

Arc Hydro Enhanced Database (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), a process that involves IT-GIS and many other business groups from across the District. The HSDMP document describes the details of AHED Governance and stewardship processes.

Four District projects were involved in the early schema design of AHED. These were: Operations Decision Support System, Flood Hydrology & Hydraulics, Hydroperiod Analysis, and Regional Simulation Model.

AHED Enhancements

The AHED schema was enhanced to implement the concept of Water Control Units. Structures were added to the database as they are a prominent component of surface water management in South Florida. The data structure supports multiple scales (4 levels of drainage areas). The concept of record level metadata was introduced in AHED where specific metadata can exist for an individual feature or a group of features that share the same attributes. To accommodate the needs of early project components, the Arc Hydro time series concept was expanded to support Hydroperiod analysis. AHED provided a common interface to view project results as well as a storage source for project data.

AHED Data Model

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

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.

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 is 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.

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.

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 \(ERD\)](#).

Hydro Network

AHED HydroEdge and HydroJunction feature classes participate in the Hydro Network. The Hydro Network in AHED is a type of 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, control structures 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.

Subtypes and Domains

To create rules for coherency of the database, there are several domains and subtypes in place.

Feature Level Metadata

AHED Model stores specific metadata attributes related to each individual feature or a group of features.

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 (old datasets)	AHED / USGS	HUC Level	# 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.

AHED Documents

[AHED Data Dictionary](#)

[AHED Compliance Specifications](#)

[AHED Quality Assurance and Quality Control Procedures](#)

[AHED Data Ingestion Workflow](#)

[AHED Data Ingestion Methods & Protocols](#)

[AHED ERD \(Entity Relationship Diagram\)](#)

Additional Information

Arc Hydro Book

[Arc Hydro: GIS for Water Resources](#)

Arc Hydro – A Framework for Water Resources - video

[Full Length Video ~ 15 Minutes](#)

Presentations:

[SFWMD Stakeholder Training and Outreach - June 2010](#)

[Arc Hydro in Florida: Lessons Learned and Emerging Technologies – November 2007](#)

[Arc Hydro Groundwater Data Model – Fall 2009](#)

[Florida Arc Hydro Experience - ESRI User Conference 2005](#)

Other Arc Hydro Links:

[Hydro Resource Center](#)

[Hydro Data Model](#)

[GIS Hydro 2005](#)

[Arc Hydro Groundwater Wiki](#)

