

UNDERSTANDING MODEL INPUT/OUTPUT (TR-20, HEC-HMS, HEC-RAS)

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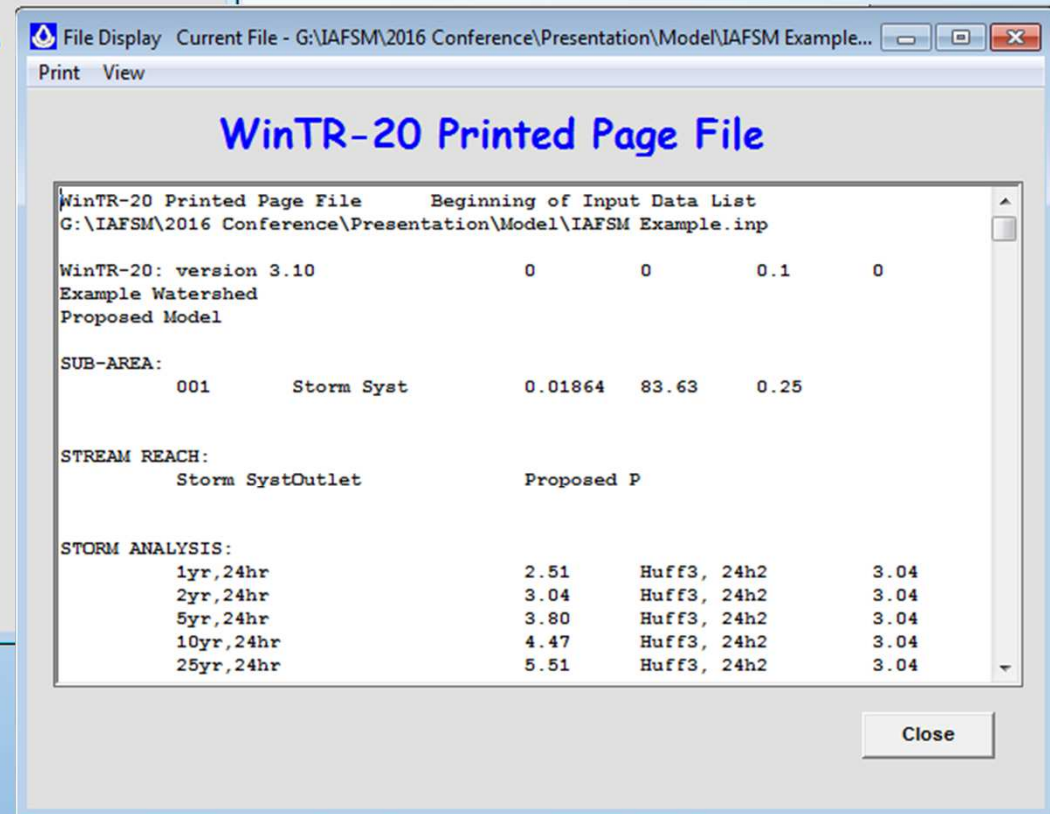
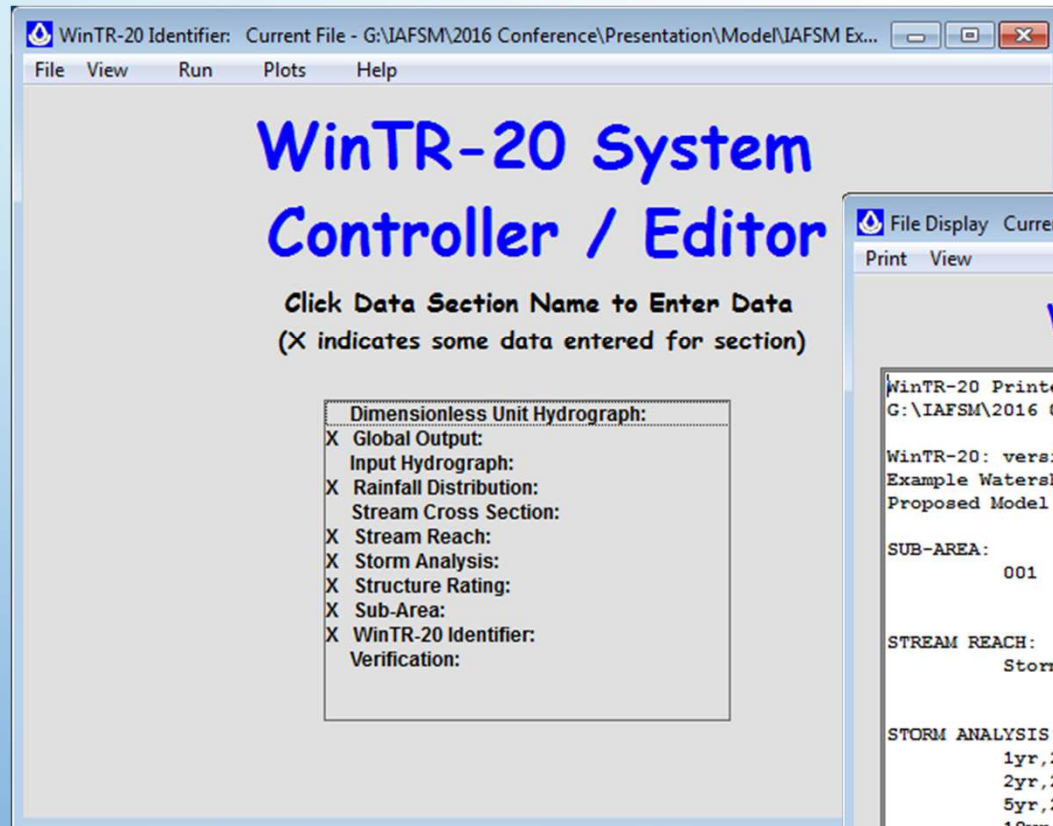
IAFSM

*Illinois Association for
Floodplain and Stormwater Management*

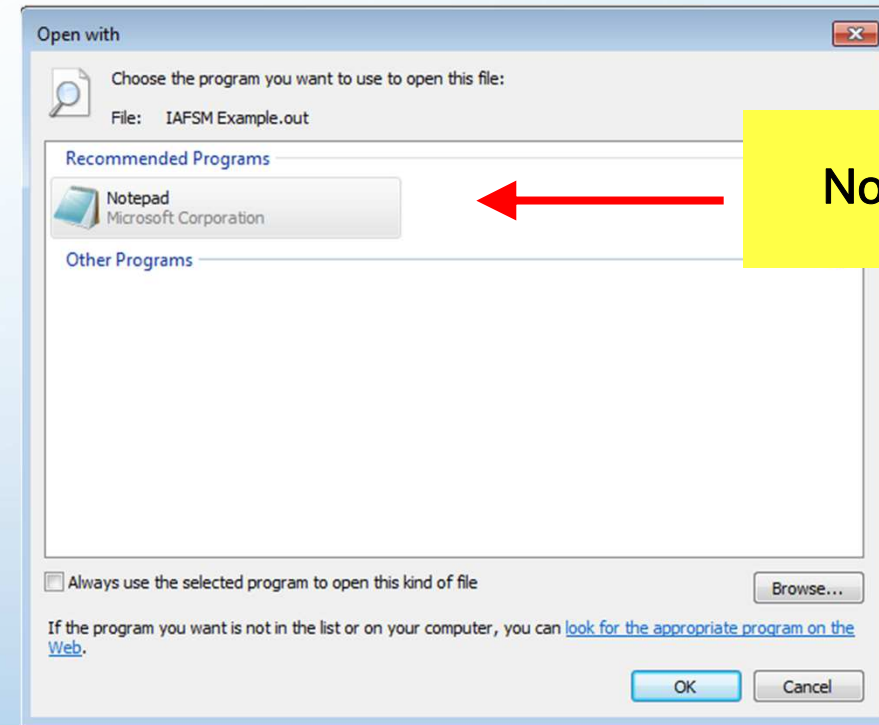
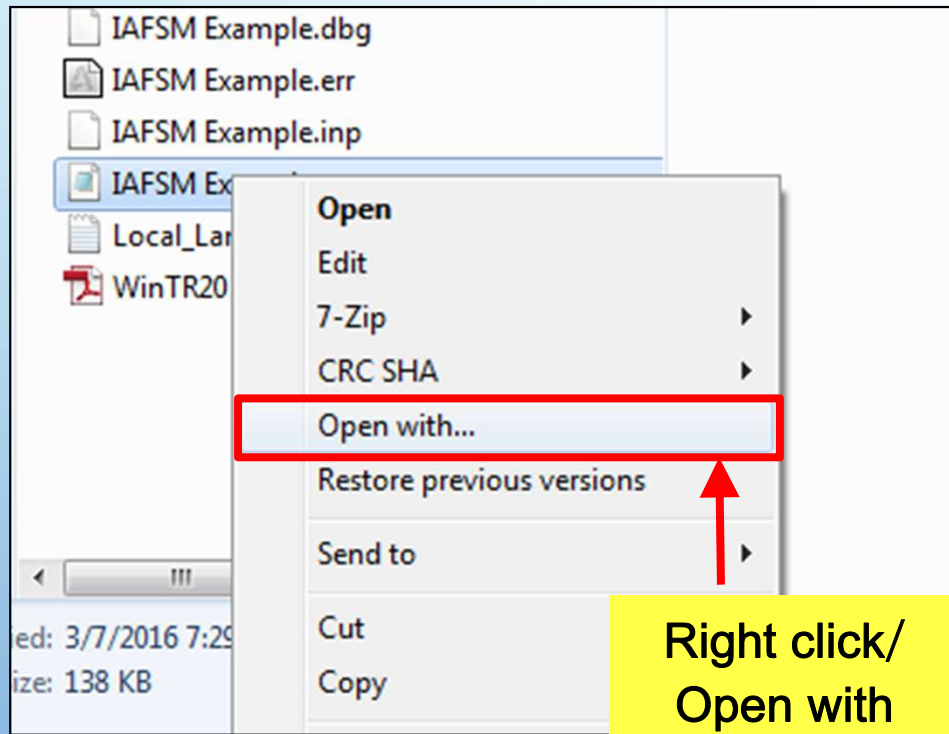
The background is a light blue gradient, transitioning from a very pale blue at the top to a slightly darker blue at the bottom. Scattered around the edges are several realistic water droplets of various sizes, each with a highlight and a shadow, giving them a three-dimensional appearance.

TR-20

Access the report by clicking run on the home screen.



Once the model has run, an output file of the report is saved in the project folder.



Input for the model is summarized in the WinTR-20 report.

File Name

Sub-Area

Stream Reach

Storm Analysis

Structure Rating

Rainfall Distribution

```
WinTR-20 Printed Page File      Beginning of Input Data List
G:\IAFSM\2016 Conference\Presentation\Model\IAFSM Example.inp

WinTR-20: version 3.10          0          0          0.1
Example Watershed
Proposed Model

SUB-AREA:
    001          Storm Syst      0.01864    83.63    0.25

STREAM REACH:
    Storm SystOutlet          Proposed P

STORM ANALYSIS:
    1yr,24hr          2.51          Huff3, 24h2
    2yr,24hr          3.04          Huff3, 24h2
    5yr,24hr          3.80          Huff3, 24h2
    10yr,24hr         4.47          Huff3, 24h2
    25yr,24hr         5.51          Huff3, 24h2
    50yr,24hr         6.46          Huff3, 24h2
    100yr,24hr        7.58          Huff3, 24h2

STRUCTURE RATING:
Proposed P692.10
    692.10          0.          0.
    693.0          1.68          0.97
    694.0          2.90          2.24
    694.6          3.43          3.09

RAINFALL DISTRIBUTION:
    Huff1, 0.5          0.025
    0.          0.16          0.33          0.43          0.52
    0.60          0.66          0.71          0.75          0.79
    0.82          0.84          0.86          0.88          0.90
    0.92          0.94          0.96          0.97          0.98
    1.00          1.00          1.00          1.00          1.00
```


The first few lines in the WinTR-20 Report provide the file location and watershed description.

WinTR-20 Identif Current File - G:\IAFSM\2016 Conference\Presentation\Model\...

WinTR-20 Identifier:

Input Units Code: ☒ English ☐ Metric

Output Units Code: ☒ English ☐ Metric

Minimum Hydrograph Value: cfs

Watershed Description:

Example Watershed

Proposed Model

Watershed Description

Min. Hydrograph Value = 0.001 cfs

```
WinTR-20 Printed Page File      Beginning of Input Data List
G:\IAFSM\2016 Conference\Presentation\Model\IAFSM Example.inp

WinTR-20: version 3.10          0          0          0.1          0
Example Watershed
Proposed Model
```

Information about the drainage area analyzed is provided.

Sub-Area Current File - G:\IAFSM\2016 Conference\Presentation\Model\IAFSM Example.inp

Sub-Area:

Sub-Area Identifier: 001 Delete Sub-Area

Sub-Area Reach Identifier: Storm Syst

Sub-Area Rain Gage Identifier:

Sub-Area Drainage Area: 0.01864 sq mi

Sub-Area Weighted Curve Number: 83.63

CN Adjustment Based on ARC: ☐ CN Reduction: ☐

Sub-Area Time of Concentration: 0.25 hr

Sub-Area Peak Output Code: ☐ Yes ☐ No ☒ Blank

Sub-Area Hydrograph Output Code: ☐ Yes ☐ No ☒ Blank

Sub-Area Hydrograph File Code: ☐ Yes ☐ No ☒ Blank

SUB-AREA: 001 Storm Syst 0.01864 83.63 0.25

Note:

Review drainage area, CN, and Tc for accuracy.

Sub-Area
ID

Sub-Area
Reach ID

Drainage Area
(sq. mi.)

CN

Tc
(hr)

Within the sub-area menu, the CN and Tc can be calculated.

Sub-Area Land Use Current File - G:\IAFSM\2016 Conference\Presentation\Mod...

Land Use Details:

Sub-Area Identifier: 001

Local Curve Number Identifiers and curve numbers can be added to grid using Local Land Use entry on main window File pull down.

Land Use Area Identifier	A Area	CN A	B Area	CN B	C Area	CN C	D Area	CN D
Open Space (Poor)		68		79		86		89
Open Space (Fair)		49		69		79		84
Open Space (Good)		39		61		74		80
Impervious		98		98		98		98
Roads (Paved)		98		98		98		98
Roads (Paved w/ditch)		83		89		92		93
Roads (Gravel)		76		85		89		91
Roads (Dirt)		72		82		87		89
Urban Desert (Natural)		63		77		85		88
Urban Desert (Artificial)		96		96		96		96

Summary of grid information.

Accumulated Drainage Area sq mi

Sub-Area Weighted CN

Enter the area (sq mi) of each land use for a weighted CN

Time of Concentration Current File - G:\IAFSM\2016 Conference\Presentation\Model\IAFSM Example.inp

Time of Concentration - Velocity Method:

Sub-Area Identifier: 001 2-Yr Rainfall 3.04

Flow Type	Length ft	Slope len/len	Manning "n"	Flow Surface	End Area sq ft	Wetted Perimeter ft	Velocity ft/sec	Travel Time hr
Sheet	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
Shallow Concentrated	<input type="text"/>	<input type="text"/>		<input type="text"/>				
Shallow Concentrated	<input type="text"/>	<input type="text"/>		<input type="text"/>				
Channel	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	
Channel	<input type="text"/>	<input type="text"/>	<input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	

Time of Concentration (hr)

Enter the length, slope, n value and flow surface for sheet flow, shallow concentrated flow, and channel flow for a Tc

The stream reach data shows the routing of stormwater.

Stream Reach Current File - G:\IAFSM\2016 Conference\Presentation\Model\IAFSM Example.inp

Stream Reach:

Stream Reach Identifier: **Storm Syst** Delete Reach

Stream Receiving Reach Identifier: **Outlet**

Reach Cross Section Identifier:

Reach Structure Identifier: **Proposed P**

Reach Channel Length: ft

Reach Valley Length: ft

Constant Base Flow: csm

Reach Peak Output Code: ☐ Yes ☐ No ☒ Blank

Reach Hydrograph Output Code: ☐ Yes ☐ No ☒ Blank

Reach Hydrograph File Code: ☐ Yes ☐ No ☒ Blank

Split Flow Reach Identifier:

Split Flow Cross Section Identifier:

Starting Split Flow: cfs

Ending Split Flow: cfs

Split Flow Drainage Area:

Note:

Check the routing to ensure unrestricted areas are not routed through the detention basin.

STREAM REACH:
Storm SystOutlet

Proposed P

Stream
Reach ID

Reach
Structure ID

Under Storm Analysis, all of the storm events analyzed are summarized.

Storm Analysis Current File - G:\IAFSM\2016 Conference\Presentation\Model\IAFSM Example....

Storm Analysis:

Repeat the following for each Storm Identifier and Rain Gage Identifier combination

Storm Identifier: 100yr,24hr

Rain Gage Identifier:

Gage Starting Time: hr

Gage Rainfall: 7.58 in

Gage Rain Table Identifier: Huff3, 24h

Gage Antecedent Runoff Condition: ☐ 1 ☒ 2 ☐ 3

2-Yr 24-Hr Rainfall: 3.04 in

Storm Id	Rain Gage Id	Start	Rain	Rain Table Id	ARC	2-Yr
1yr,24hr			2.51	Huff3, 24h	2	3.04
2yr,24hr			3.04	Huff3, 24h	2	3.04
5yr,24hr			3.80	Huff3, 24h	2	3.04
10yr,24hr			4.47	Huff3, 24h	2	3.04
25yr,24hr						
50yr,24hr						
100yr,24hr						

STORM ANALYSIS:

1yr, 24hr	2.51	Huff3, 24h2
2yr, 24hr	3.04	Huff3, 24h2
5yr, 24hr	3.80	Huff3, 24h2
10yr, 24hr	4.47	Huff3, 24h2
25yr, 24hr	5.51	Huff3, 24h2
50yr, 24hr	6.46	Huff3, 24h2
100yr, 24hr	7.58	Huff3, 24h2

Storm ID

Rainfall
(in.)

Rainfall
Distribution

A table for the proposed detention pond is provided.

Structure Rating Current File - G:\IAFSM\2016 Conference\Presentation...

Structure Rating:

Structure Identifier: Proposed P Delete Structure

Structure Starting Elevation: 692.10 ft

Repeat the following for each structure rating point for the Structure Identifier

Structure Elevation: ft

Structure Discharge: cfs

Structure Storage: ac ft

Elevation	Discharge	Storage
692.10	0.	0.
693.0	1.68	0.97
694.0	2.90	2.24
694.6	3.43	3.09

Click row in grid to edit previously entered
RIGHT click to delete row.

(Close) (Close)

Notes:

1. Take note of the order (Stage/Discharge/Storage)
2. Compare the 100-yr elevation in the output table to the pond elevations.

STRUCTURE RATING:

Proposed P692.10

692.10	0.	0.
693.0	1.68	0.97
694.0	2.90	2.24
694.6	3.43	3.09

Elevation
(ft)

Discharge
(cfs)

Storage
(ac-ft)

Review the rainfall distribution used by the model.

Rainfall Distribution Current File - G:\IAFSM\2016 Conference\Presentation\Mod...

Rainfall Distribution:

Rain Table Identifier:

Rain Table Time Increment: hr

Click cell in grid to edit previously entered data. RIGHT click to insert or delete a value.

Mass Rainfall Points
@ Rain Table Time Increment

0.	0.03	0.06	0.09	0.12
0.15	0.19	0.23	0.27	0.32
0.38	0.45	0.57	0.70	0.79
0.85	0.89	0.92	0.95	0.97
1.00	1.00	1.00	1.00	1.00

RAINFALL DISTRIBUTION:

Huff3, 24h

1.20

0.	0.03	0.06	0.09	0.12
0.15	0.19	0.23	0.27	0.32
0.38	0.45	0.57	0.70	0.79
0.85	0.89	0.92	0.95	0.97
1.00	1.00	1.00	1.00	1.00

Check the output parameters.

Global Output Current File - G:\IAFSM\2016 Conference\Presentation\Model\I...

Global Output:

Hydrograph Print Precision:

Minimum Hydrograph Display Flow: cfs

Print Time Increment: hr

	Sub-Area	Reach
Default Peak Output Code:	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
Default Hydrograph Output Code:	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> Yes <input type="radio"/> No
Default Hydrograph File Code:	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input type="radio"/> Yes <input checked="" type="radio"/> No

GLOBAL OUTPUT:
3 0.001 0.1 YY N YY N

Set to 2 or 3 for maximum accuracy

Larger values (>0.1) may cut off beginning and ending tails of hydrograph for a lower discharge

A summary of the output is provided on the last page.

Example watershed Proposed Model						
Area or Reach Identifier	Drainage Area (sq mi)	----- Peak Flow by Storm -----				
		1yr, 24hr (cfs)	2yr, 24hr (cfs)	5yr, 24hr (cfs)	10yr, 24hr (cfs)	25yr, 24hr (cfs)
001	0.019	2.10	2.81	3.85	4.77	6.20
Storm Syst	0.019	2.10	2.81	3.85	4.77	6.20
DOWNSTREAM		0.88	1.21	1.69	1.97	2.44
OUTLET	0.019	0.88	1.21	1.69	1.97	2.44
Area or Reach Identifier	Drainage Area (sq mi)	----- Peak Flow by Storm -----				
		50yr, 24hr (cfs)	100yr, 24hr (cfs)	(cfs)	(cfs)	(cfs)
001	0.019	7.51	9.04			
Storm Syst	0.019	7.51	9.04			
DOWNSTREAM		2.88	3.25			
OUTLET	0.019	2.88	3.25			

Discharge from
100-yr Storm

Within the output, look for the storm event of interest.

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	STORM 100yr, 24hr			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
001	0.019		5.648		15.60	9.04	484.79
Line							
Start Time (hr)	Flow values @ time increment of 0.100 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
2.400	0.0	0.05	0.14	0.18	0.22	0.26	0.29

Storm event of
interest

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Storm Syst	0.019	Downstream	5.584	694.39	18.23	3.25	174.10

Elevation of
100-yr storm

Discharge of
100-yr storm

Parameter Selection for Desired Change in WinTR-20 Runoff Volume.


WinTR-20 Parameter to be Changed, Independent of Others	Desired Change in Runoff Volume (%)							
	-50%	-25%	-10%	-5%	+5%	+10%	+25%	+50%
Required Change in Drainage Area	-50%	-25%	-10%	-5%	+5%	+10%	+25%	+50%
Required Change in Rainfall	-26%	-13%	-5%	-2.5%	+2.5%	+5%	+12.5%	+23%
Required Change in CN	-17%	-8%	-2%	-1%	+1%	+2%	+7%	+13%
Required Change in Tc	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C

N/C signifies, No Change possible to alter volume. This parameter does not effect volume prediction.

Source: NRCS

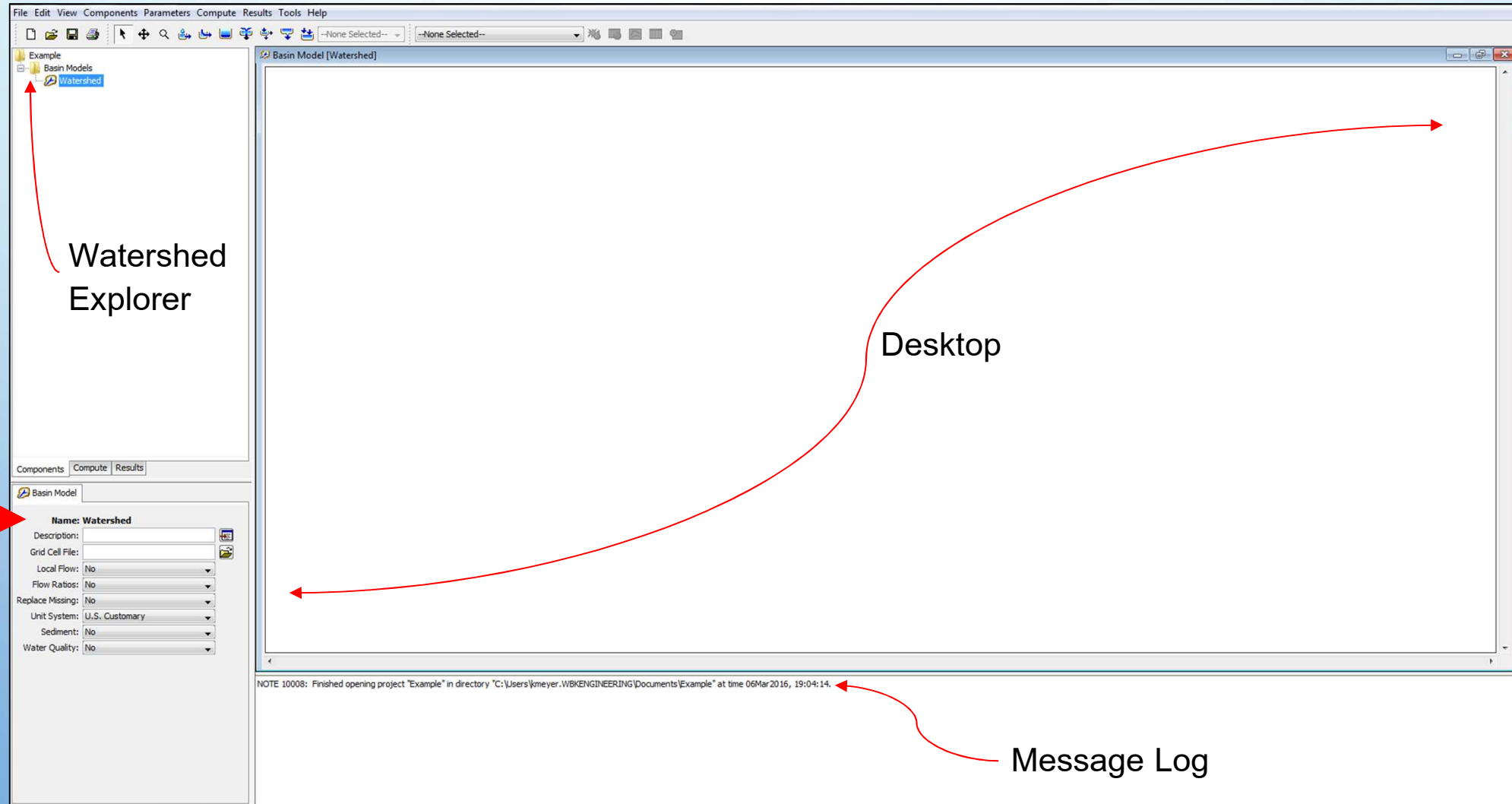
Parameter Selection for Desired Change in WinTR-20 Peak Runoff.

WinTR-20 Parameter to be Changed, Independent of Others	Desired Change in Runoff Peak (%)							
	-50%	-25%	-10%	-5%	+5%	+10%	+25%	+50%
Required Change in Drainage Area	-50%	-25%	-10%	-5%	+5%	+10%	+25%	+50%
Required Change in Rainfall	-24%	-12%	-5%	-2.50%	+2.5%	+5%	+11%	+21%
Required Change in CN	-13.5%	-6%	-2%	-1%	+1%	+2%	+5.5%	+11%
Required Change in Tc	+150%	+50%	+15%	+7%	-6%	-12%	26.5%	-44%

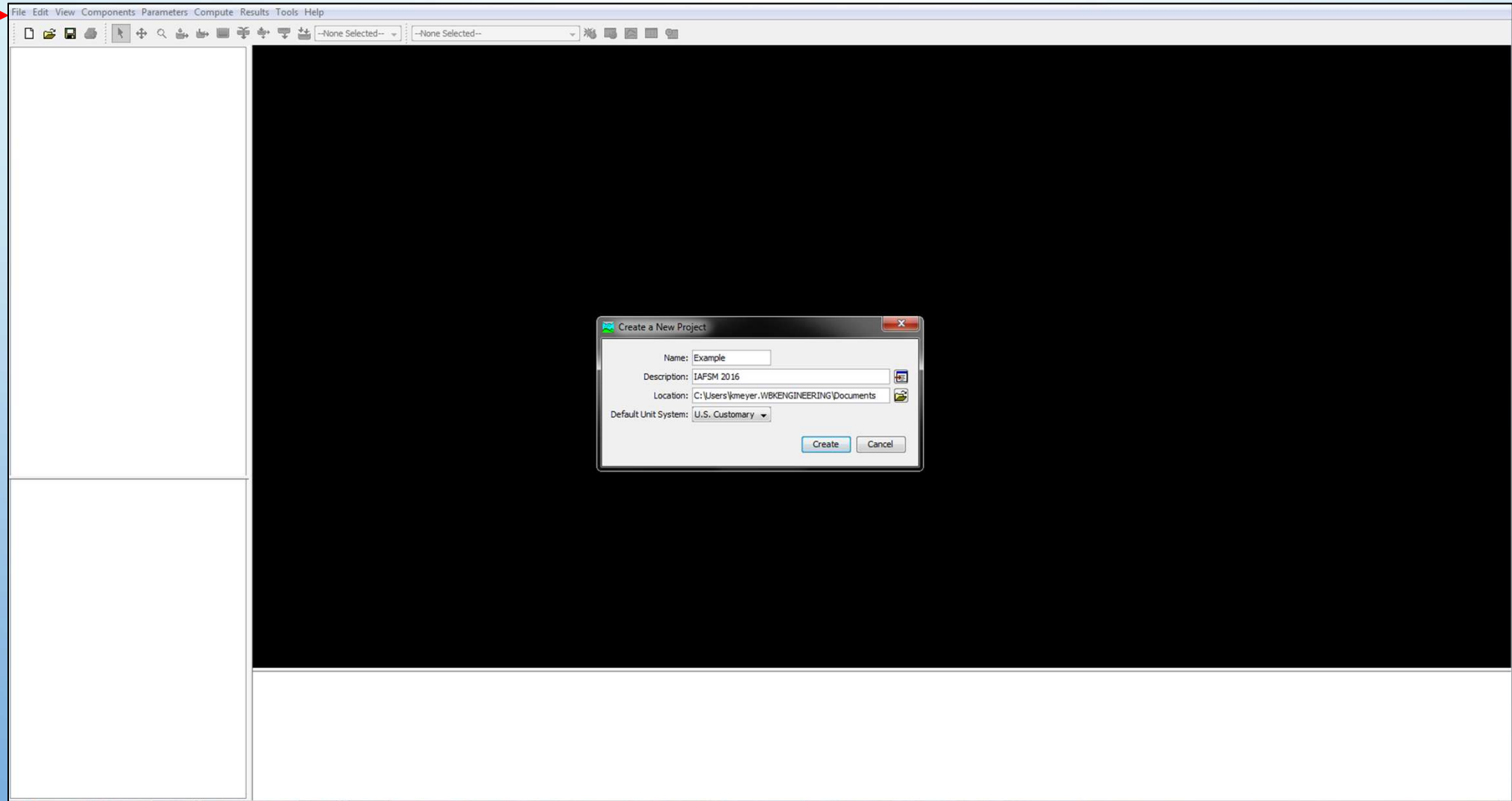
The background is a light blue gradient with a bright, circular light source at the top center, creating a lens flare effect. Several realistic water droplets of various sizes are scattered around the edges, particularly in the top-left, top-right, and bottom-right corners. The text "HEC-HMS" is centered in the middle of the image.

HEC-HMS

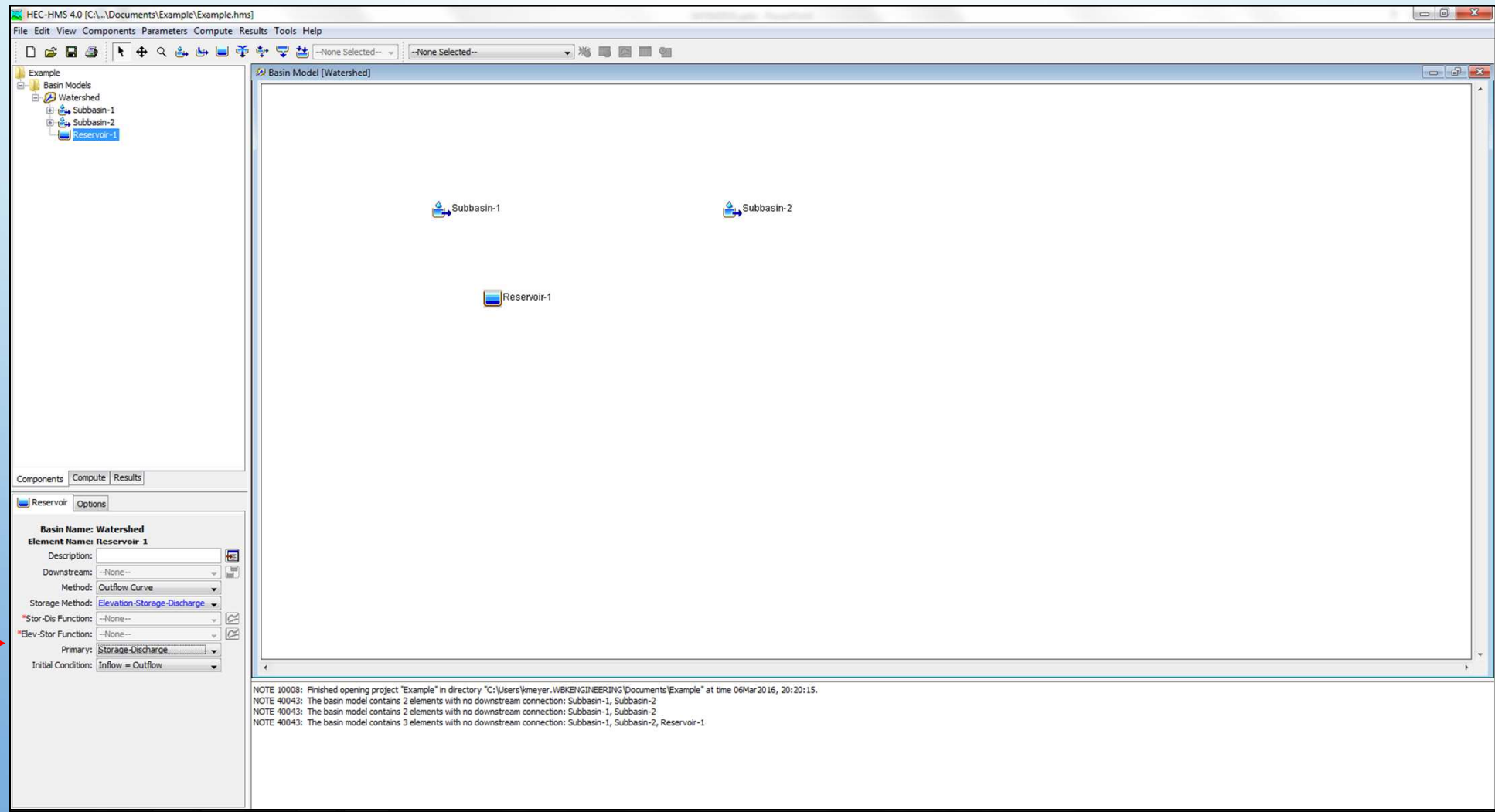
Program Screen



Starting a New Project & Toolbars



Basin Model Manager: Input Subbasin, Reservoirs, Reach, Diversion, Junction



Reservoirs: Paired Data

HEC-HMS 4.0 [C:\...\Documents\Example\Example.hms]

File Edit View Components Parameters Compute Results Tools Help

Example

- Basin Models
- Watershed
- Paired Data
- Storage-Discharge Functions
- Reservoir 1
- Elevation-Storage Functions
- Reservoir 1

Basin Model [Watershed]

Subbasin-1

Subbasin-2

Reservoir-1

Paired Data Manager

Data Type: Storage-Discharge Functions

Current pair: Storage-Discharge Functions

- Storage-Discharge Functions
- Elevation-Storage Functions
- Elevation-Area Functions
- Elevation-Discharge Functions
- Inflow-Diversion Functions
- Diameter-Percentage Functions
- Cross Sections
- Unit Hydrograph Curves

New...

Copy...

Rename...

Delete

Description...

Components Compute Results

Paired Data Table Graph

Elevation (FT)	Storage (AC-FT)
906.5	0
908	2.7
910	19.2
912	60.8
914	131.3
916	254.4

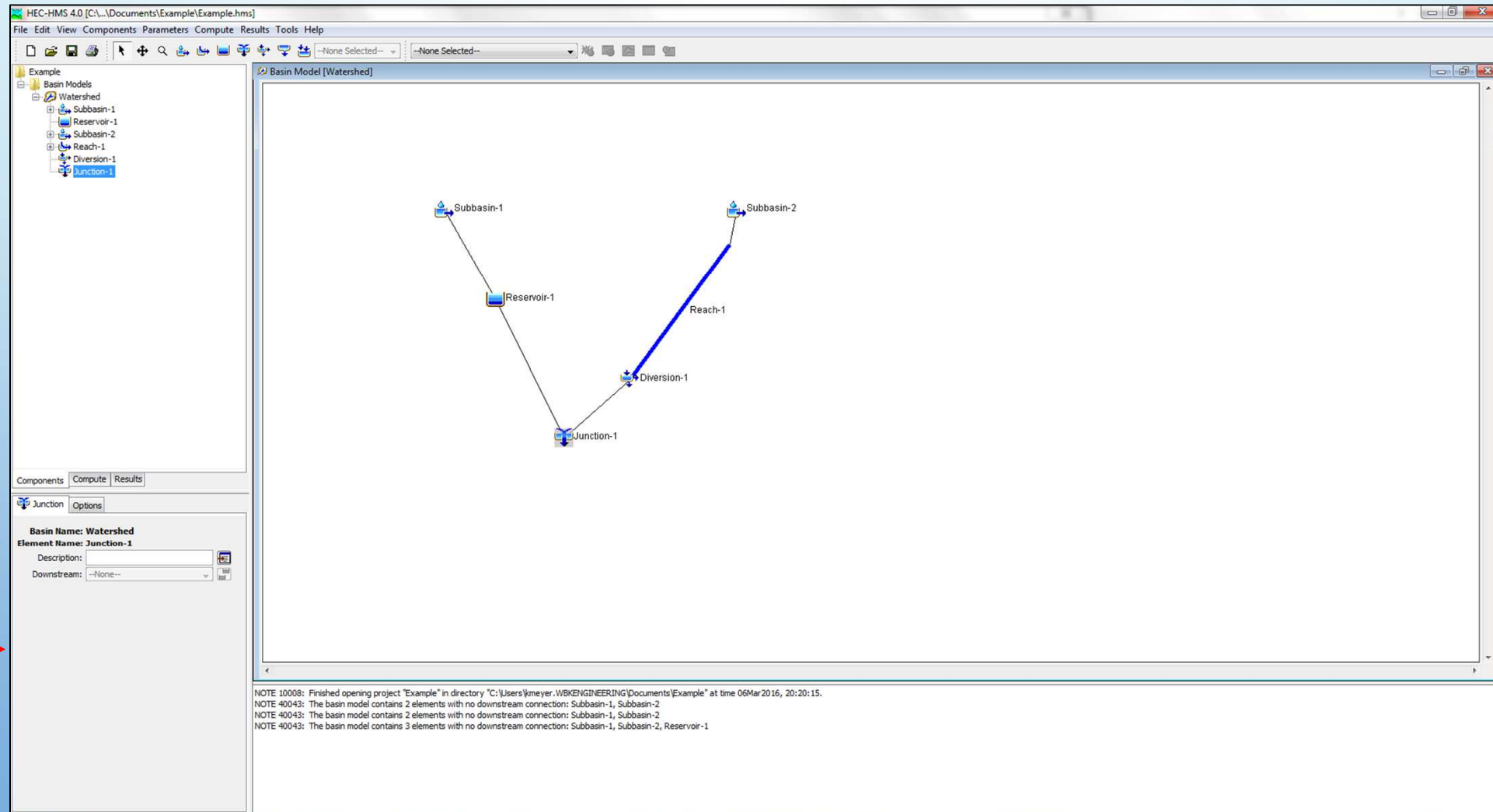
NOTE 10008: Finished opening project "Example" in directory "C:\Users\jmeier\WORKENGINEERING\Documents\Example" at time 06Mar2016, 20:20:15.

NOTE 40043: The basin model contains 2 elements with no downstream connection: Subbasin-1, Subbasin-2

NOTE 40043: The basin model contains 2 elements with no downstream connection: Subbasin-1, Subbasin-2

NOTE 40043: The basin model contains 3 elements with no downstream connection: Subbasin-1, Subbasin-2, Reservoir-1

Basin Model Manager: Input Subbasin, Reservoirs, Reach, Diversion, Junction



Completed Basin Model Manger

The screenshot displays the Basin Model Manager software interface. The main window is titled "Basin Model [Franklinville Creek - AMC II]". The left sidebar shows a project tree with the following structure:

- Franklinville
 - Basin Models
 - Franklinville Creek - AMC I
 - Franklinville Creek - AMC II (selected)
 - North
 - South St.
 - Junction-1
 - Reach-2
 - Central
 - Southeast
 - Dean St.
 - Reach-3
 - Junction-2
 - Reach-1
 - Junction-3
 - Southwest
 - Junction-4
 - Franklinville Creek - AMCIII
- Meteorologic Models
- Control Specifications
- Time-Series Data
- Paired Data

The main map area shows a map of the Franklinville Creek basin with various components labeled: North, South St., Junction-1, Reach-2, Junction-2, Reach-3, Junction-3, Reach-1, Junction-4, Southwest, Central, Dean St., and Southeast. The map is overlaid with a grid and shows the flow paths of the basin model.

Below the map, there is a "Basin Model" section with the following details:

- Name: Franklinville Creek - AMC II
- Description:
- Grid Cell File:
- Local Flow: No
- Flow Ratios: No
- Replace Missing: No
- Unit System: U.S. Customary
- Sediment: No
- Water Quality: No

At the bottom of the interface, there are two notes:

- NOTE 10008: Finished opening project "Franklinville" in directory "W:\Projects\2010\100002 FranklinvillePH\Office\Reports\Hydrologic\HECHMS\Franklinville" at time 04Jun2012, 10:50:31.
- NOTE 10179: Opened basin model "Franklinville Creek - AMC II" at time 04Jun2012, 10:50:36.

Meteorological Model

The screenshot displays the HEC-HMS 4.0 interface. The main window shows the 'Basin Model Manager' with a tree view of components. A red arrow points to the 'Meteorologic Model Manager' tab. Below it, three subbasin configuration windows are shown, each with a 'Meteorologic Models' list and a 'Components' tab. Red arrows highlight the selection of 'HUFF 100YR 24HR' in the list and the 'Specified Hyetograph' option in the 'Components' tab.

Subbasin-1 Configuration:

- Met Name: HUFF 100YR24HR
- Description: [Empty]
- Precipitation: Specified Hyetograph
- Evapotranspiration: --None--
- Snowmelt: --None--
- Unit System: U.S. Customary

Subbasin-2 Configuration:

- Met Name: HUFF 100YR24HR
- Description: [Empty]
- Precipitation: Specified Hyetograph
- Evapotranspiration: --None--
- Snowmelt: Frequency Storm
- Unit System: Specified Hyetograph

Subbasin-3 Configuration:

- Met Name: HUFF 100YR24HR
- Description: [Empty]
- Precipitation: Specified Hyetograph
- Evapotranspiration: --None--
- Snowmelt: Frequency Storm
- Unit System: Specified Hyetograph

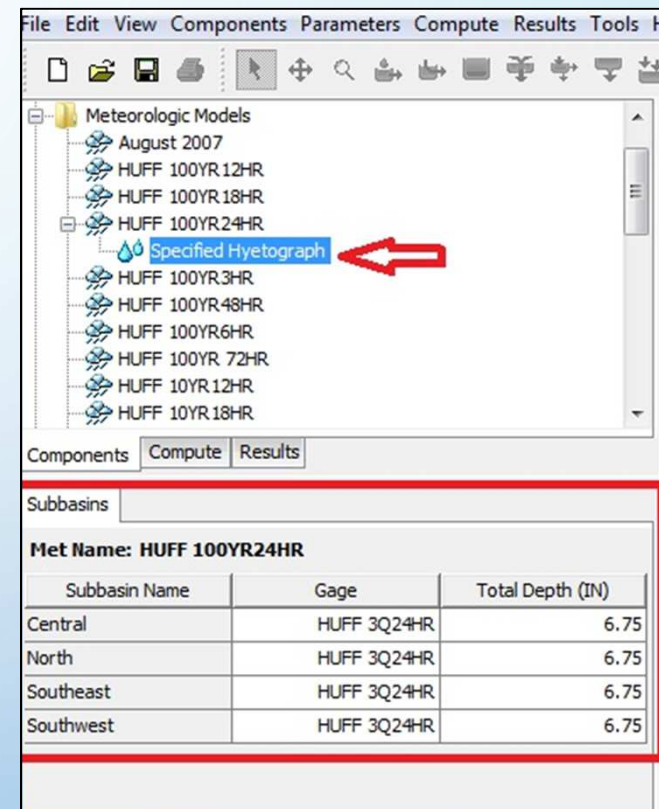
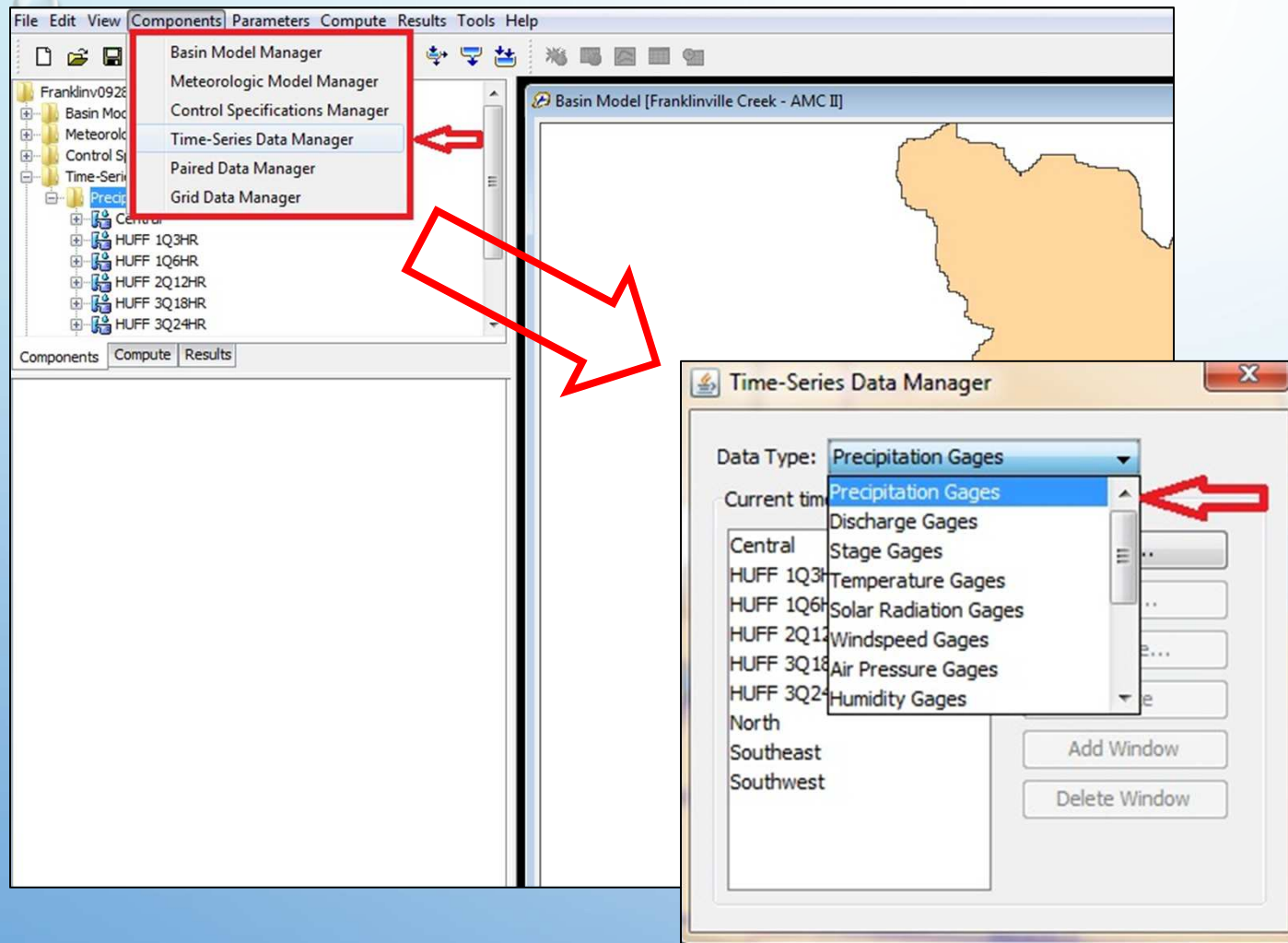
Basin Model Options:

Basin Model	Include Subbasins
Franklinville Creek - AMC I	No
Franklinville Creek - AMC II	Yes
Franklinville Creek - AMCI	No

Log Window:

NOTE 10008: Finished opening project "Example" in directory "C:\Users\kmeyer\WORKENGINEERING\Documents\Example" at time 07Mar2016, 19:37:35.
NOTE 10179: Opened basin model "Watershed" at time 07Mar2016, 19:38:00.
WARNING 41563: Could not load storage-discharge table for reservoir "Reservoir-1".

Rainfall Data



Rainfall Data

File Edit View Components Parameters Compute Results Tools Help

Franklinv092811submit

- Basin Models
- Meteorologic Models
- Control Specifications
- Time-Series Data
 - Precipitation Gages
 - Central
 - HUFF 1Q3HR
 - HUFF 1Q6HR
 - HUFF 2Q12HR
 - HUFF 3Q18HR

Components Compute Results

Time-Series Gage Time Window Table Graph

Name: HUFF 2Q12HR

Description:

Data Source: Manual Entry

Units: Incremental Inches

Time Interval: 1 Hour

Latitude Degrees:

File Edit View Components Parameters Compute Results Tools H

Franklinv092811submit

- Basin Models
- Meteorologic Models
- Control Specifications
- Time-Series Data
 - Precipitation Gages
 - Central
 - HUFF 1Q3HR
 - HUFF 1Q6HR
 - HUFF 2Q12HR
 - HUFF 3Q18HR

Components Compute Results

Time-Series Gage Time Window Table Graph

Name: HUFF 2Q12HR

*Start Date (ddMMYYYY) 01Jan2000

*Start Time (HH:mm) 00:00

*End Date (ddMMYYYY) 03Jan2000

*End Time (HH:mm) 00:00

File Edit View Components Parameters Compute Results Tools H

Franklinv092811submit

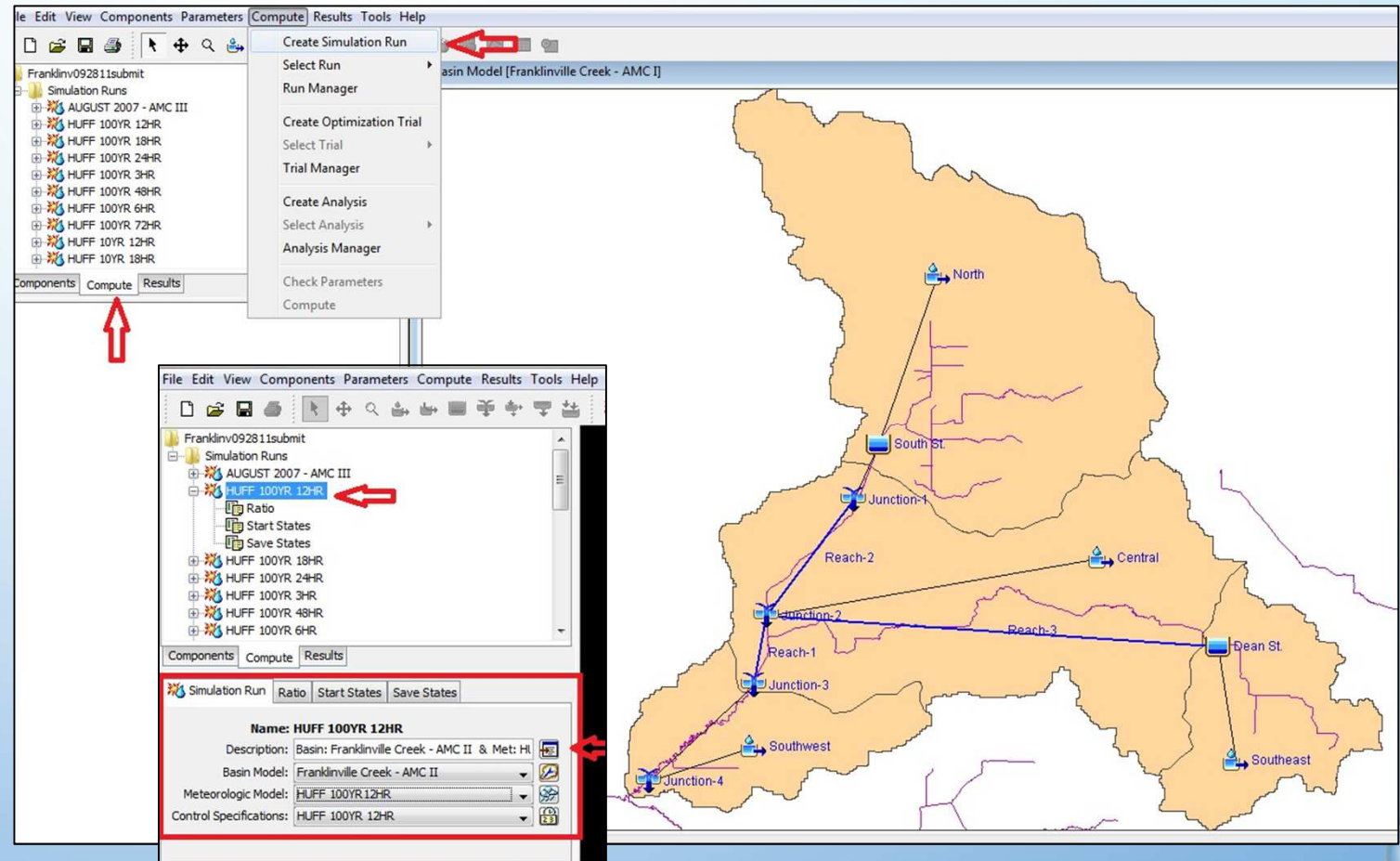
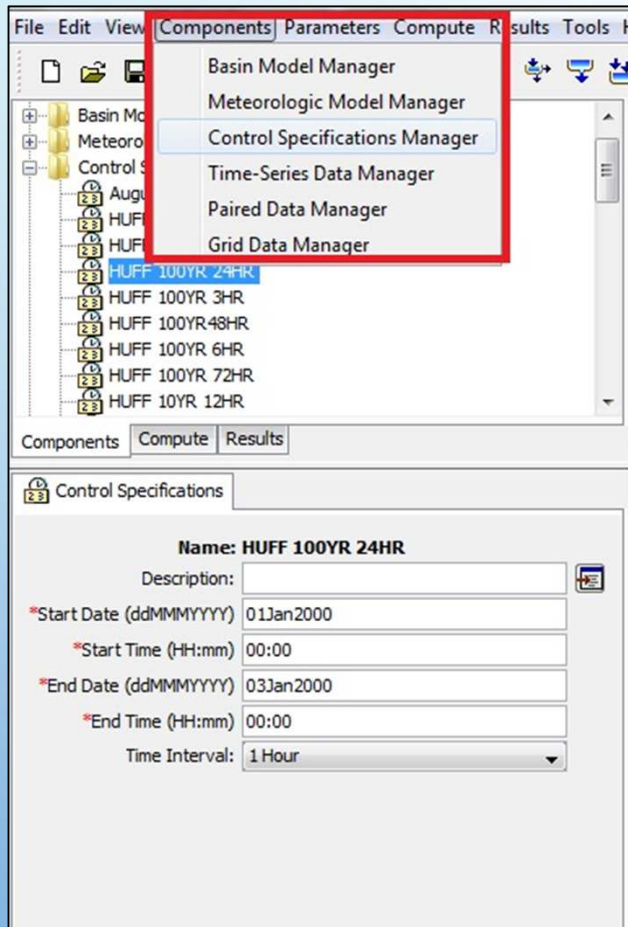
- Basin Models
- Meteorologic Models
- Control Specifications
- Time-Series Data
 - Precipitation Gages
 - Central
 - HUFF 1Q3HR
 - HUFF 1Q6HR
 - HUFF 2Q12HR
 - HUFF 3Q18HR

Components Compute Results

Time-Series Gage Time Window Table Graph

Time (ddMMYYYY, HH:mm)	Precipitation (IN)
01Jan2000, 00:00	
01Jan2000, 01:00	0.050
01Jan2000, 02:00	0.054
01Jan2000, 03:00	0.106
01Jan2000, 04:00	0.173
01Jan2000, 05:00	0.201
01Jan2000, 06:00	0.146
01Jan2000, 07:00	0.100
01Jan2000, 08:00	0.070
01Jan2000, 09:00	0.050
01Jan2000, 10:00	0.016
01Jan2000, 11:00	0.017
01Jan2000, 12:00	0.017
01Jan2000, 13:00	0.000
01Jan2000, 14:00	0.000
01Jan2000, 15:00	0.000
01Jan2000, 16:00	0.000
01Jan2000, 17:00	0.000
01Jan2000, 18:00	0.000
01Jan2000, 19:00	0.000
01Jan2000, 20:00	0.000
01Jan2000, 21:00	0.000
01Jan2000, 22:00	0.000
01Jan2000, 23:00	0.000
02Jan2000, 00:00	0.000
02Jan2000, 01:00	0.000

Control Specification & Simulation Run



Reading The Output

The screenshot displays a software interface for hydrologic modeling. The main window is titled "Global Summary Results for Run 'HUFF 100YR 18HR'". It shows project details, run parameters, and a table of hydrologic element results. A map at the bottom right shows the spatial distribution of the elements.

Project: Franklinv092811submit **Simulation Run:** HUFF 100YR 18HR

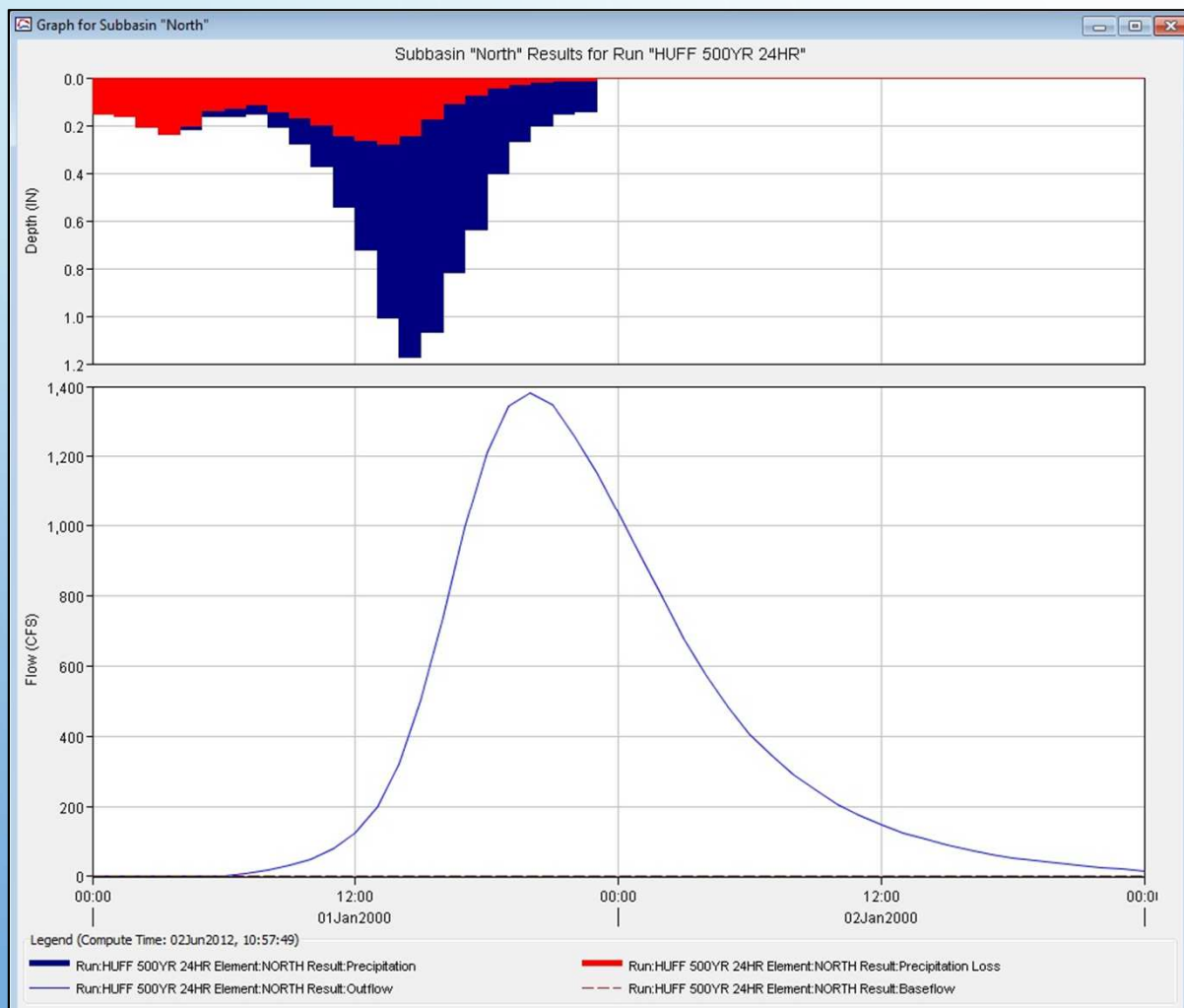
Start of Run: 01Jan2000, 00:00 **Basin Model:** Franklinville Creek - AMC II
End of Run: 03Jan2000, 00:00 **Meteorologic Model:** HUFF 100YR 18HR
Compute Time: 02Jun2012, 10:58:12 **Control Specifications:** HUFF 100YR 18HR

Show Elements: All Elements **Volume Units:** ☒ IN ☐ AC-FT **Sorting:** Hydrologic (dropdown menu with options: Hydrologic, Alphabetic)

Hydrologic Element	Drainage Area (MI ²)	Peak Discharge (CFS)	Time of Peak	
North	4.51	857.5	01Jan2000, 16:00	3.38
South St.	4.51	795.0	01Jan2000, 18:00	3.38
Junction-1	4.51	795.0	01Jan2000, 18:00	3.38
Reach-2	4.51	788.5	01Jan2000, 18:00	3.37
Central	4.25	1487.5	01Jan2000, 13:00	3.68
Southeast	1.33	523.9	01Jan2000, 13:00	3.68
Dean St.	1.33	425.1	01Jan2000, 14:00	3.68
Reach-3	1.33	422.5	01Jan2000, 15:00	3.68
Junction-2	10.09	2248.0	01Jan2000, 14:00	3.54
Reach-1	10.09	1985.7	01Jan2000, 16:00	3.54

The map at the bottom right shows the spatial distribution of the elements, with labels for South St. and Junction-1.

Reading The Output



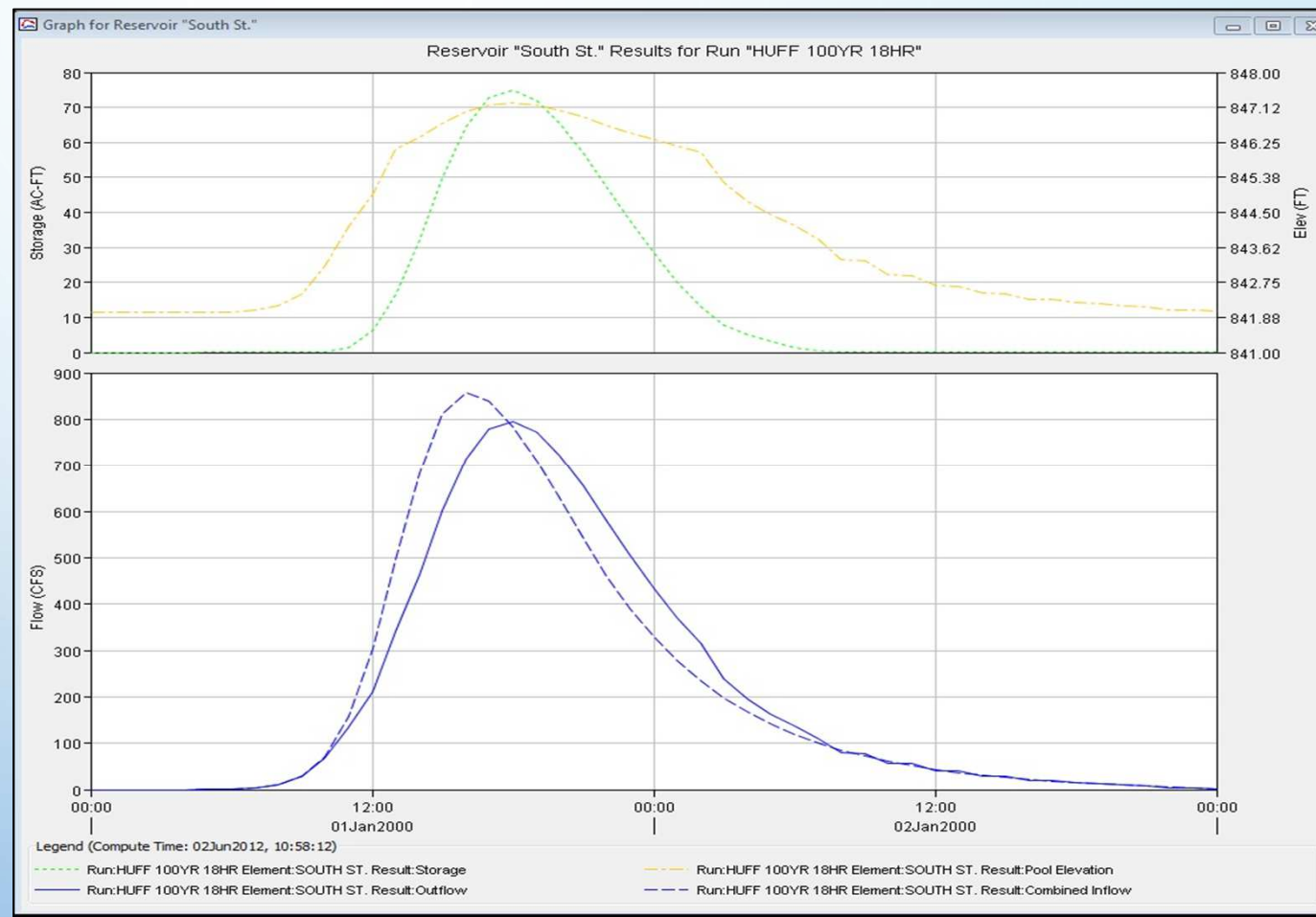
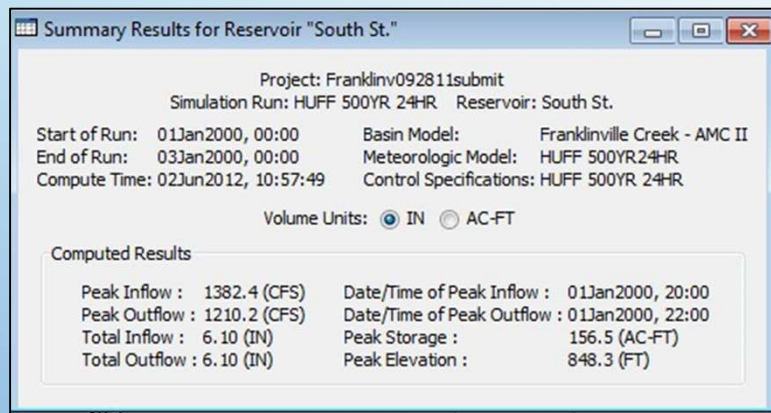
Time-Series Results for Subbasin "North"

Project: Franklinv092811submit
Simulation Run: HUFF 500YR 24HR Subbasin: North

Start of Run: 01Jan2000, 00:00 Basin Model: Franklinville Creek - AMC II
End of Run: 03Jan2000, 00:00 Meteorologic Model: HUFF 500YR24HR
Compute Time: 02Jun2012, 10:57:49 Control Specifications: HUFF 500YR 24HR

Date	Time	Precip (IN)	Loss (IN)	Excess (IN)	Direc... (CFS)	Base... (CFS)	Total... (CFS)
01Jan2000	00:00				0.0	0.0	0.0
01Jan2000	01:00	0.15	0.15	0.00	0.0	0.0	0.0
01Jan2000	02:00	0.16	0.16	0.00	0.0	0.0	0.0
01Jan2000	03:00	0.21	0.21	0.00	0.0	0.0	0.0
01Jan2000	04:00	0.24	0.24	0.00	0.0	0.0	0.0
01Jan2000	05:00	0.22	0.20	0.01	0.6	0.0	0.6
01Jan2000	06:00	0.16	0.14	0.02	3.3	0.0	3.3
01Jan2000	07:00	0.16	0.13	0.04	9.3	0.0	9.3
01Jan2000	08:00	0.15	0.11	0.04	19.0	0.0	19.0
01Jan2000	09:00	0.21	0.14	0.07	32.2	0.0	32.2
01Jan2000	10:00	0.28	0.17	0.11	50.8	0.0	50.8
01Jan2000	11:00	0.37	0.20	0.17	79.0	0.0	79.0
01Jan2000	12:00	0.54	0.24	0.30	124.9	0.0	124.9
01Jan2000	13:00	0.72	0.26	0.46	200.1	0.0	200.1
01Jan2000	14:00	1.01	0.28	0.73	321.0	0.0	321.0
01Jan2000	15:00	1.17	0.24	0.93	502.7	0.0	502.7
01Jan2000	16:00	1.07	0.17	0.90	740.2	0.0	740.2
01Jan2000	17:00	0.82	0.11	0.71	994.8	0.0	994.8
01Jan2000	18:00	0.64	0.07	0.57	1209.9	0.0	1209.9
01Jan2000	19:00	0.40	0.04	0.36	1342.6	0.0	1342.6
01Jan2000	20:00	0.27	0.03	0.24	1382.4	0.0	1382.4
01Jan2000	21:00	0.20	0.02	0.18	1345.8	0.0	1345.8
01Jan2000	22:00	0.15	0.01	0.14	1260.3	0.0	1260.3
01Jan2000	23:00	0.14	0.01	0.13	1152.9	0.0	1152.9
02Jan2000	00:00	0.00	0.00	0.00	1038.5	0.0	1038.5
02Jan2000	01:00	0.00	0.00	0.00	918.6	0.0	918.6

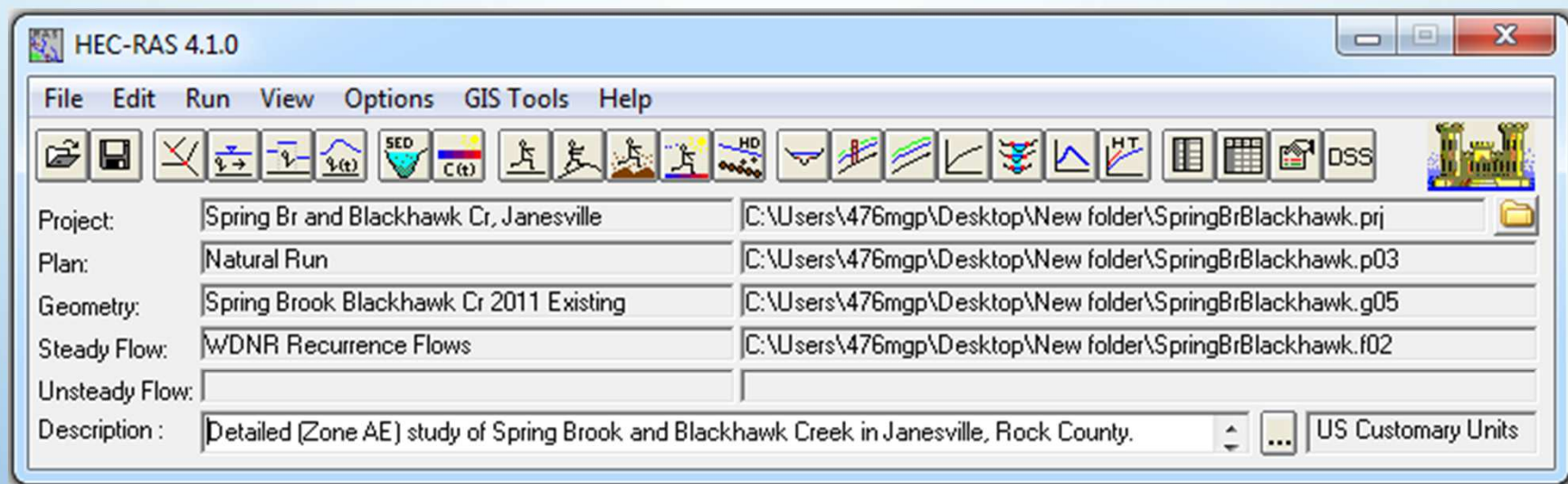
Reading The Output



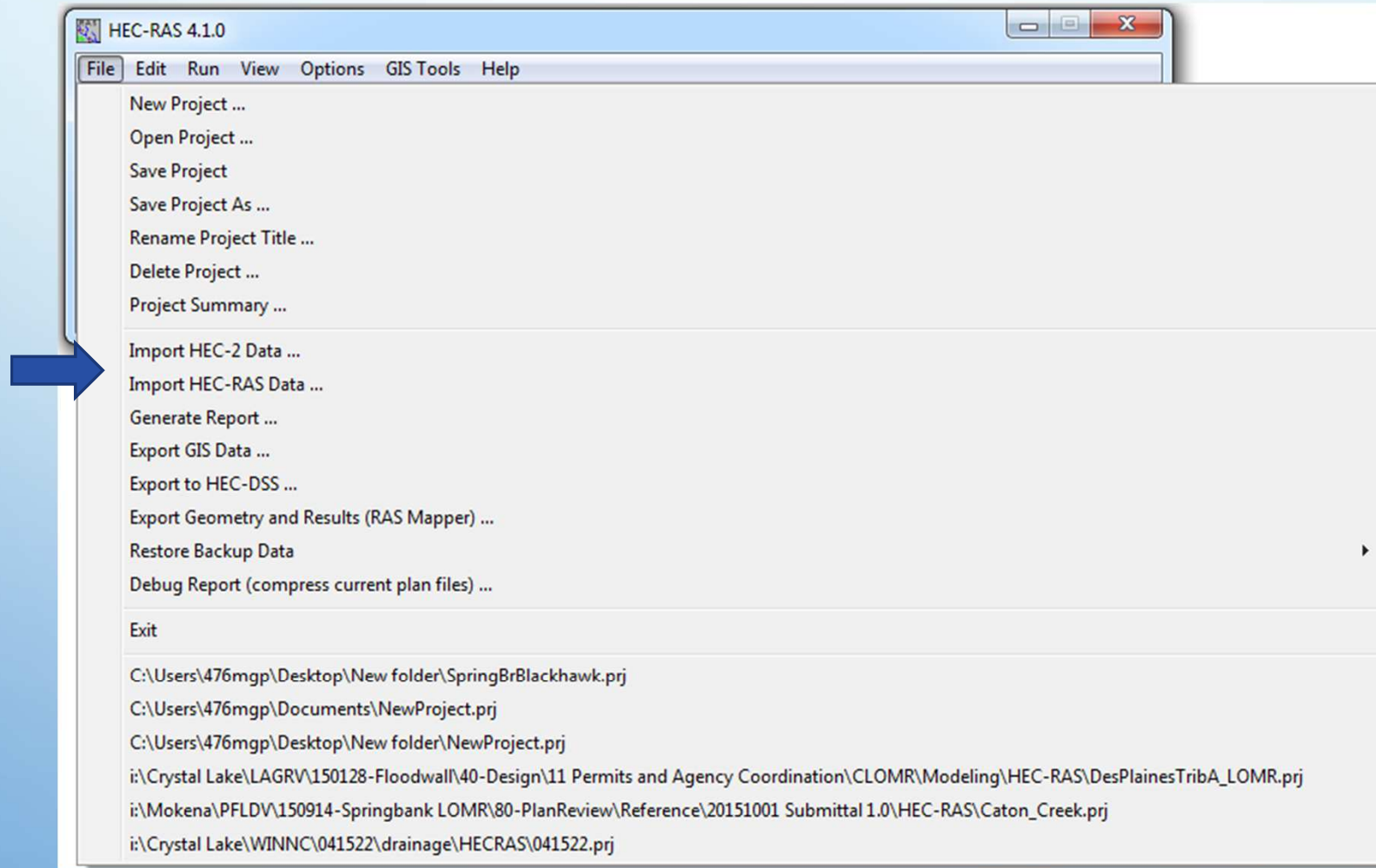
The background is a light blue gradient with a bright, circular light source in the upper center, creating a lens flare effect. Several realistic water droplets of various sizes are scattered around the edges, with some in the top-left, top-right, and bottom-right corners.

HEC-RAS

HEC-RAS

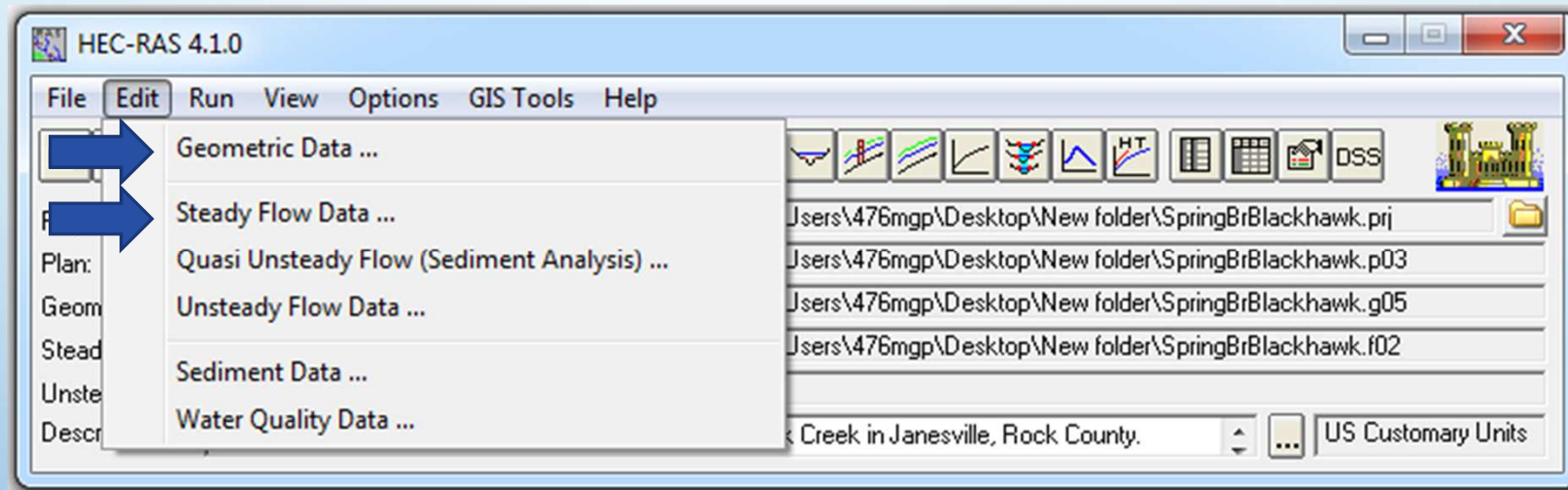


IMPORTING DATA



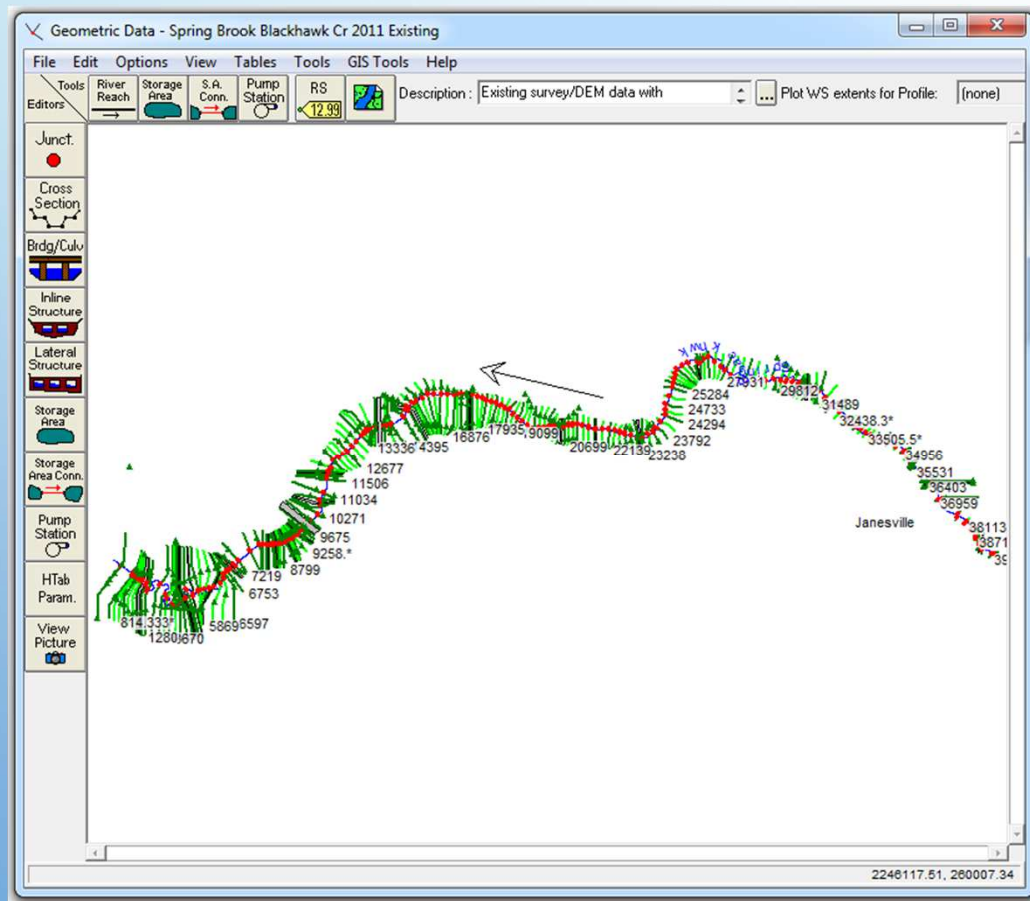
DATA INPUT

GEOMETRIC DATA AND FLOW DATA



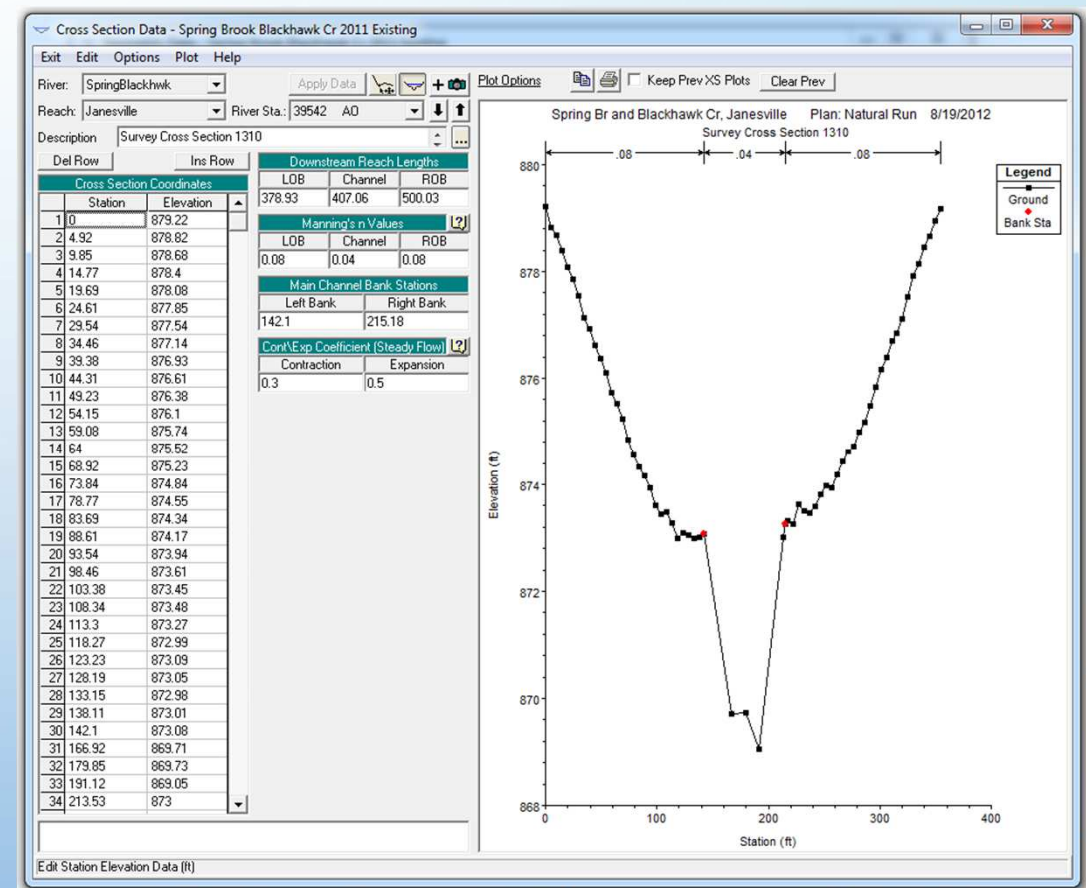
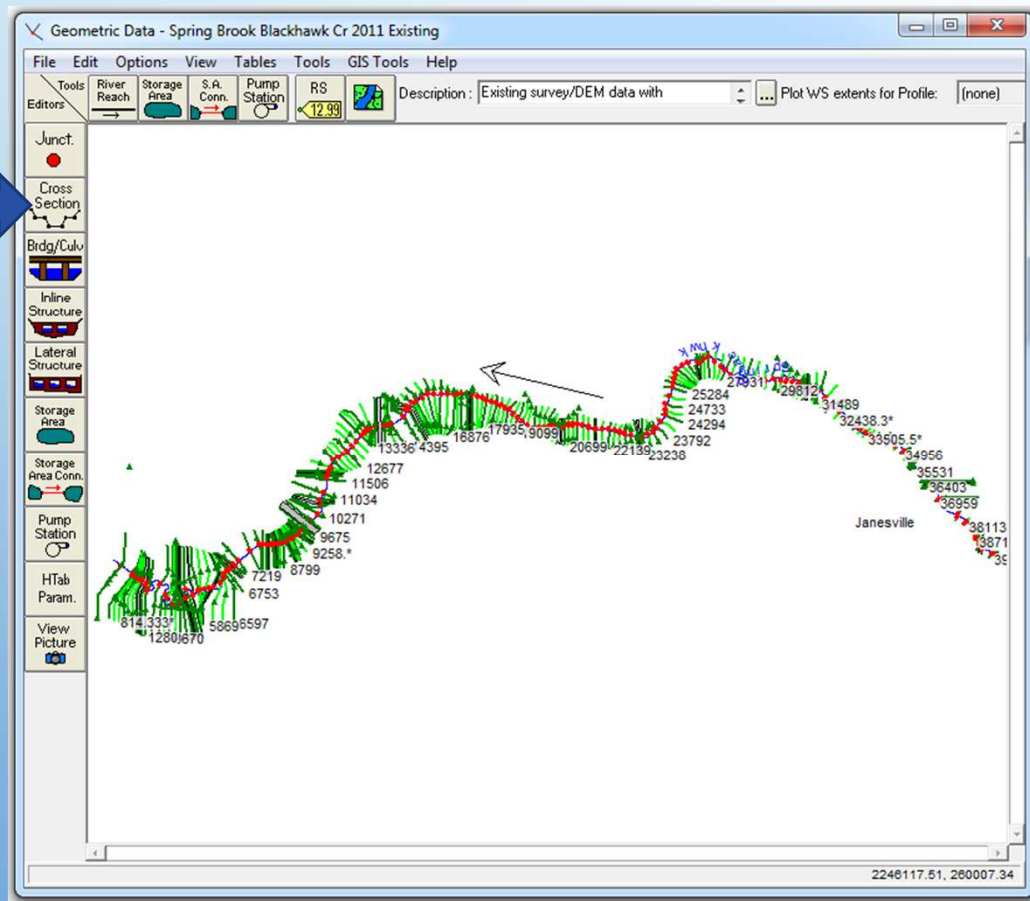
DATA INPUT

GEOMETRIC DATA EDITOR



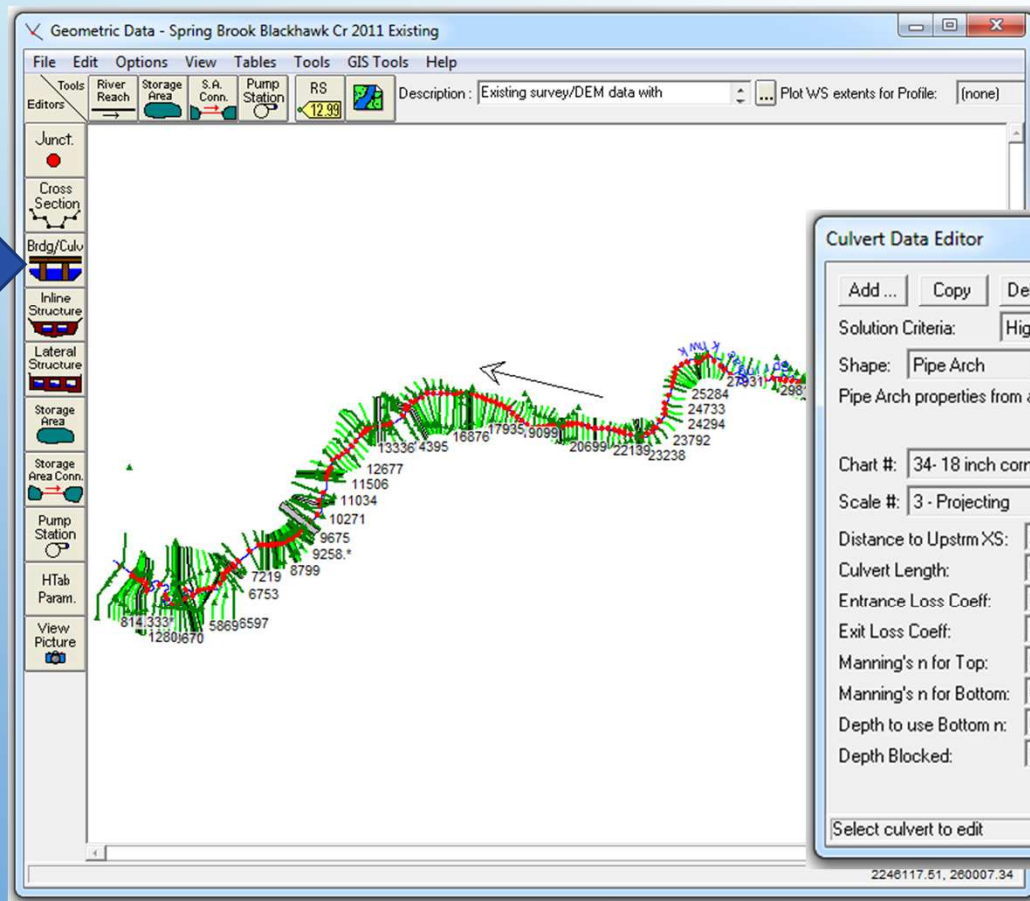
DATA INPUT

GEOMETRIC DATA - CROSS SECTIONS



DATA INPUT

GEOMETRIC DATA - CULVERTS



Culvert Data Editor

Add ... Copy Delete ... Culvert ID: Culvert #1

Solution Criteria: Highest U.S. EG Rename ...

Shape: Pipe Arch Span: 8.17 Rise: 5.75

Pipe Arch properties from a rise of: 5.75 (ft)

Chart #: 34- 18 inch corner radius; Corrugated metal

Scale #: 3 - Projecting

Distance to Upstrm XS: 27.9 Upstream Invert Elev: 860.69

Culvert Length: 59.9 Downstream Invert Elev: 860.44

Entrance Loss Coeff: 0.9 # identical barrels: 2

Exit Loss Coeff: 1

Manning's n for Top: 0.024

Manning's n for Bottom: 0.024

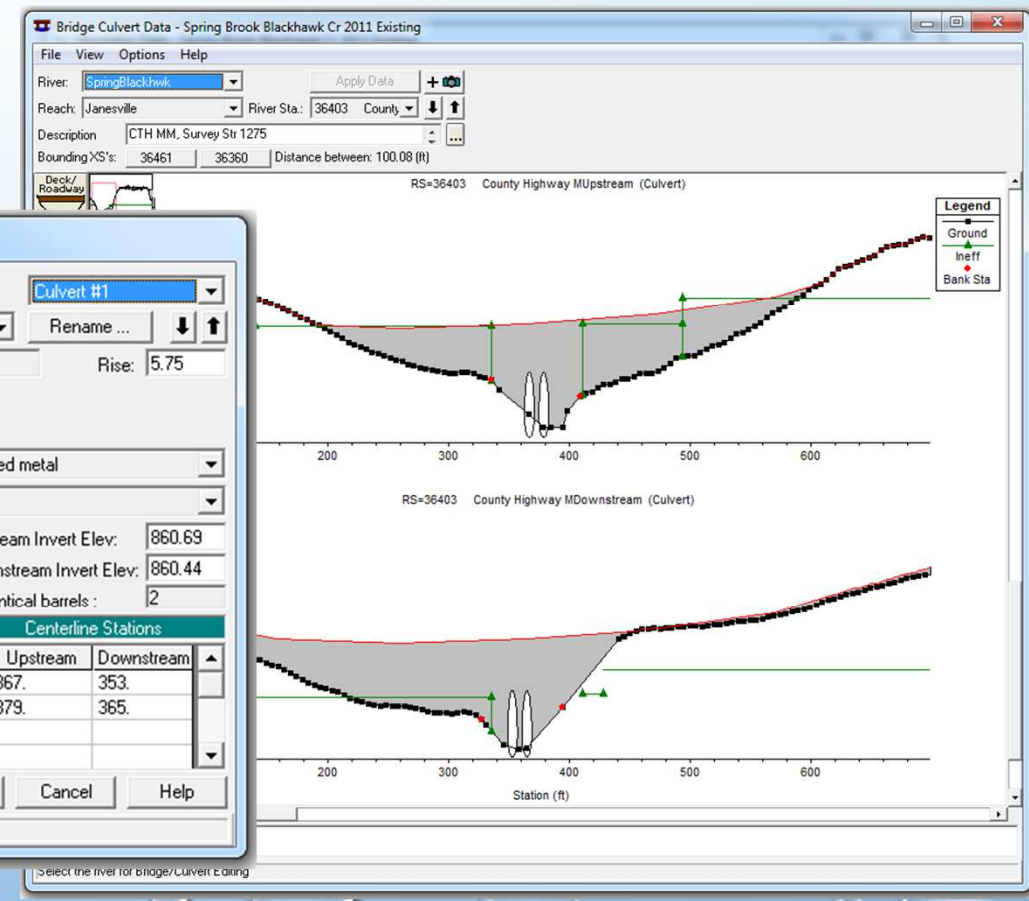
Depth to use Bottom n: 0

Depth Blocked: 0

Centerline Stations		
	Upstream	Downstream
1	367.	353.
2	379.	365.
3		
4		

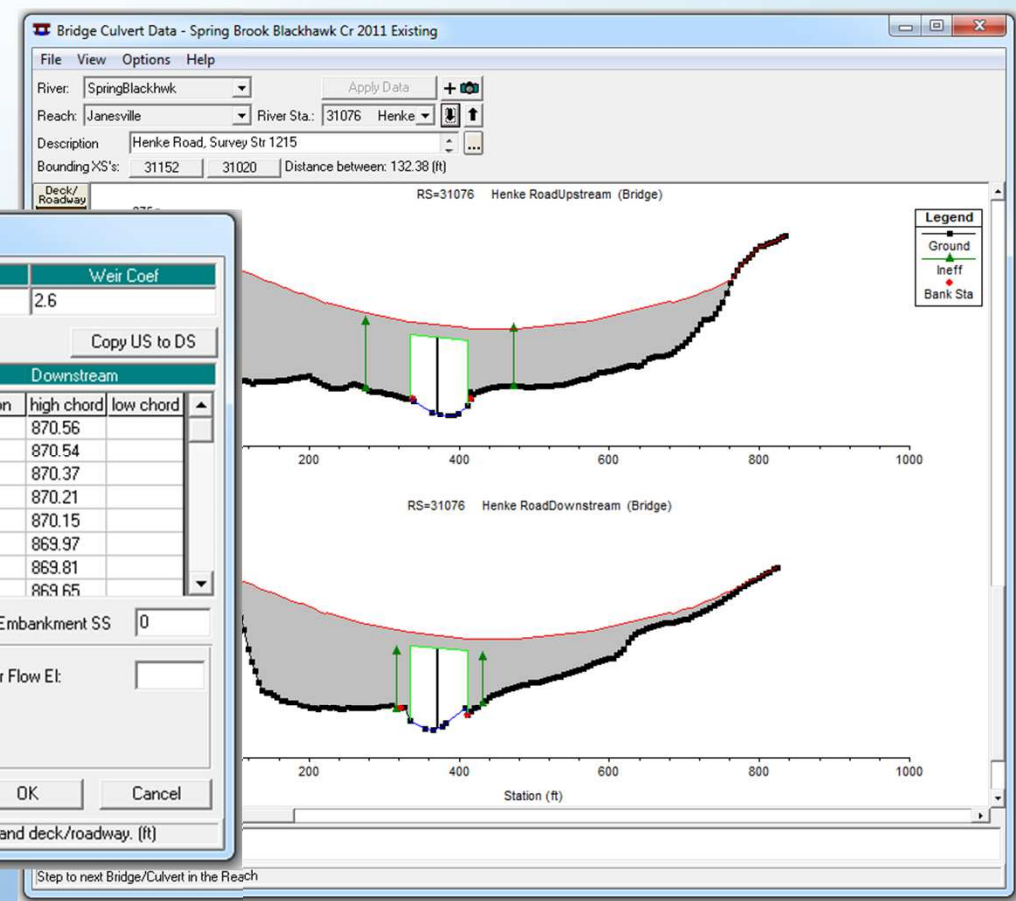
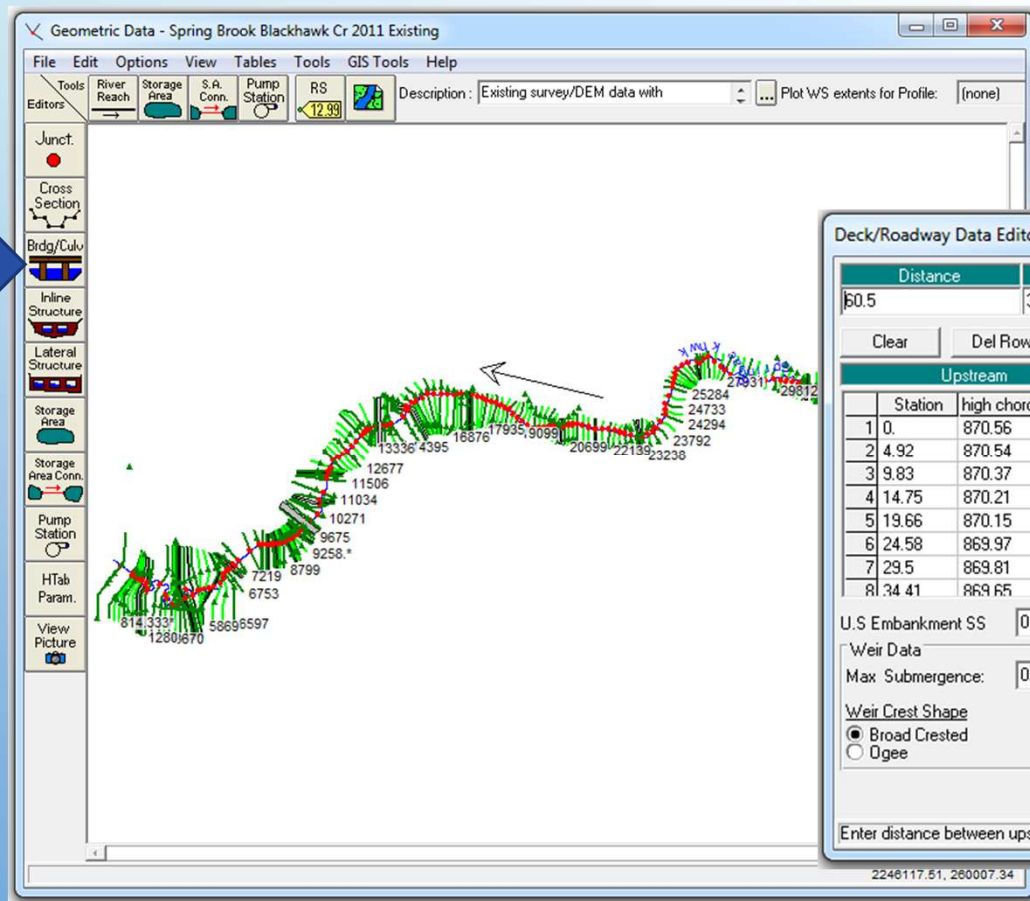
OK Cancel Help

Select culvert to edit



DATA INPUT

GEOMETRIC DATA - BRIDGES



Deck/Roadway Data Editor

Distance	Width	Weir Coef
60.5	32.1	2.6

Clear Del Row Ins Row Copy US to DS

	Station	high chord	low chord	Station	high chord	low chord
1	0.	870.56		0.	870.56	
2	4.92	870.54		4.92	870.54	
3	9.83	870.37		9.83	870.37	
4	14.75	870.21		14.75	870.21	
5	19.66	870.15		19.66	870.15	
6	24.58	869.97		24.58	869.97	
7	29.5	869.81		29.5	869.81	
8	34.41	869.65		34.41	869.65	

U.S Embankment SS 0 D.S Embankment SS 0

Weir Data

Max Submergence: 0.98 Min Weir Flow El:

Weir Crest Shape

☒ Broad Crested

☐ Ogee

OK Cancel

Enter distance between upstream cross section and deck/roadway. (ft)

DATA INPUT

FLOW DATA – STEADY FLOW

Steady Flow Data - WDNR Recurrence Flows

File Options Help

Enter/Edit Number of Profiles (25000 max):

Locations of Flow Data Changes

River:

Reach: River Sta.:

Flow Change Location			Profile Names and Flow Rates					
River	Reach	RS	10 year	25 year	50 year	100 year	500 year	
1	SpringBlackhwk	Janesville	39542	732	1029	1183	1393	1862
2	SpringBlackhwk	Janesville	31489	2050	2923	3372	3978	5340
3	SpringBlackhwk	Janesville	23238	2263	3230	3728	4402	5918
4	SpringBlackhwk	Janesville	16457	2439	3487	4033	4776	6442
5	SpringBlackhwk	Janesville	16037	2772	3989	4627	5481	7391
6	SpringBlackhwk	Janesville	9969	2899	4179	4848	5773	7854
7	SpringBlackhwk	Janesville	5869	3474	5087	5922	7052	9594

Enter to edit the boundary conditions

Steady Flow Boundary Conditions

☒ Set boundary for all profiles ☐ Set boundary for one profile at a time

Available External Boundary Condition Types

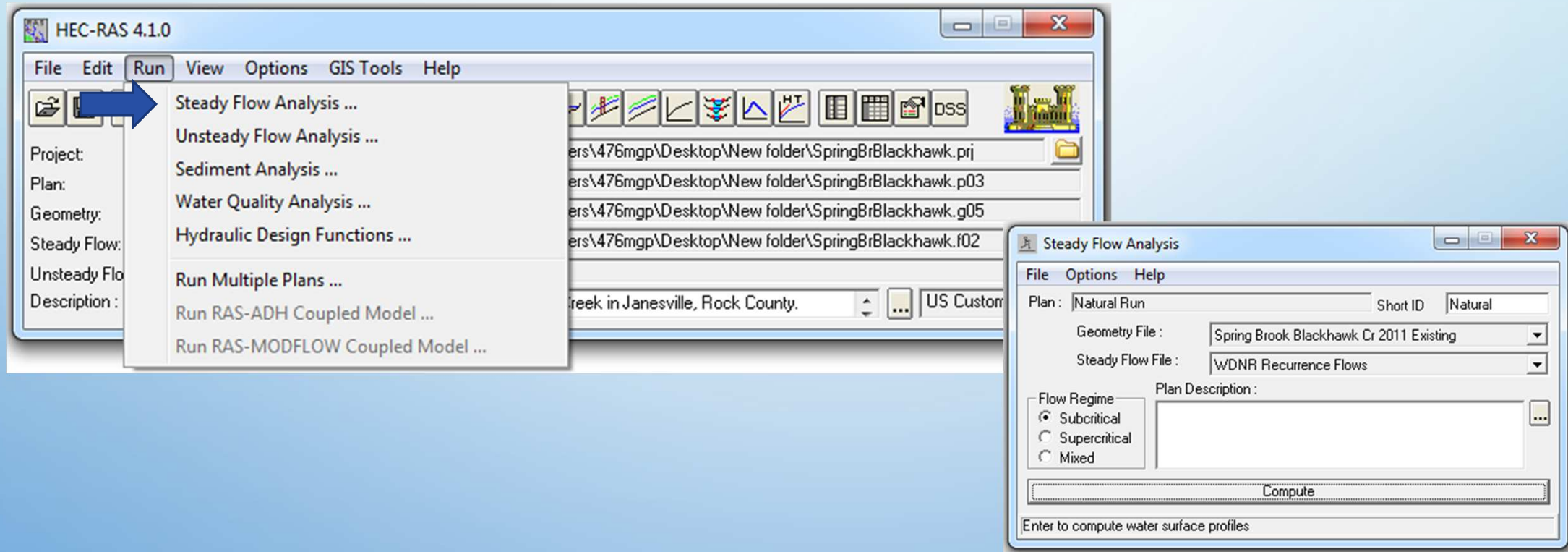
Selected Boundary Condition Locations and Types

River	Reach	Profile	Upstream	Downstream
SpringBlackhwk	Janesville	all		Known WS

Steady Flow Reach-Storage Area Optimization ...

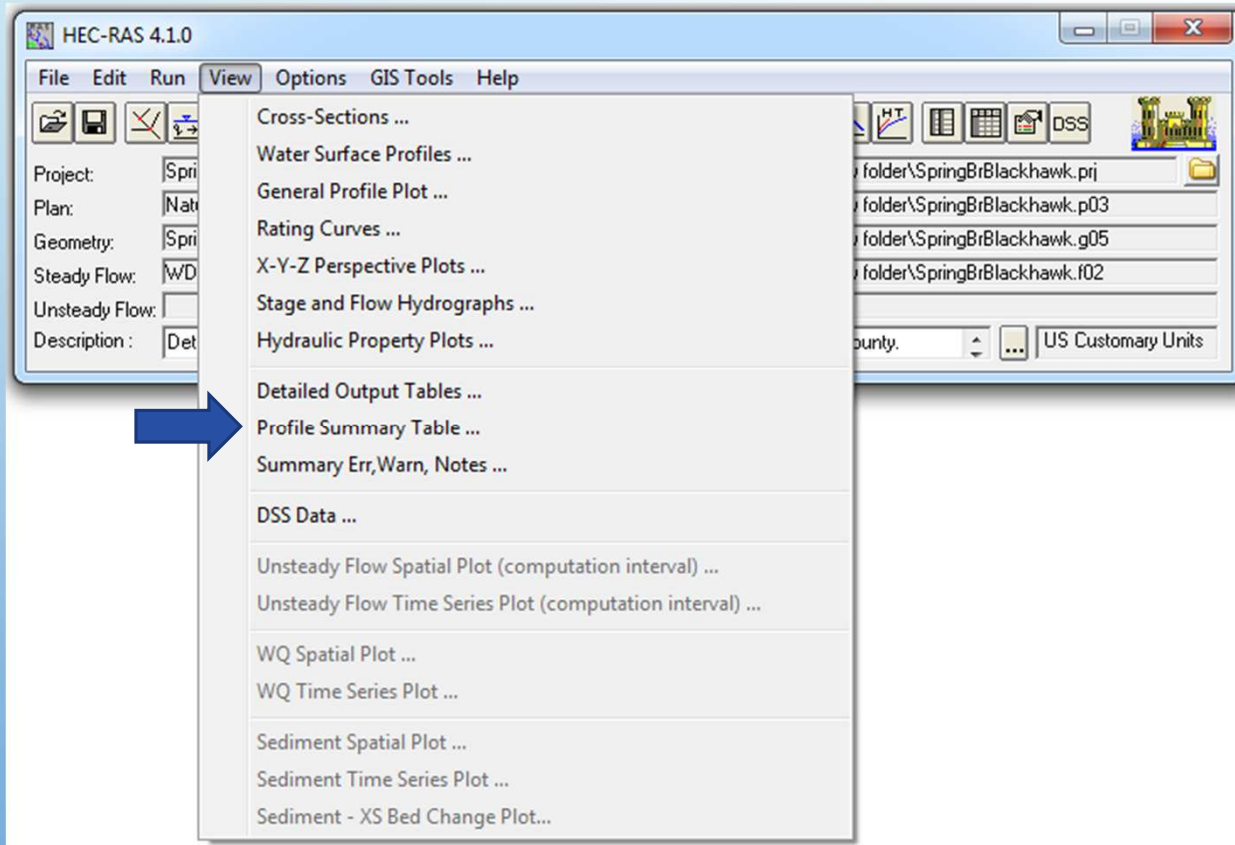
Enter to accept data changes.

RUNNING THE MODEL PLAN



REVIEWING OUTPUT DATA

PROFILE SUMMARY TABLE



Profile Output Table - Standard Table 1

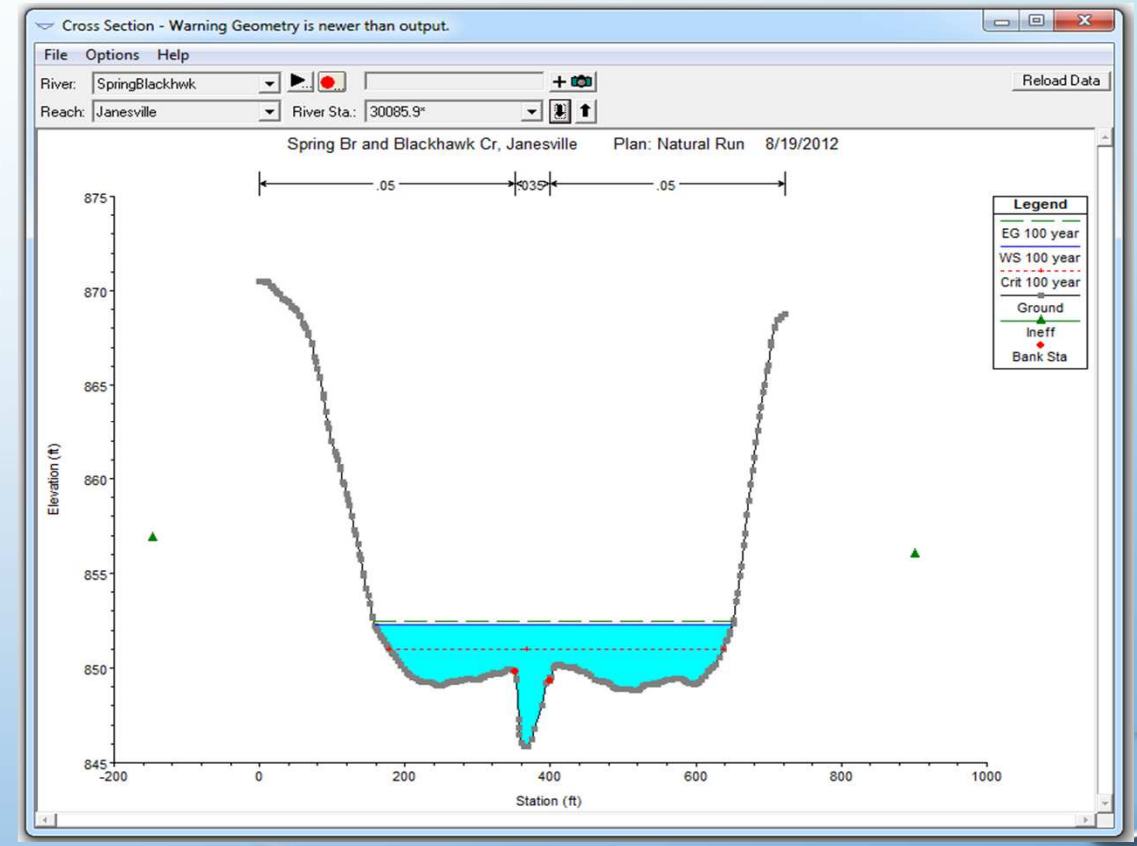
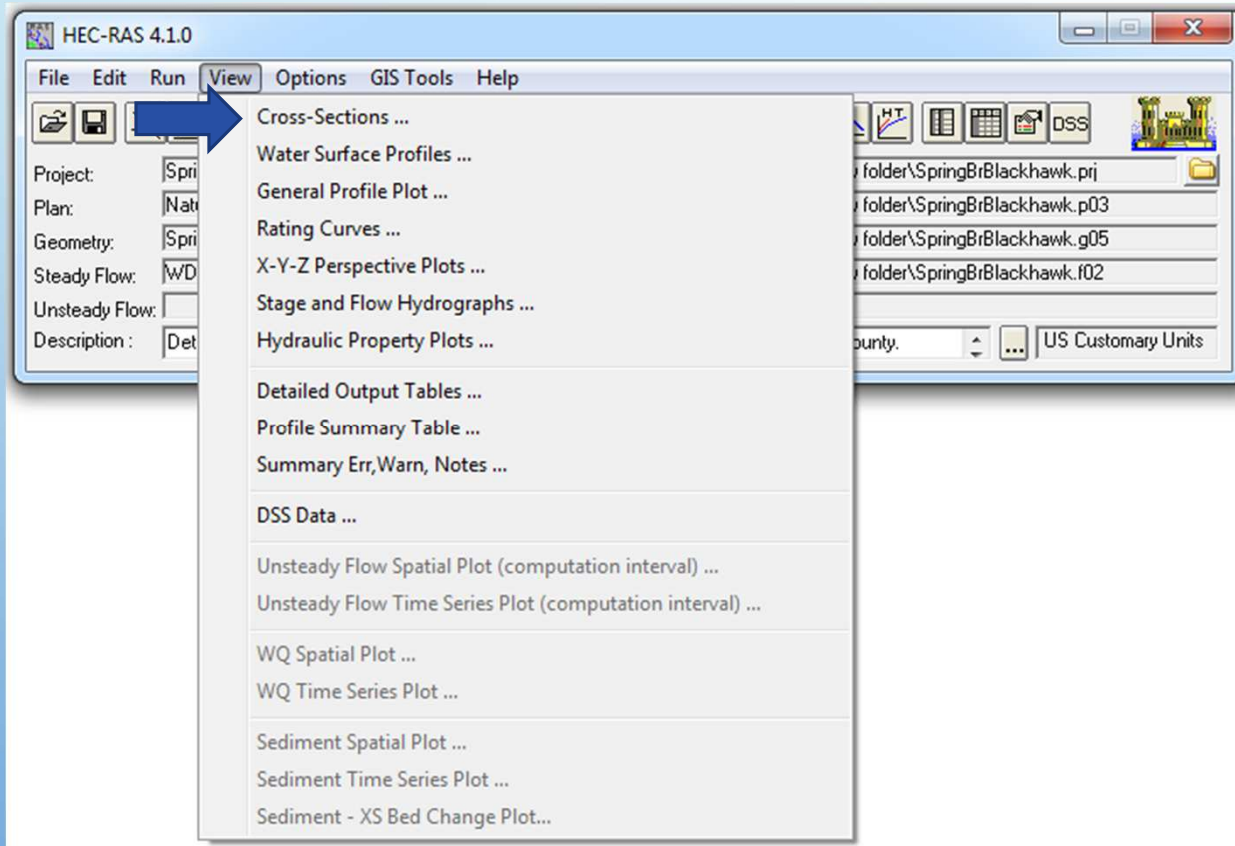
File Options Std. Tables Locations Help

HEC-RAS Plan: Natural River: SpringBrBlackhawk Reach: Janesville [Reload Data]

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Janesville	39542	AO	10 year	732.00	869.05	873.86	874.01	0.001524	3.10	271.75	153.87	0.31
Janesville	39542	AO	50 year	1183.00	869.05	874.71	874.91	0.001591	3.71	422.99	200.06	0.33
Janesville	39542	AO	100 year	1393.00	869.05	875.00	875.22	0.001656	3.97	483.40	209.79	0.34
Janesville	39135		10 year	732.00	867.66	873.77	870.07	0.000158	1.21	695.55	201.80	0.10
Janesville	39135		50 year	1183.00	867.66	874.59	870.57	0.000228	1.60	865.07	213.83	0.13
Janesville	39135		100 year	1393.00	867.66	874.86	870.78	0.000270	1.80	927.25	244.71	0.14
Janesville	39060	Milton-Shopiere	Bridge									
Janesville	38985	AN	10 year	732.00	867.28	872.29	870.10	0.000632	2.48	504.60	290.24	0.21
Janesville	38985	AN	50 year	1183.00	867.28	873.40	873.48	0.000638	2.90	704.85	300.63	0.22
Janesville	38985	AN	100 year	1393.00	867.28	873.78	873.88	0.000668	3.11	776.22	317.11	0.23
Janesville	38715.5*		10 year	732.00	867.05	871.97	872.09	0.001374	2.83	261.05	92.44	0.29
Janesville	38715.5*		50 year	1183.00	867.05	873.06	873.22	0.001243	3.28	390.97	146.79	0.29
Janesville	38715.5*		100 year	1393.00	867.05	873.42	873.61	0.001259	3.50	446.22	154.84	0.30
Janesville	38446	AM	10 year	732.00	866.82	871.41	871.59	0.002600	3.45	212.28	85.81	0.39
Janesville	38446	AM	50 year	1183.00	866.82	872.58	872.78	0.002188	3.65	324.38	105.91	0.37
Janesville	38446	AM	100 year	1393.00	866.82	872.93	873.16	0.002241	3.83	363.34	112.05	0.38
Janesville	38113.5*		10 year	732.00	865.93	870.56	870.74	0.002542	3.41	214.89	87.05	0.38
Janesville	38113.5*		50 year	1183.00	865.93	871.95	872.12	0.001755	3.35	352.92	110.88	0.33
Janesville	38113.5*		100 year	1393.00	865.93	872.29	872.48	0.001822	3.56	391.08	115.84	0.34
Janesville	37781	AL	10 year	732.00	865.04	869.78	869.94	0.002242	3.24	225.70	89.54	0.36
Janesville	37781	AL	50 year	1183.00	865.04	871.53	871.66	0.001072	2.94	413.26	129.37	0.27
Janesville	37781	AL	100 year	1393.00	865.04	871.84	871.99	0.001161	3.19	454.02	135.47	0.28
Janesville	36959	AK	10 year	732.00	862.92	869.07	869.13	0.000521	1.82	402.11	126.65	0.18
Janesville	36959	AK	50 year	1183.00	862.92	871.21	871.25	0.000257	1.67	722.29	175.09	0.14
Janesville	36959	AK	100 year	1393.00	862.92	871.48	871.53	0.000296	1.86	769.88	179.94	0.15
Janesville	36461		10 year	732.00	861.54	868.93	864.35	0.000198	1.69	437.12	307.41	0.12
Janesville	36461		50 year	1183.00	861.54	871.16	865.01	0.000077	1.31	1552.70	382.94	0.08
Janesville	36461		100 year	1393.00	861.54	871.42	865.26	0.000094	1.47	1634.55	391.27	0.09

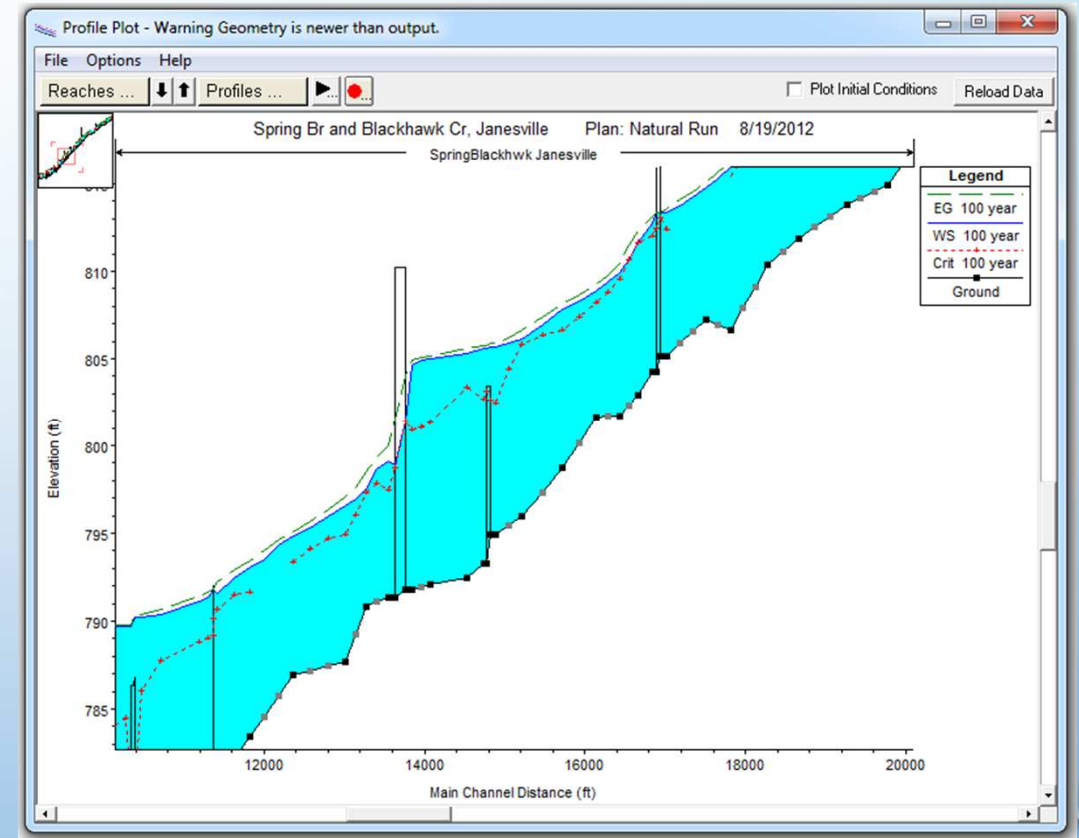
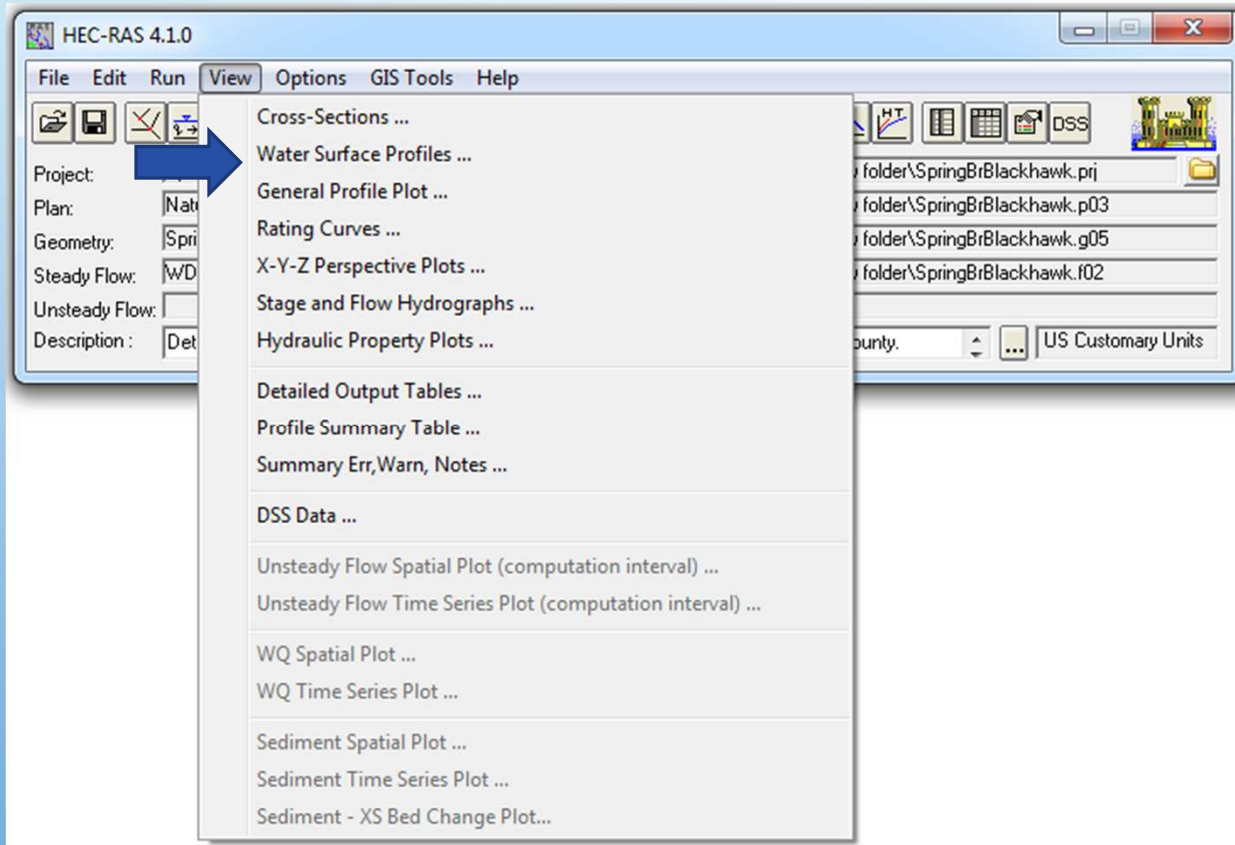
REVIEWING OUTPUT DATA

CROSS SECTIONS



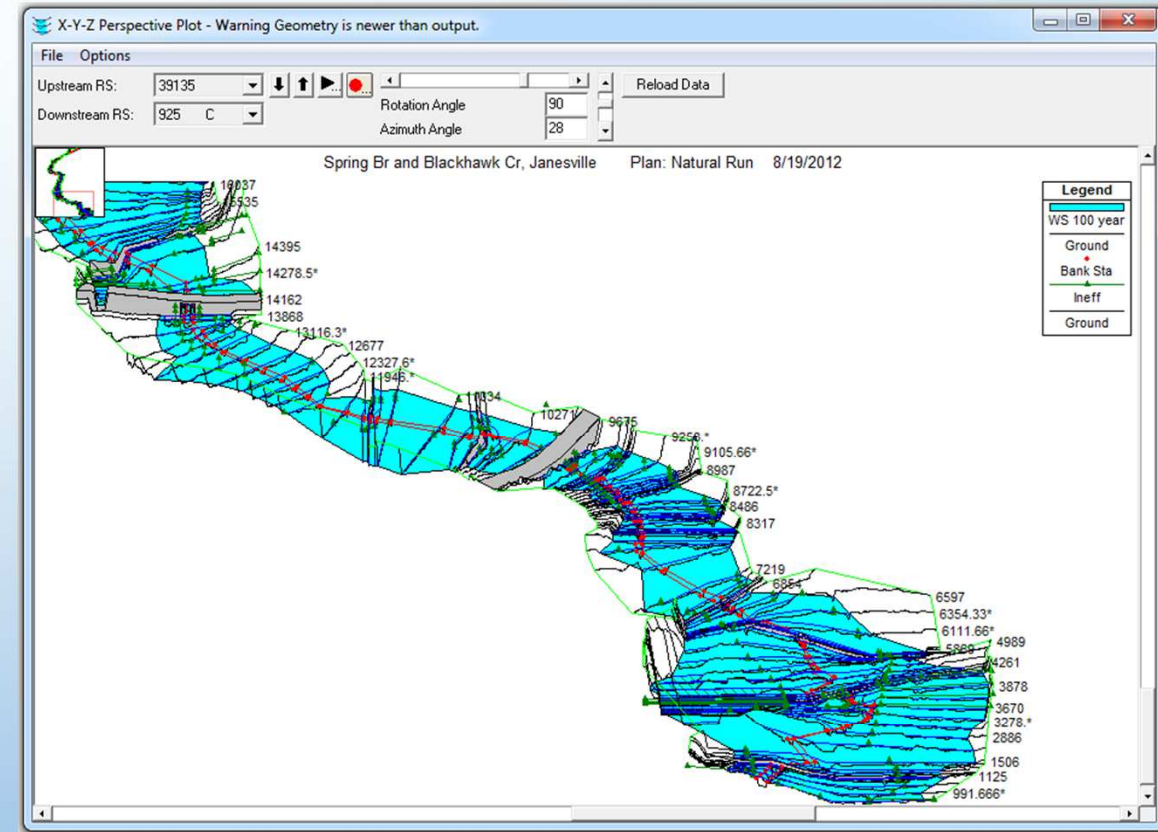
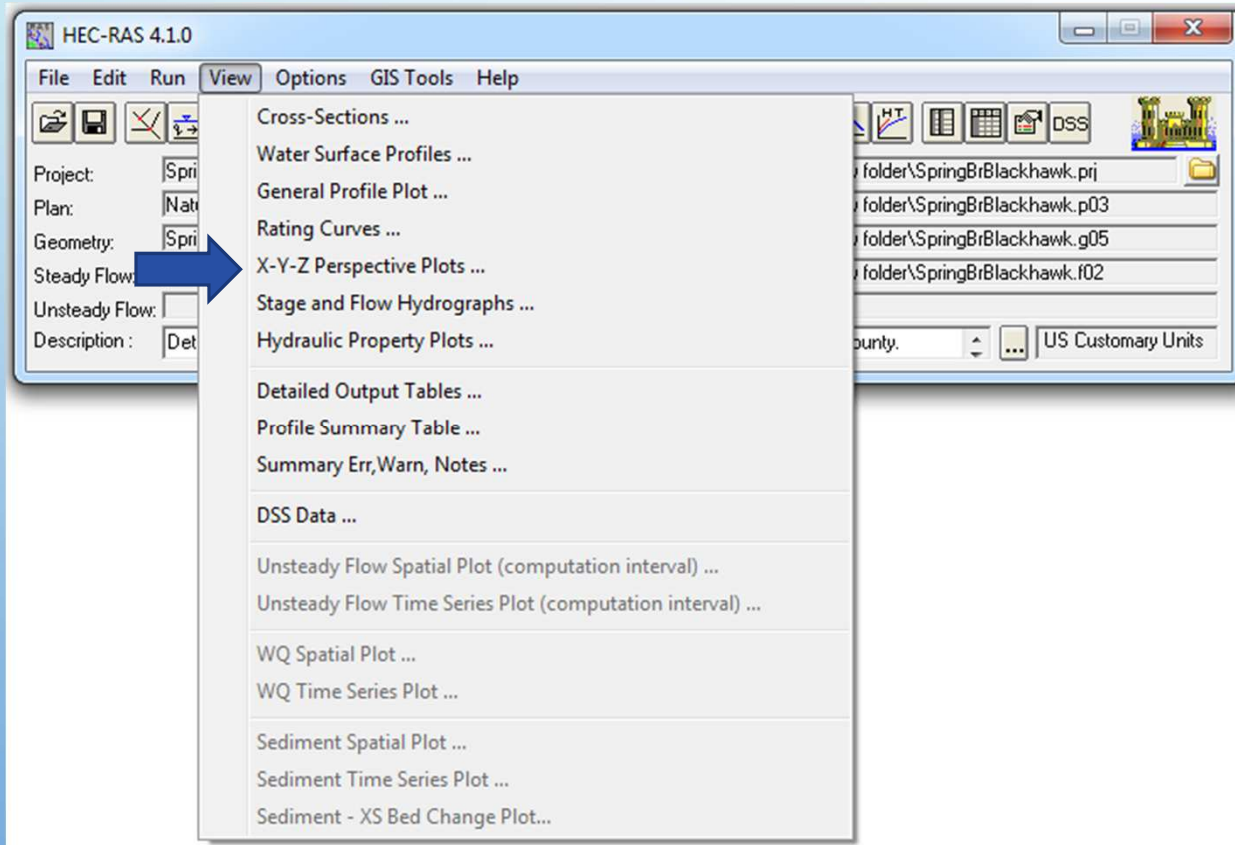
REVIEWING OUTPUT DATA

WATER SURFACE PROFILE



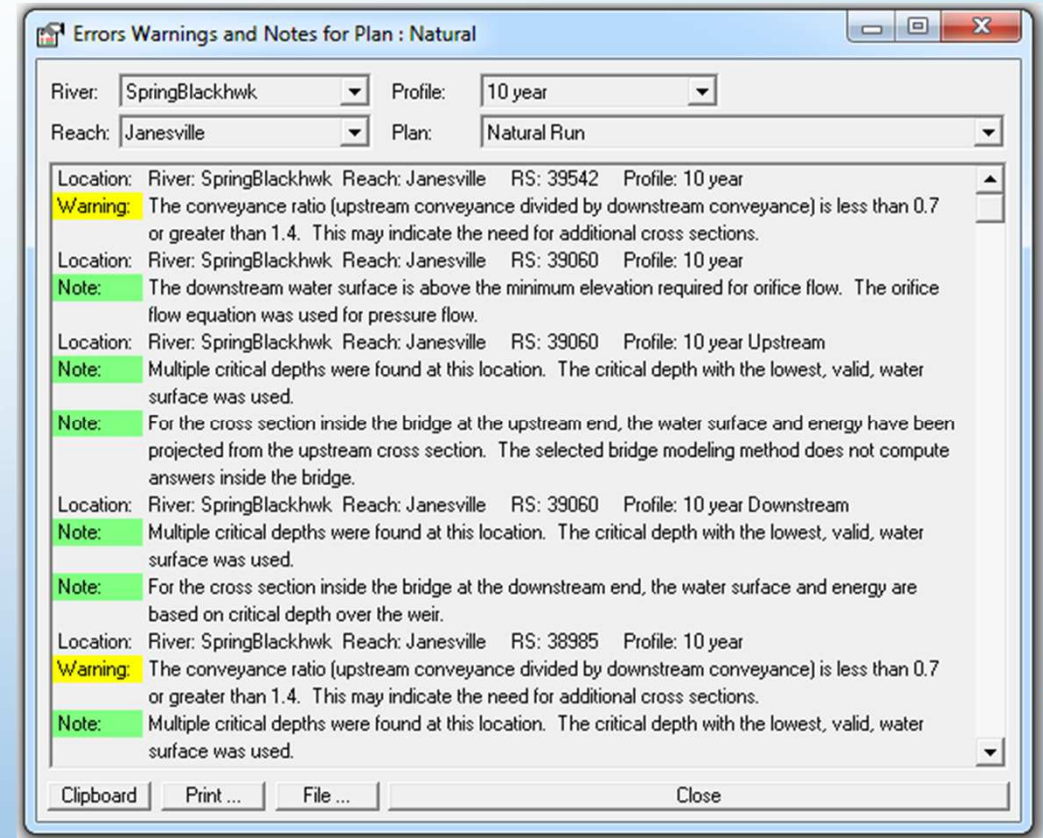
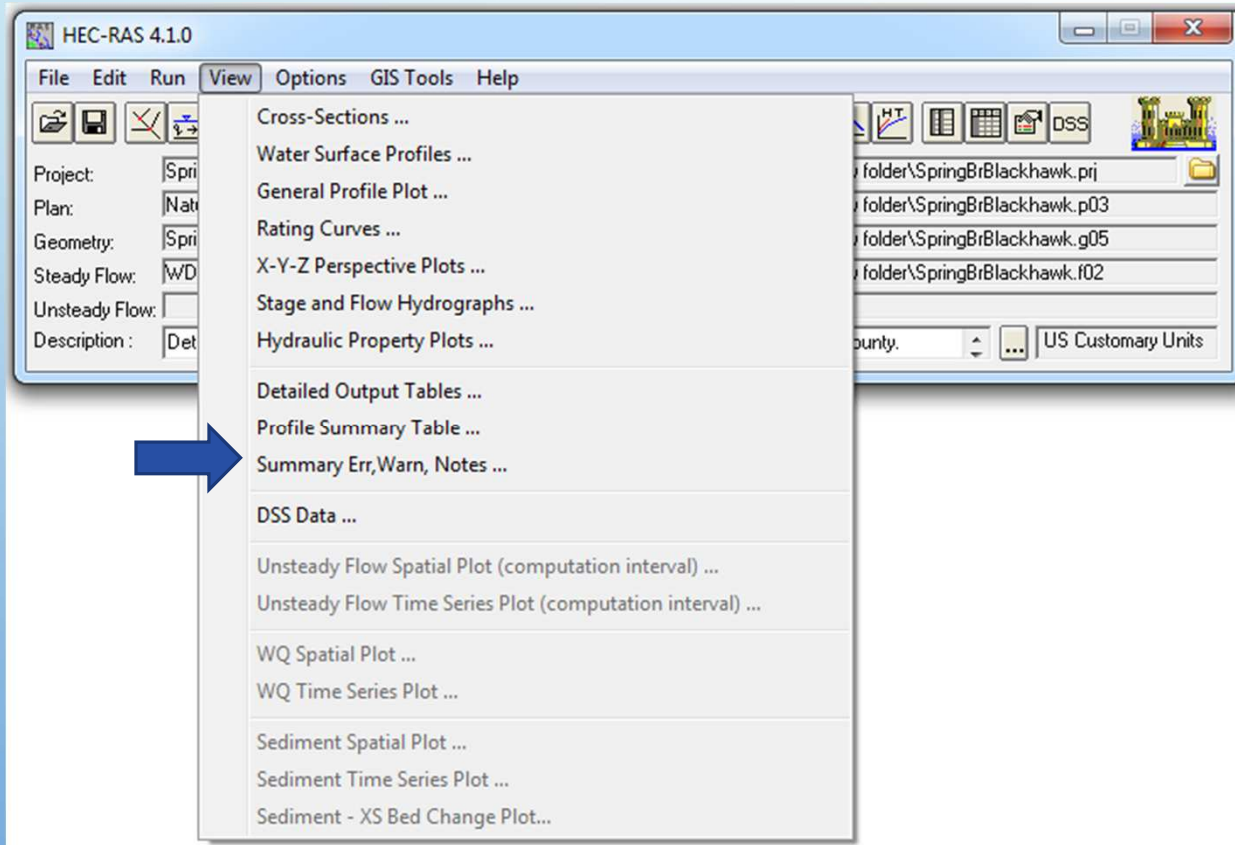
REVIEWING OUTPUT DATA

X-Y-Z PERSPECTIVE PLOT

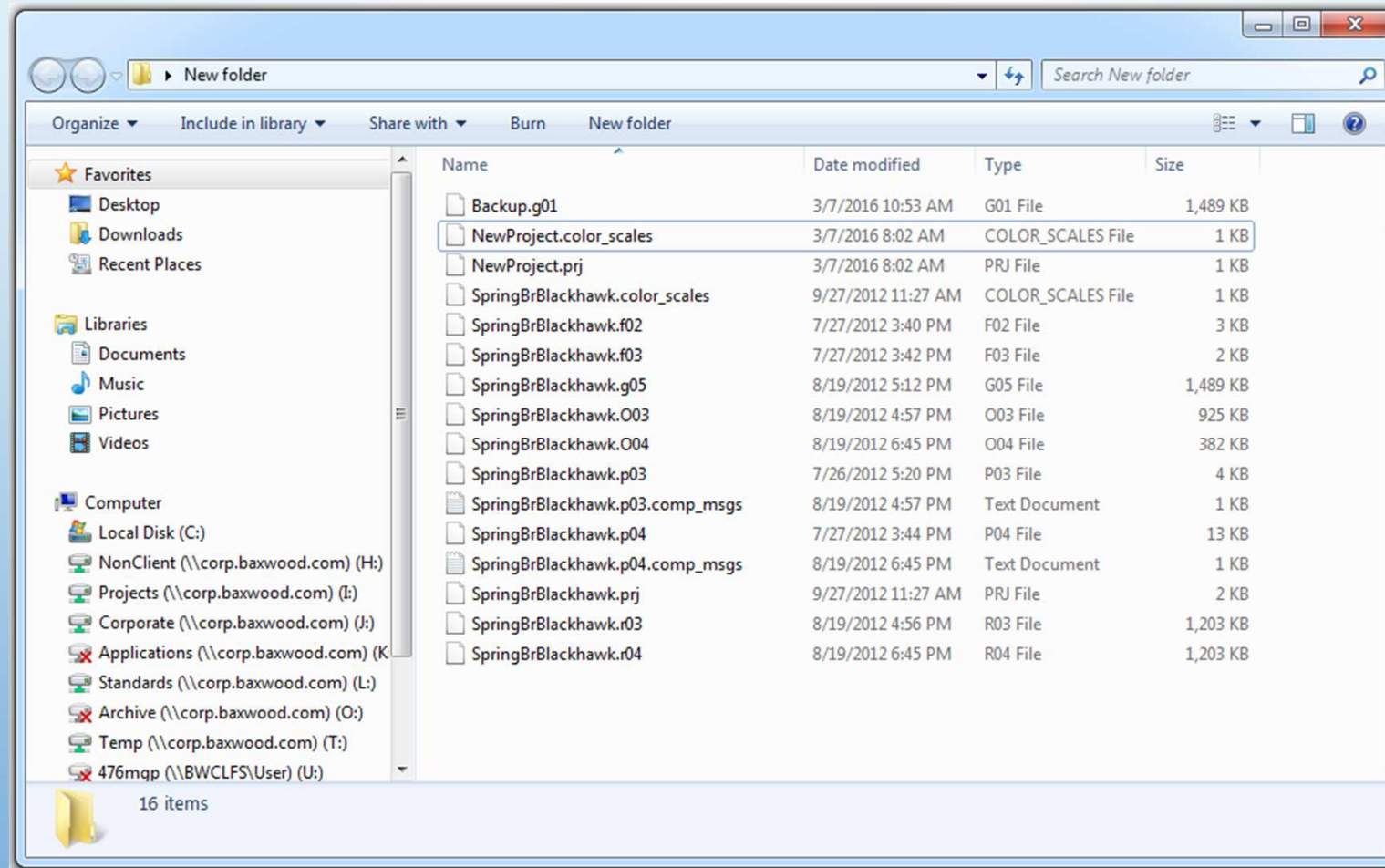


REVIEWING OUTPUT DATA

SUMMARY OF ERRORS, WARNINGS, & NOTES



FILE STRUCTURE



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