

Unsteady Flow Modeling with HEC-RAS

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Outline



- Boundary Conditions and Computation
- Inline Structures and Gates
- Reservoir Modeling Layout Options



Boundary and Initial Conditions, and Computation Options and Tolerances



Unsteady Flow Data

- External Boundaries required
 - Upstream and Downstream ends of the river
 - Typically flow or stage hydrograph upstream
 - Typically rating or “normal depth” downstream
- Internal Boundaries can be added
 - Add flow within the river system
 - Define gate operation
- Initial Conditions - at the start of simulation



Unsteady Flow Data Editor

HEC-RAS 5.0.3

File Edit Run View Options GIS Tools Help

Project: Bald Eagle Creek Example Dam Break Study C:\... \workshop35\W3_5UnsteadyFlow.prj

Plan: PMF Event No Breach C:\... \workshop35\W3_5UnsteadyFlow.p04

Geometry: Existing GIS Data Nov 2006 C:\... \workshop35\W3_5UnsteadyFlow.g01

Steady Flow:

Unsteady Flow: PMF Event from HMS C:\... \workshop35\W3_5UnsteadyFlow.u02

Description: The United States Army Corps of Engineers has granted access to the information in this model for instructional US Cus

Unsteady Flow Data - PMF Event from HMS

File Options Help

Boundary Conditions | Initial Conditions | Apply Data

Boundary Condition Types

Stage Hydrograph Flow Hydrograph Stage/Flow Hydr. Rating Curve

Normal Depth **Lateral Inflow Hydr.** Uniform Lateral Inflow Groundwater Interflow

T.S. Gate Openings Elev Controlled Gates Navigation Dams IB Stage/Flow

Rules Precipitation

Add Boundary Condition Location

Add RS ... Add SA/2D Flow Area ... Add SA Connection ... Add Pump Station ...

Select Location in table then select Boundary Condition Type

	River	Reach	RS	Boundary Condition
1	Bald Eagle Cr.	Lock Haven	137520	Flow Hydrograph
2	Bald Eagle Cr.	Lock Haven	136948	Uniform Lateral Inflow
3	Bald Eagle Cr.	Lock Haven	81454	T.S. Gate Openings
4	Bald Eagle Cr.	Lock Haven	80720	Uniform Lateral Inflow
5	Bald Eagle Cr.	Lock Haven	76865	Lateral Inflow Hydr.
6	Bald Eagle Cr.	Lock Haven	67130	Lateral Inflow Hydr.
7	Bald Eagle Cr.	Lock Haven	66041	Uniform Lateral Inflow
8	Bald Eagle Cr.	Lock Haven	28519	Lateral Inflow Hydr.
9	Bald Eagle Cr.	Lock Haven	1	Lateral Inflow Hydr.
10	Bald Eagle Cr.	Lock Haven	-1867	Normal Depth

Storage/2D Flow Areas		Boundary Condition
1	193	Lateral Inflow Hydr.



Upstream Boundary Conditions

- Flow Hydrograph
- Stage Hydrograph
- Stage/Flow Hydrograph

Unsteady Flow Data - PMF Event from HMS

File Options Help

Boundary Conditions | Initial Conditions | Apply Data

Boundary Condition Types

Stage Hydrograph	Flow Hydrograph	Stage/Flow Hydr.	Rating Curve
Normal Depth	Lateral Inflow Hydr.	Uniform Lateral Inflow	Groundwater Interflow
T.S. Gate Openings	Elev Controlled Gates	Navigation Dams	IB Stage/Flow
Rules	Precipitation		

Add Boundary Condition Location

Add RS ... Add SA/2D Flow Area ... Add SA Connection ... Add Pump Station ...

Select Location in table then select Boundary Condition Type

	River	Reach	RS	Boundary Condition
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8	Bald Eagle Cr.	Lock Haven	28519	Lateral Inflow Hydr.
9	Bald Eagle Cr.	Lock Haven	1	Lateral Inflow Hydr.
10	Bald Eagle Cr.	Lock Haven	-1867	Normal Depth

Storage/2D Flow Areas		Boundary Condition
1	193	Lateral Inflow Hydr.



Flow Hydrograph

- Read from DSS
 - Select DSS file
 - Select Pathname

- Enter in Table
 - Select time interval
 - Select start date/time
 - Enter flow data - or cut & paste

Flow Hydrograph

River: Nittany River Reach: Weir Reach RS: 60.1

Read from DSS before simulation Select DSS file and Path

File:

Path:

Enter Table Data time interval: 1 Hour

Select/Enter the Data's Starting Time Reference

Use Simulation Time: Date: 08APR 1999 Time: 0000

Fixed Start Time: Date: Time:

No. Ordinates

Hydrograph Data			
	Date	Simulation Time	Flow
		(hours)	(cfs)
1	07Apr 1999 2400	00:00	5179.57
2	08Apr 1999 0100	01:00	5716.45
3	08Apr 1999 0200	02:00	6605.13
4	08Apr 1999 0300	03:00	7836.48
5	08Apr 1999 0400	04:00	9397.87
6	08Apr 1999 0500	05:00	11273.28
7	08Apr 1999 0600	06:00	13443.47
8	08Apr 1999 0700	07:00	15886.16
9	08Apr 1999 0800	08:00	18576.29
10	08Apr 1999 0900	09:00	21486.26
11	08Apr 1999 1000	10:00	24586.21
12	08Apr 1999 1100	11:00	27844.32
13	08Apr 1999 1200	12:00	31227.16
14	08Apr 1999 1300	13:00	34700.03
15	08Apr 1999 1400	14:00	38227.28

Time Step Adjustment Options ("Critical" boundary conditions)

Monitor this hydrograph for adjustments to computational time step

Max Change in Flow (without changing time step):

Min Flow: Multiplier:



Flow Hydrograph

- Min Flow
- Multiplier
- Hydrograph Monitor for Time Slicing

Minimum time step for time slicing (hrs):	<input type="text" value="0"/>
Maximum number of time slices:	<input type="text" value="20"/>

Flow Hydrograph

River: Nittany River Reach: Weir Reach RS: 60.1

Read from DSS before simulation

File:

Path:

Enter Table Data time interval: 1 Hour

Select/Enter the Data's Starting Time Reference

Use Simulation Time: Date: 08APR 1999 Time: 0000

Fixed Start Time: Date: Time:

Hydrograph Data			
	Date	Simulation Time	Flow
		(hours)	(cfs)
1	07Apr1999 2400	00:00	5179.57
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Time Step Adjustment Options ("Critical" boundary conditions)

Monitor this hydrograph for adjustments to computational time step

Max Change in Flow (without changing time step):

Min Flow: Multiplier:



Downstream Boundary Conditions

- Downstream Options:

- ▶ Normal Depth
- ▶ Rating Curve
- ▶ Stage Hydrograph
- ▶ Flow Hydrograph
- ▶ Stage & Flow Hydrograph

Unsteady Flow Data - PMF Event from HMS

File Options Help

Boundary Conditions | Initial Conditions | Apply Data

Boundary Condition Types

Stage Hydrograph	Flow Hydrograph	Stage/Flow Hydr.	Rating Curve
Normal Depth	Lateral Inflow Hydr.	Uniform Lateral Inflow	Groundwater Interflow
T.S. Gate Openings	Elev Controlled Gates	Navigation Dams	IB Stage/Flow
Rules	Precipitation		

Add Boundary Condition Location

Add RS ... Add SA/2D Flow Area ... Add SA Connection ... Add Pump Station ...

Select Location in table then select Boundary Condition Type

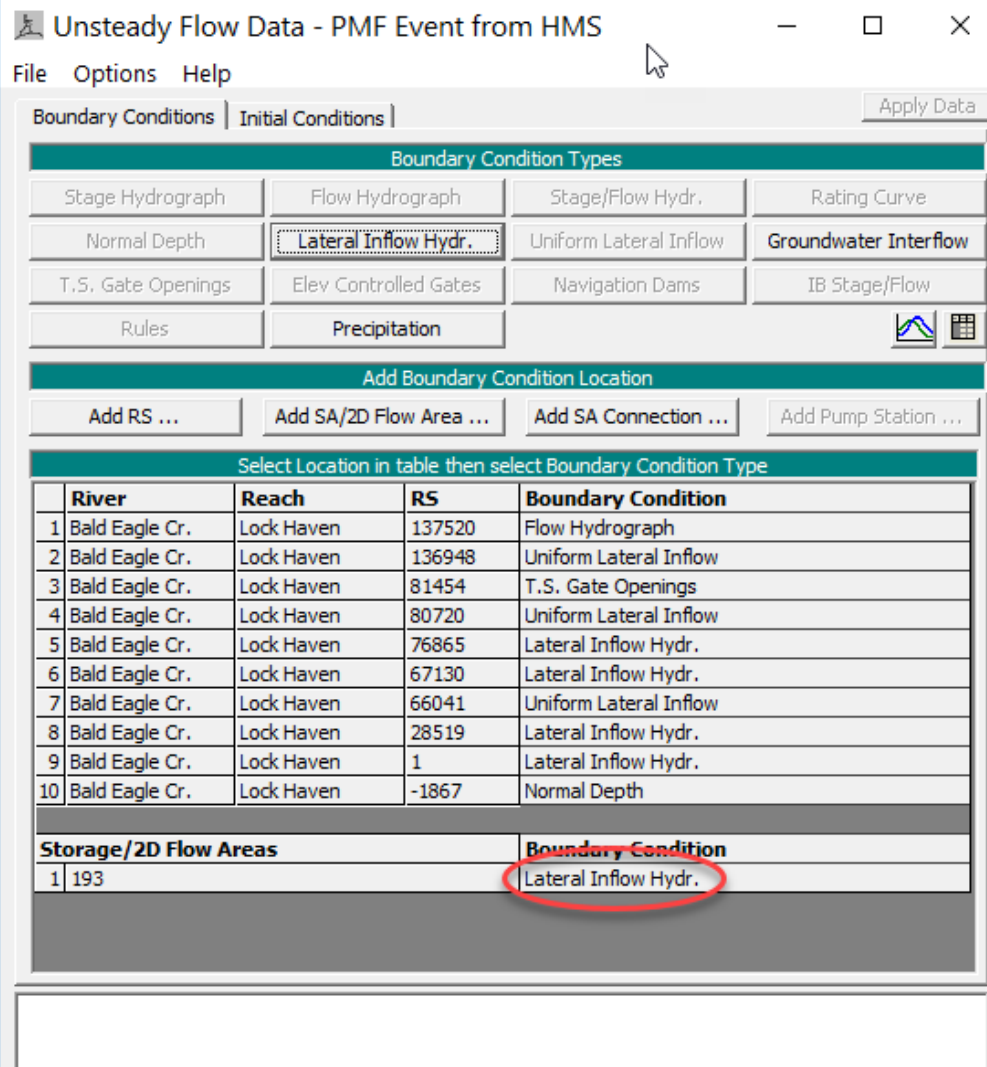
	River	Reach	RS	Boundary Condition
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9	Bald Eagle Cr.	Lock Haven	1	Lateral Inflow Hydr.
10	Bald Eagle Cr.	Lock Haven	-1867	Normal Depth

Storage/2D Flow Areas		Boundary Condition
1	193	Lateral Inflow Hydr.



Storage Area Boundary Conditions

- Storage Areas are no longer limited to one lateral inflow hydrograph boundary (RAS 4.2 Alpha 2).
- Add Storage Area to table more than one time for additional hydrograph.



Unsteady Flow Data - PMF Event from HMS

File Options Help

Boundary Conditions | Initial Conditions | Apply Data

Boundary Condition Types

Stage Hydrograph	Flow Hydrograph	Stage/Flow Hydr.	Rating Curve
Normal Depth	Lateral Inflow Hydr.	Uniform Lateral Inflow	Groundwater Interflow
T.S. Gate Openings	Elev Controlled Gates	Navigation Dams	IB Stage/Flow
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7 Bald Eagle Cr.	Lock Haven	66041	Uniform Lateral Inflow
8 Bald Eagle Cr.	Lock Haven	28519	Lateral Inflow Hydr.
9 Bald Eagle Cr.	Lock Haven	1	Lateral Inflow Hydr.
10 Bald Eagle Cr.	Lock Haven	-1867	Normal Depth

Storage/2D Flow Areas

Storage/2D Flow Areas	Boundary Condition
1 193	Lateral Inflow Hydr.



Initial Conditions

- Requires an initial flow for all reaches – can be left blank for dendritic systems
- Pool elevation for storage areas can be left blank
- Can change initial flow at any location
- Use system status from previous simulation (restart file)

Unsteady Flow Data - PMF Event for SA Model

File Options Help

Boundary Conditions [Initial Conditions] Apply Data

Initial Flow Distribution Method

Use a Restart File Filename:

Enter Initial flow distribution (Optional - leave blank to use boundary conditions)

Add RS...

User specified fixed flows (Optional) [?]

	River	Reach	RS	Initial Flow
1	Bald Eagle Cr.	Lock Haven	82303	1068
2	Bald Eagle Cr.	Lock Haven	81914	1000
3	Bald Eagle Cr.	Lock Haven	-897	6000

Initial Elevation of Storage Areas/2D Flow Areas (Optional) Import Min SA Elevation(s)

Keep initial elevations constant during warmup [?]

	Storage Area/2D Flow Area	Initial Elevation
1	190	535
2	191	537
3	192	546
4	193	559.7
5	194	595
6	195	615.6
7	Sayers Res	657

Initial internal water surface elevations set



Initial Internal Stages

- Internal RS Initial Stages used to set initial water surface at a XS
- Stage U/S from inline structure is based on a balance of outlet size/gate opening and water surface

Unsteady Flow Data - PMF Event for SA Model

File Options Help

Delete Initial Flow(s) From Table ...
 DSS Pathname Summary Table ...
 Internal RS Initial Stages ...
 Flow Minimum and Flow Ratio Table ...
 Observed (Measured) Data
 Old River Diversion Adjustment ...

1	Bald Eagle Cr.	Lock Haven	82303	1068
2	Bald Eagle Cr.	Lock Haven	81914	1000
3	Bald Eagle Cr.	Lock Haven	-897	6000

Unsteady Flow Data - Initial Stages

River: Bald Eagle Cr.

Reach: Lock Haven River Sta.: 82303

Locations and Initial Stages				
	River	Reach	RS	Elev
1	Bald Eagle Cr.	Lock Haven	81914	657

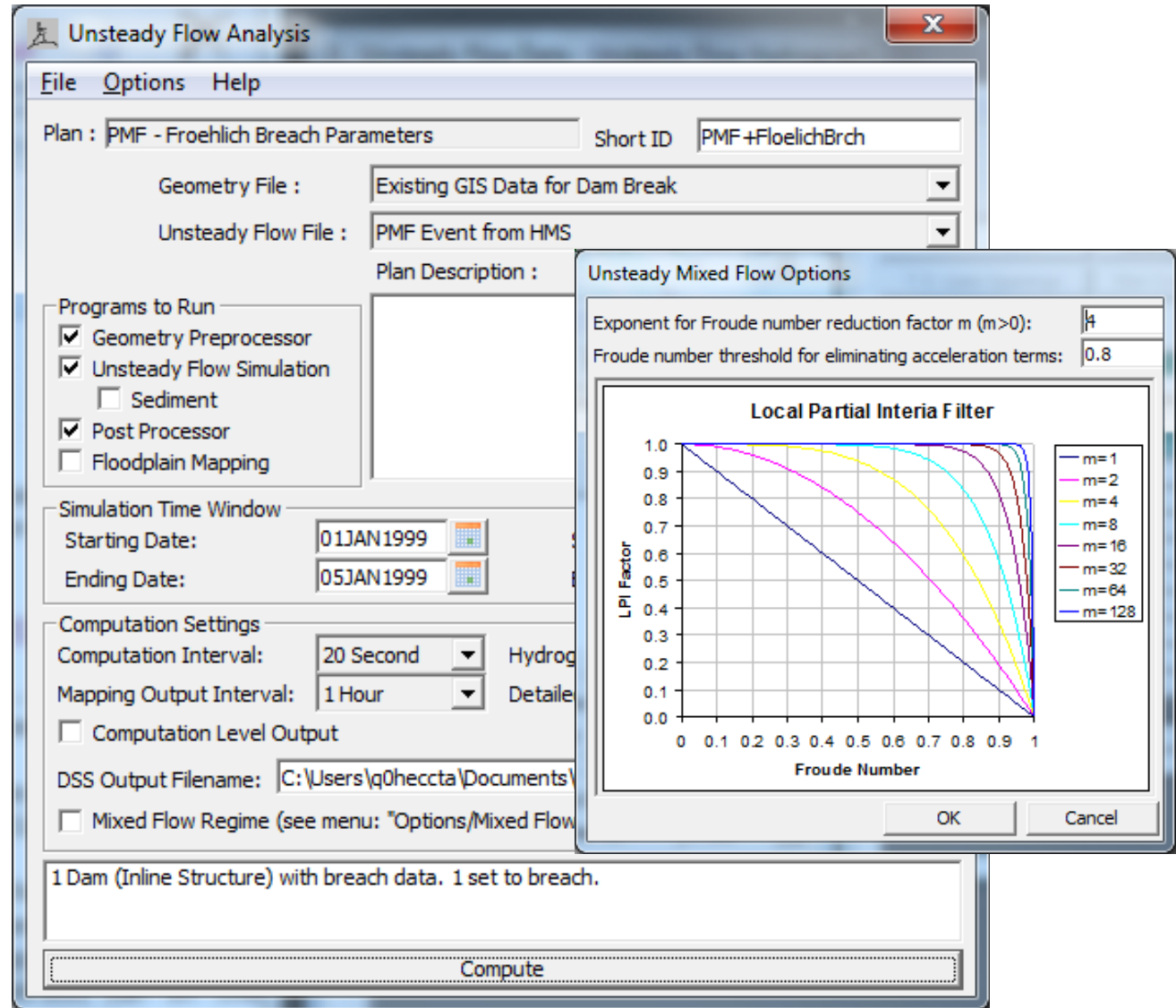
	Storage Area/2D Flow Area	Initial Elevation
1	190	535
2	191	537
3	192	546
4	193	559.7
5	194	595
6	195	615.6
7	Sayers Res	657

Initial internal water surface elevations set



Computation

- Computation Time Step
- Hydrograph Output
- Detailed Output
- Mixed Flow Regime



The screenshot shows the 'Unsteady Flow Analysis' dialog box in HEC-RAS. The main dialog is configured with the following settings:

- Plan: PMF - Froehlich Breach Parameters
- Short ID: PMF+FloelichBrch
- Geometry File: Existing GIS Data for Dam Break
- Unsteady Flow File: PMF Event from HMS
- Programs to Run:
 - Geometry Preprocessor
 - Unsteady Flow Simulation
 - Sediment
 - Post Processor
 - Floodplain Mapping
- Simulation Time Window:
 - Starting Date: 01JAN1999
 - Ending Date: 05JAN1999
- Computation Settings:
 - Computation Interval: 20 Second
 - Mapping Output Interval: 1 Hour
 - Computation Level Output
 - DSS Output Filename: C:\Users\q0heccta\Documents\
 - Mixed Flow Regime (see menu: "Options/Mixed Flow

The 'Unsteady Mixed Flow Options' sub-dialog is open, showing the 'Local Partial Interia F filter' graph. The graph plots the LPI Factor (y-axis, 0.0 to 1.0) against the Froude Number (x-axis, 0 to 1). Multiple curves are shown for different values of the exponent m (1, 2, 4, 8, 16, 32, 64, 128). The curves show that as m increases, the LPI Factor remains closer to 1.0 for a longer range of Froude numbers before dropping to 0.0. The 'Exponent for Froude number reduction factor m (m>0):' is set to 4, and the 'Froude number threshold for eliminating acceleration terms:' is set to 0.8.

At the bottom of the main dialog, it states: "1 Dam (Inline Structure) with breach data. 1 set to breach." and a "Compute" button is visible.



Computation Options

- Theta
1 = Most Stable
- Water Surface Tolerance
- Stability Factors
1 = Most Accurate
3 = Most Stable
 - Lateral Structure
 - Inline Structure
 - Weir Flow Submergence

HEC-RAS Unsteady Computation Options and Tolerances

General (1D Options) | 2D Flow Options | 1D/2D Options

Unsteady Flow Options

Theta [implicit weighting factor] (0.6-1.0):	<input type="text" value="1"/>	Number of warm up time steps (0 - 100,000):	<input type="text" value="0"/>
Theta for warm up [implicit weighting factor] (0.6-1.0):	<input type="text" value="1"/>	Time step during warm up period (hrs):	<input type="text" value="0"/>
Water surface calculation tolerance [max=0.2](ft):	<input type="text" value="0.02"/>	Minimum time step for time slicing (hrs):	<input type="text" value="0"/>
Storage Area elevation tolerance [max=0.2](ft):	<input type="text" value="0.02"/>	Maximum number of time slices:	<input type="text" value="20"/>
Flow calculation tolerance [optional] (cfs):	<input type="text"/>	Lateral Structure flow stability factor (1.0-3.0):	<input type="text" value="2"/>
Max error in water surface solution (Abort Tolerance)(ft):	<input type="text" value="100"/>	Inline Structure flow stability factor (1.0-3.0):	<input type="text" value="1"/>
Maximum number of iterations (0-40):	<input type="text" value="20"/>	Weir flow submergence decay exponent (1.0-3.0):	<input type="text" value="1"/>
Maximum iterations without improvement (0-40):	<input type="text"/>	Gate flow submergence decay exponent (1.0-3.0):	<input type="text" value="1"/>
		DSS Messaging Level (1 to 10, Default = 4)	<input type="text" value="4"/>

Geometry Preprocessor Options

Family of Rating Curves for Internal Boundaries

- Use existing internal boundary tables when possible.
- Recompute at all internal boundaries

1D Equation Solver

- Skyline/Gaussian (Default: Faster for dendritic systems)
- Pardiso (Optional: May be faster for large interconnected systems)

Number of cores to use with Pardiso solver:

OK Cancel Defaults ...



Inline Structures and Gates



Entering Inline Structure Data

Inline Structure Data - Existing GIS Data for Dam Break

File View Options Help

River: Bald Eagle Cr. Apply Data + [Camera]

Reach: Lock Haven River Sta.: 81454 Joseph Sayers Da [Down] [Up]

Upstream XS: 81914 Upstream channel length: 998.163 (ft)

Description: Foster Joseph Sayers Dam and Reservoir

Pilot Flow: 0 [Breach (plan data) ...] [Rules (unsteady data) ...]

All Culverts: No Flap Gates

Weir / Embankment Gate Culvert Outlet RC Outlet TS

Bald Eagle Creek Example Dam Break Study Plan: PMF - Froehlich Breach Parameters 9/9/2011

Elevation (ft)

Station (ft)

Legend: Ground, Bank Sta

Select the river for inline structure editing



Weir and Embankment Profile

- Distance + Width < U/S XS Reach Length
- Weir include top of dam and spillway
- Weir Coef. used for both dam and spillway

Inline Structure Weir Station Elevation Editor

Distance	Width	Weir Coef
450	25	3.82

Clear Del Row Ins Row Filter...

Edit Station and Elevation coordinates

	Station	Elevation
1	0.	683.
2	1700.	683.
3	1700.	657.
4	2300.	657.
5	2300.	683.
6	6980.	683.
7		
8		

U.S Embankment SS D.S Embankment SS

Weir Data
Weir Crest Shape

Broad Crested
 Ogee

Spillway Approach Height:
Design Energy Head: Cd ...

OK Cancel

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



Gates

- Sluice
- Radial
- Overflow
- User Defined Curves

Inline Gate Editor

Gate Group: Gate #1

Gate type (or methodology): Radial

Geometric Properties

Height: 15
 Width: 7
 Invert: 590
 # Openings: 2

Centerline Stations

	Station
1	5070.
2	5090.
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Gate Flow

Radial Gate Flow

Radial Discharge Coefficient: 0.65
 Trunnion Exponent: 0
 Opening Exponent: 1
 Head Exponent: 0.5
 Trunnion Height: 0

Submerged Orifice Flow

Orifice Coefficient (typically 0.8): 0.8

Head Reference: Center of opening

Weir Flow Over Gate Sill (gate out of water)

Weir Shape: Broad Crested

Weir Coefficient: 3

OK Cancel Help



Gate Settings

- Add the Inline Structure station as a BC location to Specify Gate Settings

Unsteady Flow Data - PMF Event for SA Model

File Options Help

Boundary Conditions | Initial Conditions | Apply Data

Boundary Condition Types

Stage Hydrograph	Flow Hydrograph	Stage/Flow Hydr.	Rating Curve
Normal Depth	Lateral Inflow Hydr.	Uniform Lateral Inflow	Groundwater Interflow
T.S. Gate Openings	Elev Controlled Gates	Navigation Dams	IB Stage/Flow
Rules			

Add Boundary Condition Location

Add RS ... Add Storage Area ... Add SA Connection ... Add Pump Station ...

Select Location in table then select Boundary Condition Type

	River	Reach	RS	Boundary Condition
1	Bald Eagle Cr.	Lock Haven	81454	T.S. Gate Openings
2	Bald Eagle Cr.	Lock Haven	80720	Uniform Lateral Inflow
3	Bald Eagle Cr.	Lock Haven	76865	Lateral Inflow Hydr.
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7	Bald Eagle Cr.	Lock Haven	1	Lateral Inflow Hydr.
8	Bald Eagle Cr.	Lock Haven	-1867	Normal Depth

Storage/2D Flow Areas		Boundary Condition
1	Sayers Res	Lateral Inflow Hydr.

Initial internal water surface elevations set



Gate Boundary Conditions

Gate Openings

River: Nittany River Reach: Weir Reach RS: 41.75

Gate Group: **Left Group**

Read from DSS before simulation Select DSS file and Path

File:

Path:

Enter Table Data time interval: 1 Hour

Select/Enter the Data's Starting Time Reference

Use Simulation Time: Date: 08APR.1999 Time: 0000

Fixed Start Time: Date: Time:

No. Ordinates Interpolate Missing Values Del Row Ins Row

Hydrograph Data			
	Date	Simulation Time (hours)	Gate Opening Height (ft)
1	07Apr 1999 2400	00:00	3.
2	08Apr 1999 0100	01:00	3.23
3	08Apr 1999 0200	02:00	3.47
4	08Apr 1999 0300	03:00	3.7
5	08Apr 1999 0400	04:00	3.93
6	08Apr 1999 0500	05:00	4.17
7	08Apr 1999 0600	06:00	4.4
8	08Apr 1999 0700	07:00	4.63
9	08Apr 1999 0800	08:00	4.87

Plot Data OK Cancel

Elevation Controlled Gates

River: Nittany River Reach: Weir Reach RS: 41.75

Gate Group: **Left Group**

Reference: **Based on upstream WS**

Upstream WS Elevation Reference

Upstream WS elevation at which gate begins to open:

Upstream WS elevation at which gate begins to close:

Gate Opening Rate:(ft/min):

Gate Closing Rate:(ft/min):

Maximum Gate Opening:

Minimum Gate Opening:

Initial Gate Opening (Optional):

OK Cancel



Lateral Structures

- Connect to River XSs or to a Storage Area
- HW Position affects computation
- Similar options as for an inline structure

Lateral Structure Editor - Existing GIS Data Nov 2006

File View Options Help

River: Bald Eagle Cr. Apply Data + [Camera Icon]

Reach: Lock Haven HW RS: 74000 [Down Arrow] [Up Arrow]

Description [Text Box] [Up Arrow] [Down Arrow] [More Icon]

HW Position: Left overbank Plan Data Optimization ... Breach ...

Tailwater Connection
 Type: Storage Area/2D Flow Area
 SA/2DFA: Storage area: 194 Set SA/2DFA ... Weir Length: 4227.97
 Centerline Length: n/a

Overflow Computation Method
 Normal 2D Equation Domain (no gates, no culverts) Use Weir Equation

All Culverts: No Flap Gates Centerline GIS Coords...
 Structure Type: Weir/Gates/Culverts/Diversion Rating Curves Terrain Profile ...

Weir / Embankment
 Gate
 Culvert
 Diversion RC
 Outlet TS

HW connections based on XS channel length's

Select River Station of Lateral Structure to Edit



Lateral Structures

Lateral Weir Embankment

Weir Data

Weir Width:

Weir Computations:

Standard Weir Equation Parameters

Weir flow reference:

Weir Coefficient (Cd):

Weir Crest Shape:

Weir Stationing Reference

HW Distance to Upstream XS:

Embankment Station/Elevation Table

	Station	Elevation
1	0.	661.19
2	7.75	660.73
3	14.37	659.49
4	36.68	655.34
5	52.49	652.44
6	77.51	650.26
7	97.23	648.67
8	140.64	643.17
9	141.97	642.99
10	145.18	642.86
11	186.71	641.23
12	193.79	640.99
13	203.78	640.62
14	231.45	639.46
15	266.92	634.95
16	276.19	633.66
17	298.74	631.14
18	320.93	628.73
19	330.05	626.85
20	350.9	622.54
21	365.67	619.59
22	393.19	617.46

HW Lateral Structure Connections

Computed Default Weir Stationing User Defined Weir Stationing

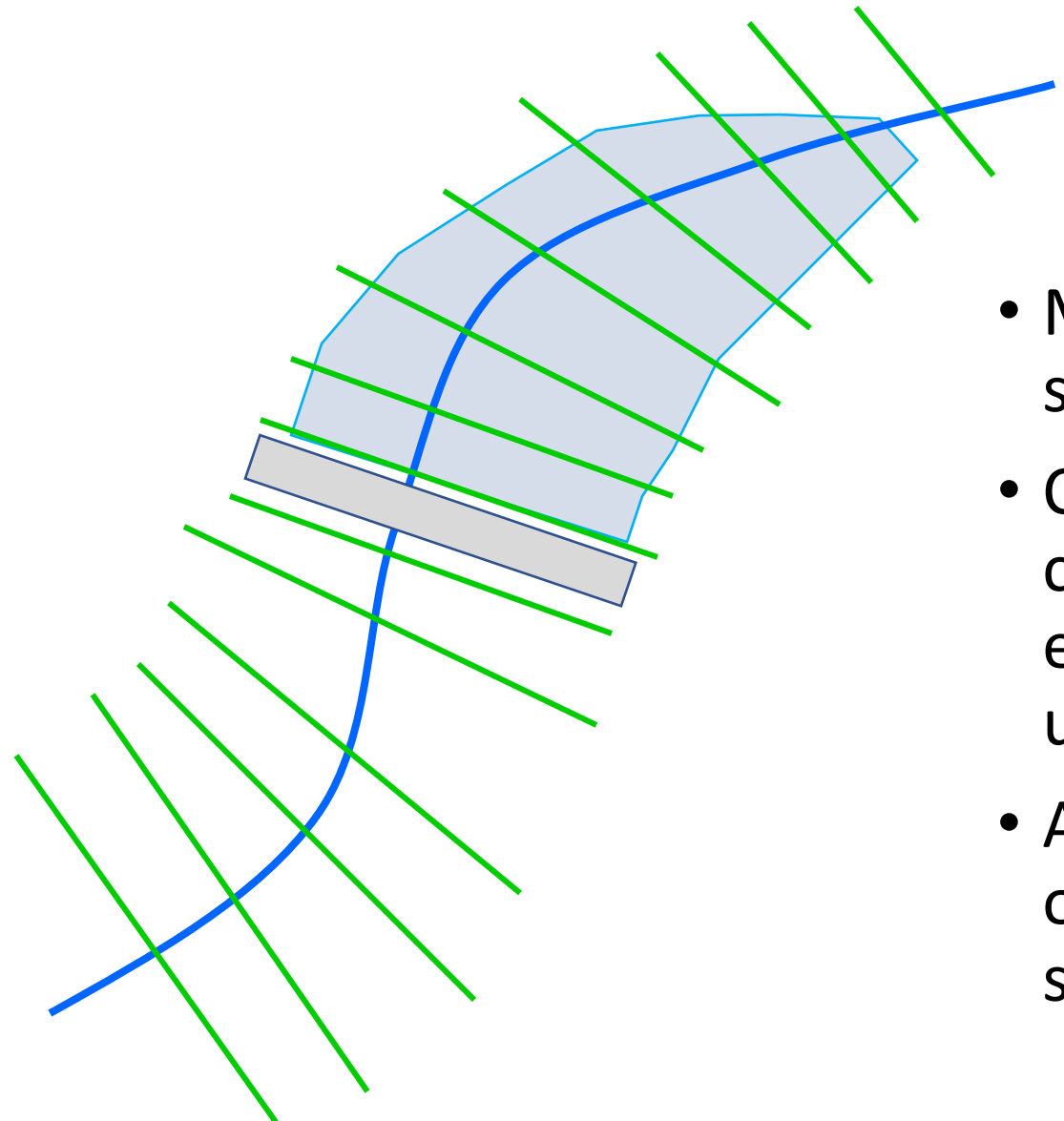
Default Computed Weir Stationing		User Defined Weir Stationing	
	XS RSs	Weir Station	
1	74120	0	1
2	73035	1194.64	2
3	72156	2181.73	3
4	71394	2806.148	4
5	70531	3673.115	5
6	69539	4439.399	6
7			7
8			8
9			9
10			10
11			11
12			12
13			13
14			14
15			15
16			16
17			17
18			18
19			19



Reservoir Modeling Options



Reservoir Modeling Option

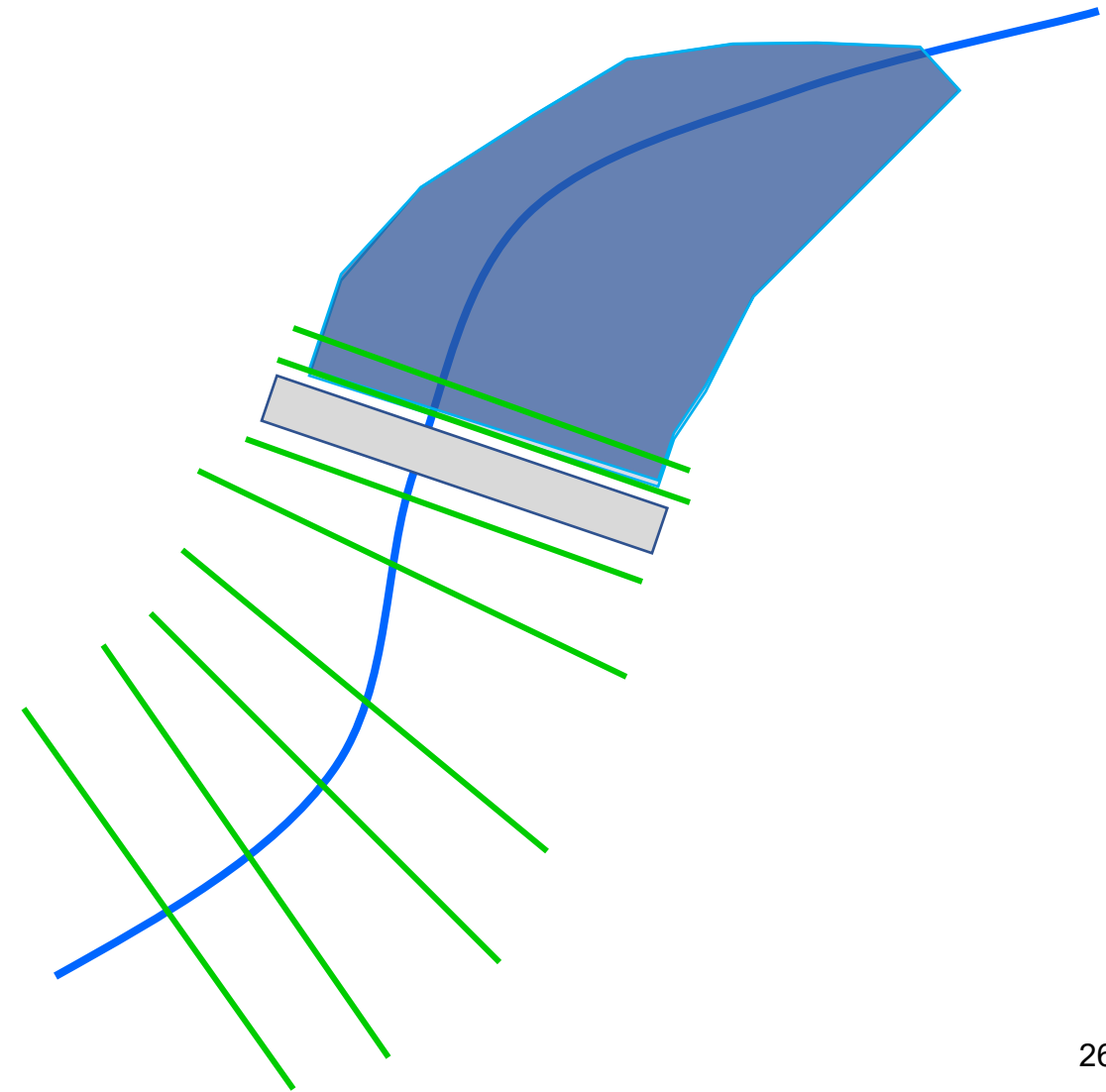


- Model Reservoir with cross sections
- Cross sections must include channel information, especially around dam both u/s and d/s
- Allows for dynamic routing of water (sloped water surface)



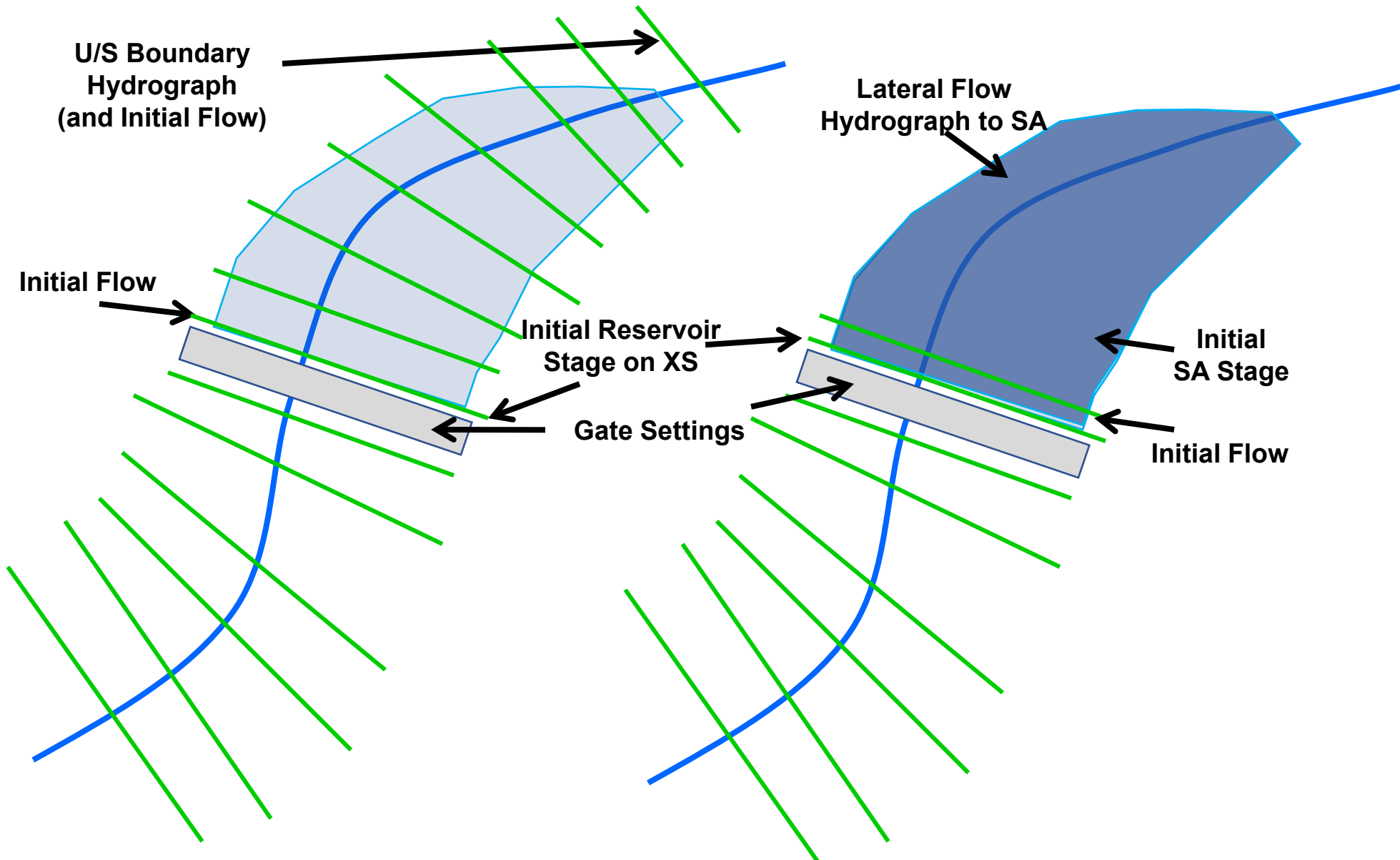
Reservoir Modeling Option

- Model Reservoir with a Storage Area
- Must have 2 cross sections U/S from inline structure
- Cross sections must include channel down to dam invert on both side of the inline structure
- Linear routing in storage area results in horizontal water surface





Reservoir Modeling Options



Connecting a Storage Area

The image displays a sequence of four screenshots from the HEC-RAS software interface, illustrating the process of connecting a storage area to a reach. Each screenshot shows a 'Geometric Data' window with a toolbar and a 'Description' field.

- First Screenshot:** Shows a 'Reservoir' object (blue triangle) and a 'Reach' object (blue line). The 'Storage Area Conn.' tool is highlighted in the toolbar.
- Second Screenshot:** Shows the 'Move Object' menu option selected in the 'Editors' menu. A red arrow points to the 'Move Object' option.
- Third Screenshot:** Shows a dialog box with the text 'Do you want to connect the upstream end of this reach to storage?'. A 'Yes' button is visible.
- Fourth Screenshot:** Shows the final connected state. The 'Reach' is now labeled 'River' and is connected to the 'Reservoir'.



Stage-Volume Curve

Storage Area Editor

Storage Area: Sayers Res

Connections and References to this Storage Area

XS: RS=82303

Area times depth method

Area (acres):

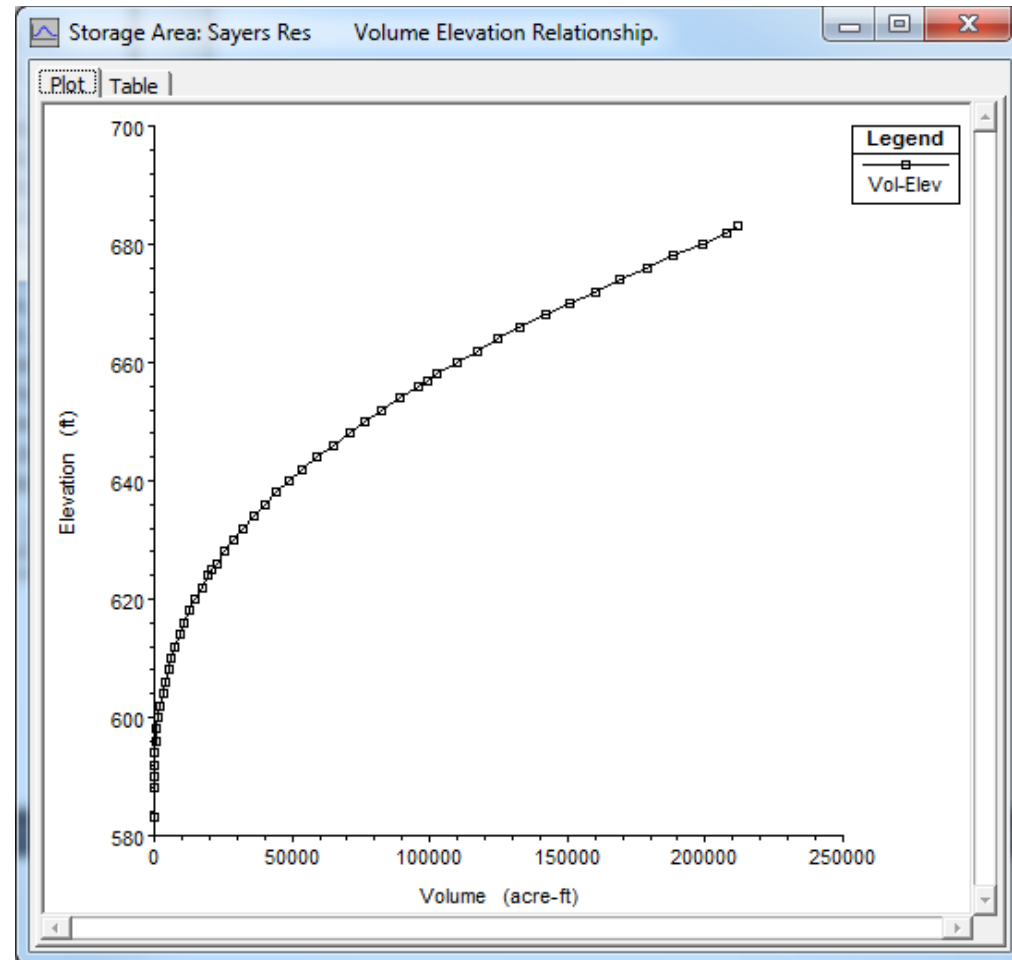
Min Elev:

Elevation versus Volume Curve

Elevation Volume Curve		
First elevation must have zero volume		
Elevation	Volume (acre-ft)	
1	583.	0.
2	588.	0.01
3	590.	20.
4	592.	80.
5	594.	180.
6	596.	360.
7	598.	760.
8	600.	1390.
9	602.	2160.
10	604.	3030.
11	606.	4010.
12	608.	5100.
13	610.	6300.
14	612.	7640.
15	614.	9150.
16	616.	10850.
17	618.	12750.
18	620.	14840.
19	622.	17130.
20	624.	19660.

Plot Vol-Elev ...

OK Cancel





Storage Area Inflow

Unsteady Flow Data - PMF Event for SA Model

File Options Help

Boundary Conditions | Initial Conditions |

Boundary Condition Types

Stage Hydrograph	Flow Hydrograph	Stage/Flow Hydr.	Rating Curve
Normal Depth	Lateral Inflow Hydr.	Uniform Lateral Inflow	Groundwater Interflow
T.S. Gate Openings	Elev. Controlled Gates	Navigation Dams	IB Stage/Flow
Rules			

Add Boundary Condition Location

Select Location in table then select Boundary Condition Type

River	Reach	RS	IS	Boundary Condition
1 Bald Eagle Cr.	Lock Haven	81454	IS	T.S. Gate Openings
2 Bald Eagle Cr.	Lock Haven	80720		Uniform Lateral Inflow
3 Bald Eagle Cr.	Lock Haven	76865		Lateral Inflow Hydr.
4 Bald Eagle Cr.	Lock Haven	67130		Lateral Inflow Hydr.
5 Bald Eagle Cr.	Lock Haven	66041		Uniform Lateral Inflow
6 Bald Eagle Cr.	Lock Haven	28519		Lateral Inflow Hydr.
7 Bald Eagle Cr.	Lock Haven	1		Lateral Inflow Hydr.
8 Bald Eagle Cr.	Lock Haven	-1867		Normal Depth

Initial internal water surface elevations set

Unsteady Flow Data - PMF Event for SA Model

File Options Help

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Storage/2D Flow Areas

Storage/2D Flow Areas	Boundary Condition
1 Sayers Res	Lateral Inflow Hydr.

Initial internal water surface elevations set