

Illinois' Statewide Streams Application (SSA)

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Need for SSA

- **Current lines are over 10 years old**
- **No flow splits, sinks, broken lines**
- **100K lines**

SSA

ArchHydro-based set of tools and workflow for:

- **Characterizing Illinois streams based on geomorphologic, biologic, and environmental data**
- **Tying stream data with other project databases**
- **Developing standardized reports based on streams and related datasets**

SSA

Objectives:

- **Sustainable way to capture, maintain hydrologic network**
- **Characterize network components via appropriate variables**
- **Attached program-specific attributes to network**
- **Model hydrologic processes to assess potential impacts**
- **Provide easy access to network, characteristics, attributes, process modeling tools, etc.**
- **Leverage ESRI expertise, experience to accelerate progress**

SSA

Implemented as two distinct components:

- Desktop component
- Web component



SSA

Stream line improvements

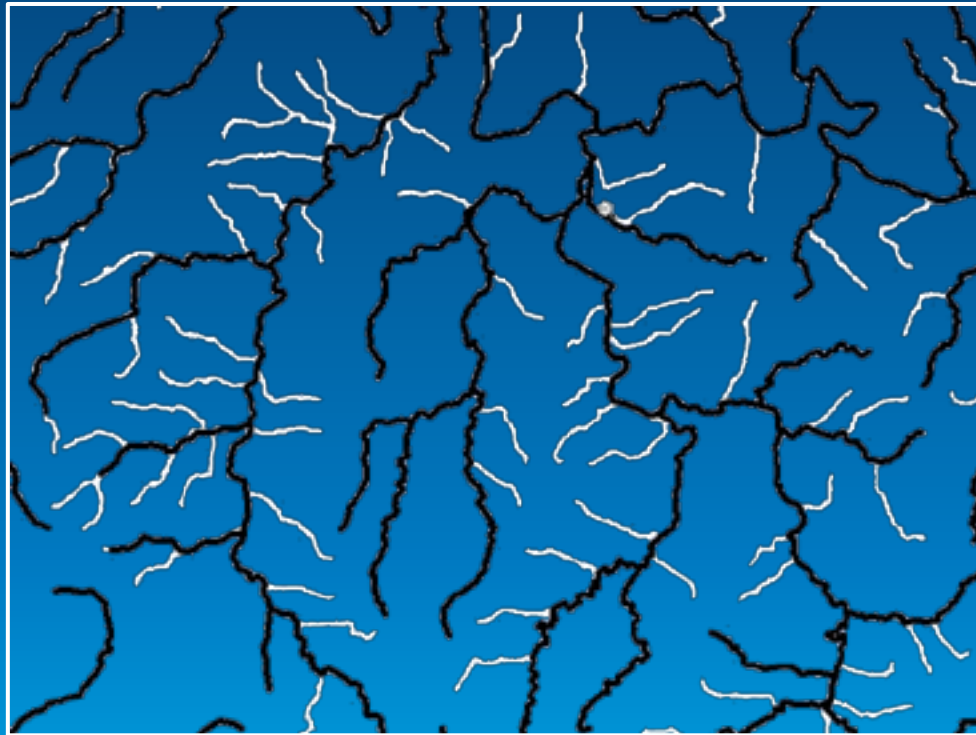
- Higher resolution: 24K vs. 100K
- Addition of flow splits and sinks
- Edited lines based on recent imagery vs. topo maps
- **Data Reviewer Extension**

Processing Units

- **Based on Ecological Drainage Units**



1:24,000 vs. 1:100,000



Reduced stream lines in high dense areas

“Original” dense streams



Ran process 1 time

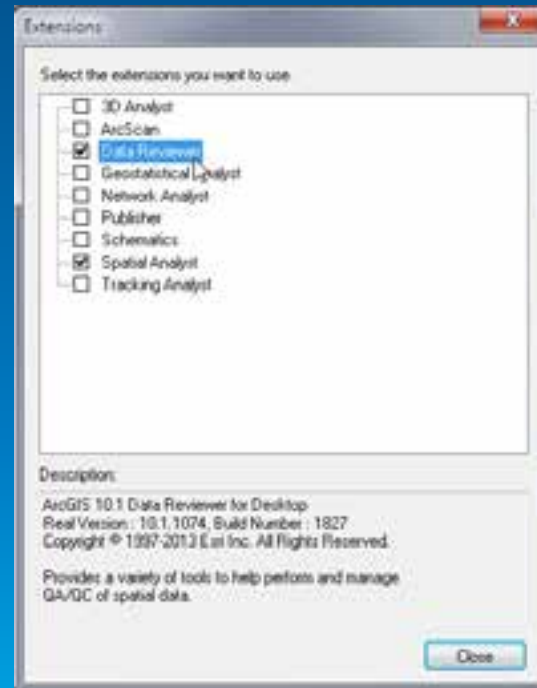
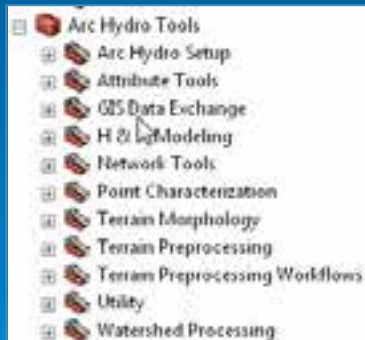


Ran process 7 times



Line clean-up and technical process steps

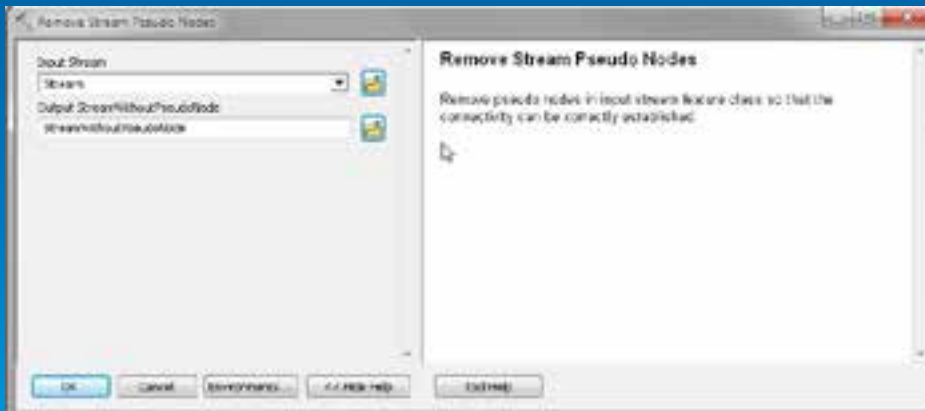
- ArcHydro Tools
- Data Reviewer Extension



ArcHydro Tools



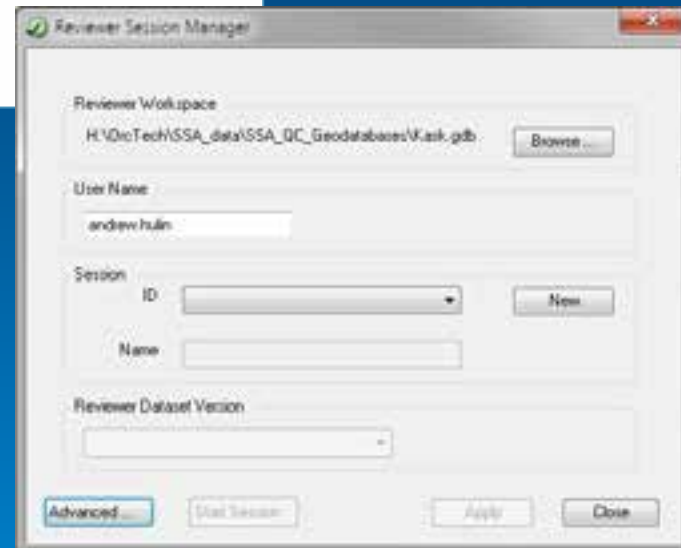
- Create initial QA/AC geodatabase
- Stream connectivity parameters
- Remove stream pseudonodes



Data Reviewer

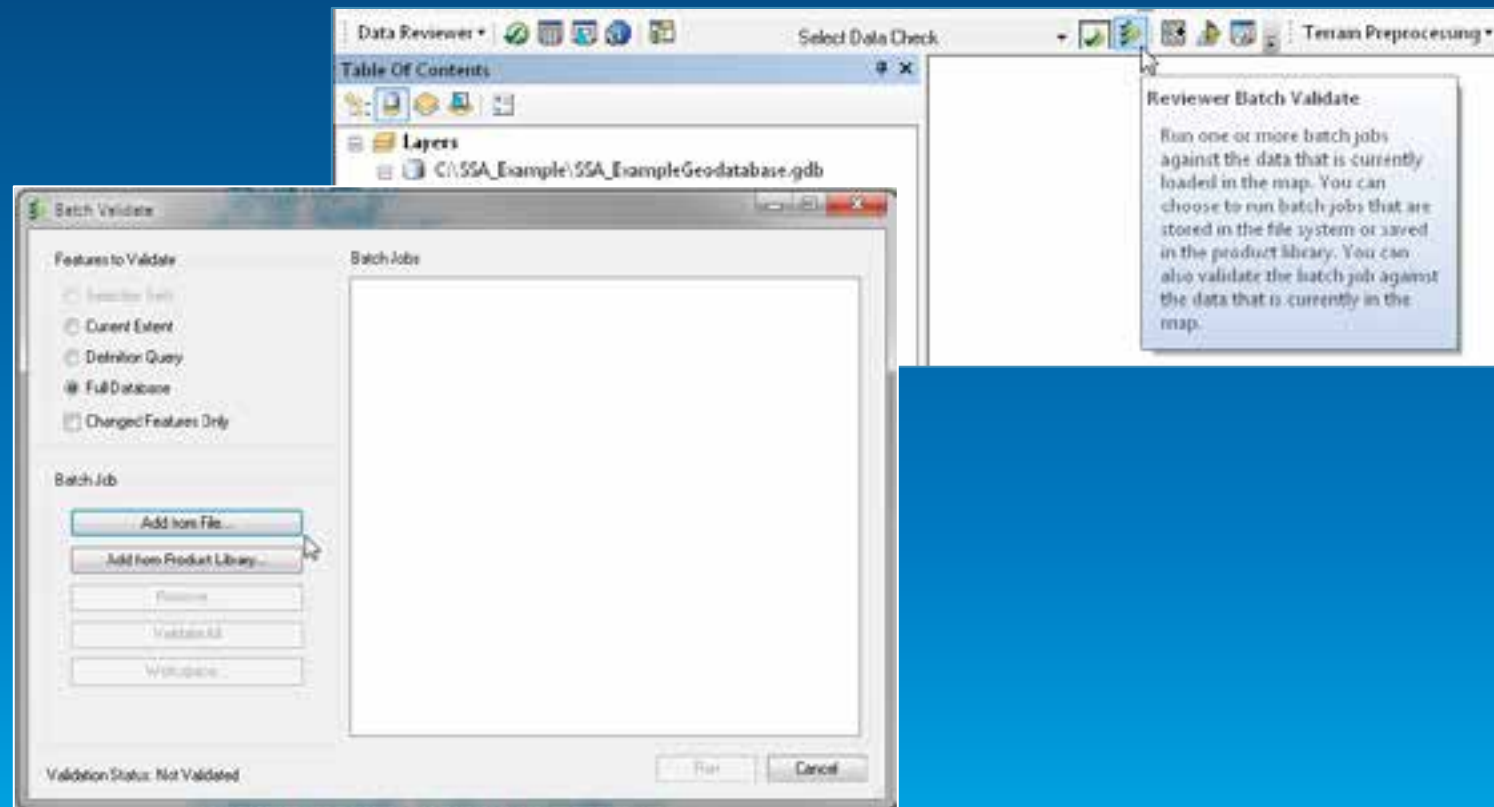


- Assign workspace
- Name users
- Specify dataset versions



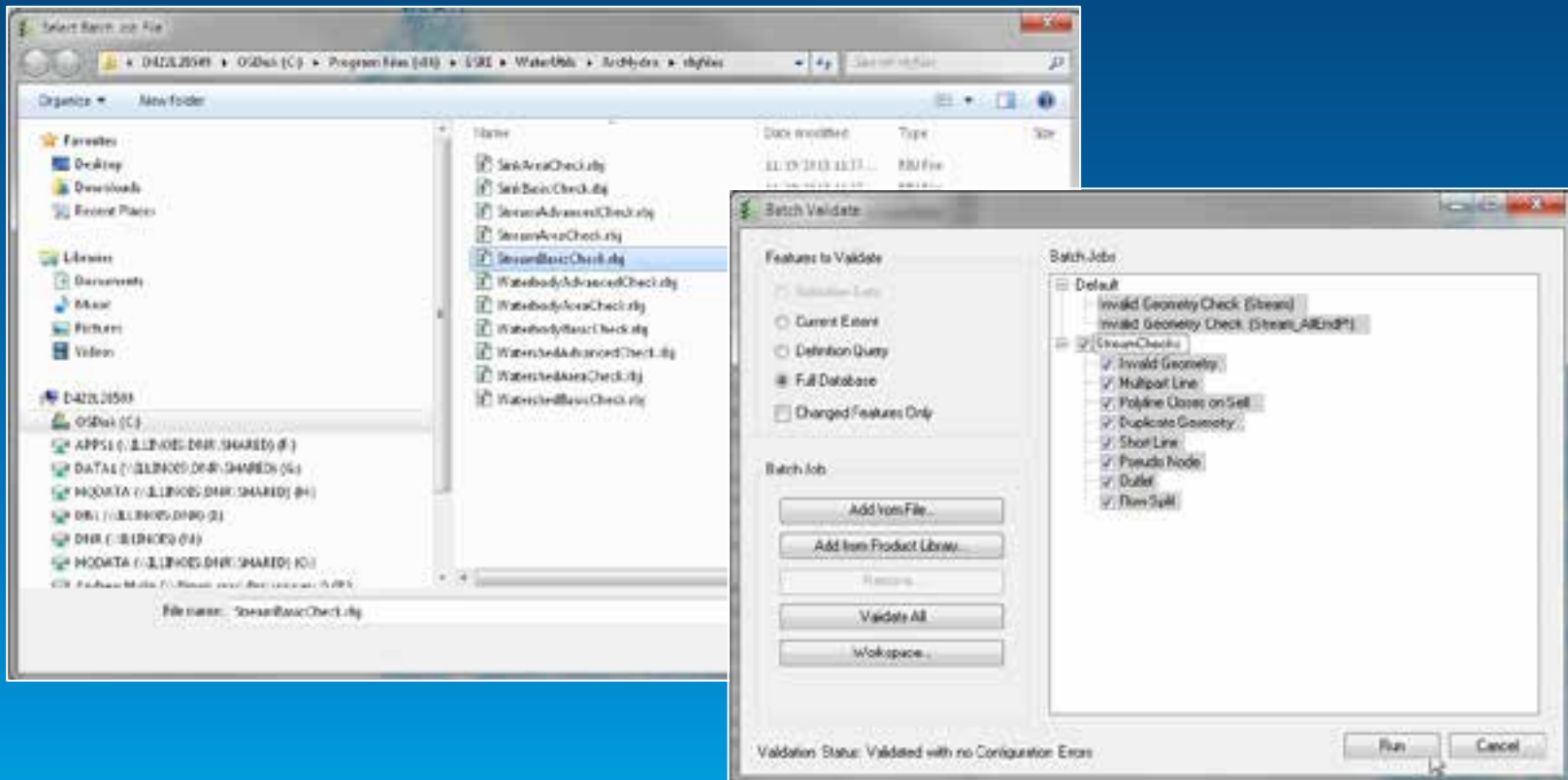
Data Reviewer

- Batch Validate

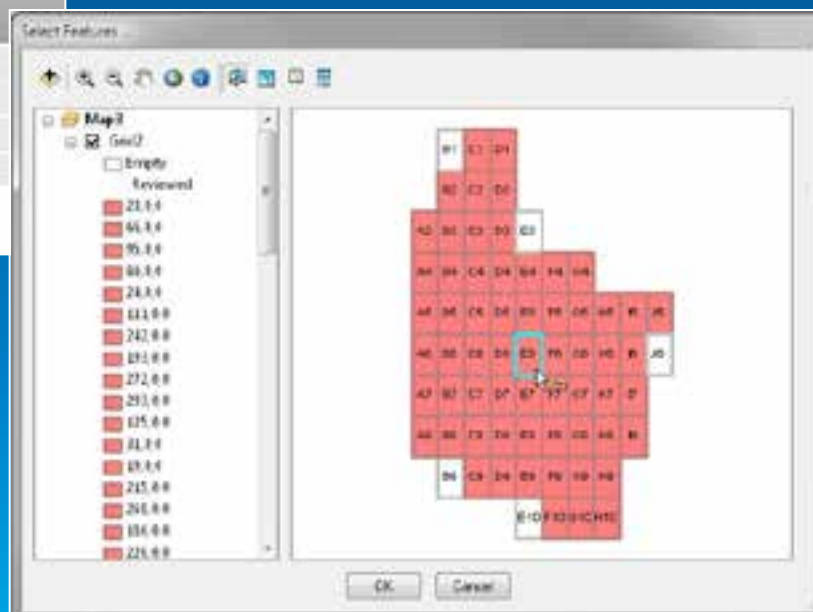
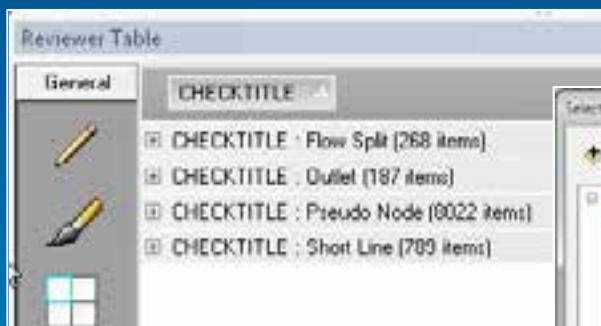


Data Reviewer

- Batch Validate



Data Reviewer



Flow Splits: *Areas on the stream lines where Data Reviewer has identified that a single stream line branches into two lines.*

- **MainPath**
- **SecondaryPath**
- **Divergence**

Upstream Characteristics:

- **1: Inherits upstream characteristics**
- **0: Does not inherit upstream characteristics**



Flow Split



Main Path

Secondary Path

Flow Split

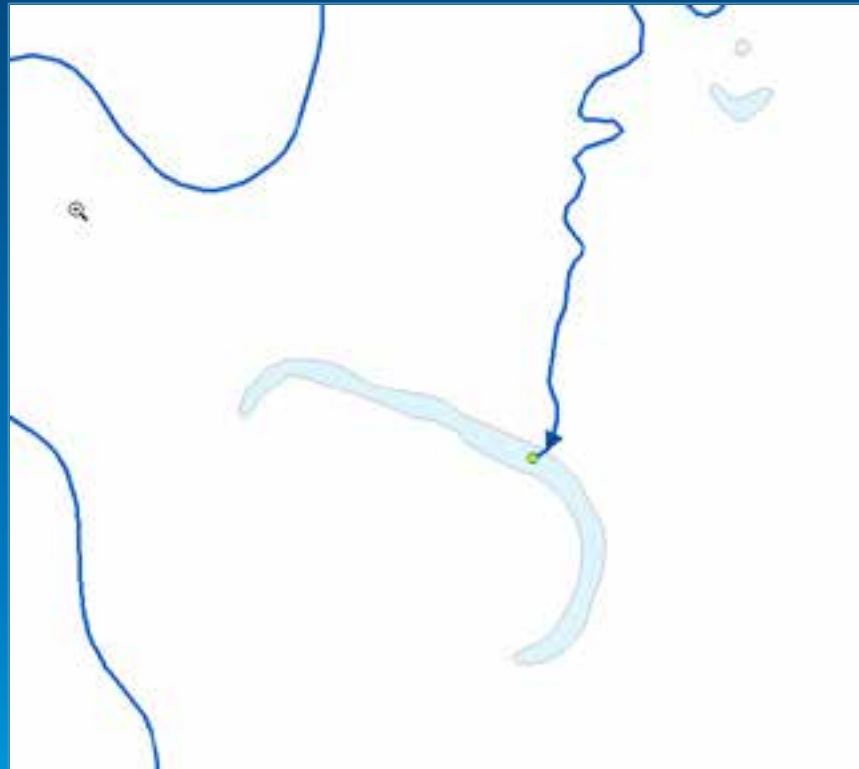


Line segment identified as having issue

Designate as MainPath,
CharUp = 1

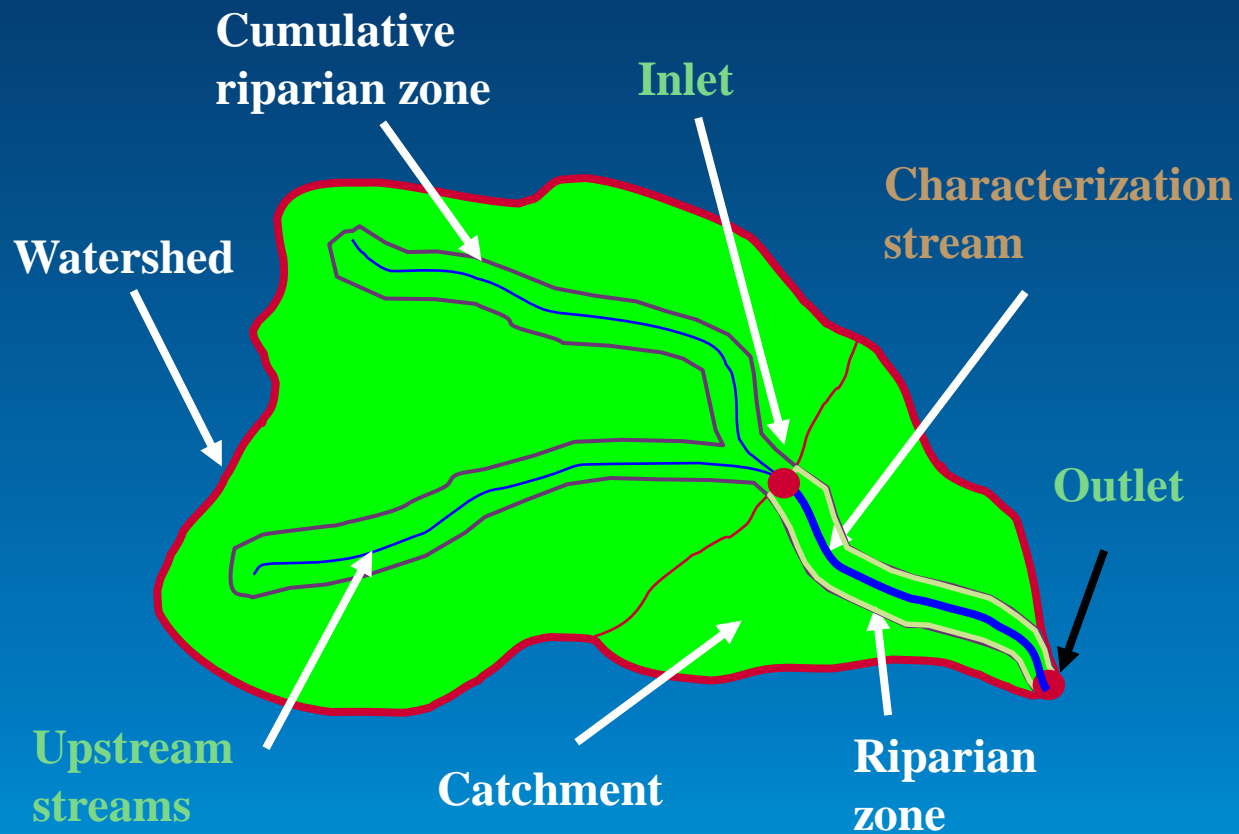
Designate as Divergence,
CharUp = 0

Outlets: *Stream lines where data reviewer has identified that a single stream line ends*



Outlets





Aqueducts, Siphons, and Culverts

Aqueduct



Aqueducts, Siphons, and Culverts

Siphon



Aqueducts, Siphons, and Culverts

Culvert



Strip Mines



Strip Mines



Sinks and Waterbodies

- **Lake** – Polygon has stream flowing in and flowing out
- **Source** – Polygon has stream flowing out
- **Stream Sink** – Stream terminates in polygon
- **Sink** – Polygon not connected to stream
- *Delete* – imagery does not show waterbody

Sinks and Waterbodies

Sink



Sinks and Waterbodies

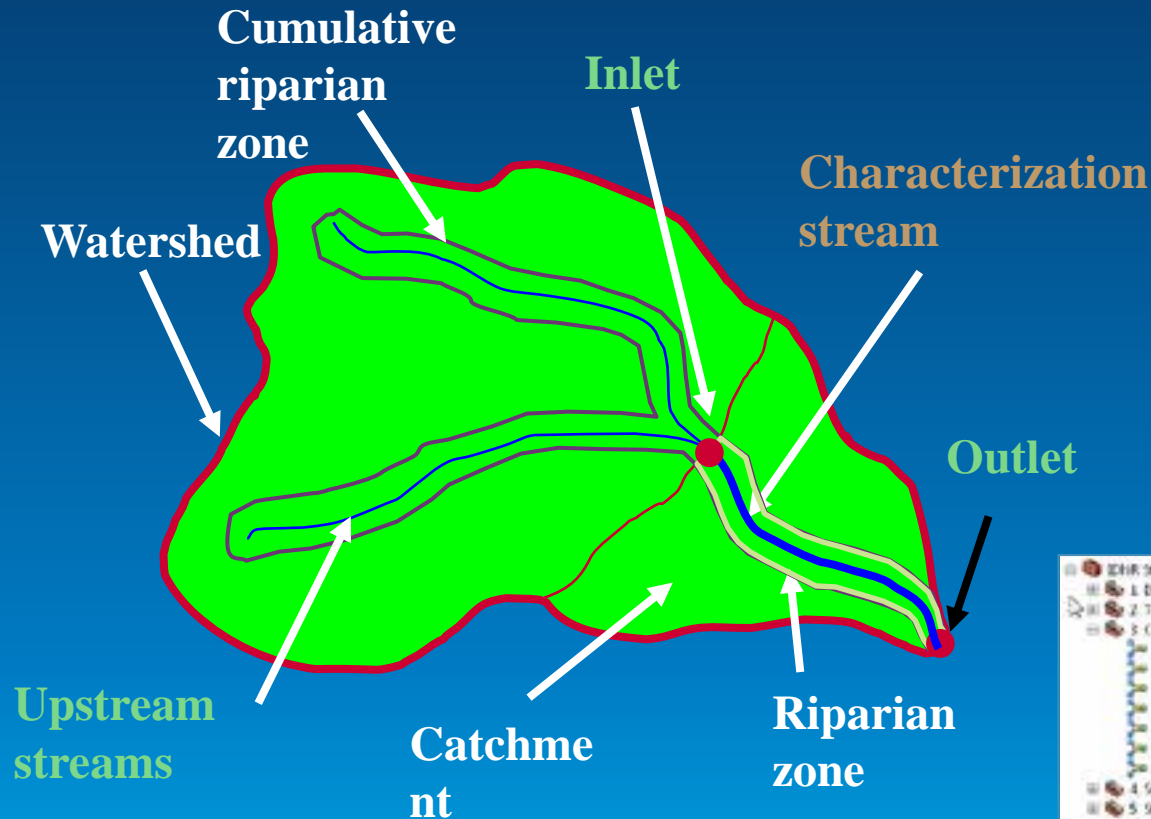
Source



Lakes



Development of characterization layers



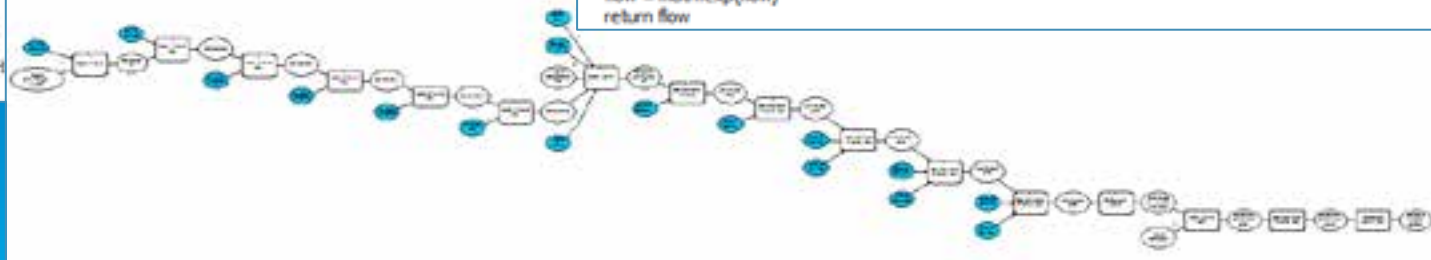
- DEM Streams file
- 1. DEM Preparation
- 2. Terrain Preprocessing
- 3. Characterization Layer Definition
 - 1. Create Characterization Streams
 - 2. Create Characterization Streams with Active Paths
 - 3. Create Characterization Drainages and Subwatersheds
 - 4. Create Riparian Zones
 - 5. Create Waterbody Subwatersheds
 - 6. Create Waterbody Watersheds
- 4. Supporting Data Generation
- 5. Stream Characterization
- 6. Local Area Characterization
- 7. Total Area Characterization
- 8. Multi Layer Characterization
- 9. Data Export and Report Generation

What is characterized?

- Data layers
- Combinations
- Complex characteristics

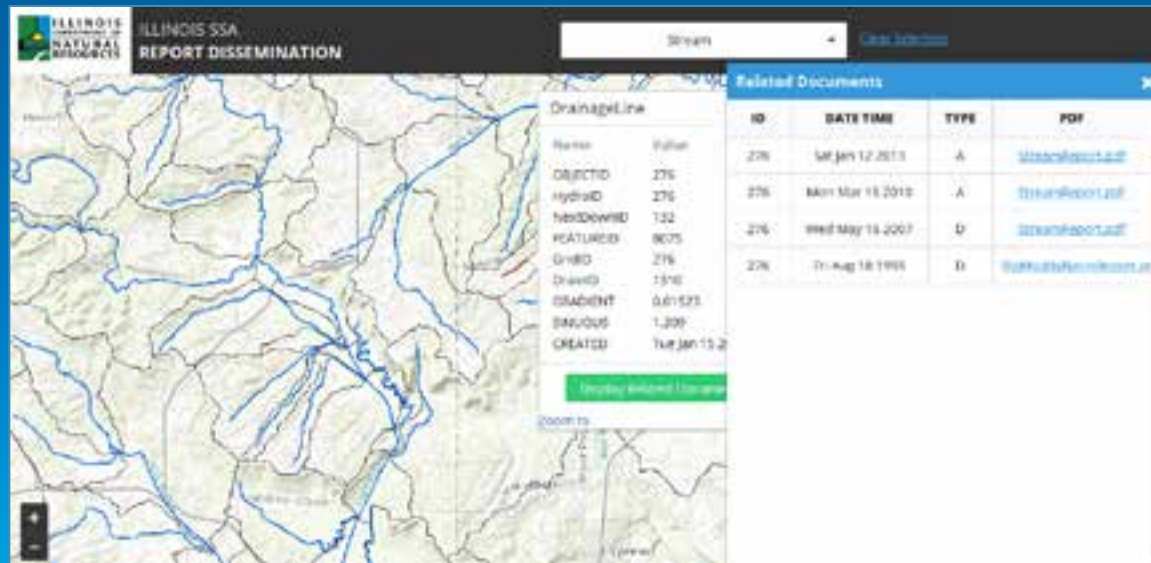
<input checked="" type="checkbox"/> BEDROCK DEPTH	[Bedrock Depth]
<input checked="" type="checkbox"/> BEDROCK TYPE	[Bedrock Type]
<input checked="" type="checkbox"/> CHNN DEN	[Channel density in km of streams per square km of area.]
<input checked="" type="checkbox"/> CROSSINGCOUNT	
<input checked="" type="checkbox"/> DABCY	[Mean Darcy]
<input checked="" type="checkbox"/> GDD	[Annual growing degree days in Base 30 (degree days)]
<input checked="" type="checkbox"/> LANDUSE WLCD RATIO	[Landuse ratios based on NLCD]
<input checked="" type="checkbox"/> MAAT	[Mean annual air temperature in C x 10]
<input checked="" type="checkbox"/> MAX JULY AIR	[Maximum July air temperature in Degrees]
<input checked="" type="checkbox"/> MEAN JULY AIR	[Mean July air temperature in Degrees]
<input checked="" type="checkbox"/> MIN JULY AIR	[Minimum July air temperature in Degrees]
<input checked="" type="checkbox"/> PERMEABILITY	[Mean soil permeability (cm/hour) * 10]
<input checked="" type="checkbox"/> PREC	[Mean annual precipitation in mm]
<input checked="" type="checkbox"/> QUATERNARY GEOLOGY RATIO	[Quaternary Geology Ratios]
<input checked="" type="checkbox"/> RD CROSS	[Number of road stream crossing per square km]
<input checked="" type="checkbox"/> RD DEN	[Road density in km of roads per square km]
<input checked="" type="checkbox"/> ROADLENGTH	[Road length in km per square km]
<input checked="" type="checkbox"/> SLOPE	
<input checked="" type="checkbox"/> W AREA	
<input checked="" type="checkbox"/> W AREAL	
<input checked="" type="checkbox"/> W LENGTH	

```
if slope == 0:  
    return -999  
else:  
    flow = const + dacoef * math.log(float(da)*0.3861) + slopecoef * math.log(float(slope)) + coarsemorainecoef *  
    math.exp(float(coarsemoraine)) + openwatercoef * math.exp(float(openwater))  
    flow = flow + totalwetlandcoef * math.exp(float(totalwetland)) + finemorainecoef * math.exp(float(finemoraine)) +  
    urbancoeff * math.exp(float(urban))  
    flow = flow + bedrockcoef * math.exp(float(bedrock)) + peatcoef * math.exp(float(peat)) + outwashcoef *  
    math.exp(float(outwash)) + agriculturecoef * math.exp(float(agriculture))  
    flow = math.exp(flow)  
    return flow
```



Data Dissemination

- Data packaging (per processing unit)
- Web app for standardized reports
 - Stream characteristic
 - Annual program reports



The screenshot displays the Illinois SSA Report Dissemination web application. The interface includes a map of a stream network, a metadata table for a selected 'DrainageLine', and a 'Related Documents' table listing reports.

ILLINOIS STATE SURVEY AND MAPPING
ILLINOIS SSA
REPORT DISSEMINATION

Stream [Clear Selection](#)

DrainageLine

Name	Value
OBJECTID	276
HydroID	276
NetDownID	132
FEATUREID	8075
GrRID	276
DrainID	1310
GRADIENT	0.61523
STATUS	1,209
CREATED	Tue Jan 13 2015 10:00:00 AM

[Display related documents](#)

Related Documents

ID	DATE TIME	TYPE	PDF
276	Sat Jan 12 2013	A	StreamReport.pdf
276	Mon Mar 16 2010	A	StreamReport.pdf
276	Wed May 13 2009	D	StreamReport.pdf
276	Thu Aug 18 1995	D	StreamReportReport.pdf