

RMC-RFA Reservoir Model

DLS-114, Module 2.12



U.S. ARMY



**US Army Corps
of Engineers®**

Dam and Levee
Safety Programs

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TAPPS DIKE, WA (SOURCE: USACE)

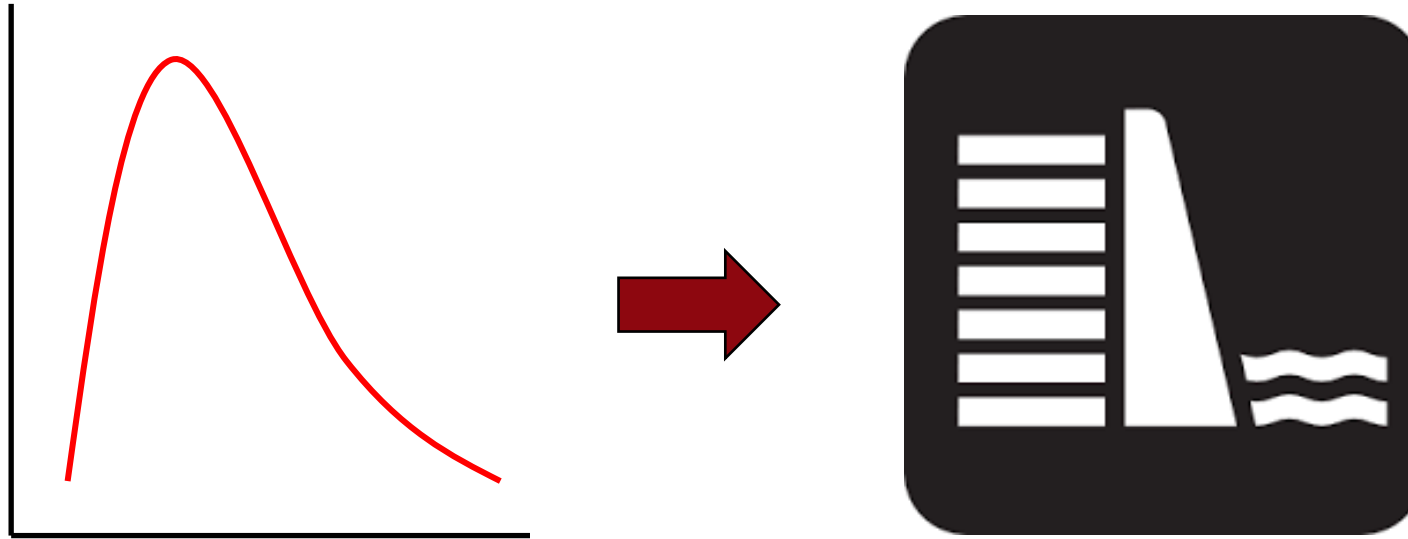
Learning Objectives

- Discuss the reservoir modeling theory in RMC-RFA
- Explore methods for developing a reservoir model
- Demonstrate entering a reservoir model into RMC-RFA

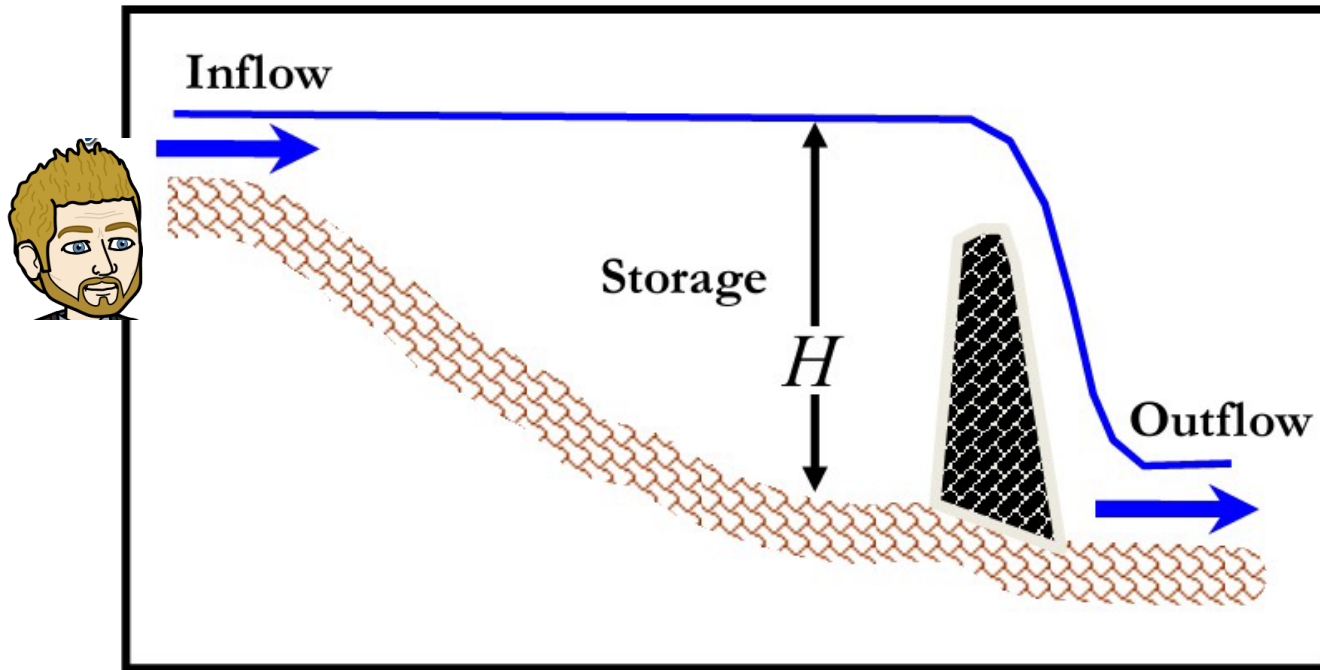


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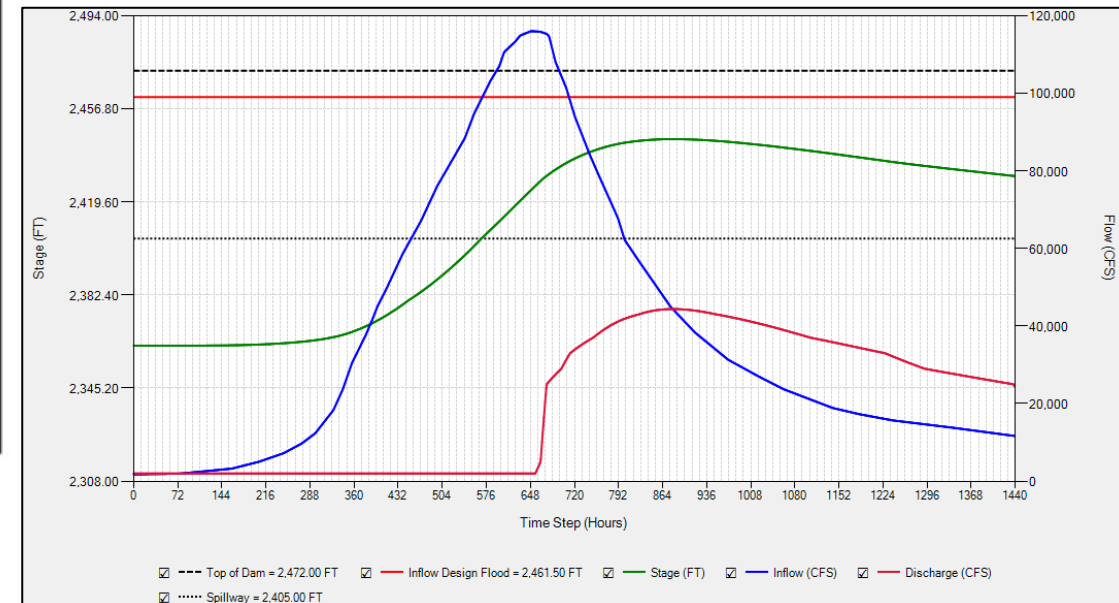
Reservoir Routing Model



Reservoir Routing



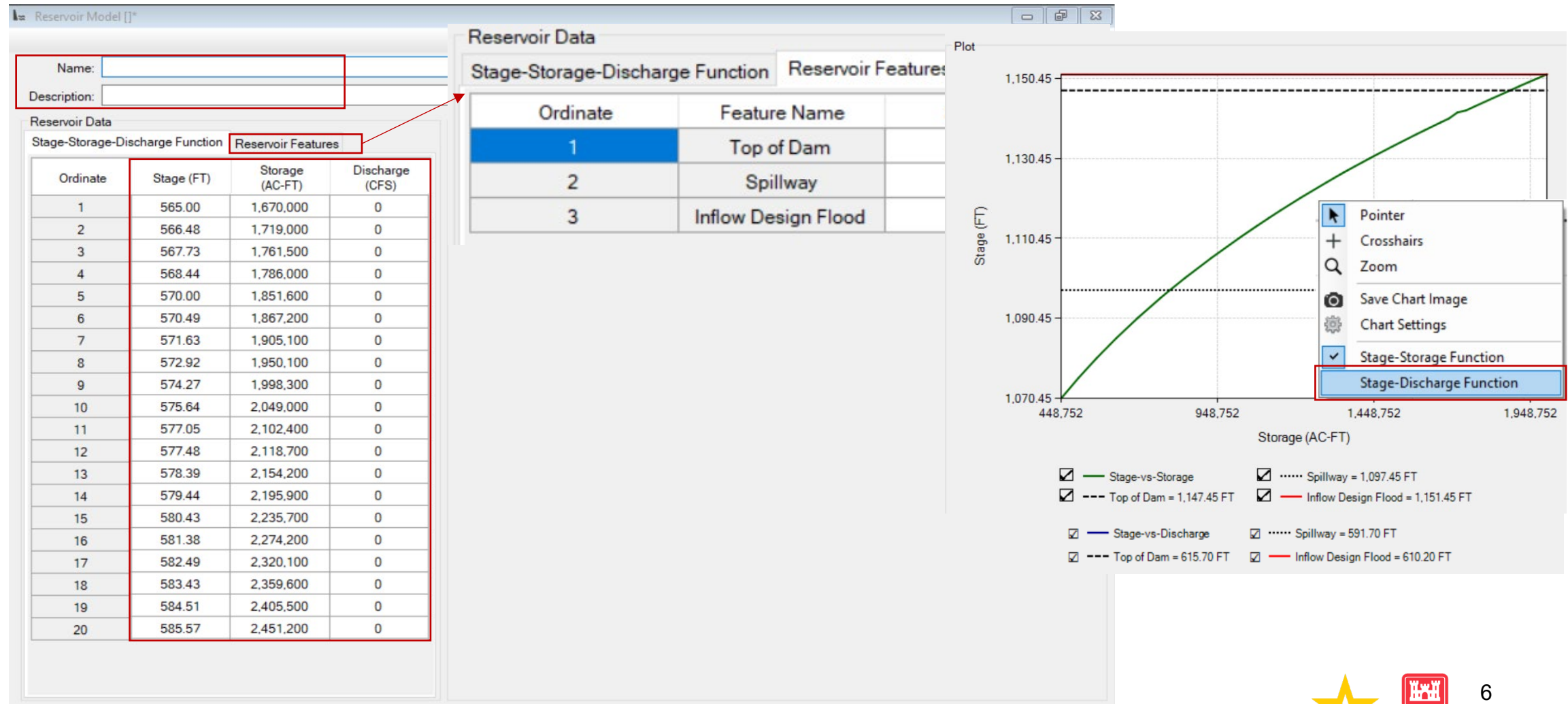
$$\frac{dS}{dt} = I - O$$



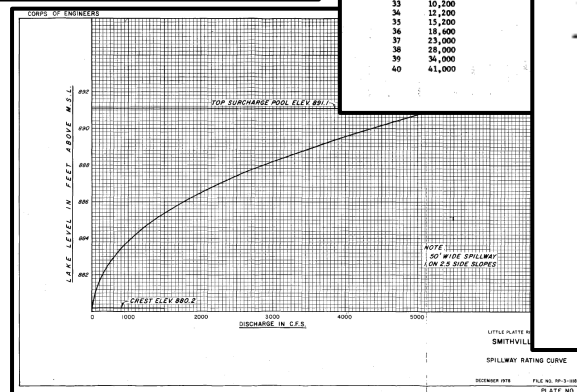
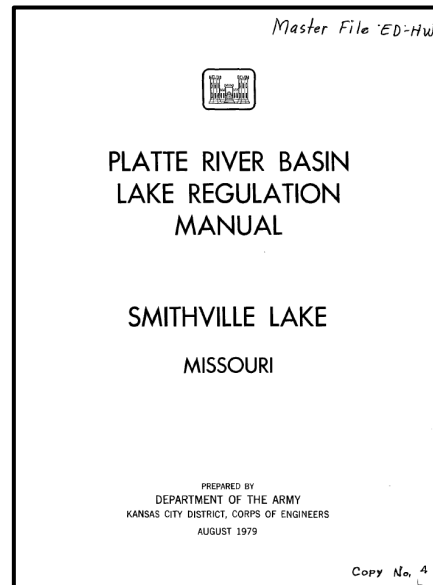
Simplified Routing

- RMC-RFA uses one stage-storage-discharge curve
- No complex operations
- Simplified approach
 - Extreme floods
 - Surcharge operations/max capacity
 - Calibrated to observed small to medium sized floods

Entering a Reservoir Model Into RMC-RFA



Developing Stage-Storage Curve



SECTION IX
FLOOD CONTROL REGULATION

Stream Station	Little Platte R. At Smithville	Platte R. Near Agency	Platte R. Near Camden Pt.	Missouri R. At Kansas City
Elev. ft.	780.40	807.38	807.38	715.79
Stage in Feet	11.5	66.9	Available (See Par. 9-14)	277.3

Stage in Feet	Discharge in c.f.s.
-2	6,300
-1	10,300
0	14,500
1	19,100
2	24,000
3	29,100
4	34,400
5	40,000
6	44,200
7	48,000
8	51,000
9	54,000
10	57,000
11	60,000
12	63,000
13	66,000
14	69,000
15	72,000
16	75,000
17	78,000
18	81,000
19	84,000
20	87,000
21	90,000
22	93,000
23	96,000
24	99,000
25	102,000
26	105,000
27	108,000
28	111,000
29	114,000
30	117,000
31	120,000
32	123,000
33	126,000
34	129,000
35	132,000
36	135,000
37	138,000
38	141,000
39	144,000
40	147,000

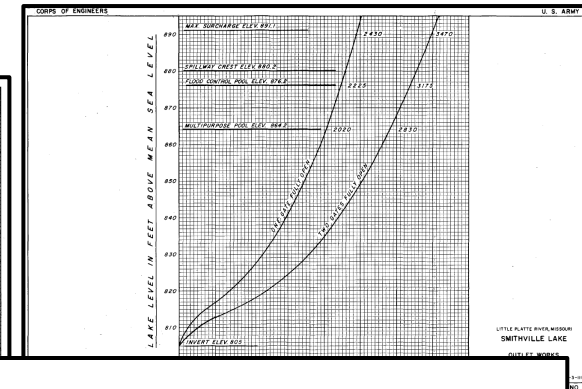
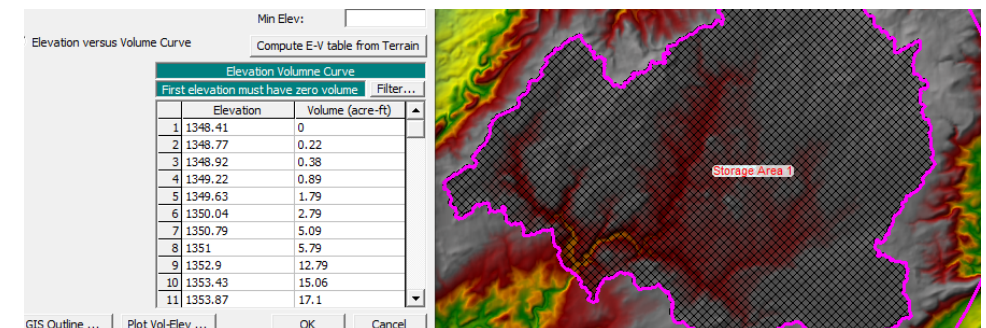
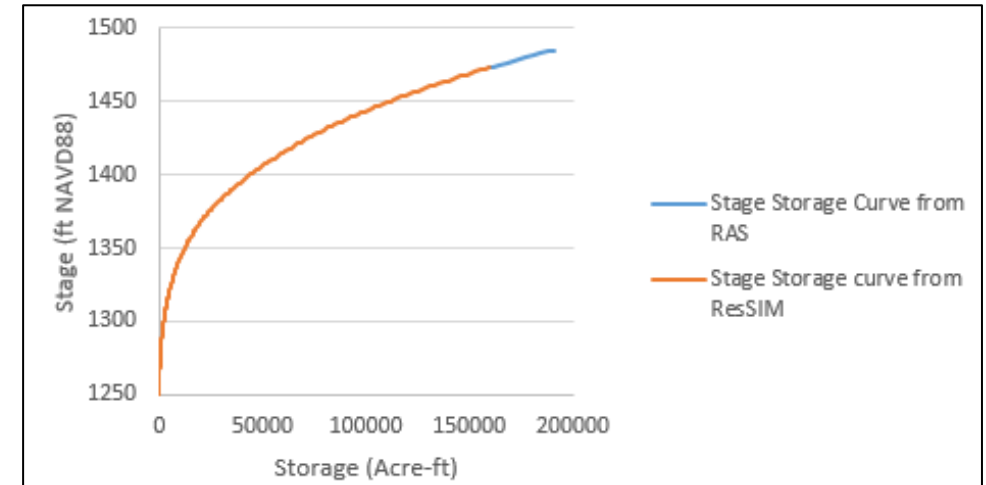
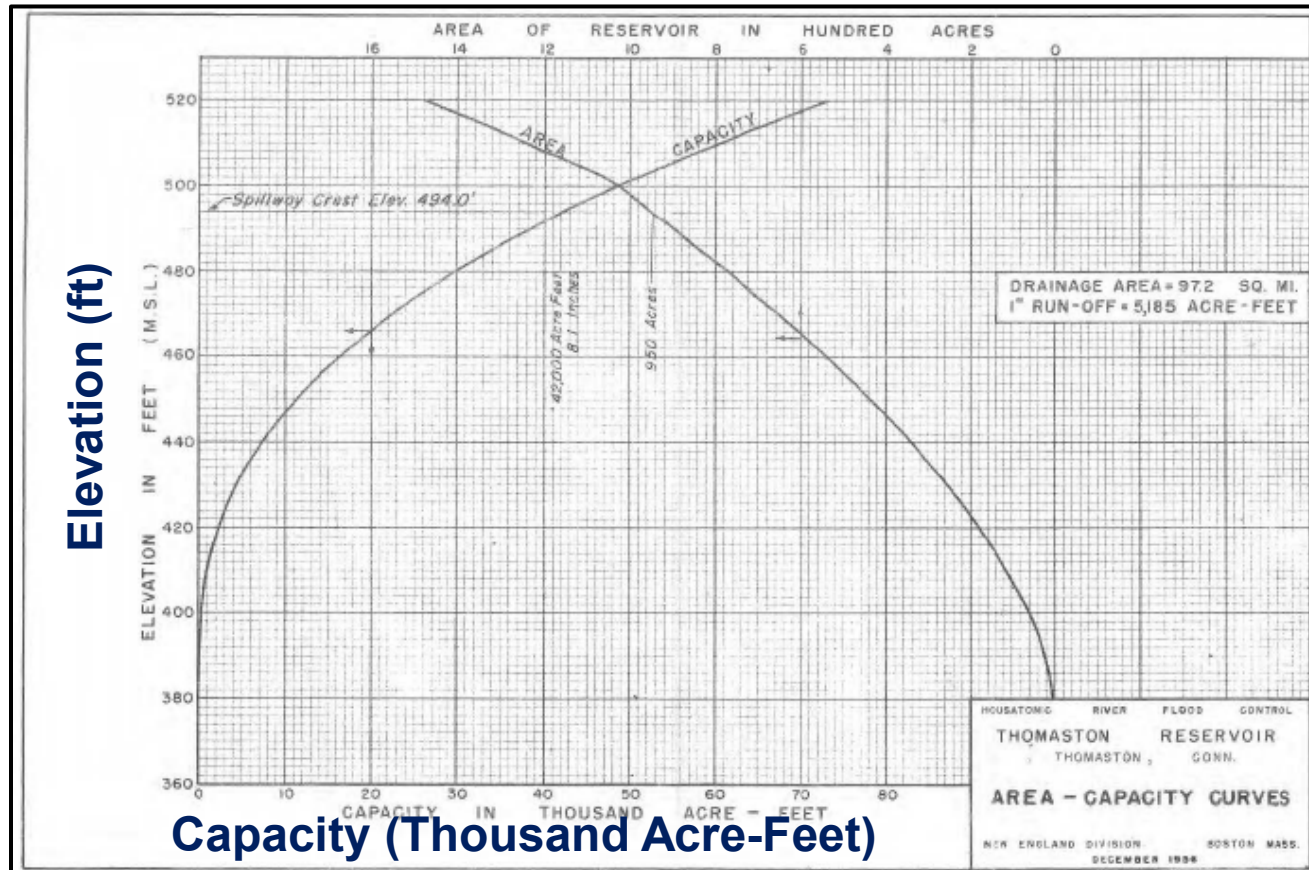


Table 8.--Permissible Changes in Outflow Rates

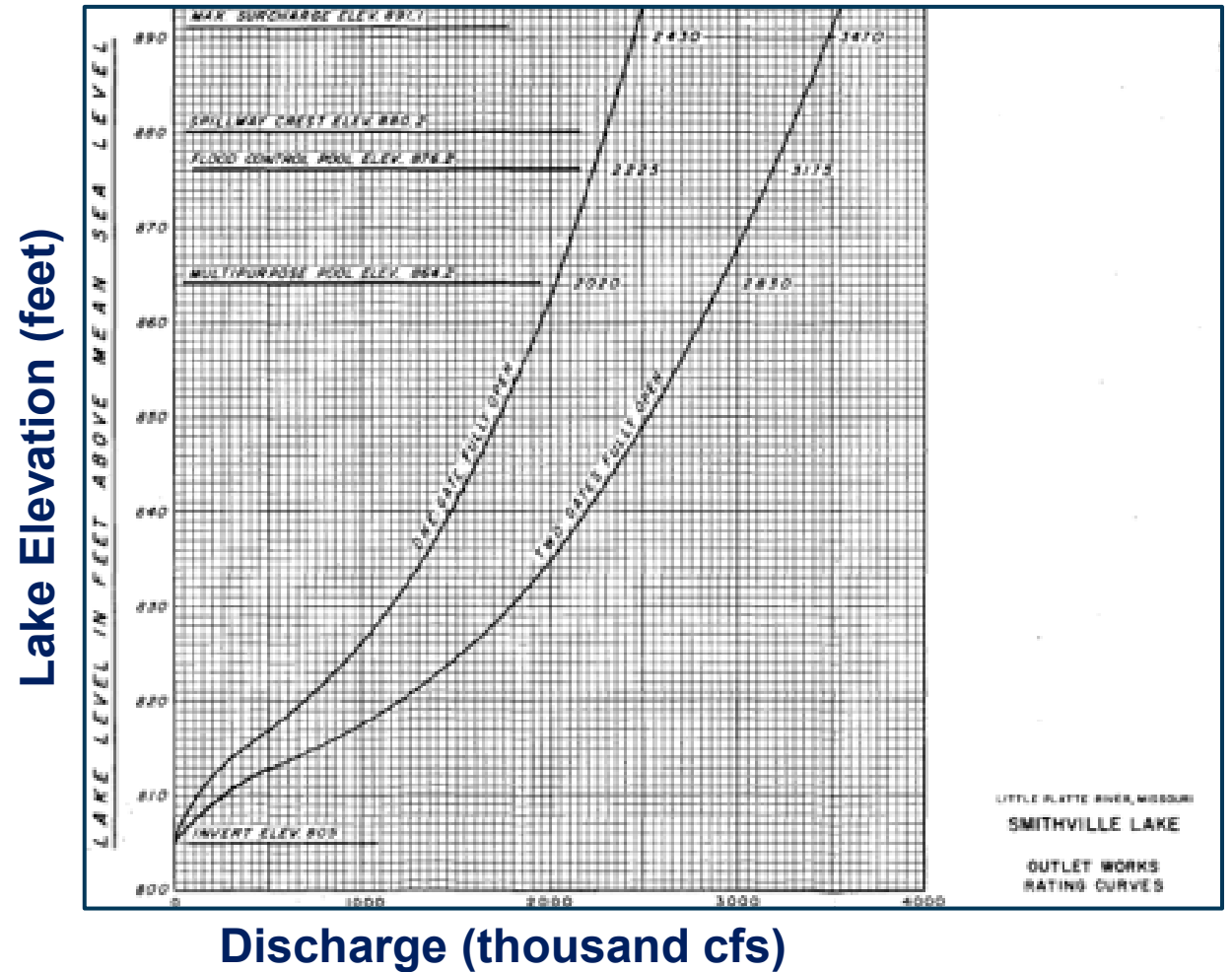
For Increasing Flows		For Decreasing Flows	
Total Flow (c.f.s.)	Hourly Increment (c.f.s.)	Total Flow (c.f.s.)	Hourly Increment (c.f.s.)
0	100	3,000	750
100	150	2,250	600
250	250	1,650	500
500	300	1,150	350
800	350	800	300
1,150	500	500	250
1,650	600	250	150
2,250	750	100	100
3,000	-	0	-

Extrapolating Stage-Storage



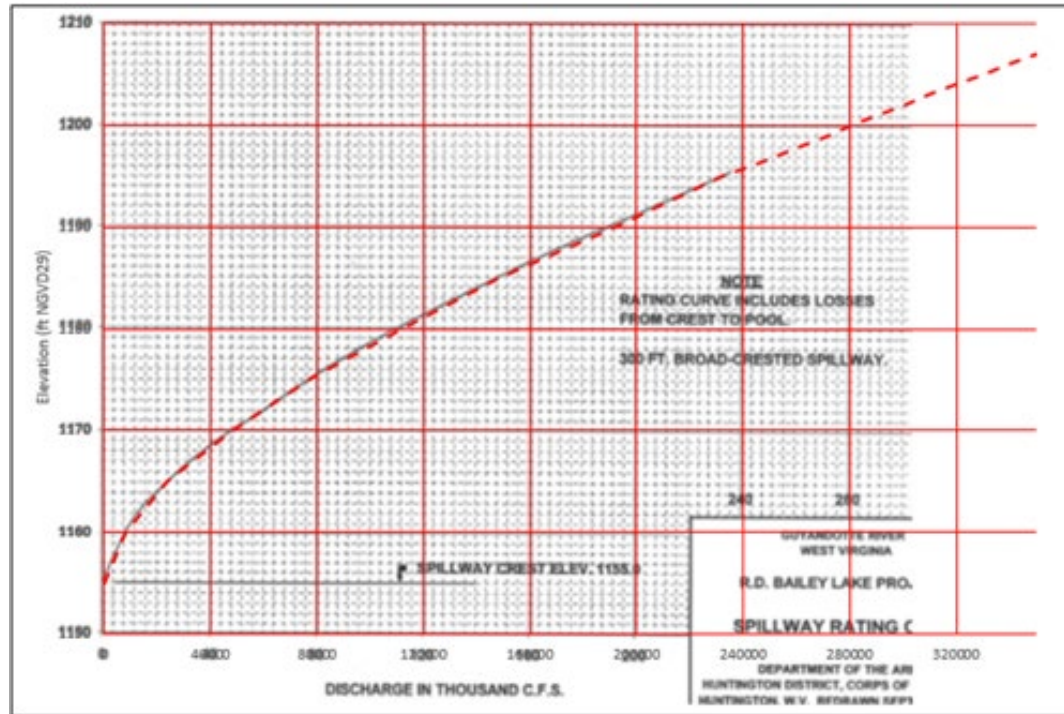
Developing Stage-Discharge Curve

- Rating curves document maximum outflows
- Based on anticipated operations
- Include regulating outlets, spillways and overtopping
- Check assumptions

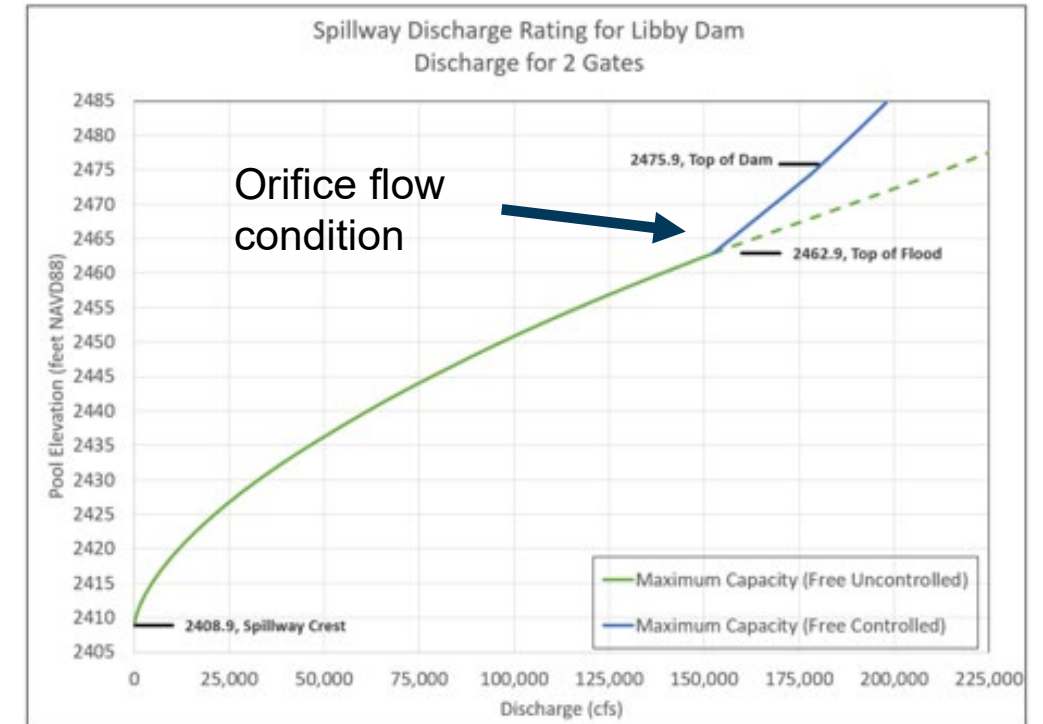


Extrapolating Stage-Discharge

Ungated spillway



Gated spillway

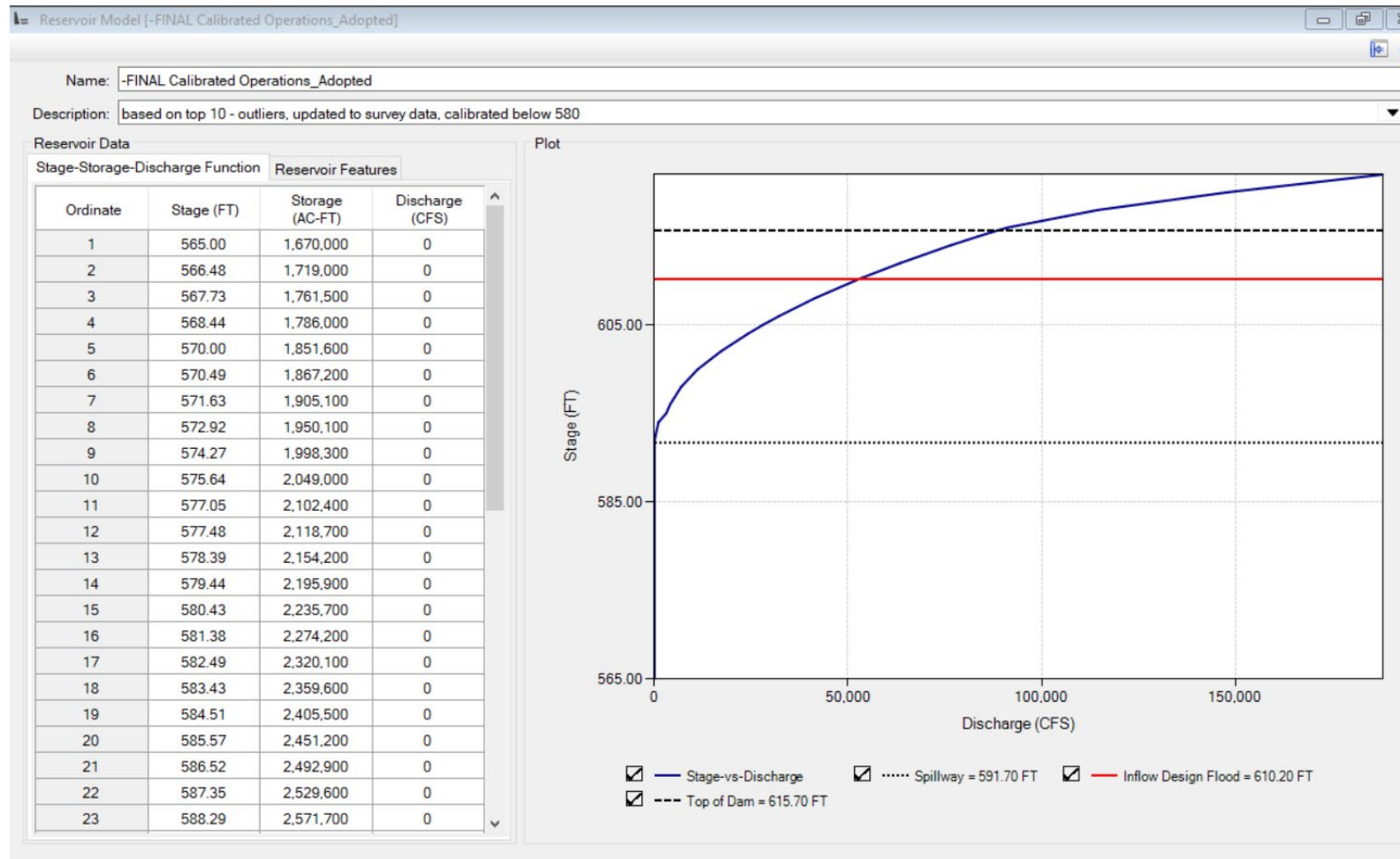


Overtopping Discharge Curve

Methods to compute OT discharge:

- Compute discharge using weir equation: $Q = CLH^{3/2}$
 - Q: Discharge in (cfs)
 - C: Discharge coefficient
 - L: Length of crest (feet)
 - H: Head on weir (feet)
- Compute discharge using a hydraulic model and survey crest information

Final Stage-Storage-Discharge



Inflow Volume-Based Stochastic Simulation Framework



? Questions

