

THE ARCGIS HYDRO FRAMEWORK DATA MODEL

for the Guadalupe River Basin, Texas

Geographical representation of drainage systems

At the highest level are basins, which may be subdivided into watersheds or catchments. Digital elevation models may be used to define drainage area boundaries for catchments, watersheds, and basins.

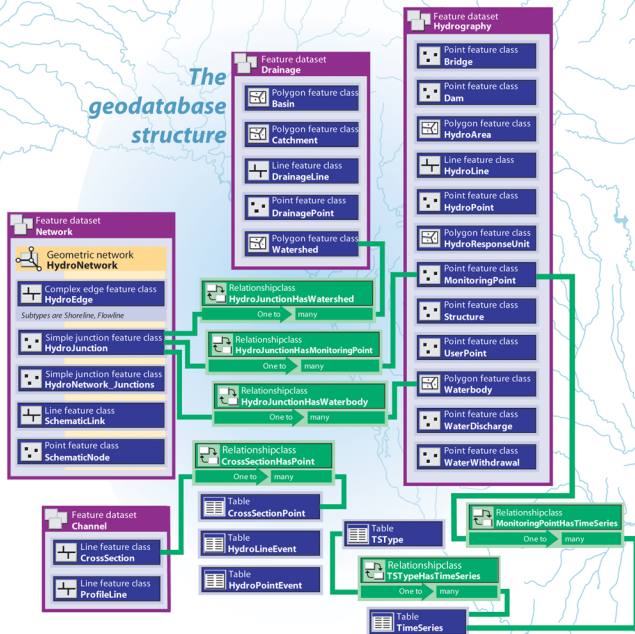
Basins
Basins are a set of administratively chosen drainage areas that partition a region for purposes of water resources management. Basins are normally named after the principal rivers and streams of the region. Basins serve as data packaging units for Arc Hydro datasets.

Watersheds
Watersheds are a tessellation or subdivision of a basin into drainage areas selected for a particular hydrologic purpose. Watersheds may drain to points on a river network, to river segments, or to waterbodies.

Catchments
Catchments are a tessellation or subdivision of a basin into elementary drainage areas defined by a consistent set of physical rules.

Digital elevation model
A digital elevation model is a grid or raster of square cells whose cell value is the land surface elevation in the center of cell. A digital elevation model describes the shape of the land surface terrain, which can be analyzed to define drainage area boundaries.

The geodatabase structure



Network features

HydroJunctions are a set of points located at the ends of flow segments and at other strategic locations on the flow network.

Defines whether a junction is a sink, a source, or neither.
Unique feature identifier in the geodatabase.
Requires public identifier in the geodatabase.
HydroID of the next downstream HydroJunction.
Length to nearest downstream sink (usually basin outlet).
The total upstream area draining to this HydroJunction.
Dispenser of feature type.

Simple junction feature class		Geometry		Point		Contains M values		No		Contains Z values		No	
Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length						
OBJECTID	OID												
Shape	Geometry	Yes											
AncillaryRole	Small Integer	Yes					2						
Enabled	Small Integer	Yes	1	EnabledDomain			2						
HydroID	Integer	Yes											
HydroCode	String	Yes					30						
NextDownID	Integer	Yes											
LengthDown	Double	Yes											
DrainArea	Double	Yes											
FType	String	Yes					30						

Relationship class: HydroJunctionHasMonitoringPoint

Type: Simple
Cardinality: One To Many
Forward label: MonitoringPoint
Backward label: HydroJunction
Notification: None

Origin feature class: HydroJunction
Destination feature class: MonitoringPoint
Primary key: HydroID
Foreign key: JunctionID

No relationship rules defined.

Simple feature class: MonitoringPoint

Field name: Data type

OBJECTID: OID

Shape: Geometry

HydroID: Integer

HydroCode: String

FType: String

Name: String

JunctionID: Integer

Relationship class: HydroJunctionHasWaterbody

Type: Simple
Cardinality: One To Many
Forward label: Waterbody
Backward label: HydroJunction
Notification: None

Origin feature class: HydroJunction
Destination feature class: Waterbody
Primary key: HydroID
Foreign key: JunctionID

No relationship rules defined.

Simple feature class: Waterbody

Field name: Data type

OBJECTID: OID

Shape: Geometry

HydroID: Integer

HydroCode: String

FType: String

Name: String

AreaSqKm: Double

JunctionID: Integer

Shape_Length: Double

Shape_Area: Double

Relationship class: HydroJunctionHasWatershed

Type: Simple
Cardinality: One To Many
Forward label: Watershed
Backward label: HydroJunction
Notification: None

Origin feature class: HydroJunction
Destination feature class: Watershed
Primary key: HydroID
Foreign key: JunctionID

No relationship rules defined.

Simple feature class: Watershed

Field name: Data type

OBJECTID: OID

Shape: Geometry

HydroID: Integer

HydroCode: String

DrainID: Integer

AreaSqKm: Double

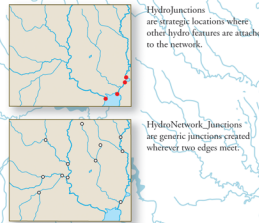
JunctionID: Integer

NextDownID: Integer

Shape_Length: Double

Shape_Area: Double

Types of hydro junctions



Connecting network features with HydroID

HydroID is a unique numerical integer identifier for all features within one Arc Hydro geodatabase.

Layer/Key	Table	Layer/Key	Table
DrainageLine	Key A	HydroID	100003
Watershed	Key B	HydroID	200007
HydroJunction	Key C	HydroID	300000

The HydroID for a new feature in a feature class is dispensed from a HydroIDTable. A feature class points to its HydroID dispenser in the HydroIDTable through its LayerKey defined in the LayerKeyTable.

Several feature classes can point to the same HydroID dispenser by using the same LayerKey.

Complex edge feature class: HydroEdge

Field name: Data type

OBJECTID: OID

Shape: Geometry

HydroID: Integer

HydroCode: String

ReachCode: String

Name: String

LengthKm: Double

LengthDown: Double

FlowDir: Integer

FType: String

EdgeType: Integer

Shape_Length: Double

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
1	Flowline	FlowDir	1	HydroFlowDirections
		EdgeType	1	HydroEdgeType
2	Shoreline	Enabled	1	EnabledDomain
		EdgeType	2	HydroEdgeType

Coded value domain: EnabledDomain

Description: Field type: Small Integer
Split policy: Default Value
Merge policy: Default Value

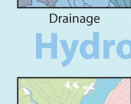
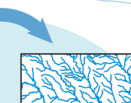
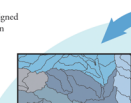
Code	Description
0	False
1	True

Coded value domain: HydroFlowDirections

Description: Field type: Integer
Split policy: Default Value
Merge policy: Default Value

Code	Description
0	Uninitialized
1	WithDigitized
2	AgainstDigitized
3	Indeterminate

Flow on a network



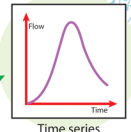
Hydro features

Hydro edges are the network of lines describing map hydrography. There are two types: flowlines, which trace water movement, and shorelines, which form the interface between land and water.

Unique feature identifier in the geodatabase.
Requires public identifier of the feature.
Permanent public identifier of the feature.
An identifier for a river or stream segment.
Geographic name.
Length of edge edge in kilometers.
Length to nearest downstream sink (usually the basin outlet).
Defines the direction of flow on the edge.
Dispenser of feature type.
Defines the edge as being either a flowline or a shoreline.

Types of hydro edges

Hydro networks trace water movement through streams and rivers represented as HydroEdges.



From a logical standpoint, water can flow from any feature with a HydroID to any other feature with a HydroID. We use Time series to model a series of flow or precipitation measurements to support integration with hydrologic modeling software.

