDROFLOWDIR
		FLOWLINETYPE		AHED_FLOWLINETYPE
		QCSTATUS	0	QC_STATUS
		CARTO	0	CARTO
1	FLOWLINE	ENABLED	1	EnabledDomain
		DECISION		AHED_DECISIONDOMAIN
		EDGETYPE	1	AH_HYDROEDGETYPE
		NHD_FLOWDIR	1	AH_HYDROFLOWDIR
		NHD_RESOLUTION		NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		FLOWDIR	1	AH_HYDROFLOWDIR
		FLOWLINETYPE		AHED_FLOWLINETYPE
		QCSTATUS	0	QC_STATUS
		CARTO	0	CARTO

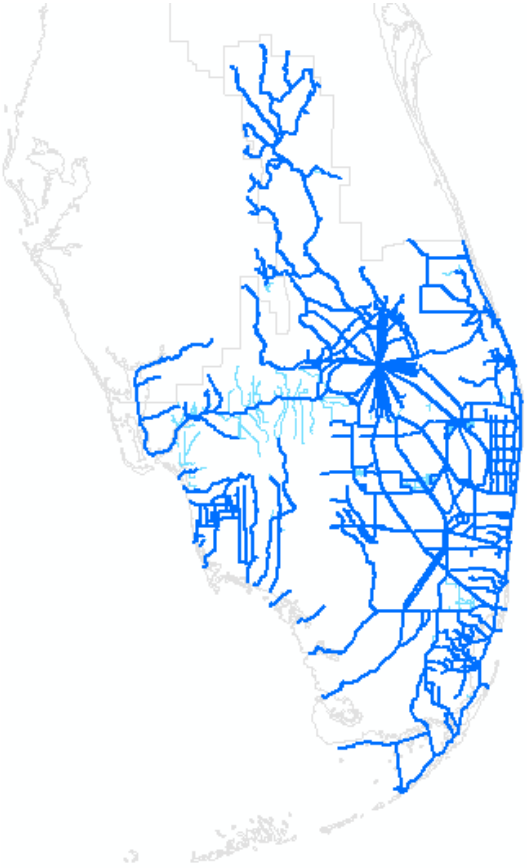
DISCUSSION

HydroEdges are the network of lines describing the map hydrography. They represent canals, streams or rivers plus artificial lines in lakes or wetlands to maintain the connectivity of the Hydro Network.

There are two subtypes in HydroEdges:

Flowline, which traces water movement, and

Shoreline, which forms the interface between land and water where it is not defined by a Waterbody polygon.



SOURCE

The HydroEdge feature class is populated using the 24K NHD. The NHDFlowline feature class was used as the source.

Many NHD fields were also imported to HydroEdge feature class; these are the fields that have an NHD prefix.

The AHED Tool, 'Translation Tables' was used in Arc Map to load the data in from NHD and match the fields.

Figure 5: Primary and secondary HydroEdges

GEOMETRY

HydroEdge geometry of the Primary and secondary features have been corrected using the latest available 1:12000 DOQQs or County aerial photography. Primary and secondary HydroEdges are split at Watershed boundaries and Waterbodies, and are coincident with the HydroJunctions present at those points.

End points of HydroEdges are always covered by HydroJunctions to maintain Network connectivity. These HydroJunctions are of type NetworkJunction, unless the HydroJunction is related to a Hydraulic Element. Geometry and attribute edits to HydroEdge features are tracked through NHDStatus table.

TOPOLOGY

HydroEdge Endpoint Must Be Covered By HydroJunction

HydroEdge Must Not Self-Intersect

ATTRIBUTES

ENABLED- This is a Boolean field. Yes means that the edge is participating in the network. No is used to block routes to prevent looping. Values are selected from ENABLED Domain.

DRAINID- HydroID of the Water Control Catchment that contains the HydroEdge feature , and is available where populated from AH_ODSS , and can be assigned using a spatial join. The HydroID of the Water Control Catchment is preferred in support of water balancing and relationships to the Operations Decision Support System. Alternative would be HydroID assigned from SubBasin by correlating first eight characters of the HydroEdge NHD_REACHCODE to the SubBasin HUC Code (to be stored in the SubBasin ALIAS field). Currently not populated.

LENGTHMI- Reach length in miles

LENGTHDOWN- Length downstream to ultimate outfall. If the network is built and flow directions are established, this value can be calculated automatically using the Arc Hydro tool, Calculate Length Downstream for Edges.

EDGETYPE- Descriptor of feature subtype: Flowline or Shoreline. It uses the domain AH_HYDOEDGETYPE.

NHD_FLOWDIR- Original flow direction stored with the feature in NHD.

NHD_COMID- Unique identifier of the NHD reach or feature.

NHD_FDATE- Feature date from NHD.

NHD_RESOLUTION- Resolution of data (Local, High, Medium, or Low; 1:24K is High resolution, 1:100K is Medium)

NHD_FCODE- Numeric value that encodes the type and values for a set of characteristics for an NHD feature. This five-digit code has two parts: the first three digits encode the feature type; the last two digits encode values for a set of characteristics associated with the feature. The field is now linked to a new domain NHD_FCODE which has the list of feature codes for features to be populated in AHED.

NHD_GNIS_ID- Geographic Names Information System (GNIS) identifier of the reach name. A "blank" means that the name has not been populated in GNIS

NHD_GNIS_NAME- Geographic Names Information System (GNIS) name of the reach.

NHD_LENGTHMI- Length in Miles. This attribute is calculated from LengthKM on import.

NHD_REACHCODE- A numeric code that uniquely identifies a reach. This 14-digit code has 2 parts: the first 8 digits are the hydrologic unit code for the SubBasin in which the reach is located; the last 6 digits are a sequentially ordered, arbitrarily assigned number. This field can be used to develop queries that relate the HydroEdge to its USGS SubBasin.

FMEASURE- Starting or From measure of the routing measures.

TMEASURE- Ending or To measure of the routing measures.

FROM_NODE- HydroID of the up-measure HydroJunction at the starting point of HydroEdge. It is assigned using the AHED Tool – Generate From/To Nodes for Lines or can be assigned manually.

TO_NODE- HydroID of the down-measure HydroJunction at the endpoint of HydroEdge. It is assigned using the AHED Tool – Generate From/To Nodes for Lines or can be assigned manually.

HYDRO_ORDER- Classification indicating Primary, Secondary or Tertiary level.

NEXTDOWNID- HydroID of the HydroJunction next in line downstream. This is a user defined relationship to allow Arc Hydro Tools trace by. The tool can use the value to trace upstream or downstream along a connected series of NEXTDOWNID values. Currently not populated.

> **Note:** *This field was originally developed for dendritic networks in Arc Hydro Model. In south Florida, multiple outlets occur in one drainage area. Therefore, this field can be populated if the use of above mentioned tools is intended.*

WATERBODYID- HydroID of the containing Waterbody. The Feature Relationship Builder Tool is used to build this relationship. Populating this field creates a relationship between the HydroEdge and its containing waterbody.

FLOWDIR- Flow direction of the reach. By default the flow direction is assigned with digitized direction, meaning that the reach flows the same way that it was digitized. There is a domain associated with this field with the following values: **UnInitialized**, **WithDigitized**, **AgainstDigitized**, and **Indeterminate.** FLOWDIR values get updated when the flow directions are corrected in the database. This is done in two ways; either the HydroEdge is flipped to reverse the direction which it was digitized originally. Or the value of this field is changed to AgainstDigitized.

SEG_NAME- The name of a segment of the HydroEdge if exists. Some projects, such as Kissimmee River Restoration Project, assign names to individual segments of the river as restorations were being completed. This field was added to keep track of these names. The Waterbody feature class

has a similar field. It may be necessary in the future to assign a unique name to each HydroEdge segment for operations purpose , even if several of them share the same Name.

FLOWLINETYPE- This field was added in Pilot to identify the type of FlowLines. Basically it was decided to assign all the actual canals as CANALDITCH, and rivers as STREAMRIVER and HydroEdges inside lakes as ARTIFICIALPATH. These values are in a domain called AHED_FLOWLINETYPE. The main reason for adding this field was compatibility with the Watershed Atlas Tool. NHD data uses these categories in a different way. The original NHD categorization is kept in NHD_FCODE field.

CARTO- This field is used for mapping purposes. Constructing HydroEdges at WMSJunctions results in adding several extra HydroEdge features to represent water flow through Hydraulic Elements. This field is used to code features that need to be drawn or be excluded from drawing at low/high scale maps.

4.6. HYDROJUNCTION

Simple feature class
HYDROJUNCTION

Geometry Point
Contains M values No
Contains Z values No

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
	ANCILLARYROLE	Long integer	Yes	0	AncillaryRoleDomain	10		
	ENABLED	Short integer	Yes	1	EnabledDomain	5		
R	HYDROID	Long integer	Yes			10		
O	HYDROCODE	String	Yes					30
CR	NAME	String	Yes					30
O	NEXTDOWNID	Long integer	Yes			10		
O	LENGTHDOWN	Double	Yes			38	8	
O	DRAINAREA	Double	Yes			38	8	
CR	FTYPE	String	Yes		AHED_FTYPE			30
R	JUNCTIONTYPE	Long integer	Yes	4	AHED_JUNCTIONTYPE	10		
CR	HYDRO_ORDER	String	Yes		AHED_HYDRO_ORDER			30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	5		
	SHAPE	Geometry	Yes					

Subtypes of HYDROJUNCTION

Subtype field *JUNCTIONTYPE*
Default subtype *4*

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
5	DRAINPOINT	ANCILLARYROLE	0	AncillaryRoleDomain
		ENABLED	1	EnabledDomain
		FTYPE		AHED_FTYPE
		JUNCTIONTYPE	4	AHED_JUNCTIONTYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS
3	INTERNAL	ANCILLARYROLE	0	AncillaryRoleDomain
		ENABLED	1	EnabledDomain
		FTYPE		AHED_FTYPE
		JUNCTIONTYPE	3	AHED_JUNCTIONTYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS
2	UNCONTROLLED	ANCILLARYROLE	0	AncillaryRoleDomain
		ENABLED	1	EnabledDomain
		FTYPE		AHED_FTYPE
		JUNCTIONTYPE	2	AHED_JUNCTIONTYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS
1	CONTROLLED	ANCILLARYROLE	0	AncillaryRoleDomain
		ENABLED	1	EnabledDomain
		FTYPE		AHED_FTYPE
		JUNCTIONTYPE	1	AHED_JUNCTIONTYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS
4	NETWORKJUNCTION	ANCILLARYROLE	0	AncillaryRoleDomain
		ENABLED	1	EnabledDomain
		FTYPE		AHED_FTYPE
		JUNCTIONTYPE	4	AHED_JUNCTIONTYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS

DISCUSSION

HydroJunctions are points that are created at endpoints of HydroEdge features plus additional strategic locations on the Hydro Network.

HydroJunctions are an important part of the Arc Hydro model in terms of creating network relationships. It is through HydroJunctions that features from other feature classes are related to the Hydro Network.

SOURCE

HydroJunctions at the end of HydroEdges, of type 'NetworkJunction', were created when the Hydro Network was first built. They are created manually when new HydroEdges are added. Other types of HydroJunctions are added as needed to relate other features to the Hydro Network.

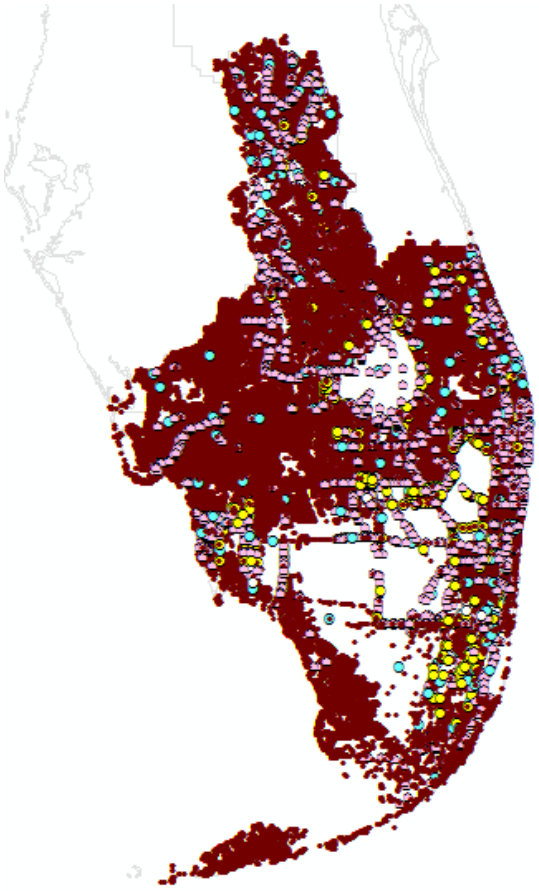


Figure 6: HydroJunctions

GEOMETRY

Building the geometric network for the first time creates HydroJunctions at the end of all HydroEdges. Consequent network builds will only create new HydroJunctions at HydroEdge endpoints where HydroJunctions are missing.

HydroJunctions at the endpoints of HydroEdges are of type 'NetworkJunction'.

If endpoint HydroJunctions are related to Hydraulic Elements, they will be of types: 'Controlled' or 'UnControlled'. These features are coincident with Watershed, Subwatershed and Water Control System boundaries.

HydroJunctions of type 'Internal' are related to Monitoring Points and Stations. They are created by projecting Monitoring Point or Station features on to the primary or secondary Network.

HydroJunctions of type 'DrainPoint' are related to Watersheds. They are created by projecting Watershed centroid on to the primary network.

'Internal' and 'DrainPoint' HydroJunctions are not at HydroEdge endpoints.

TOPOLOGY

HydroJunction Point Must Be Covered By Line HydroEdge

HydroJunction:Controlled Must Be Covered By Endpoint of HydroEdge

HydroJunction:Controlled Must Be Covered By Boundary of Watershed

HydroJunction:Controlled Must Be Covered By Boundary of SubWatershed

HydroJunction:Controlled Must Be Covered By Boundary of Water Control System

ATTRIBUTES

ANCILLARYROLE- Defines whether a junction is a sink, a source, or neither of these (ANCILLARYROLE Domain). This is selected when the network is created and Arc Hydro tools are being run.

ENABLED- This is a Boolean field. Yes means that the junction is participating in the network. No is used to block routes to prevent looping. Values are selected from ENABLED Domain.

NAME- This is the name of the feature that is related to the HydroJunction. This relationship is set by calculating the JunctionID field of a feature (such as a Watershed) to be equal to the HydroID of the HydroJunction.

NEXTDOWNID- HydroID of the next downstream Hydrojunction. This is a user defined relationship to allow Arc Hydro Tools trace by NextDownID to operate on the network. The tool can use the value to trace upstream or downstream along a connected series of NEXTDOWNID values. Currently not populated.

Note: *This field was originally developed for dendritic networks in standard Arc Hydro. In south Florida, multiple outlets occur in one drainage area. Therefore, this field can be populated if the use of above mentioned tools is intended.*

LENGTHDOWN- Length downstream to outfall. Calculated on a network with no loops and flow directions defined by using Arc Hydro Tool - Calculate Length Down for Junctions. Currently not populated.

DRAINAREA- Drainage Area in Acres related to the HydroJunction. Value can only be calculated if NextDownID is decided for each HydroJunction. This is a placeholder for a more dynamic calculation to be identified during Task 5 – Operation Decision Support System modeling, due *to the dependency on the NextDownID field for populating DrainArea*

FTYPE- The type of feature projected onto the hydro network to create the HydroJunction (e.g. Monitoring Point, Station, Watershed and Waterbody). Note that HydroJunctions may be associated with more than one feature, for

example several nearby Monitoring Points are all related to the same HydroJunction. The values for this field are selected from AHED_FTYPE Domain.

JUNCTIONTYPE- Identifies the type of HydroJunction. The values are stored in a domain named AHED_JUNCTIONTYPE. The five junction subtypes are:

- **Controlled-** Located on the hydro network and is realted to a Controlled Hydraulic Element. Controlled HydroJunctions should always be located at the endpoints of HydroEdges, rather than at internal nodes, in order to be included as upstream or downstream HydroJunctions on a reach.
- **Uncontrolled-** Located on the hydro network at an uncontrolled structure (such as a fixed weir) or other operationally known locations.
- **Internal-** A HydroJunction created on a HydroEdge within a Waterbody to relate a monitoring point or the Waterbody to the hydro network. HydroID of the Internal HydroJunction is populated in the JunctionID field of the feature (Waterbody or Monitoring Point). Internal HydroJunctions are not at HydroEdge end points.
- **DrainPoint-** HydroJunction that relates the Watersheds to the network by projecting the centroid of each Watershed polygon on the primary HydroEdge in the Watershed.
- **NetworkJunction-** NetworkJunctions are at end points of all HydroEdges. They are very important for the network connectivity. The HydroID of these HydroJunctions are used for populating From_Node and To_Node values of HydroEdges.

HYDRO_ORDER- Classification of Primary, Secondary, or Tertiary features. For HydroJunctions, this value depends on the HydroEdge classification. For example, HydroJunctions located on Primary HydroEdges are also Primary.

4.7. MONITORINGPOINT

Simple feature class
MONITORINGPOINT

Geometry *Point*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
CR	JUNCTIONID	Long integer	Yes			0		
R	DBNAME	String	Yes		AHED_DBNAME			30
R	STATION	String	Yes					24
R	STATION_TYPE	Long integer	Yes	1	STN_TYPE	0		
R	SITE	String	Yes					24
R	SITEGRPID	Long integer	Yes			0		
CR	HYDRO_ORDER	String	Yes		AHED_HYDRO_ORDER			15
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	AGENCY	String	Yes					10
R	STATION_ACTIVITY_ID	Long integer	Yes			0		
R	PARAMETER	String	Yes					20
	SHAPE	Geometry	Yes					

Subtypes of MONITORINGPOINT

Subtype field *STATION_TYPE*
Default subtype *1*

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
1	HYDROLOGY	DECISION		AHED_DECISIONDOMAIN
		DBNAME		AHED_DBNAME
		STATION_TYPE		STN_TYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS
		PARAMETER		HYDROLOGY_PARAMETER
2	WATERQUALITY	DECISION		AHED_DECISIONDOMAIN
		DBNAME		AHED_DBNAME
		STATION_TYPE		STN_TYPE
		HYDRO_ORDER		AHED_HYDRO_ORDER
		QCSTATUS	0	QC_STATUS
		PARAMETER		WQ_PARAMETER

DISCUSSION

Monitoring Point features represent a subset of monitoring activity records that are generated from observations that occur at monitoring stations. Because of two conditions, multiple Monitoring Point features may share the same coordinates that represent the monitoring station's location in AHED:

- Multiple observation types may occur at a unique monitoring station.
- Multiple observation types that occur at distinctly different monitoring stations may share a single monitoring station's coordinates because of historical workflows that did not require positional accuracy that would create distinct monitoring station coordinates.

A unique ID field (STATION_ACTIVITY_ID) was added to DBHYDRO DM_Station_Activity table to provide a unique ID for each activity type. This field also has been added to AHED Monitoring Points for reference.

The Monitoring Point feature class has two subtypes for the STATION_TYPE field as:

- Hydrology
- Water Quality

Each SubType uses its own domain for the **PARAMETER** attribute that represents values existing for that SubType.

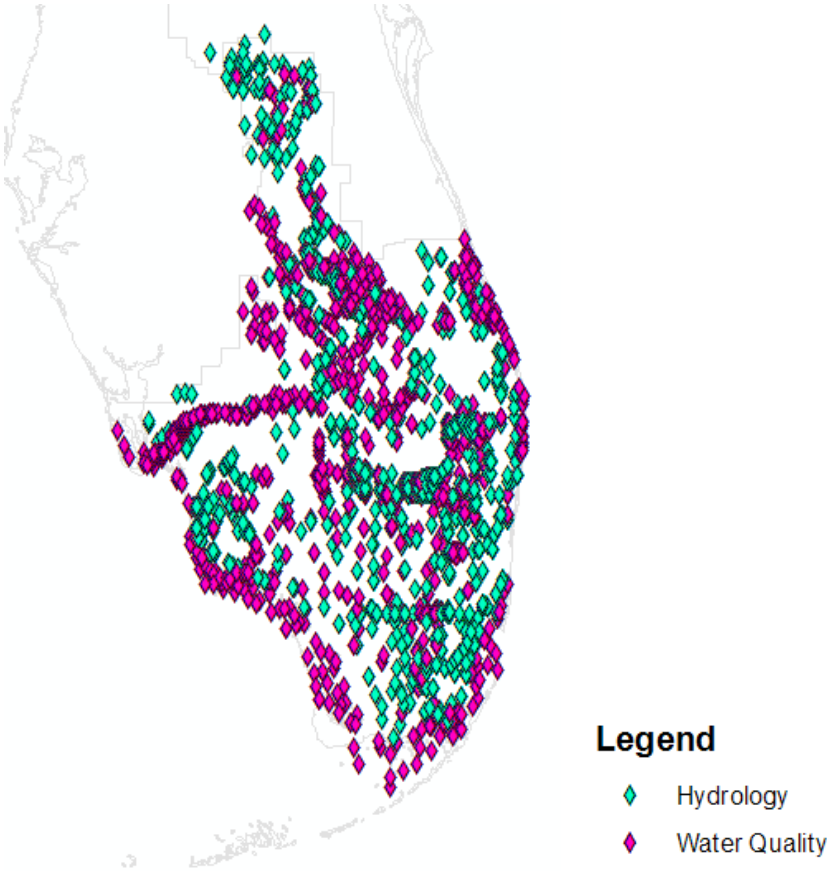


Figure 7: Monitoring Points

SOURCE

The monitoring activity records that are represented by the Monitoring Point features are stored and managed in DBHYDRO. A subset of the DBHYDRO monitoring activity records are selected, imported, constructed, and updated in AHED:

- All active water quality monitoring records
- All active hydrologic monitoring records that monitor flow conditions
- All active hydrologic monitoring records that monitor stage conditions

This selection results in roughly 3500 of 20,000 features being constructed in AHED.

The ArcMap definition query that subsets the DBHYDRO source records is:
(STATUS = 'A' AND ACTIVITY_T = 'WQ') OR (STATUS = 'A' AND (ACTIVITY_S = 'FLOW' OR ACTIVITY_S = 'STAGE')

GEOMETRY

The current database for monitoring activity records XY locations is DBHYDRO. As updates occur in DBHYDRO, a script that runs nightly, updates AHED Monitoring Point feature class. The changes that cannot happen automatically will be managed in AHED by the data steward responsible for this layer during the AHED open editing window.

Monitoring Points that fall on primary and secondary features, for example primary canals and lakes, are constructed to be related to the Hydro Network by adding 'Internal' HydroJunctions and building the relationships.

Monitoring Points that fall in non-primary or non-secondary features will not be related to the Network. The details of relating Monitoring Points to the Network is described in AHED Data Construction Manual.

TOPOLOGY

Monitoring Point feature class does not participate in the Topology.

ATTRIBUTES

DECISION - Holds key expert decision on the Monitoring Point. Values come from AHED_DECISIONDOMAIN.

a. *Channel* - Monitoring Point is monitoring the hydro network and should be projected onto the Hydro Network to create an Internal HydroJunction.

b. *FloodPlain* - Monitoring Point applies elsewhere (floodplain, subsurface) and should be related to the watershed HydroJunction (This is not implemented in AHED).

JUNCTIONID- HydroID of the related 'Internal' HydroJunction.

DBNAME- Identifies which external Timeseries RDBMS is linked to this Monitoring Point: DBHydro, SCADA, STORET, etc.

STATION- The SFWMD station name copied from source database. It provides a link to an individual station in the source database as well as associated time series databases.

STATION_TYPE- Defines the type of Monitoring Point, Hydrology or Water Quality. The values are stored in the STN_TYPE domain.

SITE- Name of the Site from the Monitoring Site feature class. Can be used to join Monitoring Points to Monitoring Sites and to populate the SITEGRPID field with SITE HYDROID.

SITEGRPID- HYDROID of the related Monitoring Site.

HYDRO_ORDER- This field is added to identify if the feature is primary / secondary / tertiary or local. The field is populated using the AHED_HYDRO_ORDER coded value domain. Monitoring Points will take the Hydro_Order of the related Structure. Monitoring Points measuring stage or other activities in open waters will take the classification of the HydroEdge / Waterbody being measured.

PARAMETER- This field is populated using two coded value domains based on the monitoring point subtype.

Coded value domains are WQ_Parameter and Hydrology_Parameter.

Each domain has the list of different parameters monitored for that subtype.

STATION_ACTIVITY_ID- This field is populated from DBHYDRO, providing a unique identifier for each monitoring activity record.

AGENCY- The agency responsible for the Monitoring Point. This attribute is populated from the source database (DBHydro).

4.8. MONITORINGSITE

Simple feature class
MONITORINGSITE

Geometry *Point*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	SITE	String	Yes					24
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE	Geometry	Yes					
O	DESCRIPTION	String	Yes					256

DISCUSSION

A Site is a location that is typically associated with one or more functionally related Water Management System components (e.g., structures) or monitoring stations or control stations in proximity to one another. A Site can be defined for different purposes. Site boundaries may or may not be explicitly defined and are permitted to overlap. Examples of components and stations associated with a single site are:

- All wells, pumping systems, and other stations and components located at an Aquifer Storage and Recovery (ASR) facility

- All water level stations adjacent to a water control structure, the water control structure itself, and the associated communications tower

SOURCE

Monitoring Sites are loaded to AHED feature class from the database of record for Monitoring Sites in DCVP. Only Sites that have related Monitoring Points in AHED are added.

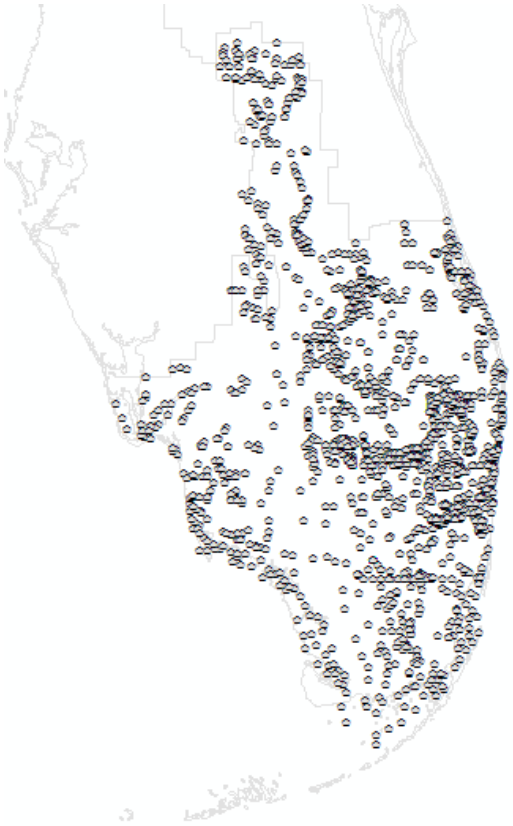


Figure 8: Monitoring Sites

GEOMETRY

The current database for Monitoring Sites XY locations is DCVP. As updates occur in the source database, a script that runs nightly, updates AHED Monitoring Site feature class. The changes that cannot happen automatically will be done in AHED by the data steward responsible for this layer during the AHED open editing window. Monitoring Sites are not related to the Hydro Network.

TOPOLOGY

Monitoring Site feature class does not participate in Topology.

ATTRIBUTES

SITE- Unique SITE Name, carried over from source database.

DESCRIPTION- A string field for documenting any specific notes related to a Site feature.

4.9. STRUCTURE

Simple feature class
STRUCTURE

Geometry *Point*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
O	NEXTDOWNID	Double	Yes			0	0	
O	LENGTHDOWN	Double	Yes			0	0	
O	DRAINAREA	Double	Yes			0	0	
R	STRUCTURETYPE	String	Yes		STRUCT_TYPE			30
R	NAME	String	Yes					12
R	CONTROL	String	Yes					15
O	FIELDSTA	String	Yes		FIELD_STATION			17
O	CANAL	String	Yes					30
CR	STA	String	Yes					30
CR	HYDRO_ORDER	String	Yes		AHED_HYDRO_ORDER			15
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE	Geometry	Yes					

DISCUSSION

A structure is a cohesive whole built or erected from distinct parts; a structure may be composed of other structures. A structure, or "hydraulic structure" in the Water Management System, is a submerged or partially submerged artifact in any body of water (including groundwater) that disrupts the natural flow of water, conveys water, controls the direction or rate of flow, maintains a desired water surface elevation, or measures water. A dam, for instance, is a type of hydraulic structure used to hold water in a reservoir as potential energy, just as a weir is a type of hydraulic structure which can be used to pool water for irrigation, establish control of the bed (grade control) or, as a new innovative technique, to divert flow away from eroding banks or into diversion channels for flood control. Other types of structures include levees, impoundments, gates, pump stations, etc.

SOURCE

Structures were loaded into AHED from the legacy enterprise data source. As new structures are constructed and become operational, they are added to AHED. Additional structure data (mostly secondary) were obtained from county or city sources.

GEOMETRY

Structures are represented by points centered on the structure as seen on the imagery (County imagery or 1:12000 DOQQs). Structure points are snapped to Water Control System boundaries.

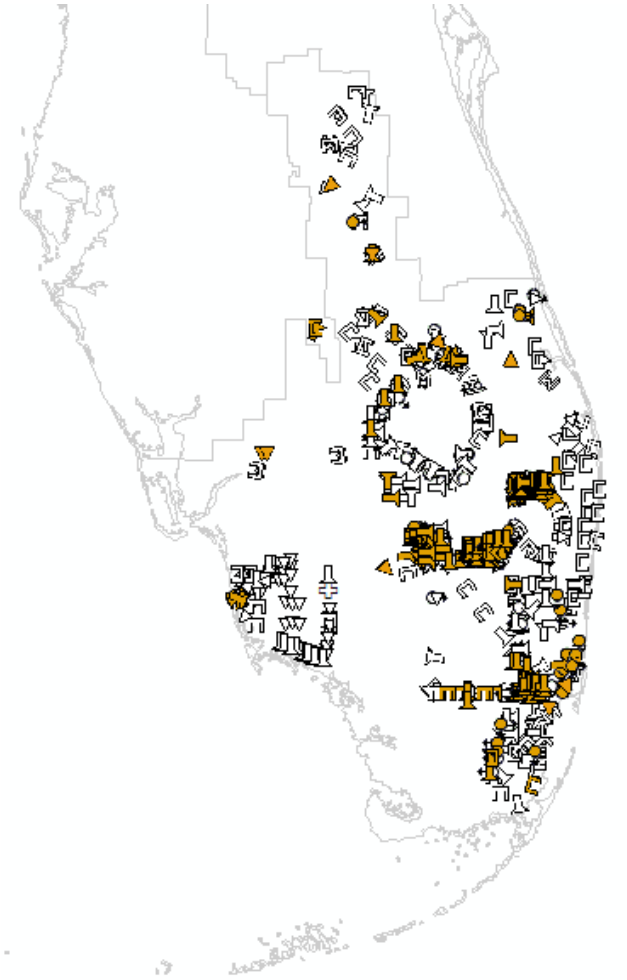


Figure 9: Primary and secondary Structures

TOPOLOGY

Structure Must Be Covered By Boundary of Water Control System

ATTRIBUTES

NEXTDOWNID- In standard Arc Hydro the NEXTDOWNID attribute of the structure is used for tracing the upstream accumulation controlled by that structure or the downstream features affected by the structure without relying on a network being built. Because network traces in the District

involve multiple possible paths, it will be necessary to use the network tracing tool rather than the Arc Hydro Tool based on NEXTDOWNID.

LENGTHDOWN- Length downstream to outfall. Can be copied from associated HydroJunction after the Arc Hydro Tool is used to calculate length down for junctions.

DRAINAREA- Drainage Area in acres of Upstream Water Control Unit served by structure

STRUCTURETYPE – Type of structure as defined by Operations. The values are stored in STRUCT_TYPE domain.

CONTROL- Identifier for how water is controlled at the structure. This data is collected from SME's. Example values are GATED, OPEN, LOCK, etc.

FIELDSTA- The district Field Station responsible for maintaining the Structure. The values are stored in the FIELD_STATION domain.

CANAL- The name of the canal on which the structure is located.

HYDRO_ORDER- This field is added to identify if the feature is primary / secondary / tertiary or local. This replaces the Operations1 and Operations2 fields that initially existed in the schema. The field is populated using the AHED_HYDRO_ORDER coded value domain.

STA – The STA (Storm Treatment Area) that the Structure is in.

4.10. WATERBODY

Simple feature class
WATERBODY

Geometry *Polygon*
Contains M values *No*
Contains Z values *Yes*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
O	NAME	String	Yes					30
R	AREAACRES	Double	Yes			0	0	
R	WATERBODYTYPE	Long integer	Yes	1	AHED_WBTYPE	0		
CR	JUNCTIONID	Long integer	Yes			0		
R	NHD_COMID	Long integer	Yes			0		
R	NHD_FDATE	Date	Yes			0	0	8
R	NHD_RESOLUTION	Long integer	Yes	2	NHD_RESOLUTION	0		
O	NHD_GNIS_ID	String	Yes					10
O	NHD_GNIS_NAME	String	Yes					65
R	NHD_AREASQMI	Double	Yes			0	0	
R	NHD_ELEVATION	Double	Yes			0	0	
R	NHD_REACHCODE	String	Yes					14
R	NHD_FCODE	Long integer	Yes		NHD_FCODE	0		
R	NHD_SOURCE_FC	Long integer	Yes		NHD_SOURCE_FC	0		
CR	HYDRO_ORDER	String	Yes		AHED_HYDRO_ORDER			30
O	ALIAS	String	Yes					100
O	SEG_NAME	String	Yes					50
O	IMPAIRED_WB	Long integer	Yes	-1	FDEP_IMPAIRED_WB	0		
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

Subtypes of WATERBODY

Subtype field *WATERBODYTYPE*
Default subtype *1*

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
2	LAKE	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS
3	MARSH	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS
4	ESTUARY	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS
5	LAGOON/BAY	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS
6	OCEAN	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS
1	CANALSEGMENT	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS
7	STREAM/RIVER	DECISION		AHED_DECISIONDOMAIN
		WATERBODYTYPE	1	AHED_WBTYPE
		NHD_RESOLUTION	2	NHD_RESOLUTION
		NHD_FCODE		NHD_FCODE
		NHD_SOURCE_FC		NHD_SOURCE_FC
		HYDRO_ORDER		AHED_HYDRO_ORDER
		IMPAIRED_WB	-1	FDEP_IMPAIRED_WB
		QCSTATUS	0	QC_STATUS

DISCUSSION

A polygon feature class delineating different water body types such as rivers, streams, canals, lakes, estuaries and marshes.

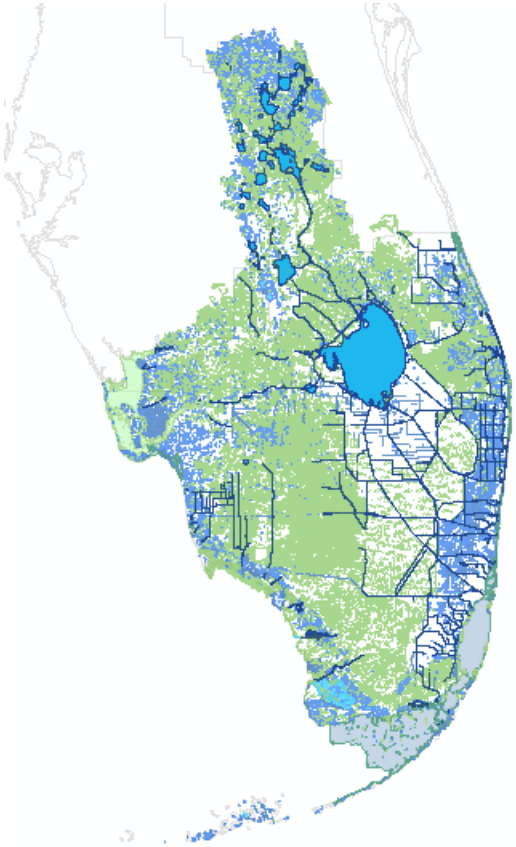


Figure 10: Waterbodies

SOURCE

Waterbodies were loaded into AHED from NHDinGEO 24K dataset. There are many types of waterbodies in NHD, but only six types were imported to AHED from NHDAREA and NHDWATERBODY feature classes. These comprise the seven Subtypes of Waterbody feature class:

- CanalSegment
- Estuary
- Lake
- Lagoon/Bay
- Marsh
- Ocean
- Stream/River

AHED tool, Translation Tables, was used to import these features from NHD. Several fields from the original NHD feature classes have also been added to AHED Waterbody for record keeping and change tracking.

GEOMETRY

The geometry of primary and secondary Waterbody features of types Canal Segments, Streams and Lakes were corrected using the 1:12000 DOQQs or better imagery mainly around structures. Boundary details farther away from structures were corrected with a lower priority. Boundaries for other Waterbody subtypes such as marshes have not been modified.

The primary/secondary Waterbody polygons are split at Watershed/Subwatershed boundaries and where Waterbody/HydroEdge names change. The split is coincident with the HydroJunctions located at those points. Boundary and attribute edits to NHD features are tracked through NHDStatus table.

TOPOLOGY

Waterbody participates in topology with Station and Water Control Unit feature classes:

Station Must Be Properly Inside Waterbody

Water Control Unit Area Boundary Must Be Covered By Boundary Of Waterbody

ATTRIBUTES

WATERBODYTYPE- AHED Waterbody subtypes. Field values are stored in AHED_WBTYPE domain as: Lake, CanalSegment, Marsh, Estuary, Lagoon/Bay, Stream/River and Ocean.

JUNCTIONID- HydroID of the related internal HydroJunction representing the Waterbody centroid that relates the Waterbody to the network.

NHD_COMID- Unique identifier of the NHD feature or reach.

NHD_FDATE- Feature Date.

NHD_RESOLUTION- Resolution of NHD data (High, Medium, or low).

NHD_GNIS_ID- GNIS identifier of the populated name.

NHD_GNIS_NAME- GNIS name of feature.

NHD_AREASQMI- Area in square miles.

NHD_ELEVATION- The elevation of the Waterbody, in meters using the vertical datum. In the initial release of the NHD, only canal/ditch, lake/pond, reservoir, and stream/river in the Waterbody theme can have elevations. Most of these features do not have a value for elevation, so -9998 (unspecified) is the most common value. For all other NHD feature types, the value for elevation is –9999 (not applicable).

NHD_REACHCODE- A numeric code that uniquely identifies a reach. This 14-digit code has 2 parts: the first 8 digits are the hydrologic unit code for the

SubBasin in which the reach is located; the last 6 digits are a sequentially ordered, arbitrarily assigned number.

NHD_FTYPE- NHD feature types.

NHD_FCODE- Numeric values describing type and characteristics for NHD features. This five-digit code has two parts: the first three digits encode the feature type; the last two digits encode values for a set of characteristics associated with the feature.

Example: 43601: Reservoir: Reservoir Type = AquaCulture

43609: Reservoir: Reservoir Type = Cooling Pond

NHD_SOURCE_FC- Waterbody feature class in AHED is populated by importing some feature types from NHDWaterbody and NHDArea feature classes. To facilitate export of edited data from AHED to NHD it is required to identify the original sources of these features in AHED Waterbody feature class. NHD_Source_FC field will identify the data source for individual Waterbody features. It is linked to the coded value domain NHD_SOURCE_FC.

HYDRO_ORDER- The classification indicating Primary, Secondary or Tertiary drainage system.

IMPAIRED_WB- Stores name of the impaired Waterbody as identified by FDEP. Impaired Waterbodies are listed in domain FDEP_Impaired_WB. This field was added for a specific tool usage (AHED Water Quality Tool) and is not populated for all Waterbodies.

SEG_NAME- The name of a segment of the waterbody if exists. Some projects, such as Kissimmee River Restoration Project, assign names to individual segments of the river as restorations are completed. This field was added to keep track of these names. The HydroEdge feature class has a similar field.

4.11. RAINAREA

Simple feature class
RAINAREA

Geometry Polygon
Contains M values Yes
Contains Z values No

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			10		
R	HYDROID	Long integer	Yes			10		
O	HYDROCODE	String	Yes					30
R	NAME	String	Yes					100
R	PERCENT_TO	Double	Yes			38	8	
R	PERCENT_BA	Double	Yes			38	8	
R	PERCENT_DL	Double	Yes			38	8	
R	AREAACRES	Double	Yes			38	8	
R	QPF	Long integer	Yes			10		
R	BASINAREA	Double	Yes			38	8	
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	5		
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

The Rain Areas are set of polygons representing regions of equivalent forecasted rainfall. The District is divided into 16 rain areas. This facilitates operational decision making using summary rainfall statistics for each area.

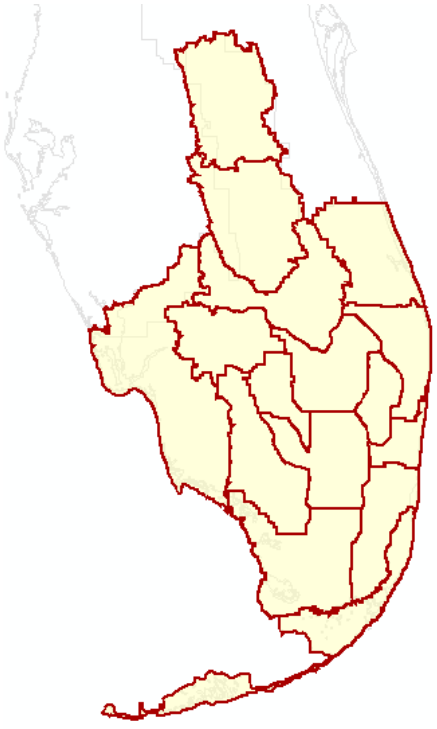


Figure 11: Rain Areas

SOURCE

This dataset was built based on an existing RainArea dataset that existed outside of AHED with coordination with Operations experts to delineate new areas. RainAreas are grouping of AHED Watersheds.

GEOMETRY

The RainArea polygons are created based on the aggregation of AHED Watershed boundaries as directed by SME's. Boundaries are coincident with Watersheds.

TOPOLOGY

RainArea Must Not Overlap

RainArea Must Not Have Gaps

RainArea Area Boundary Must Be Covered By Watershed

ATTRIBUTES

PERCENT_TO- The percentage of that Rain Area Basin in relation to the entire District's area.

PERCENT_BA- The weighted area percentage of the rain gage in relation to the particular Rain Area Basin. (This is actually calculated in another shapefile that is created by doing an overlay command with thiessen polygons that are created off the rain gages.)

PERCENT_DL- The weighted area percentage of the rain gage in relation to the entire District's area.

QPF- Fraction of Project Flood **(***To be completed by District Data Steward-Contact Chandra Pathak).*

BASINAREA- Area of the containing Watershed in Square Miles.

4.12. RAINMESH

Simple feature class
RAINMESH

Geometry Polygon
Contains M values Yes
Contains Z values No

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			10		
R	HYDROID	Long integer	Yes			10		
O	HYDROCODE	String	Yes					30
R	CENTROID_X	Double	Yes			38	8	
R	CENTROID_Y	Double	Yes			38	8	
R	PIXEL_NO	Double	Yes			38	8	
O	DISPFIELD	Double	Yes			38	8	
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

RainMesh is the geographic representation of cells on which rainfall is defined by NEXRAD.

Figure 12: Rainmesh

SOURCE

The 2 Km by 2 Km NexRAD mesh that rainfall data is reported on has been loaded into AHED RainMesh feature class.

TOPOLOGY

RainMesh does not participate in topology.

ATTRIBUTES

HYDROID- A unique feature identifier in the Geodatabase, populated by adding 10,000,000 to the Pixel_no. This number should not change.

CENTROID_X- Centroid X coordinate

CENTROID_Y- Centroid Y coordinate

PIXEL_NO- The pixel number imported from NexRad mesh.

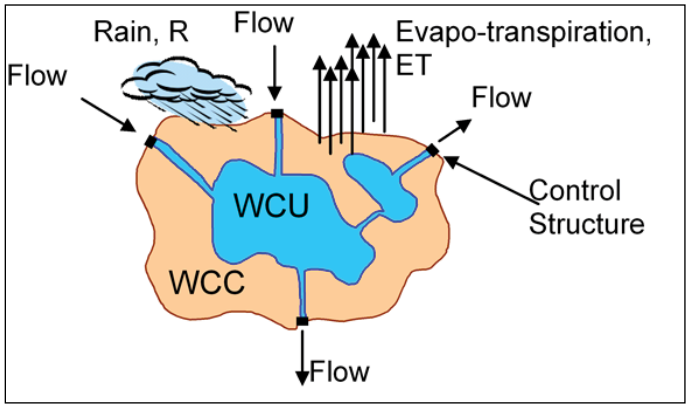
DISPFIELD- unknown

RainMesh feature class does not get modified; therefore, it does not have the QCSTATUS field.

ODSS Feature Classes

The following Feature Classes are added to AHED schema (version 2) to support ODSS.

4.13. WATER CONTROL SYSTEM (WCS)



Simple feature class
WATERCONTROLSYSTEM

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	AREAACRES	Double	Yes			0	0	
R	NAME	String	Yes					40
CR	FUNCTIONALTYPE	Short integer	Yes		ODSS_WCSTYPE	0		
O	DESCRIPTION	String	Yes					256
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

WCS is a drainage area comprising of a Water Control Unit (WCU), Water Control Catchment (WCC), and peripheral Structures or Hydraulic Components, as seen in the above diagram. A WCS is bounded by horizontal and vertical surfaces for the purpose of calculating a water budget. A WCS can also be composed of smaller, nested Water Control Systems to represent a larger Drainage Area as a single entity.

COMPONENT FEATURES

WCS objects' outer boundaries are assembled using AHED Watershed and SubWatershed features. These "Drainage Area" features would aggregate to construct WCS outer boundaries.

GEOMETRY

The WCS boundary line must pass through the WMSJunction, Hydraulic Element Set, Hydraulic Element(s), Structure, and HYDROJUNCTION:CONTROLLED point features.

HYDROEDGE:FLOWLINE line features must have their From Node or To Node on the WCS Boundary when representing water flow from one WCS to another WCS.

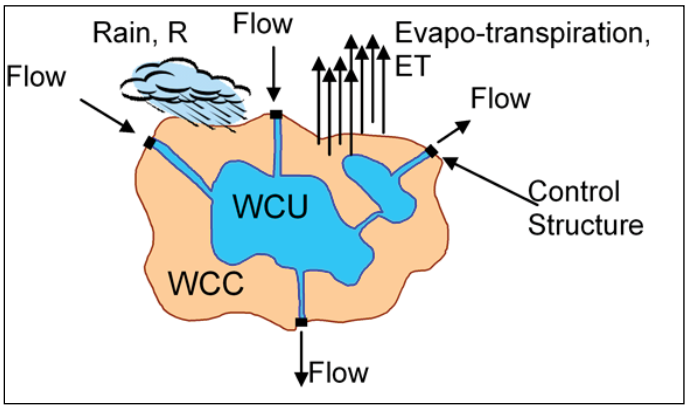
TOPOLOGY

- WCS Must Not Overlap
- WCS Must Not Have Gaps (single exception is outer boundary of all WCSs)
- WCS Area Boundary Must Be Covered By Boundary of Watershed
- WCS Area Boundary Must Be Covered By Boundary of SubWatershed

ATTRIBUTES

NAME- Name of WCS as supplied by ODSS SMEs. The WCS name is the same as the WCU name. See the ODSS conventions for naming WCUs.
FUNCTIONALType- Functional type of WCS. Values are selected from ODSS_WCSTYPE domain.
DESCRIPTION- A description for the feature. Values, where exist, are supplied from Operations legacy systems.

4.14. WATER CONTROL UNIT (WCU)



Simple feature class
WATERCONTROLUNIT

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	AREAACRES	Double	Yes			0	0	
R	WATERCONTROLSYSTEMID	Long integer	Yes			0		
R	NAME	String	Yes					40
R	PERFORMANCETYPE	Short integer	Yes	0	ODSS_WCUTYPE	0		
O	DESCRIPTION	String	Yes					256
CR	ISSINK	Long integer	Yes		AHEDBOOLEAN	0		
CR	ISSOURCE	Long integer	Yes		AHEDBOOLEAN	0		
CR	ISPREFERREDREGULATORYROUTE	Long integer	Yes		AHEDBOOLEAN	0		
CR	ISELIGIBLEREGULATORYROUTE	Long integer	Yes		AHEDBOOLEAN	0		
CR	ISPREFERREDWATERSUPPLYSOURCE	Long integer	Yes		AHEDBOOLEAN	0		
CR	ISELIGIBLEWATERSUPPLYROUTE	Long integer	Yes		AHEDBOOLEAN	0		
CR	ISCOASTAL	Long integer	Yes		AHEDBOOLEAN	0		
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

A set of contiguous (or discontinuous) Waterbodies whose periphery is bounded by a set of Structures or Hydraulic Components such that there is uncontrolled flow among the constituent Waterbodies.

COMPONENT FEATURES

WCU objects' boundaries are assembled using AHED Waterbody features. These Waterbody features would become part of a multi-part polygon feature that forms the WCU feature.

GEOMETRY

The WCU boundary line follows the edge of the water feature as seen on the imagery. When details of Hydraulic Elements are visible, the WCU boundary delineates those details.

TOPOLOGY

- WCU Must Not Overlap
- WCU Must Not Overlap With Water Control Catchment
- WCU Area Boundary Must Be Covered By Boundary of Waterbody

ATTRIBUTES

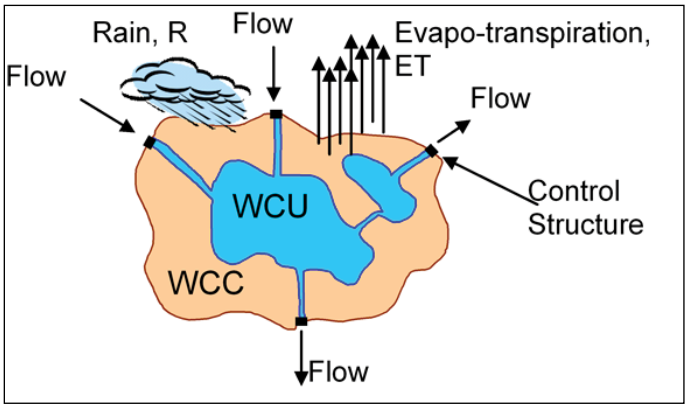
NAME- Name of WCU as supplied by ODSS SMEs. Name of WCU is the same as the name of containing WCS. ODSS convention for naming WCUs is as follows:

- Names should not include any dashes. If a name has multiple parts, they are separated by underscore '_'.
- Examples below show names of WCUs where one WCU has been split into many sections (WCUs). Each WCU name has an underscore with a trailing #:

  L2W_1
  L31N_2
  L3_3

PERFORMANCEType- Type of WCS. Values are selected from ODSS_WCUTYPE domain.
DESCRIPTION- A description for the feature. Values, where exist, are supplied from Operations legacy systems.
All the following fields have Boolean values:
isSink- Indicates whether storage is available to receive regulatory releases.
isSource- Indicates whether water-supply releases are currently allowed.
isPreferredRegulatoryRoute- Suitability for participating in a route for regulatory releases.
isEligibleRegulatoryRoute- A path (practical or not) for all WCUs with storage and a possible sink.
isPreferredWaterSupplySource- Ranked sources for water supply delivery for optional selection while setting a water-supply mode.
isEligibleWaterSupplyRoute- Establishing dynamic water supply route. Normal usage is yes/no. Maybe is set by auto search of all available paths and is used to utilize all possible avenues rather than all practical. Yes is set to provide a path (practical or not) to all WCUs with a possible supply source upstream.
isCoastal- Indicates at least one WMSJunction in the WaterControlUnit is to the Coast.

4.15. WATER CONTROL CATCHMENT (WCC)



Simple feature class
WATERCONTROLCATCHMENT

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	WATERCONTROLSYSTEMID	Long integer	Yes			0		
R	AREAACRES	Double	Yes			0	0	
R	NAME	String	Yes					40
	SHAPE	Geometry	Yes					
	SHAPE_Length	Double	Yes			0	0	
	SHAPE_Area	Double	Yes			0	0	

DISCUSSION

Within a Water Control System (WCS), the extent of land surface area that drains into a Water Control Unit (WCU). The outer boundary of any given Water Control Catchment is the same as the WCS' outer boundary.

COMPONENT FEATURES

WCC feature is created by subtracting the WCU feature from the WCS feature.

GEOMETRY

External boundary of a WCC feature is coincident with the WCS boundary. Internal gaps that represent the edges of the WCU, also are coincident with WCU boundaries.

TOPOLOGY

- WCC Must Not Overlap
- WCC Area Boundary Must Be Covered By Boundary of WCS

ATTRIBUTES

NAME- Name of WCC as supplied by ODSS SMEs.
WATERCONTROLSYSTEMID- This field is populated by HydroID of the Water Control System, building a relationship between WCS and WCC.

4.16. WATER MANAGEMENT SYSTEM JUNCTION (WMSJUNCTION)

Simple feature class
WMSJUNCTION

Geometry *Point*
Contains M values *No*
Contains Z values *Yes*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
CR	DOWNSTREAMWATERCONTROLUNITID	Long integer	Yes			0		
CR	UPSTREAMWATERCONTROLUNITID	Long integer	Yes			0		
R	NAME	String	Yes					40
R	TYPE	Short integer	Yes	0	ODSS_WMSJUNCTIONTYPE	0		
R	DISCHARGEDIRECTIONCOMPASS	Short integer	Yes			0		
	SHAPE	Geometry	Yes					

DISCUSSION

Hydrologic connections between Water Control Units are referred to as WMSJunctions. Within the Operations data model, a WMSJunction is represented as a point. No more than two WMSJunctions can exist between two connected Water Control Units, each indicating direction of normal flow (inflow/outflow).

COMPONENT FEATURES

WMSJunctions exist at Structures that connect two Water Control Systems. Usually there is one WMSJunction for each structure on the boundary of WCS.

GEOMETRY

WMSJunction is snapped to the boundary of Water Control System, centered on the Structure as seen on the imagery. Unless several structures share one WMSJunction (in case of STAs' internal structures), the WMSJunction point is coincident with the Structure point.
When a Structure has odd number of Hydraulic Elements, the WMSJunction is also coincident with the middle Hydraulic Element point.

TOPOLOGY

- WMSJunction Must Be Covered By Boundary of Water Control System

ATTRIBUTES

DOWNSTREAMWATERCONTROLUNITID- This field is populated by HYDROID of the downstream WCU.
UPSTREAMWATERCONTROLUNITID- This field is populated by HYDROID of the Upstream WCU.
NAME- Name of WMSJunction as supplied by ODSS SMEs.
TYPE- Type of WMSJunction. Values are selected from ODSS_WMSJUNCTIONTYPE domain.
DISCHARGEDIRECTIONCOMPASS- The angle representing the direction of flow through WMSJunction. The value is used for displaying the WMSJunction point with an arrow representing the flow direction.

4.17. HYDRAULIC ELEMENT SET (HES)

Simple feature class
HYDRAULICELEMENTSET

Geometry *Point*
Contains M values *No*
Contains Z values *Yes*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	WMSJUNCTIONID	Long integer	Yes			0		
R	NAME	String	Yes					40
R	TYPE	Short integer	Yes	0	ODSS_HESTYPE	0		
	SHAPE	Geometry	Yes					

DISCUSSION

A set of Controls that can be associated to accomplish a particular purpose, e.g., for controlling or calculating the flow of water between two Waterbodies. A Control Set can span multiple Structures or Sites.

COMPONENT FEATURES

Hydraulic Element Set has a many to many relationship to Hydraulic Elements. This M:M relationship is broken into two 1:M relationships using a table called HES_HE. Both Hydraulic Element Set and Hydraulic Element feature classes have a 1:M relationships to this table.

GEOMETRY

The HES feature is snapped to the WCS boundary and to the WMSJunction feature.

TOPOLOGY

- Hydraulic Element Set Must Be Covered By Boundary of Water Control System

ATTRIBUTES

WMSJUNCTIONID- This field is populated by HYDROID of the WMSJunction.
NAME- Name of Hydraulic Element Set as supplied by ODSS SMEs. The ODSS convention is: <WMSJunction_nmae>-<Hydraulic Element_type>.
For example: S31 structure is a Culvert with three barrels. The WMSJunction at this structure is called: **S31-C**.
TYPE- Type of Hydraulic Element Set. Values are selected from ODSS_HESTYPE domain.

4.18. HYDRAULIC ELEMENT (HE)

Simple feature class
HYDRAULICELEMENT

Geometry *Point*
Contains M values *No*
Contains Z values *Yes*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	STRUCTUREID	Long integer	Yes			0		
R	JUNCTIONID	Long integer	Yes			0		
R	NAME	String	Yes					40
R	TYPE	Short integer	Yes	0	ODSS_HETYPE	0		
	SHAPE	Geometry	Yes					

DISCUSSION

Any artificial or natural object that affects the flow of water. This includes common hydraulic Controls (e.g., gates and pumps) and other Hydraulic Structures (e.g., Bridges and Culverts) but may also include natural features or temporary blockages.

COMPONENT FEATURES

Hydraulic Elements can belong to more than one Hydraulic Element Set. This M:M relationship is broken into two 1:M relationships using a table called HES_HE. Both Hydraulic Element Set and Hydraulic Element feature classes have a 1:M relationships to this table.

GEOMETRY

Hydraulic Elements are snapped to the boundary of WCS representing the locations of hydraulic elements such as pumps, gates, etc as seen on the imagery. Hydraulic Elements are coincident with Controlled / UnControlled HydroJunctions.

TOPOLOGY

- Hydraulic Element Must Be Covered By Boundary of Water Control System

ATTRIBUTES

JUNCTIONID- This field is populated by HYDROID of the related HydroJunction. Depending on the control type of the Hydraulic Element, the HydroJunction type can be Controlled or UnControlled.
NAME- Name of Hydraulic Element. ODSS convention for naming Hydraulic Elements is as follows: <WMSJunction_name>-<HE_type><HE_number>
For example: S119-G1 is the first Gate at WMSJunction S119-S (Spillway).
TYPE- Type of Hydraulic Element. Values are selected from ODSS_HETYPE domain.

4.19. STATION

Simple feature class
STATION

Geometry *Point*
Contains M values *No*
Contains Z values *Yes*

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
O	DECISION	String	Yes		AHED_DECISIONDOMAIN			50
O	EXPERT	String	Yes					50
R	SOURCEID	Long integer	Yes			0		
R	HYDROID	Long integer	Yes			0		
O	HYDROCODE	String	Yes					30
CR	HYDRO_ORDER	String	Yes		AHED_HYDRO_ORDER			15
R	QCSTATUS	Short integer	Yes	0	QC_STATUS	0		
R	STATION_ACTIVITY_ID	Long integer	Yes			0		
R	JUNCTIONID	Long integer	Yes			0		
R	SITEGRPID	Long integer	Yes			0		
R	NAME	String	Yes					40
R	MEDIUM	Short integer	Yes	0	ODSS_MEDIUM	0		
O	DESCRIPTION	String	Yes					256
	SHAPE	Geometry	Yes					

DISCUSSION

A Station is a unique location, within a medium, established for the primary purpose of observing and recording environmental phenomena or controlling the movement of water (e.g., a gate or pump). A Station can be associated with a set of physical characteristics that are consistent through time to the degree that data collected at that Station can be confidently analyzed as a homogeneous Time Series. Each Station is formally assigned a unique and persistent name. The name for each Station is unique among all monitoring station and control station data objects managed in the WMS.

COMPONENT FEATURES

Stations are constructed from AHED MonitoringPoint features of type STAGE representing head water and tail water stages of a structure.

GEOMETRY

Head water and tail water MonitoringPoints are copied over to Stations feature class. Each point is moved to the upstream or downstream WCU where the data is observed or recorded at that station. Station names are also modified.

TOPOLOGY

- Station Must Be Properly Be Inside Water Control Unit

ATTRIBUTES

STATION_ACTIVITY_ID- This field is populated from DBHYDRO, providing a unique identifier for each monitoring activity record.
JUNCTIONID- This field is populated by HYDROID of the related HydroJunction of type "Internal".
SITEGRPID- This field is populated by HYDROID of the related Monitoring Site.
NAME- Name of Station. ODSS convention for naming Station is as follows:
Upstream Station: <WMSJunction_name>-U
Downstream Station: <WMSJunction_name>-D
MEDIUM- The medium that Station's activity occurs. The values are supplied from ODSS_MEDIUM domain.
DESCRIPTION- Any available description for the object from legacy datasets will be stored in this field.

5. AH_HH – HYDROLOGY AND HYDRAULICS FEATURE DATASET

Layers in this dataset will be maintained by H&H staff. As layers become updated, the updates will go through the change control process to be reflected in the Enterprise database.

5.1. FEMAFLOOD

Simple feature class
FEMAFLOOD

Geometry *Polygon*
Contains M values *Yes*
Contains Z values *No*

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
Shape	Geometry	Yes					
OBJECTID	Object ID						
DECISION	String	Yes		AHED_DECISIONDOMAIN			50
EXPERT	String	Yes					50
SOURCEID	Long integer	Yes			0		
HYDROID	Long integer	Yes			0		
HYDROCODE	String	Yes					30
FLD_ZONE	String	Yes		FEMA_ZONE			55
FLOODWAY	String	Yes		FEMA_FLOODWAY			30
FLOODFREQ	String	Yes		AHED_FLOODFREQDOMAIN			30
EFFECTIVEYR	Date	Yes			0	0	8
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

FEMA 100yr/500yr flood zones (1% Chance Flood Hazard and .2% Chance Flood Hazard)

The process of FEMA Digital Flood Insurance Rate Map (DFIRM) modernization which is part of the H&H project, results in new flood boundary delineations. These new delineations will have to go through the approval

process with the local governments. The FEMA database as well as Arc Hydro enterprise datasets will be updated after changes have been approved.

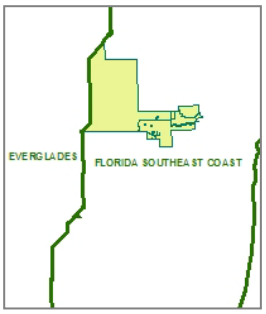


Figure 13: FEMA Flood

SOURCE

The FEMA flood boundaries downloaded from FEMA are available at the District on gisdata1. Currently only the area of C-4 watershed is being populated with this data in AHED.

ATTRIBUTES

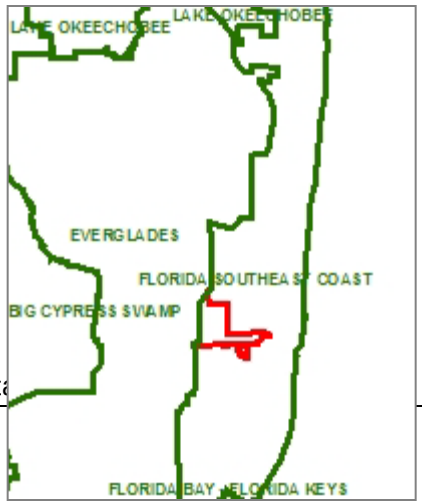
FLD_ZONE- FEMA zone designation. See FEMA_ZONE Domain listed below in the Domain List section 11.3.

FLOODWAY- FEMA floodway. See FEMA_FLOODWAY Domain listed below in the Domain List section 11.3.

FLOODFREQ- The frequency designation for the area to flood, 100yr, 500yr, or some future designation. See AHED_FLOODFREQDOMAIN Listed in Section 10.3.

EFFECTIVEYR- The year the flooding on the Flood Insurance Rate Map (FIRM) became effective.

5.2. HHBOUND



The bounding polygon of the H&H study area.

SOURCE

This layer gets updated with new boundaries as new project areas are added to the H&H project.

PROJLOC- Project location, this can vary depending on project such as county, SubBasin, watershed. It can vary based on project.

PROJSTART- Project start date

PROJEND- Project complete date

AHEDUPDATE- Date of project PGDB updates promoted to enterprise AHED.

Figure 14: HHBound

NEWQUALITY- Yes means existing features will receive a quality update from this project. Values are populated from AHED BOOLEAN domain.

NEWFEATURES- Yes means new features will be added to AHED through this project. Values are populated from AHED BOOLEAN domain.

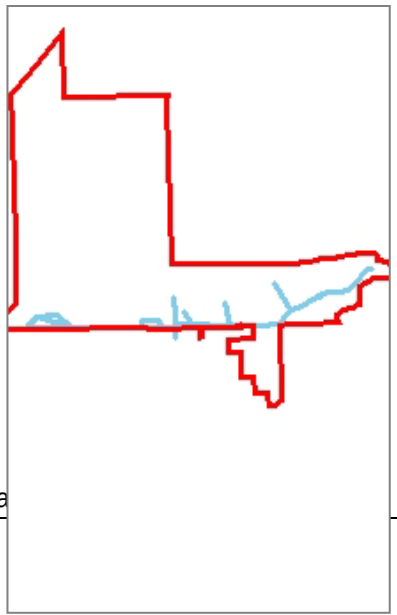
UPTODATE- Yes means all project quality and feature updates have already been applied to the AHED geodatabase. Values are populated from AHED BOOLEAN domain.

5.3. PROFILELINE

Simple feature class
PROFILELINE

Geometry *Polyline*
Contains M values Yes
Contains Z values Yes

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
Shape	Geometry	Yes					
OBJECTID	Object ID						
DECISION	String	Yes		AHED_DECISIONDOMAIN			50
EXPERT	String	Yes					50
SOURCEID	Long integer	Yes			0		
HYDROID	Long integer	Yes			0		
HYDROCODE	String	Yes					30
NAME	String	Yes					100
FTYPE	String	Yes					30
PROFORIGIN	String	Yes					30
Shape_Length	Double	Yes			0	0	



Arc Hydro Profile. A longitudinal profile along a stream or river channel. A line drawn in the direction of flow.

SOURCE

Source of this data is field surveys which is either available from the District or participating Counties. Data gets loaded into

the ProfileLine feature class as modeling new watersheds get underway.

FTYPE- A descriptor of feature type such as Thalweg, LeftFloodLine, RightFloodLine, LeftBank and RightBank. Each FTYPE adds 29 or 88 to indicate whether source data stored are NGVD 29 or NAVD 88.

PROFORIGIN- A classifier for the method by which the ProfileLine was defined such as Survey, TIN, Sonar.

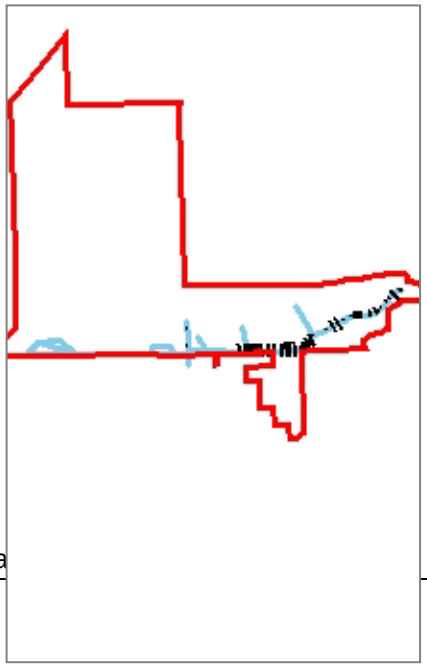
Figure 15: ProfileLine

5.4. XSECTION

Simple feature class
XSECTION

Geometry *Polyline*
Contains M values *No*
Contains Z values *Yes*

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
Shape	Geometry	Yes					
OBJECTID	Object ID						
DECISION	String	Yes		AHED_DECISIONDOMAIN			50
EXPERT	String	Yes					50
SOURCEID	Long integer	Yes			0		
HYDROID	Long integer	Yes			0		
XSCODE	String	Yes					30
HYDROCODE	String	Yes					30
JUNCTIONID	Long integer	Yes			0		
XSORIGIN	String	Yes					30
PROFILEM	Double	Yes			0	0	
BOTELEV	Double	Yes			0	0	
TOPELEV	Double	Yes			0	0	
STAFROM	String	Yes					254
STATO	String	Yes					254
SECLENGTH	Double	Yes			0	0	
DEPTH	Double	Yes			0	0	
BOTWIDTH	Double	Yes			0	0	
TOPWIDTH	Double	Yes			0	0	
SLOPE	Double	Yes			0	0	
STRUCTURE	String	Yes					254
SURVEYCOMMENT	String	Yes					254
XSTYPE	String	Yes		AHED_XSTYPE			254
Shape_Length	Double	Yes			0	0	



Arc Hydro XSection. A transverse profile of a stream or river channel represented by a line drawn through the base of the channel perpendicular to the direction of flow. These are intended to be selected representative cross-sections for characterizing the system for AHED. More detailed definition of which sections to include will be developed under Task 5.
A system for storage and Enterprise access to all surveyed data is outside Task 2 scope. This is being addressed in a related

task carried out by ESRI for Southwest Florida Water Management District and will be evaluated by SFWMD for inclusion in AHED.

SOURCE

Figure 16: XSection

XSection gets updated as new surveys become available.

There is a difference between the actual surveyed data and the data used in the model. It needs to be determined by project leads if the modified data should be stored in AHED as well as the actual data.

ATTRIBUTES

XSCODE- A unique identifier for a cross section in Arc Hydro.

HYDROCODE- Permanent public identifier of the feature.

JUNCTIONID- HydroID of the related HydroJunction. From_node of the HydroEdge containing the XSECTION.

XSORIGIN- A classifier for the origin of the Cross section data (e.g. SurveyRTKGPS, TIN, etc.)

PROFILEM- The measure location of the cross-section along the stream profile

Special modeling attributes to be imported from Canals and Lakes coverages:

BOTELEV- Bottom elevation of representative cross-section in this reach.

TOPELEV- Top elevation of representative cross-section in this reach.

STAFROM- Station from distance (Legacy Survey Station, see Expert).

STATO- Station to distance (Legacy Survey Station, see Expert).

SECLENGTH- The length of the section.

DEPTH- Reference depth of canal or lake.

BOTWIDTH- Bottom width of representative section for this reach.

TOPWIDTH- Top width of representative section for this reach.

SLOPE- Representative Side slope of the channel for this reach.

STRUCTURE – District Name of Related Structure if applicable.

SURVEYCOMMENT – Comment field for surveyed XSection.

XSTYPE- XSECTION type to support the District data source – Lake, Canal, or Channel. Added 29, and 88 to each type to indicate whether source data in the 3D cross-section file are NGVD29 or NAVD88 vertical datum (e.g. Canal29).

6. AH_HP – HYDROPERIOD FEATURE DATASET

The feature classes in this feature dataset will be maintained by Hydroperiod business group.

6.1. HYDROPERIODBOUND

Simple feature class
HYDROPERIODBOUND

Geometry: Polygon
Contains M values: Yes
Contains Z values: No

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
Shape	Geometry	Yes					
OBJECTID	Object ID						
DECISION	String	Yes		AHED_DECISIONDOMAIN			50
EXPERT	String	Yes					50
SOURCEID	Long integer	Yes			0		
HYDROID	Long integer	Yes			0		
HYDROCODE	String	Yes					30
NAME	String	Yes					30
PROJLOC	String	Yes					255
PROJSTART	Date	Yes			0	0	8
PROJEND	Date	Yes			0	0	8
AHEDUPDATE	Date	Yes			0	0	8
NEWQUALITY	Long integer	Yes		AHEDBOOLEAN	0		
NEWFEATURE	Long integer	Yes		AHEDBOOLEAN	0		
UPTODATE	Long integer	Yes		AHEDBOOLEAN	0		
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

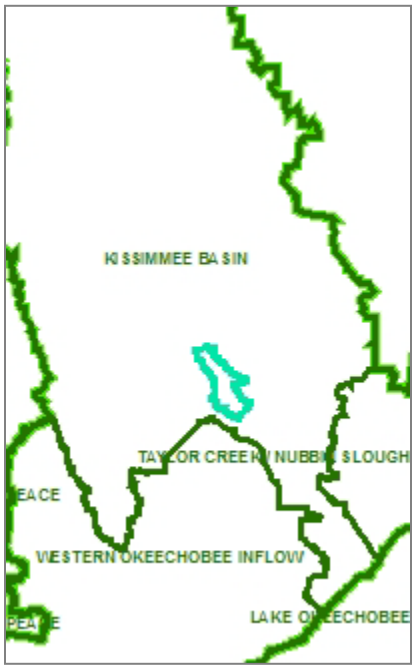


Figure 17: HydroPeriodBound

Bounding polygon for the Hydroperiod study area.

SOURCE

As new Hydroperiod study areas develop, this feature class gets updated.

ATTRIBUTES

PROJLOC- Project location

PROJSTART- Project start date

PROJEND- Project complete date

AHEDUPDATE- Date of project PGDB updates promoted to enterprise AHED.

NEWQUALITY- Yes means existing features will receive a quality update from this project. Values are populated from AHED BOOLEAN domain.

NEWFEATURES- Yes means new features will be added to AHED through this project. Values are populated from AHED BOOLEAN domain.

UPTODATE- Yes means all project quality and feature updates have already been applied to the AHED geodatabase. Values are populated from AHED BOOLEAN domain.

6.2. WATERDEPTHSAMPLE

Simple feature class
WATERDEPTHSAMPLE

Geometry: Point
Contains M values: No
Contains Z values: No

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
Shape	Geometry	Yes					
OBJECTID	Object ID						
DECISION	String	Yes		AHED_DECISIONDOMAIN			50
EXPERT	String	Yes					50
SOURCEID	Long integer	Yes			0		
HYDROID	Long integer	Yes			0		
HYDROCODE	String	Yes					30
SAMPLEID	String	Yes					10
SAMPLEDATE	String	Yes					20
SAMPLETIME	String	Yes					10
SAMPLECOLLECTOR	String	Yes					4
NAME	String	Yes					30
X_COORD	Double	Yes			0	0	
Y_COORD	Double	Yes			0	0	
DEPTH	Double	Yes			0	0	
UNITS	String	Yes		AHED_UNITS			10

Points for which a single water depth was measured in the field over a four year period. This data is used for QC of ponded depth grids values and will help in identifying interpolation methods that produce most accurate water depth values.

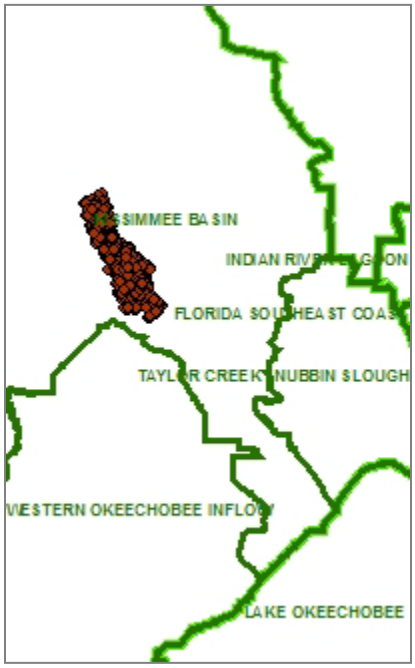


Figure 18: WaterDepthSample

SOURCE

Data is loaded in AHED for the Hydroperiod boundary area. Data for future study areas should be loaded into AHED. Water depth samples need to be collected for new project areas.

ATTRIBUTES

SAMPLEID- Unique identifier for the sample point

SAMPLEDATE- Sample date

SAMPLETIME- Sample time

SAMPLECOLLECTOR- Person who collected the sample

NAME- SFWMD name for sample location

X_COORD, Y_COORD- X and Y (Easting and Northing) Coordinates in Florida State Plane East, NAD83, US Feet.

DEPTH- Water Depth

UNITS- Units of measure for Water Depth

6.3. WATEREXTENT

Simple feature class
WATEREXTENT

Geometry *Polygon*
Contains M values *Yes*
Contains Z values *No*

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
Shape	Geometry	Yes					
OBJECTID	Object ID						
DECISION	String	Yes		AHED_DECISIONDOMAIN			50
EXPERT	String	Yes					50
SOURCEID	Long integer	Yes			0		
HYDROID	Long integer	Yes			0		
HYDROCODE	String	Yes					30
NAME	String	Yes					30
Shape_Length	Double	Yes			0	0	
Shape_Area	Double	Yes			0	0	

This feature class is used to weigh the water surface elevation (WSE) in the river (as compared to the WSE measured in the floodplain) during water surface interpolation. Polygons are created from Waterbody boundaries and/or shorelines.

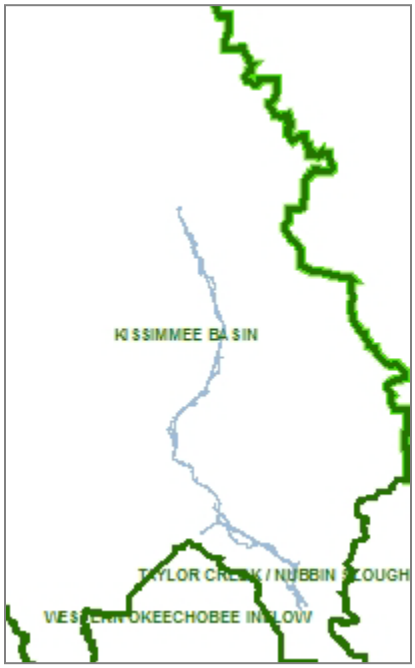


Figure 19: WaterExtent

SOURCE

Data is populated for the Hydroperiod boundary area using the Waterbody polygons.

HYDROID- Unique feature identifier in the geodatabase

HYDROCODE- Permanent public identifier of the features

NAME- SFWMD Feature Name

7. NON-SPATIAL TABLES

7.1. TIMESERIES TABLES

The Arc Hydro Framework has been expanded to include Time Series. There is much interest in Timeseries data and there are varied requirements by different organizations to bridge to external timeseries databases and to display and store the data in Arc Hydro.

As a result of this, a meeting with ESRI, University of Texas and other organizations was held in April 2005 to discuss and come to agreements on these issues. Timeseries schema in AHED may change as a result of these developments.

Currently Timeseries data is not stored in AHED. The AHED Timeseries tables are used as template for project personal geodatabases. For example, the Hydroperiod tool downloads data from DBHydro and stores it in the Hydroperiod PGDB timeseries tables using the AHED templates.

7.1.1. TSTYPE

Table
TSTYPE

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	Object ID						
TSTYPEID	Long integer	Yes			10		
VARIABLE	String	Yes					30
UNITS	String	Yes		AHED_UNITS			30
ISREGULAR	Long integer	Yes		AHEDBOOLEAN	10		
TSINTERVAL	Long integer	Yes		AH_TSINTERVALTYPE	10		
DATATYPE	Long integer	Yes		AH_TSDATATYPE	10		
ORIGIN	Long integer	Yes		AH_TSORIGINS	10		

The type of time series (e.g. INSTANTANEOUS, INCREMENTAL;

SEE TSDATATYPE DOMAIN).

TSTYPEID- Identifier for the type of time series

VARIABLE- The variable described by the timeseries, like streamflow

UNITS- Units of measurement

ISREGULAR- Whether data is regularly or irregularly measured by time

TSINTERVAL- Time interval represented by each measurement

DATETYPE- Type of time series data e.g. instantaneous, cumulative

ORIGIN- Origin of the Time series data

7.1.2. ATTRIBUTESERIES

Table
ATTRIBUTESERIES

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	Object ID						
FEATUREID	Long integer	Yes			10		
STRUCTUREID	Long integer	Yes			10		
TSDATETIME	Date	Yes			0	0	8
TSVALUE	Double	Yes			38	8	
HYDROID	Long integer	Yes			10		
HYDROCODE	String	Yes					30
TSTYPEID	Long integer	Yes			10		

The Attribute Series table stores multiple time and value pairs associated with a static point, line or polygon.

FEATUREID- HydroID of the geometric feature described by the time series, for Hydroperiod Analysis, Attribute Series are associated with Monitoring Points.

STRUCTUREID- HydroID of the Structure associated with the attribute series, if any. This relationship is part of the water balancing work under development for Task 5. It permits a relationship to both the Controlled HydroJunction through FeatureID and to the associated Structure through STRUCTUREID.

TSDATETIME- Date and time of the time series value

TSVALUE- Time series value

Based on Impact analysis done during population phase for Hydroperiod tool, it was suggested to add following fields to maintain same table structure between enterprise and personal geodatabase.

HYDROID- HydroID of the feature for which timeseries is stored.

HYDROCODE- Permanent public identifier of the features.

TSTYPEID- Link to TSTYPE table describing Timeseries type.

7.1.3. TIMESERIES

Table
TIMESERIES

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length
OBJECTID	Object ID						
FEATUREID	Long integer	Yes			10		
TSDATETIME	Date	Yes			0	0	8
TSVALUE	Double	Yes			38	8	
TSTYPEID	Long integer	Yes			10		

The Time Series table is a general form for any type of timeseries. Adds TSTYPEID to handle multiple timeseries types (See TSTYPE table below).

FEATUREID- ID of the feature described by the time series

TSDATETIME- Date and time of the time series value

TSVALUE- Time series value

TSTYPEID – Link to TSTYPE table describing Timeseries type (See Below).

7.2. APUNIQUEID AND LAYERKEYTABLE

Table
APUNIQUEID

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
IDNAME	String	Yes					35
LASTID	Long integer	Yes			10		

Table
LAYERKEYTABLE

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
LAYERNAME	String	Yes					35
LAYERKEY	String	Yes					35
IDFLDNAME	String	Yes					35

The HydroID of a feature is obtained from a HydroID counter. The counter keeps track of the last HydroID used in a table called APUNIQUEID. A second table called LAYERKEYTABLE contains the relationship between the feature class name and the last used HydroID.

These tables can either exist in the geodatabase workspace or in an external database. In AHED these tables exist within the SDE workspace. If the tables do not exist in the workspace, the first time that Arc Hydro tools are used, they will automatically get generated.

HydroIDs are generated in the following way:

By default, the LAYERKEYTABLE will have no entries, while the APUNIQUEID table will have two records, one defining the HYDROID counter and the other the MARINEID counter. MARINEID is added as an example of other unique IDs that can be maintained and is not used by Arc Hydro tools. All new features will draw the HydroID from the LASTID associated with the IDNAME field in the APUNIQUEID table.

To assign a range of HydroIDs to each feature class, the LAYERKEYTABLE can be used, where a LAYERKEY is assigned to each LAYERNAME. Through the LAYERKEY a relationship will be maintained between the two tables to track the LASTID used for each LAYER.

APUNIQUEID

IDNAME- The name of the unique ID field, for example HydroID. If ranges of Ids are assigned to each Layer, this field will contain values from LAYERKEY field.

LASTID- The last uniqueID value used in the database.

LAYERKEYTABLE

LAYERNAME- Name of the Layer
LAYERKEY- A unique string ID for the Layer which will be populated in the IDNAME in the APUNIQUEID table, for example KeyA, KeyB,…

IDFLDNAME- The name of the UniqueID field, for example HydroID

7.3. XSECTIONPOINT

Table
AHED.XSECTIONPOINT

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
XSCODE	String	Yes					30
XSM	Double	Yes			38	8	
ELEV29	Double	Yes			38	8	
ELEV88	Double	Yes			38	8	

An object identifying the CrossSectionM and Elevation values of a point on a channel Cross Section.

XSCODE- An identifier for a cross section in Arc Hydro
XSM- The measured distance of the point across the cross section
ELEV29- Elevation of the point above mean sea level in NGVD29
ELEV88- Elevation of the point above mean sea level in NAVD88

7.4. SOURCEQUALITY

For details refer to section 3.4 - Metadata fields in SourceQuality table.

7.5. HHATLASDOC

Table renamed to HHATLASDOC from HH_ATLAS_DOC, since the ESRI semantic checker generated warnings for table name with underscore.

Table
HHATLASDOC

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
R	DOC_ID	Long integer	Yes			10		
R	FEAT_HYDROID	Long integer	Yes			10		
R	DOC_NAME	String	Yes					100
R	FILENAME	String	Yes					100
R	LOCATION	String	Yes					255
R	OWNER	String	Yes					50
O	OWNER_CONTACT	String	Yes					50
O	LAST_UPD	Date	Yes			0	0	8

This table stores the path to the Watershed related documents. This table is designed to support the Watershed Atlas tool. The Location field can have file paths as well as web page links. A script called Identify Broken Links runs every night to check if the paths are valid and the document exists. If any links are missing then an automated mail is send to the ArcHydro support group defined in Microsoft Outlook.

DOC_ID- Incremental ID defined for each document. A document will have same ID across the table. Duplicate values permitted provided they are assigned to the same document.
FEAT_HYDROID- HydroID of the feature to which the document is related.
DOC_NAME- Name of the document.
FILENAME- Actual file name.
LOCATION- File path or html link.
OWNER- Name of the person who owns/maintains the document.
OWNER_CONTACT- Phone numbers of the owner.
LAST_UPD- Date when the document was last modified.

7.6. DOMAINLUT

Table renamed to DOMAINLUT from DOMAIN_LUT, since the ESRI semantic checker generated warnings for table name with underscore.

Table
DOMAINLUT

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
R	FC_NAME	String	No					30
R	FC_FIELD_NAME	String	No					30
R	DOMAIN_NAME	String	Yes					30
R	DOMAIN_CODE	String	No					100
R	DOMAIN_DESC	String	No					100

ArcIMS-MapDotNet development environment cannot read the domain values if any. It can only retrieve the code and not the value. To display values for coded value domains defined in AHED, this table is defined.

FC_NAME- Name of the Feature class to which the domain belongs.

***Note**: Domain could belong to more than one Feature class. All will have to be listed in this table if required.*

FC_FIELDNAME- Name of the field to which the domain is linked.

DOMAIN_NAME- Name of the domain.

DOMAIN_CODE- Code for all the values defined in domain.

DOMAIN_DESC- Actual value of the corresponding domain code.

7.7. NLMODEDESC

Table renamed to NLMODEDESC from NL_MODE_DESC, since the ESRI semantic checker generated warnings for table name with underscore.

Table
NLMODEDESC

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
R	MODE_NUM	Long integer	Yes			10		
R	MODE_DESC	String	Yes					200

This table stores the mode description as defined in WREP. The table is populated referring NL_region table in WREP schema. This table is designed to support the metadata report generated for Water Quality Monitoring stations in Water Quality Load tool.

MODE_NUM- Mode number as defined in WREP
MODE_DESC- Mode description as defined in WREP

7.8. SYMBOLOGY

Table
SYMBOLOGY

	Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
	OBJECTID	Object ID						
R	FEATUREID	Long integer	Yes			10		
R	FTYPE	String	Yes		AHED_FTYPE			20
CR	SYMBOL500K	Long integer	Yes			10		
CR	ANGLEMAP	Long integer	Yes			10		
CR	WALLMAP	Long integer	Yes		AHEDBOOLEAN	10		

This is a generic table to store symbology details for features. At present only Structure feature class has values in this table, but any feature class can be related to this table if it has specific symbology requirements. This may require schema changes to add new fields to this table.

FEATUREID- HydroID of feature for which symbology details are stored.

FTYPE- Stores feature class name.
SYMBOL500K- Symbol to be displayed at 1:500K scale.
ANGLEMAP- Angle at which symbol to be displayed on map to represent correct flow directions.
WALLMAP- Identifies structures to be displayed when printing wall maps.

7.9. HES_HE

Table
HES_HE

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
HYDRAULICELEMENTSETID	Long integer	Yes			0		
HYDRAULICELEMENTID	Long integer	Yes			0		

Two ODSS feature classes, Hydraulic Element Set and Hydraulic Element can be related with a Many:Many relationship. This relationship has been broken into two One:Many relationships using the HES_HE table. Both feature classes have a One:Many relationship with this table.

8. AHED DOMAINS

Domains listed in alphabetical order:

Coded value domain
AH_HYDROEDGETYPE
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	FLOWLINE
2	SHORELINE

Coded value domain
AH_HYDROFLOWDIR
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
0	UNINITIALIZED
1	WITHDIGITIZED
2	AGAINSTDIGITIZED
3	INDETERMINATE

Coded value domain
AH_TSDATATYPE
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	INSTANTANEOUS
2	CUMULATIVE
3	INCREMENTAL
4	AVERAGE
5	MAXIMUM
6	MINIMUM

Coded value domain
AH_TSINTERVALTYPE
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	1MINUTE
2	2MINUTE
3	3MINUTE
4	4MINUTE
5	5MINUTE
6	10MINUTE
7	15MINUTE
8	20MINUTE
9	30MINUTE
10	1HOUR
11	2HOUR
12	3HOUR
13	4HOUR
14	6HOUR
15	8HOUR
16	12HOUR
17	1DAY
18	1WEEK
19	1MONTH
20	1YEAR
99	OTHER

Coded value domain
AH_TSORIGINS
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	RECORDED
2	GENERATED

Coded value domain
AHED_DBNAME
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
DBHYDRO_DCVP	DBHYDRO_DCVP
SCADA	SCADA
IMS	IMS
WREP	WREP

Coded value domain
AHED_DECISIONDOMAIN
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
CHANNEL	CHANNEL
FLOODPLAIN	FLOODPLAIN

Coded value domain
AHED_FLOODFREQDOMAIN
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
FP100YR	FP100YR
FP500YR	FP500YR
FP100YRFUTURE	FP100YRFUTURE

Coded value domain
AHED_FLOWLINETYPE
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	ARTIFICIALPATH
2	CANALDITCH
3	STREAMRIVER

Coded value domain
AHED_FTYPE
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
MONITORINGPOINT	MONITORINGPOINT
WATERSHED	WATERSHED
WATERBODY	WATERBODY
HYDRAULICELEMENT	HYDRAULICELEMENT
STATION	STATION

Coded value domain
AHED_HYDRO_ORDER
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
PRIMARY	PRIMARY
SECONDARY	SECONDARY
TERTIARY	TERTIARY
LOCAL	LOCAL

Coded value domain
AHED_JUNCTIONTYPE
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	CONTROLLED
2	UNCONTROLLED
3	INTERNAL
4	NETWORKJUNCTION
5	DRAINPOINT

Coded value domain
AHED_ORIGINATOR
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
SFWMD	SFWMD
SWFWMD	SWFWMD
SJRWMD	SJRWMD
FDEP	FDEP
USGS	USGS
USACE	USACE
MIAMI-DADE	MIAMI-DADE
BROWARD	BROWARD
PALM BEACH	PALM BEACH
NRCS	NRCS
COUNTY	COUNTY
STATE	STATE
FEDERAL	FEDERAL
LOCAL WATER CONTROL DISTRICT	LOCAL WATER CONTROL DISTRICT
MUNICIPALITY	MUNICIPALITY
PRIVATE	PRIVATE

Coded value domain
AHED_UNITS

Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
CENTIMETER	CENTIMETER
METER	METER
KILOMETER	KILOMETER
MILE	MILE
FEET	FEET

Coded value domain
AHED_WBTYPE

Description
Field type *Long integer*
Split policy *Duplicate*
Merge policy *Default value*

Code	Description
1	CANALSEGMENT
2	LAKE
3	MARSH
4	ESTUARY
5	LAGOON/BAY
6	OCEAN
7	STREAM/RIVER

Coded value domain
AHED_XSTYPE

Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
LAKE	LAKE
CANAL	CANAL
CHANNEL	CHANNEL

Coded value domain
AHEDBOOLEAN

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	YES
0	NO

Coded value domain
AncillaryRoleDomain

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
0	None
1	Source
2	Sink

Coded value domain
CARTO

Description *Used for coding*
Field type *hydroedges for map*
Split policy *displays*
Merge policy *Short integer*

Code	Description
0	NOT CODED
1	DO NOT DRAW
2	DRAW

Coded value domain
EnabledDomain

Description
Field type *Short integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
0	False
1	True

Coded value domain
FDEP_IMPAIRED_WB

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
-1	NONE
1	LAKE OKEECHOBEE
2	KISSIMMEE RIVER
3	C-6

Coded value domain
FEMA_FLOODWAY
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
FLOODWAY	FLOODWAY
COLORADO RIVER	COLORADO RIVER
FLOODWAY CONTAINED IN CHANNEL	FLOODWAY CONTAINED IN CHANNEL
FLOWAGE EASEMENT BOUNDARY	FLOWAGE EASEMENT BOUNDARY
STATE ENCROACHMENT	STATE ENCROACHMENT
AREA OF SPECIAL CONSIDERATION	AREA OF SPECIAL CONSIDERATION

Coded value domain
FEMA_ZONE
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
A	A
AE	AE
AH	AH
AO	AO
AR	AR
1 PCT FLOOD HAZARD CONTAINED IN CHANNEL	1 PCT FLOOD HAZARD CONTAINED IN CHANNEL
1 PCT FUTURE CONDITIONS	1 PCT FUTURE CONDITIONS
A99	A99
V	V
VE	VE
0.2 PCT ANNUAL CHANCE FLOOD HAZARD	0.2 PCT ANNUAL CHANCE FLOOD HAZARD
0.2 PCT ANNUAL CHANCE FLOOD HAZARD CONTAINED IN CHANNEL	0.2 PCT ANNUAL CHANCE FLOOD HAZARD CONTAINED IN CHANNEL
AREA NOT INCLUDED	AREA NOT INCLUDED
D	D
X PROTECTED BY LEVEE	X PROTECTED BY LEVEE
X	X
OPEN WATER	OPEN WATER

Coded value domain
FIELD_STATION
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
BIG CYPRESS BASIN	BIG CYPRESS BASIN
CLEWISTON	CLEWISTON
FT LAUDERDALE	FT LAUDERDALE
HOMESTEAD	HOMESTEAD
KISSIMMEE	KISSIMMEE
MIAMI	MIAMI
OKEECHOBEE	OKEECHOBEE
WEST PALM BEACH	WEST PALM BEACH

Coded value domain
GPS_ACCURACY
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	PROFESSIONAL (<1m)
2	RESOURCE (7-10m)

Coded value domain
HOR_DATUM
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	NAD 1983 HARN
2	NAD1983
3	NAD 1927

Coded value domain
HOR_SURVEY_ORDER
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	FIRST ORDER
2	SECOND ORDER CLASS I
3	SECOND ORDER CLASS II
4	THIRD ORDER CLASS I
5	THIRD ORDER CLASS II

Coded value domain
HYDROLOGY_PARAMETER
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
STAGE	STAGE
FLOW	FLOW

Coded value domain

MAPSCALE

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	6000
2	12000
3	24000
4	100000

Coded value domain

NHD_FCODE

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
33400	CONNECTOR
33600	CANAL/DITCH
43600	RESERVOIR
55800	ARTIFICIAL PATH
43601	RESERVOIR: RESERVOIR TYPE = AQUACULTURE
43609	RESERVOIR: RESERVOIR TYPE = COOLING POND
43612	RESERVOIR: RESERVOIR TYPE = SEWAGE TREATMENT POND
43613	RESERVOIR: RESERVOIR TYPE = WATER STORAGE; CONSTRUCTION MATERIAL = NONEARTHEN
43624	RESERVOIR: RESERVOIR TYPE = TREATMENT
46003	STREAM/RIVER: HYDROGRAPHIC CATEGORY = INTERMITTENT
46006	STREAM/RIVER: HYDROGRAPHIC CATEGORY = PERENNIAL
46600	SWAMP/MARSH
39004	LAKE/POND: HYDROGRAPHIC CATEGORY = PERENNIAL
39009	LAKE/POND: HYDROGRAPHIC CATEGORY = PERENNIAL; STAGE = AVERAGE WATER ELEVATION
49300	ESTUARY
44500	SEA/OCEAN

Coded value domain

NHD_FEATURE_STATUS

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	ADD FEATURE
2	MODIFY FEATURE ATTRIBUTE
3	MODIFY FEATURE GEOMETRY
5	DELETE FEATURE

Coded value domain

NHD_RESOLUTION

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	LOCAL
2	HIGH
3	MEDIUM

Coded value domain

NHD_SOURCE_FC

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
-1	NONE
1	NHDAREA
2	NHDWATERBODY

Coded value domain

ODSS_HETYPE

Description *Hydraulic Element*
Field type *type for ODSS*
Split policy *Short integer*
Merge policy *Default value*

Code	Description
0	Not Coded
1	Culvert
2	Flume
3	Gate
4	Lock
5	Pump
6	Weir

Coded value domain

ODSS_HESTYPE

Description *Hydraulic Element*
Field type *Set type for ODSS*
Split policy *Short integer*
Merge policy *Default value*

Code	Description
0	Not Coded
1	Culvert
2	Flume
3	Lock
4	Pump
5	Spillway
6	Weir

Coded value domain
ODSS_MEDIUM

Description *Medium for ODSS*
Field type *Stations*
Split policy *Short integer*
Merge policy *Default value*

Code	Description
0	Not Coded
1	Atmosphere
2	Groundwater
3	Soil
4	Surface Water

Coded value domain
ODSS_WCSTYPE

Description *Water Control*
Field type *System type fpr*
Split policy *ODSS*
Merge policy *Short integer*

Code	Description
0	Not Coded
1	Distribution Cell
2	Diversion (Bypass) Canal
3	Flow Way
4	Inflow Canal
5	Outflow Canal
6	Seepage Canal
7	Stormwater Treatment Area
8	Treatment Cell
9	EAA
10	Preserve
11	Regional

Coded value domain
ODSS_WCUTYPE

Description *Water Control Unit*
Field type *type for ODSS*
Split policy *Short integer*
Merge policy *Default value*

Code	Description
0	Not Coded
1	Storage
2	Conveyance
3	Marsh
4	Natural Stream
5	Mixed

Coded value domain
ODSS_WMSJUNCTIONTYPE

Description *WMSJunction type*
Field type *for ODSS*
Split policy *Short integer*
Merge policy *Default value*

Code	Description
0	Not Coded
1	Controlled
2	UnControlled

Coded value domain
QC_STATUS

Description
Field type *Short integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
0	LOADED - NO QC
1	EDITOR QC
2	DBO QC
3	FINAL QC
4	ADDED
5	DELETE
6	MOVE
7	UPDATED

Coded value domain
STN_TYPE

Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	HYDROLOGY
2	WATER QUALITY

Coded value domain
STRUCT_TYPE

Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
CULVERT	CULVERT
LOCK	LOCK
PUMP	PUMP
SPILLWAY	SPILLWAY
WEIR	WEIR
FLUME	FLUME

Coded value domain
VERT_DATUM
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	NGVD29
2	NAVD88

Coded value domain
VERT_SURVEY_ORDER
Description
Field type *Long integer*
Split policy *Default value*
Merge policy *Default value*

Code	Description
1	FIRST ORDER CLASS I
2	FIRST ORDER CLASS II
3	SECOND ORDER CLASS I
4	SECOND ORDER CLASS II
5	THIRD ORDER

Coded value domain
WQ_PARAMETER
Description
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
AUTOSAMPLER	AUTOSAMPLER
BIRDS	BIRDS
FISH	FISH
GROUNDWATER	GROUNDWATER
LOGGED	LOGGED
OTHER	OTHER
PLANTS	PLANTS
SEDIMENT	SEDIMENT
SURFACE WATER GRAB	SURFACE WATER GRAB

9. APPENDIX A- LIST OF SCHEMA CHANGES

The following is a list of schema modifications during different phases of the AHED Population Project from 2005-2007.

Subsequent schema changes are integrated into this document as well as the ERD at each version of these documents.

Phase 1:

OPERATIONS1, OPERATIONS2- Deleted in population phase from all feature classes containing these attributes. These boolean fields were used to indicate if the feature is primary or secondary. This now will be tracked in **HYDRO_ORDER** field added to all feature classes

SourceQuality

- **INSERVICEDATE** – This field stored the In-service date for features such as structures and HydroEdges. District has decided SAP as the database of record for this information. A view /table will be created in AHED to store this date once it is retrieved from SAP
- **OUTSERVICEDATE** – This field stored the Out-service date for features such as structures and HydroEdges. District has decided SAP as the database of records for this information. A view /table will be created in AHED to store this date once it is retrieved from SAP
- **AHED_ADD_DATE** and **AHED_RETIRE_DATE –** fields were added to SourceQuality table. This will store the dates when feature is added and feature is retired from AHED. The retired feature is not deleted from the database but will be disabled to not participate when hydrology network is built.
- **GPSDEVICE –** Add field.

HydroEdge

- **NHD_WBAREACOMID-** The relationship between HydroEdge and Waterbody is maintained in AHED through WaterbodyID field in HydroEdge.
- **NHD_FTYPE-** The first 3 digits of FCode correspond to FType in NHD, hence FType can still be determined through NHD_FCode field.
- **NHD_FLAG-** This information is now kept track in the NHD_STATUS table.

WQ_MonitoringPoint

Entire feature class was deleted. WQ_MonitoringPoint features class was added in pilot to store locations monitoring water quality. Only single point was stored for multiple parameters measured at same location. Concern was raised that the tools provided by ESRI which work with Arc Hydro model will break if single point presentation method used for monitoring points. Hence it was decided to remove this feature class. Water Quality monitoring points will now be stored in Monitoring point feature class.

Structure

- **ANGLEMAP-** This field stored the Map angle at which to plot the structure symbol so that it aligns with the upstream and downstream reaches. This information is now stored in a generic Symbology table added to AHED.
- **SYMBOLID –** This field was added in pilot to store the graphic symbol number used to display structures on plotted maps. This information is now stored in a generic Symbology table added to AHED.
- **CRITICAL –** This field identifies the structures that have a critical role in the District's operations. The field was removed from the enterprise dataset and therefore we removed it from the AHED structures.

Waterbody

- **NHD_WBTYPE-** Descriptor of NHD Features for Waterbodies
- **NHD_FLAG-** This information is now kept track in the NHD_STATUS table.

ProjectBound

Entire feature class deleted. This feature class was added in pilot with an intention to remove the project boundary feature classes existing in each project feature datasets. It was agreed not to remove individual project boundary feature classes. As this would duplicate the data this feature class is deleted from AHED.

AH_RSM – Regional Simulation Model AHED Extension Dataset

It was determined that this feature dataset is no longer needed in AHED. Entire feature dataset deleted.

AH_Out_of_Service – Out of Service Feature Dataset

It was determined that this feature dataset is no longer needed in AHED. Entire feature dataset deleted.

WQ_Parameters

Table is deleted. This table was added in pilot to store information of the parameters measured at each station. It was related to the WQ_MonitoringPoint feature class through Station field. This table was designed to support the Water Quality Load tool. This information will now be stored in Monitoring Point feature class using the new domains defined.

Station_TMDL

Table is deleted in population phase. This table was added in pilot to store the Total Maximum Daily Load (TMDL) values for water quality parameters measured at each station. The water quality monitoring points are now stored in the monitoring point feature class. The new schema has subtypes and domains defined for storing list of parameters.

Note: Whenever the Water Quality tool is up for maintenance to work with the new schema we will have to modify the schema to accommodate store the TMDL values. When this document was prepared (July 2007) the Nutrient Load application had undergone a complete change. The tables on which the Water Quality Load Tool depends were no more updated.

Domains Deleted

- NHD_WaterbodyType
- NHD_FlowlineType

Symbology table,

Add FType, FeatureID, Symbol500K, Angle, AngleMap, Wallmap, SymbolXWeb, SymbolXWeb500K to this table to store symbology information for structures and other feature classes.

Phase 2:

DOMAINS ADDED

1. NHD_Feature_Status
2. NHD_FCode
3. Hydrology_Parameter
4. WQ_Parameter
5. QC_STATUS

DOMAINS MODIFIED

1. Change value in AHED_FType domain WaterbodyCentroid to Waterbody

Delete and Recreate the NHDSTatus table relationship class to be based on HydroID instead of NHD_COMID

Phase 3:

Removed AHED.NRD_RAINFALL_IMAGE_DATA from AHED schema. Only synonyms exist on GHYDT and GHYDP.

Structure

Remove Verified field in Structure

Remove from Symbology table : Angle, SymbolXweb, SymbolXweb500K

Monitoring Point

Add fields: Station_Activity_ID, Agency

Remove: Impaired_WB, Region

Domains:

1. Structure: create new domains for: StructureType, Fieldstation
2. AHED_Originator Domain: Add County, State, Federal
3. MonitoringPoint: WQ Parameter domain - add new values for WQ stations
4. QCStatus domain: Add values for MPRT tool